Selected legal aspects of commercial remote-sensing

=====

Bilateral regulations and proprietary provisions

relative to LANDSAT, SPOT, MOS-1, ERS-1 and RADARSAT

Patrick A. Salin
(D.E.S. Droit, M.B.A.)

Institute of Air and Space Law
McGill University, Montreal, Canada

September 1991

Thesis presented to the Faculty of Graduate Studies and Research
in partial fulfilment for the obtention of the LL.M. degree

OUTLINE

PRELIMINARY REMARKS AND SUMMARIES

A. Acknowledgments

The author hereby acknowledges Mr. Leon Bronstein, Director, Canada Center for Remote-Sensing, Ottawa, for his support and advices, as well as for a very instructive visit of the Gatineau ground station.

He also wishes to thank Mr. Gabriel Lafferanderie, Legal Adviser, European Space Agency, Paris, for his penetrating views about remote-sensing and his long time experience in space law.

He finally wishes to thank Dr. Ram S. Jakhu, his research advisor at McGill University, for his always sound advices and patience.

B. Presentation note

1) All texts of reference have been analyzed as at July 1991.
2) Most verbs have been used in the present tense in order to actualize the analytical work.

C. Originality of this research

The interest of this research is that it actualizes most of the available published material on remote-sensing, particularly in its commercial dimension.

Particularly, Part III and certain segments of Part IV (i.e. IV.3) are newly published material. No substantial discussions or elaborated articles have been published in the vast majority of reputable legal periodicals in both English and French on the topics covered by these two parts during the period from 1985 to early 1991. As a practical consequence the author claims a total and sole responsibility for what is written in this document under Part III and Part IV.3 which leads to establishing a

> ***total and exclusive copyright on complete Part III and Part IV.3 of the present document under the terms of the Berne and Universal Copyright Conventions as revised in 1971***

notwithstanding a general copyright on the rest of the document under the principle of authorship attributable to all intellectual works under the above-mentioned conventions.

This excludes the appendix which contains a few documents for which copyrights already exist to the benefit of the operating agencies which are mentioned throughout this document.

D. Résumé

Ce mémoire analyse certains contrats régissant la relation entre les organismes propriétaires de satellites et les organismes chargés de la réception des données de télédetection transmises par ces satellites.

Il est organisé en trois parties étroitement intégrées partant d'une vision large pour se rétrécir sur des aspects très particuliers.

La première partie (II) sert à définir le cadre de la recherche et aide à comprendre comment se sont établies ces relations. C'est une partie descriptive qui montre l'importance des contexte nationaux.

La deuxième partie (III) est consacrée à l'étude des contracts proprement dits. Certains contrats sont très élaborés et témoignent du souci de créer entre les organismes concernes un véritable esprit d'équipe. Elle se penche d'abord sur l'étude de l'évolution des contrats relatifs à Landsat lorsque ce satellite était seul de son espèce dans le monde occidental (III.2). Puis elle étudie l'évolution qui s'est opérée avec les débuts de la commercialisation des données de ces satellites par un organisme privé et elle compare ces dispositions avec celles que les autres organisations ont élaborées à peu près à la même période (III.3). Enfin, cette deuxième partie étudie les dispositions particulières au système européen (III.4) et au système canadien (III.5).

La troisième partie (IV) est consacrée à une étude sommaire de l'étendue de l'application des conventions internationales de copyright et de droit d'auteur aux données de télédétection. Elle montre que la protection des données est très relative malgré la mention de toutes sortes d'avertissements et de mises en garde. Elle se penche d'abord sur une identification de la nature des droits de propriété concernés (IV.1), puis aux clauses des conventions qui pourraient s'appliquer aux données de télédétection (IV.2), et enfin à une étude comparative des clauses propres aux contrats précités relatives à la protection des données (IV.3).

En conclusion, cette recherche rappelle l'évolution des relations contractuelles relatives aux cinq organismes qui s'est déroulée en trois étapes distinctes. Elle évoque ensuite plusieurs autres aspects juridiques de la télédétection qui devraient prendre de l'importance dans les prochaines années, tels que la responsabilité des organismes propriétaires et distributeurs de données, les aspects constitutionnels de la liberté d'information et les libertés civiles et l'insertion de la télédétection commerciale dans un cadre institutionnel international approprié.

E. Abstract

This thesis analyses several contracts which regulate the relationship between organizations which own or operate remote-sensing satellites and the organizations which receive satellite transmitted data.

It is segmented into three parts which are closely interrelated, starting with a broad view and gradually focussing on specific issues.

The first part (II) is devoted to setting the frame of the research and supplying the reader with an explanation on how these relations have been set. This is a descriptive part which stresses the importance of the national environment.

The second part (III) deals with the study of the contracts. Those which are commercially oriented are very elaborated in order to create a team spirit with the local organization. It starts with a study of the evolution of the Landsat contracts when this satellite was alone of its kind in the Western world (III.2). Then it studies the impact on the contracts of the early commercialization process and compares the new contracts with those established by newly arrived and competing organizations in the market (III.3). Finally, it studies similar provisions set by the European system (III.4) and by the Canadian system (III.5)

The third part (IV) focuses on the impact of the copyright conventions on remote-sensing data protection. It shows that even though this protection is expressed by means of various warnings and "ad-hoc" clauses, this protection is still mostly formal. It starts with an identification of the type of property rights which is concerned (IV.1), then studies the clauses of the conventions which could be invoked by remote-sensing data operators (IV.2), and then compares the actual copyright clauses which appear in the contracts with one another (IV.3).

As a conclusion, this research recalls the three-phases evolution which has characterized the contracting process of bilateral remote-sensing relations. It also points out several legal issues which are likely to gain in importance in relation to remote-sensing, such as the liability of satellite data distributors, freedom of information and civil liberties issues, and finally the integration of commercial remote-sensing within an appropriate international framework.

I - INTRODUCTION

A. Purpose of the research

1. Little or nothing has been written as of early 1991 on specific legal aspects of commercial remote sensing. Most of the literature which can be found on remote-sensing is devoted to general principles as they have been expressed during the seventies. This domain has only recently - since the mid-eighties - erupted in the everyday life of the layman through media coverage of world events. It still appears to be rather esoteric to many people who persist in viewing in a dubious way the accomplishments of the few operating remote-sensing satellites which they consider to be more spectacular than meaningful in terms of everyday life.

2. From a Canadian perspective, no autonomous commercial venture has yet been launched in Canada in that field, the CCRS (Canadian Center for Remote-Sensing) having mostly been active in the dissemination of Landsat and SPOT imagery, like most other national remote-sensing centers around the world. This may also explain why most Canadian analysts, by not belonging to a country which has been, so far, an active player in that field, still convey a touch of scepticism as far as the viability of the commercial remote-sensing industry is concerned. This scepticism is contradicted by a mere observation of the remote-sensing industry which, at recent

count, listed more than 100 companies[1], and by the fact that the Canadian government has quite early demonstrated its interest in this technology, contracting out part of development programs and supporting private sector development[2].

3. Earth observation has been presented as "an inherently troublesome subject"[3]. It is true that specific difficulties arise because of the unavoidable confrontation between several sets of apparently totally self-opposed considerations:

- public and private roles;
- profit-making and humanitarian objectives;
- national security and commercial interests;
- domestic and international outlooks;
- etc.

Yet, those clashes are not specific to commercial remote-sensing. They are common to any human venture which is not restricted to a territory or group of people, and by definition which expands across cultural lines. But the fact

---

[1]. R.A. Ryerson - The Remote Sensing Industry in Canada: A Profile - EMR/CCRS - Presentation to the 12th Canadian Symposium on Remote Sensing, Vancouver BC, July 1989.

[2]. Diane Thompson - The Commercialization of Remote Sensing in Canada 1972-1990 - Paper presented at 23rd International Symposium on Remote Sensing of Environment - Bangkok, Thailand, 18-25 April 1990 - 15 pages.

[3]. McElroy John H. - The future of Earth observations in the USA - Space Policy - November 1987 - p. 313/325.

that the commercial remote-sensing story is at its beginnings certainly exacerbates those difficulties for which every nation state and group of organized human interests intends to play an active role.

4. As early as 1984, when the media had not yet put remote-sensing on the map of public interest, and parallel to the debate in the US about public funds involvement in supporting the various space programs, a prospective study ordered by the United Nations, together with a few others in 1985 and 1986, were already pointing out several trends in favour of continued developments for remote-sensing systems over the period 1985-2000[4]:

- The continuation of the French-made SPOT operational high-resolution imagery satellites with standard products;
- The transition from Landsat Multi Spectral Scanner and Thematic Mapper to high-resolution multiple spectral imaging and standard productions to a wide range of products.
- The increasing importance of stereo, as an option or as standard;
- The introduction of a wide range of Earth observation instruments (USA, Japan, Europe,...);

---

[4]. Voûte Caesar - Some consequences of the commercialization of satellite remote sensing - Space Policy - November 1987 - p. 307/312.

- The rapid development of marine observation satellites (USA, ESA, Canada, Japan);
- The increasing importance of microwave imaging for land and marine observations;
- The introduction of the concepts of selective data acquisition and programmable data acquisition to suit user requirements (with an impact in terms of copyright capacity);
- The introduction of scrambling techniques to limit access to authorized receiving stations;
- The introduction of copyright restrictions on the circulation of data.

It is to be noted here that out of the above observations, most have been confirmed during recent years, except the scrambling techniques which do not seem to have been put in practice so far.

5. In addition, the eighties have been characterized by the miniaturization of powerful computer equipment, so that it is now estimated that anybody can buy satellite photographs and enhance them with a computer. Satellite pictures are now accessible with adequate analysis tools for individual civilians while they were until recently still reserved for intelligence analysts (available software is supposed to enable anyone to process such data with an IBM-PC or AT,

provided that such computer has an important hard-disk storage capacity). This leads some market forecasters to predict that remote-sensing should become a thriving industry. It is "a very close cousin to the comsat industry: they both exploit space for information handling rather than the manufacture of orbital products, getting around the cost-per-pound drawback of current launch systems"[5].

B. Conceptual framework

1. Putting aside the standard public law approach of remote-sensing which has been mentioned earlier and on which an updated presentation of the various legal problems has been done recently[6], this research is focusing on the contractual aspects of a few commercial remote-sensing systems and of their operators which are already or which will soon be operational, namely: Landsat/EOSAT, SPOT-1-2/SPOT Image, MOS-1/NASDA, ERS-1/ESA and Radarsat/CSA/RSI.

2. These five systems have been selected because they are organized around the first commercially operated remote-sensing satellites. As at early 1991, Landsat-5, SPOT-1-2 and

---

[5]. Gump David P. - Space Enterprise beyond Nasa - Praeger - New York - 1990 - 220 pages - In particular, chapter 9: "Spotting Earthly Treasures with Orbital Cameras" p. 149/161.

[6]. Salin Patrick - Legal Impact of Remote Sensing - Unpublished Air and Space Law Writing Requirement - McGill University - Institute of Air and Space Law - April 1991 - 107 pages.

MOS-1 are operational and they have attained a worldwide reputation. ERS-1 and Radarsat are two systems which should be operational in a relatively short term (end of 1991 for ERS-1 and 1994 for Radarsat) and for which a whole array of regulating agreements have already been negotiated between concerned parties.

This research is articulated into three parts:

Part I: The development of commercial remote-sensing programs. The purpose of this part is to set the legal framework which stands in the background and within which each of the analyzed remote-sensing systems which have been researched in this thesis currently operate.

Part II: An analysis of the network of bilateral contractual ties between participating entities. Main features of these specific legal provisions will be exposed and compared to one another.

Part III: Proprietary aspects of commercial remote-sensing imagery. This part explores one of the most vital legal topics which may pave the way to a viable, i.e. profitable, commercial remote-sensing industry.

II - THE DEVELOPMENT OF COMMERCIAL REMOTE-SENSING PROGRAMS

II.1 - Commercial remote-sensing is a national activity which is neither totally public, nor totally private

A. Commercialization vs. privatization

Before penetrating into the intricacies of each of those systems, a comment should be made on the concept of *commercialization* which must be firmly distinguished from *privatization*. Quite obviously, there are links between these two terms, but they do not totally overlap one another. They fundamentally share in common the fact that they refer to private funding, by opposition to public funding. But they differ in terms of the nature of the control which is exerted by the shareholders. Commercialization refers to a partial or majority public control by means of public bodies, while privatization exclusively refers to private control of the activity by non-public bodies[7].

---

[7]. That seems to be what is meant in a letter dated April6, 1982 addressed by NASA to the Indian National Remote Sensing Agency at the time of the extension by mutual agreement of the MOU between the two public bodies and where NASA says "As you already know, the US has begun planning for an operational land remote sensing satellite system to follow the current NASA experimental program. Current plans call for the phased transfer from NASA to the NOAA of the Landsat-D and D' system with NOAA interim management until establishment of a private sector system authorized by the US government". See the complete text in the appendix.

B. Budget considerations

1. Actually, these two concepts refer to an evolution of space activities which were totally under public control and funding up to the late 1970s. The US space program came under mounting financial constraints so that partial private funding started to be considered as an option during the early 1980s, a trend which the concept of commercialization refers to. Privatization therefore represents the other end of the spectrum for control and funding, where those two vital elements of space activities would be under private hands for both control and responsibility, which will presumably never happen since it would be contrary to the spirit and to the terms of Outer Space treaties and conventions[8]. Undoubtedly, coming from a total control of space activities by States, "private commercial activities in space will be further developed and will play a still more important part in space undertakings"[9].

2. In addition to US public financial strains, the apparition of SPOT-1 with a dedicated commercializing company, SPOT Image, as the first Western satellite to be openly partially

---

[8]. 1. Bourély Michel - Les tendances actuelles du Droit de l'Espace - Revue Française de Droit Aérien - 1988 - 12/27.

2. Bourély Michel - Quelques réflexions sur la commercialisation des activités spatiales - Annales McGill IASL - 1986 - 171/184.

[9]. Qizhi He - Certain legal Aspects of Commercialization of Space Activities - Annals of Air and Space Law - 1990 - p. 333/340.

operated as a commercial entity activated the trend towards commercialization in the United States at a time when some observers even thought that the Landsat program could be dropped because of a lack of public funds.

II.2 - The Landsat commercial remote-sensing program

A. Overview of the Landsat set of regulations

A.1 - From science to commerce

1. The first commercial remote-sensing system to be operated was American, with the Landsat series, of which five satellites have been put in orbit since 1972[10]. This program was originally scheduled for scientific and research purposes under the responsibility of NASA, an agency of the US government endowed with an independent status, and enjoying a statutory dichotomy with the Department of Defense as established in section 102(b) of the National Aeronautics and Space Act of 1958[11]. NASA conducted this remote-sensing program with a wide autonomy, having been endowed with "unusual shares of authority not otherwise conferred upon

---

[10]. All dates of major events relating to the historical developments of remote sensing may be found in an historical recapitulation which appears in one of the annexes.

[11]. National Aeronautics and Space Act of 1958, Pub. L. No 85-568, 72 Stat. 426. Amended in 1985, 1986 and 1989.

agencies in the Executive Branch"[12]. NASA initiated in the middle 1970s a slow movement of disengagement from certain aspects of the remote-sensing program with the idea to transfer the commercial responsibilities to industry.

2. This commercialization trend was announced by President Carter in 1979 and transformed into a decision by President Reagan in 1983. The materialization of this decision was accomplished in 1984 through the Land Remote-Sensing Commercialization Act[13] (hereinafter identified as the Landsat Act and the full text of which appears in Annex 1) and the transfer of the system's technical responsibility from NASA to NOAA (National Oceanic and Atmospheric Administration). Bids were requested from the private sector and EOSAT - a consortium of RCA and Hughes Aircraft interests - eventually was the successful bidder and received the administrative control of the system from the Department of Commerce in September 1985.

A.2 - Purpose of the Landsat Act of 1984

1. The Landsat Act has been so far the most elaborate framework of national legislation ever enacted in the field of

---

[12]. Glazer J. Henry - The Expanded Use of Space Act Commercialization Through Advanced Joint Enterprises between Federal and Non-Federal Constituencies - Rutgers Computer & Technology Law Journal - 1987 - 339/405.

[13]. United States: Public Law 98-365 (H.R. 5155); July 17, 1984. Land Remote-Sensing Commercialization Act of 1984.

remote-sensing, and it is still so far the only one of its kind, even though historically the first legally binding text entirely devoted to remote-sensing was the Moscow Convention of 1978 signed by eight socialist countries[14]. Without performing an in-depth analysis of this Act, it is worth mentioning that it is divided into seven parts[15]. The complete document is reproduced in Annex 1. Fundamentally, the Landsat Act provides for the smooth transition of the control of the commercial aspect of the Landsat system from public to private hands, while maintaining the control of the US government (namely NOAA, under the Secretary of Commerce) over the destiny of the system for national security reasons as well as for information needs.

2. This legislation has been completed in its regulatory aspect by the National Oceanic Atmospheric Administration (NOAA) licensing rules adopted in July 1987[16]. These rules are

---

[14]. The Convention on the Transfer and Use of Data of Remote Sensing of the Earth from Outer Space (United Nations Document A/33/162, June 29, 1978). Usually named "the Moscow Convention of 1978". Signed by Cuba, Czechoslovakia, the German Democratic Republik, Hungary, Mongolia, Poland, Romania, and the U.S.S.R.

[15]. Land Remote-Sensing commercialization Act of 1984:
Title I: Declaration of findings, purposes and policies.
Title II: Operation and data marketing of Landsat system.
Title III: Provision of data continuity after the Landsat system.
Title IV: Licensing of private remote-sensing space systems.
Title V: research and development.
Title VI: General provisions.

[16]. Licensing of private remote-sensing space systems - National Oceanic Atmospheric Administration - 15 CFR Ch. IX (1-1-91 Edition) - Part 960 - p. 296/305 - 52 FR 25970, July 10, 1987.

reproduced in-extenso in Annex 6. Their purpose is to "establish the minimum practicable procedures and informational requirements to license and supervise the operation of a remote-sensing space system ... (which aim at) ... encouraging development of private sector-owned remote-sensing space systems and promotion of commercialization of land remote-sensing systems in the United States ...". Their objectives is to (i) preserve and promote the national security of the US, (ii) ensure that data from private operational remote-sensing space systems will be sold on a non-discriminatory basis, and (iii) fulfil the international obligations of the US.

B. Main features of this corpus of rules

B.1 - Definition of *commercial remote-sensing*

1 - The scope of remote-sensing activities appears to be wide, since the Act's first section identifies this activity as a "major benefit in managing the Earth's natural resources and in planning and conducting many other activities of economic importance". Such broad statement "seems to confirm congressional intent not to restrict remote-sensing commercial activity solely to environmental protection and land use, but also to enlarge this field to ... the movement of people and

goods"[17].

2 - No definition is given of the permissible resolution which would be acceptable for private use. This is of relative importance because nothing really distinguishes a *commercial* use from a *reconnaissance* or a *military* use of remote-sensing, except the picture resolution which is much finer for the latter one (an estimation of 1 meter resolution for US and Soviet military satellites against 10 meter for SPOT which is generally accepted as being the best available commercial remote-sensing satellite). This leaves the definition responsibility to the Department of Defense and allows us to say that commercial remote-sensing is *a contrario* what is not military or reconnaissance sensing.

B.2 - Types of remote-sensing data

1. The US rules identify four types of remote-sensing data and go slightly further than the three types identified by the United Nations Principles[18]. These four types are referred to

---

[17]. DeSaussure Hamilton - Remote Sensing Satellite Regulation by National and International Law - Rutgers Computer & Technology Law Journal - 1989 - p. 351/381.

[18]. See supra. Principle 1 states:

...
b) The term "primary data" means the raw data that are acquired by remote sensors borne by the space object and that are transmitted or delivered to the ground from space by telemetry in the form of electromagnetic signals, by photographic film, magnetic tape or any other means;
c) The term "processed data" means the products resulting from the processing of the primary data, needed to make such data usable;

as being:

- Basic (collected by the licensees and selected by the government for storage),
- Experimental (collected by the government for experimental programs),
- Unenhanced (unprocessed or minimally processed),
- or resulting from a value-added activity (any activity which substantially and irreversibly changes the information content of the unenhanced data).

This refinement of definition is important because it grants the value-adder proprietary rights on the enhanced information which has become personnalized through the value-adding process, except for national security reasons, as will be discussed further down.

B.3 - Registration and liability

1. The obligation to keep the UN Secretary General informed about national remote-sensing activities is an international obligation and is therefore part of US legislation, but it is not clear how private entities may participate in helping the US government fulfil this obligation, as well as it is not

---

d) The term "analyzed information" means the information resulting from the interpretation of processed data, inputs of data and knowledge from other sources;

clear how the content of enhanced data may be disclosed in order to abide with Principle XII of the 1986 UN Declaration[19].

2. The registration responsibility is vested by the US rules on the operator of the system and not on the launcher[20]. The generating factor which creates this responsibility towards US laws is the fact that the operator, whether a US (corporate or private) citizen or not, has substantial connections with or derives substantial benefits from the United States or United States law. If there are two or more launching states participating in the launching of a remote-sensing satellite, the Registration Convention of 1976 provides that there must be an agreement between the parties in order to determine which of them will officially be considered as the launching state for purposes of registration. But if the satellite has *substantial connections* with the United States, then its operator remains subject to U.S. laws. One may thus find situations where operators could be liable under two different sets of rules: one promulgated by the launching state and one promulgated by the registration states which may be different.

---

[19]. Excerpts from U.N. 1986 Declaration, Principle XII:
"... The sensed State shall also have access to the available analyzed information concerning the territory under its jurisdiction in the possession of any State participating in remote sensing activities on the same basis and terms ..."
Please see full text of the Declaration in Annex 2.

[20]. 15 C.F.R. § 960.12(d)(1).

This opens the way to possible extraterritorial applications of US law when a foreign-based operator manages a remote-sensing satellite which has *substantial connections* with the United States. Such operator must then be licensed by the Secretary of Commerce whose authority is expressly recognized by the Commercial Space Launch Act of 1986.

3. International liability relating to a commercial remote-sensing satellite directly belongs to the launching State. However, as it has been explained in the previous paragraph, both the U.S. and a foreign state could be concerned in the case of a foreign satellite having *substantial connections* with the U.S. Damages should then be split between the two States.

II.3 - The SPOT commercial remote-sensing program

A. Overview of the SPOT set of regulations

A.1 - Absence of public regulation

1. The particularity of the SPOT system is that there is no specific law which regulates remote-sensing in France. Fundamentally, two sides of the operations have been distinguished: the first one is exploitation, which is under the responsibility of the French equivalent of NASA, Centre National d'Etudes Spatiales (CNES), and the second one is data

distribution which is under the responsibility of SPOT Image, a private company in which CNES holds an important share. One can say that such a system is firmly under the control of CNES, itself under the responsibility of the French Ministry of Industry, Research and Technology. But differently from its US equivalent, there is no legislative text of general scope which organizes the commercialization of remotely sensed data in France[21].

2. The relationship between CNES and SPOT Image is organized around two agreements. The first agreement grants SPOT Image the power to negotiate and sign contracts with ground stations around the world. The second agreement awards SPOT Image with an exclusive distribution right to pass any contract with distributors and users around the world[22]. Lack of access to these two agreements unfortunately does not allow us to comment upon their content.

A.2 - An effort at both levels, national and european

There is an apparent duplication of effort in remote-sensing at a national and at a European regional level (ESA). It was in 1976 with the preparation of the next five year plan

---

[21]. Bourély Michel - Space Commercialization and the law - Space Policy - May 1988 - p. 131/142.

[22]. See supra Le Gall.

covering 1977-1982 that CNES made the proposal of an earth observation satellite, capping a six years study program devoted to earth observation techniques. The program was designed to give CNES the capacity to develop a national project in order to help France maintain its position within european space programs[23], and possibly to have the European Space Agency (ESA) foster part of the project within the internationalisation of the program[24]. At that time, ESA was supporting a similar project based on the radar technology, while CNES was more in favour of a classical type of sensor. For various reasons, ESA refused to support the French project. Only Sweden showed an interest. The French government gave its OK in February 1978 and Sweden officially signed its participation agreement in October 1978, with Belgium in 1979. SPOT-1 was launched in February 1986 and started being operational in May 1986, while SPOT-2 was launched in October 1989 and became operational in January 1990. SPOT-3 and 4 are scheduled for the mid-1990s and SPOT-5 around 2000. SPOT-1-2-3 are identical in design, the only difference being that SPOT-2

---

[23]. Le Gall Antoinette - La France et la télédétection par satellite des ressources de la Terre: Le système Spot - Thèse de maîtrise - Institut de Droit Aérien et Spatial - Université McGill - Montréal - 1986 - 270 pages.

[24]. Annex IV, Article 1 of the European Space Agency Convention: "The principal objective of the internationalisation of national programmes shall be that each Member State shall make available for participation by other Member States, within the framework of the Agency, any new civil space project which it intends to undertake, either alone or in collaboration with another member State".

and 3 are equipped with French-made sensors. Increased performance will only appear with improved on-board instruments SPOT-4 and 5[25].

Following apparent funding difficulties that the US space program was encountering in the mid-eighties, there were rumors that US and French remote-sensing interests were exchanging views about possible cooperation. On January 24, 1989, CNES issued a press release confirming these discussions and designating SPOT Image as the commercial operator of the future system. The discussions were apparently aiming at "opening new perspectives for the continuity of both the Landsat and SPOT programs after Landsat 6 and SPOT 4" which should be launched in the mid-nineties[26]. Such discussions

---

[25]. Air & Cosmos No 1223 - Feb. 4, 1989.
Satellites de télédétection Spot et Landsat. The Spot serie is contemporary to Landsat-4 and 5 which have been respectively launched in July 1982 and March 1984, having both a 2-4 years lifespan. The successor, Landsat 6 is planned for 1991-92.
Spot 1-2-3 were also originally designed with a 3 year lifespan, eventhough Spot-1 substantially outlived original plans.

[26]. Press Information - Spot Newsletter - June 1989 - p. 13.
"The French CNES and US NOAA have started exploratory discussions on the possibility of cooperation, on an equal partnership basis, in the development of a commercial civil land remote sensing satellite programme. Such a cooperation is one option CNES and NOAA have been considering. One of its objectives is to limit government expenditure necessary in the years ahead to ensure the continuation of the Spot and Landsat civil remote sensing programmes, through the establishment of a single space system. This cooperation aims at encouraging the commercialization of remote sensing activities, based on efficient utilisation of comparable and complementary technology acquired through the current Spot and Landsat programmes and on the operational experience gained over several years operation. CNES and NOAA have created a Joint Working Group to investigate the feasibility, expense and development schedule

have, however, not yet led to any publicized achievement.

B. SPOT Image

B.1 - A private corporation with controlling public interest

SPOT Image is a corporation with limited responsibility and has been created in 1981 for a duration of 99 years. Among its founding shareholders, other than CNES, it had other government agencies, such as Institut Géographique National (10%), the equivalent of the US Geological Survey, and Bureau de Recherches Géologiques et Minières (10%), which are both primarily interested in Earth observations. The remaining part of the capital (30%) was shared between private bodies such as Matra, an French aerospace conglomerate, French banks and a few foreign shareholders (Swedish and Belgian). Since that time, Matra has considerably increased its position. As at December 1990, the split between the various shareholders was the following: CNES (34,5%), Matra Espace (23%), IGN (11,3%),

---

study of a high performance satellite system that would ensure the continuous delivery of remote sensing data, provide improved products and services to the user community and thus boost the commercialization of remote sensing products. This cooperative programme would adhere to the norm of non-discriminatory access to data. The result of the current discussions will, in the course of this year, be put before the French and US Governments for a decision on their commitments to this cooperation. In parallel with these discussions, CNES will consult its partners in France and in Europe, in order to define their possible involvement, through CNES, in this programme".

SEP (11,3%) a company involved in the manufacturing of rocket boosters, Swedish, Belgian and Italian shareholders (11,5%), and French banks (8,5%)[27]. One can say that through the shares of CNES, IGN, and partly the banks, SPOT is controlled about equally by public and private bodies. On the other end, SPOT Image S.A. has two affiliated companies, SPOT Image Corporation (SICORP), a US corporation based near Washington, and SPOT Imaging Services, an Australian company based in Sidney which has been created in 1987 after the signing of an agreement with the Australian centre of Remote-Sensing (ACRES) to be a distributor of SPOT imagery in Australia.

The statutes of the corporation provide that no transfer of shares may be performed without being approved by the board of administrators[28].

Due to the particular aspect of SPOT activities and to the strategic interest it may represent for the French government, SPOT's statutes also provide for the buy-back of the shares hold by a shareholder whose control would change and represent

---

[27]. Spot Newsletter - December 1990 - La Société Italienne Telespazio entre dans le capital de Spot Image - December 1990 - p.5.

[28]. Article 10 of the statutes of Spot Image:
... la cession à un tiers à quelque titre que ce soit et sous quelque forme que ce soit, doit pour devenir définitive, être agréée par le Conseil d'Administration statuant à la majorité des administrateurs ayant le droit de participer au vote". Cited in Le Gall, see supra.

a menace for SPOT Image. This buy-back procedure or forced sale would be imposed by the Board of Administrators to such shareholder[29]. The legality of such a clause can hardly be discussed, at least under French law, since the Civil Code in its article 1832 expressly allows a disposition of this nature[30].

Finally, SPOT Image is subject to government financial control, since it is a corporation where public interests held separately or together more than 50% of the capital[31].

It has been reported that the legal status of SPOT Image was inspired by the status of Arianespace, adopted in 1980, with

---

[29]. Article 10B, alinea 1 of Spot's statutes:
"Afin de préserver l'indépendance de la société et l'intérêt de l'entreprise sociale, il est convenu expressément que les actions détenues par une autre société peuvent faire l'objet d'une cession forcée décidée par le Conseil d'Administration lorsque le contrôle de la société actionnaire vient à changer de mains par quelques procédés juridiques et pour quelques raisons que ce soient, dans la mesure où le changement de contrôle est susceptible de nuire à la poursuite de l'activité de la société". Cited in Le Gall, see supra.

[30]. Article 1832 of the French Code Civil establishes the reasoning on "la nature contractuelle de la société et la liberté des associés d'insérer dans ce contrat toutes les dispositions qu'ils jugent nécessaires à la protection de la société qu'ils créent sous la seule réserve de ne violer aucune règle d'ordre public". Cited in Le Gall, see supra.

[31]. Décret No 55-733, 26 may 1955, Article 3, alinéa 3: organizing the financial control of national entreprises "qu'elles aient ou non le caractère d'établissements publics ayant pour objet principal une activité commerciale, industrielle ou agricole, ou les sociétés dans lesquelles l'Etat détient plus de 50% du capital, détiennent ensemble ou séparément plus de 50% du capital.

the idea to build a "well suited structure ... offering large management flexibility, a rapid decision-making process, efficiency and dynamism", conditions which would not have been possible to meet, had control totally been concentrated within a public body[32].

B.2 - An exclusive and broad mandate of activity

SPOT Image has a broad mandate which encompasses the dissemination of data, as well as educating and consulting in relation to remote-sensing. It is exclusively endowed with all powers to conduct the operations which are justified by its mandate[33]. Particularly, training courses are organized by "Groupement pour le Développement de la Télédétection Aérospatiale (GTDA)" in Toulouse which offers introduction classes in remote-sensing, applications on the SPOT system, advanced training in remote-sensing and customized courses for specific training needs.

---

[32]. Chappez J. - Arianespace: première société commerciale de transport spatial - Journal du droit international - 1983 p. 695/727 (Cited in Le Gall, see supra).

[33]. Article 3 of Spot Image statutes reads as follows: "La société a pour objet toutes opérations techniques, industrielles et commerciales liées à la promotion, la distribution et la vente des produits, issus des données fournies par le satellite Spot, par ses successeurs éventuels et par tout autre satellite de télédétection de la surface terrestre ainsi que tous les services d'études, de conseil, de formation et d'élaboration de produits spécifiques liés à ces données et à leur utilisation. A cet effet, la société pourra accomplir toutes les opérations industrielles, commerciales, financières, mobilières et immobilières se rattachant directement ou indirectement à son objet ou à tout autre objet similaire ou connexe". (Cited in Le Gall, see supra).

SPOT Image is also credited with the intention to develop the value-added market, notwithstanding the presence of a substantial segment of private value-added companies.

In the consulting field, SPOT Image works in association with Scot Conseil. Also based in Toulouse, Scot Conseil has been set up in 1987 as a 100% CNES subsidiary. Its fields of activity are "to provide services including engineering consultancy, advice and technical support, in connection with systems devoted to satellite-based Earth observation, ... project coordination in the promotion of remote-sensing and ... making this technology better known among major international organizations"[34].

II.4 - The MOS commercial remote-sensing program

A. Overview of Japanese remote-sensing

Japan has been an aerospace power for a long time, challenging the western countries with sophisticated aerial means since the beginning of the aerospace adventure. In the field of aerial observation Japan has been present since the beginning of the century[35]. The first Japanese space endeavour goes back to 1955 with the launch of its first rocket. Its first satellite by the name of Osumi was launched in 1970, and in

---

[34]. Scot Conseil - Spot Newsletter - June 1990 - p. 21.

[35]. Please refer to the historical revew in appendix.

launched its first rocket powered by a liquid oxygen/liquid hydrogen engine[36]. In November 1986 was established the Remote-Sensing Promotion Council (RSPC) "to advance research, development and utilization of remote-sensing". This was done under the responsibility of the Science and Technology Agency "which promotes and coordinates remote-sensing activities in Japan"[37]. However, RSPC does not seem to have been formally active, another agency by the name of RESTEC having performed most of RSPC's functions.

Five domains of activity have been identified:

- future applications of remote-sensing;
- development programs for satellites to succeed the European ERS-1;
- development programs for various sensors;
- development programs for transmission and processing technology for data from earth observation satellites;
- international cooperation.

In other words, Japan gave itself a full fledged development program in the field of remote-sensing, within a long-term

---

[36]. Space Development in Japan - Present Status: Earth Observation - Science & Technology in Japan - August/September 1988 - p. 12.

[37]. Establishment of the Remote Sensing Promotion Council - Science & Technology in Japan - April/June 1987 - p. 41.

development plan.

B. The MOS remote-sensing program

B.1 - A scientific program

On February 19, 1987, the first Japanese Marine Observation Satellite was lifted into orbit from NASDA's Tanegashima Space Center with orbit features similar to those of landsat and SPOT. Right from the first test, excellent quality images were retransmitted from the multi-spectrum electronic self-scanning radiometer (MESSR) carried on MOS-1. Reports mention that it was a Japanese original technology. General distribution of data by NASDA was scheduled to start in the autumn of 1987[38]. However, it was not until summer 1988 that MOS-1 became fully operational. Its mission was to observe land surfaces as well as the colours and temperatures of oceans in order to monitor marine pollution, fishing grounds and forests and farm products[39].

MOS-1b, the successor of MOS-1, started to be developped in 1988 with expected launch in winter 1991. With identical capabilities, it is also aimed at establishing a common

---

[38]. Succesful launch of the First Marine Observation Satellite (MOS-1) - Science & Technology in Japan - April/June 1987 - p. 43.

[39]. Space Development in Japan - Present Status: Earth Observation - Science & Technology in Japan - August/September 1988 - p. 12.

technology to Earth observation satellites[40]. It was expected that MOS-1b would work in conjunction with MOS-1 for some time, pending MOS-1 retirement. MOS-1b was said to be the first satellite to be placed in a sun-synchronous orbit. Its data were deemed to "be made available for a wide range of users both in Japan and abroad, as are the data furnished by MOS-1"[41].

At time of launch, an earth observation satellite was on the drawing boards. The mission of such satellite was to explore resources and to carry out land, agricultural, forestry and fishery surveys. It should be equipped with a synthetic aperture radar (SAR) like ESA's ERS-1 and Canada's Radarsat, optical sensors (OPSs), a mission data transmitter (MDT) and a mission data recorder (MDR) like SPOT[42]. The observation system of this satellite will have a great importance and is developed by the Ministry of International Trade and Industry (MITI). It is to be "a microwave active sensor which can operate regardless of weather conditions and at night time, while enabling high-resolution two dimensional imaging not only of Earth's surface but also to a shallow depth beneath

---

[40]. Satellites under Development - NASDA: MOS-1b - Science & Technology in Japan - August/September 1988 - p. 24.

[41]. NASDA Proceeds with Development of MOS-1b - Science & Technology in Japan - November 1988 - p.46.

[42]. Earth Resources Satellite-1 (ERS-1) - Science & Technology in Japan - August 1987 - p. 40.

the surface"[43]. JERS-1 is scheduled to be launched in early 1992. This satellite has a two-year life time and is planned to orbit at 570 km. Its data will be dumped to ground stations located in the polar region, with NASA, ESA and CCRS in return for direct data reception by those three agencies. The SAR technique has been validated during the SEASAT experience which ceased soon after launch in 1978. The three SAR satellite planned by Japan, Europe and Canada are deemed to extend this experience[44].

B.2 - Japan to rapidly become a major remote-sensing power

It should also be added that NASDA operates a satellite Tracking and Control System composed of two satellites. One is USFB(F)-1 which tracks satellites in low-earth orbit, and the other is USB(F)-2 which tracks satellites in geostationary orbit[45].

Japan also has an Advanced Earth Observation Satellite (ADEOS) program, the purpose of which is "to maintain and develop remote-sensing technology, to develop technology necessary for platform-type satellites, also to develop technology for

---

[43]. Sensors for Earth Resources satellite - Science & Technology in Japan - August/September 1988 - p. 29.

[44]. US to Cooperate in Monitoring of Japan's ERS-1 - Science & Technology in Japan - June 1988 - p. 55.

[45]. Improvement of NASDA Satellite Tracking and Control System - Science & technology in Japan - August 1987 - p. 41.

relaying data such as Earth observation data, and to ensure the progress of international cooperation in that field". It is an international cooperation project which includes the US and Europe. This program is scheduled for launch into polar orbit originally in 1993[46], but most probably delayed until 1995.

Finally, Japan is a full member party to the Space Station agreement of December 1988, supplying an important part of the whole space structure.

Japan stands as a full size member of the group of active space powers. However, it feels it is still suffering from insufficient budgetary means as compared to main competitors. Also an issue which is not discussed here is the fuzzy distinction in the Japanese space development program, according to US views, between commercial applications and research and development which may already add to US/Japan trade friction[47].

II.5 - The ERS commercial remote-sensing program

A. Overview of ESA structure

---

[46]. Satellites under Development - NASDA: ADEOS - Science & Technology in Japan - August/September 1988 - p. 25/26.

[47]. Space Development Systems and Japan's Space-related Budget - Science & Technology in Japan - February 1991, p. 8/11.

A.1 - An optional multi-government program

1. The European Space Agency (ESA) was established by a Convention signed by 11 European States in 1975[48]. Membership has grown since that time to thirteen members and roughly represents the present European Economic Community. Canada has signed a Cooperation Agreement with ESA and participates to certain programs.

ESA is fundamentally a research and development agency and coordinates the space programs of its member States into its own programs[49]. ESA fosters programs for which participation of member States is either mandatory (part of the ESA budget) or optional (for which States are free to contribute financially and up to the amount of their choice)[50]. An example of an optional program may be found with the strong

---

[48]. Convention for the establishment of a European Space Agency. Signed on 30 May 1975 and entered into force on 30 October 1980. Original participating member States were: Germany, Belgium, Spain, France, Italy, United Kingdom, Sweden, Switzerland, Norway, Denmark, Netherlands. Austria and Norway were accepted as members by the Council in December 1986. Canada was later admitted with a special status.

[49]. Article II of the ESA Convention: "The purpose of the Agency shall be to provide for and to promote for exclusively peaceful purposes, cooperation among European States in space research and technology and their space applications, with a view to their being used for scientific purposes and for operational space applications systems."

[50]. Article V-1 of the ESA Convention: "The activities of the Agency shall include mandatory activities, in which all Members States participate, and optional activities, in which all Member States participate apart from those that formally declare themselves not interested in participating therein".

support given by Germany to the European participation into the Spacelab program, while France gave a strong support to the development of a European launcher. The development of a radar satellite such as ERS-1 was an optional program.

Optional programs are programs specific to the Agency itself and are implemented through a three steps procedure[51]:

- a Resolution of the Council by which the Board agrees that the planned program will be implemented;

- a Declaration which is subscribed by those of ESA members which are willing to participate and vote the budget of the specific program;

- and Implementing rules which are adopted by the same participants.

2. The ERS-1 optional program started with a Resolution taken at a ministerial level Agency Council meeting in February 1977 placing emphasis in a preparatory remote-sensing program. This was followed by a Council Resolution in October 1981 for the

---

[51]. Bourély Michel - Legal Problems Posed by the Commercialization of Data Collected by the European Remote Sensing Satellite ERS-1 - Journal of Space Law - 1988 - p. 129/146.

implementation of the ERS-1 program[52]. The Declaration relative to this program was made in March 1982 and complemented by Implementing Rules in July 1983 and amended in October 1983. In stating their objectives, both texts specifically mention the will to place Europe in the management of Earth's resources by using a remote-sensing capacity[53]. The eleven original Agency members participated to the program, with shares varying from 24% (Germany) down to 1,70% (Denmark) while Canada, although not a member of the Agency (Canada has signed a cooperation agreement with ESA), agreed to participate in April 1982 with a 9,10% share of the preparatory program budget. Actually, Canada has a 6.1% share in the development program, amounting to about 900,000 US$. Various decision-making resolutions were subsequently adopted

---

[52]. This Resolution recalls that "it is important to have a continuing earth observation satellite programme (EOP) which opens opportunities for scientific, experimental and preoperational satellite programmes in such fields as oceanography, land observation, meteorology, climatology and physics of the soiid earth". Resolution concerning a European Remote Sensing Satellite Programme. ESA/C/L/res. 5 (Final) 30/10/1981.

[53]. Declaration on the European Sensing Satellite Programme. Drawn up 24/03/82, updated 16/06/82, amended 19/07/83. ESA/PB-RS/XVIII/Dec. 1 (Final). Annex A of the Declaration states the programme objectives: "The main objective of the European remote-sensing satellite programme covered by this Declaration is to endow Europe with a capacity to take part in both the management of the planet's resources and the monitoring of its environment. The programme should make it possible for the short-term and long-term cost-effectiveness of the remote-sensing technique to be established while at the same time contributing to a better knowledge of the terrestrial environment. The programme will aim to establish, develop and exploit coastal, ocean and ice applications of remote sensing data".

following the phases of the program, all approved at a ministerial meeting in November 1987. While affirming their will to realize a fair balance between infrastructure programs and utilization programs, the government officials considered that the efforts of their respective countries through the Agency were "a source of new possibilities for the private sector which should be encouraged to use the available potential, to participate in investments and assume responsibilities for the operation of such systems"[54].

A.2 - Environmental research and development

Launched from Kourou, French Guyana, on top of an Ariane rocket at the end of July 1991, after several delays for technical and meteorological reasons, the ERS-1 was originally meant to be the third generation of remote-sensing satellites of the Western World, after Landsat and SPOT. It is a multi-disciplinary mission satellite with environmental objectives such as the monitoring of the greenhouse effect, coastal processes and surface pollution and disaster assessment. It also aims at contributing to operational forecasting and derived applications in the geophysics of oceans and of ice. It should also contribute to earth resources management and to the understanding of the solid Earth. Finally, ERS-1 should contribute to the development of remote-sensing operational systems in cooperation with the various Directorates General

---

[54]. See Bourély, supra.

of the E.E.C., with the various international development banks, with the various government bodies, and should contribute to ISY and "Mission to Planet Earth"[55].

B. Commercial legal aspects of ESA's remote-sensing activity

1. Fundamentally, ESA's mission is one of scientific research and development. However, its Convention provides that the Agency assumes responsibility for the operation of a satellite and for the dissemination of data, in a manner which is quite similar to NASA's role during the first ten years of the Landsat program[56]. It seems nevertheless that ESA does not substitute itself to commercial private industry when it is not required. As an example, the dissemination of Landsat imagery in Europe, as part of the Earthnet program has been performed since 1987 by a group of European private interests: Eurimage.

---

[55]. 1. Duchossois G. - The ERS-1 Mission Objectives - ESA Bulletin - February 1991 - p. 16/25.

2. ERS-1 A new tool for global environment monitoring in the 1990s. ESA BR-36 - November 1989 - 38 pages.

[56]. Article V.2 of ESA's Convention: "In the area of space applications the Agency may, should the occasion arise, carry out operational activities under conditions to be defined by the Council by a majority of all Member States. When so doing the Agency shall:
a. place at the disposal ... such of its own facilities ...
b. ensure ... the launching, placing in orbit and control of operational application satellites;
c. carry out any other activity requested by users and approuved by the Council. The cost of such operational activities shall be borne by the users concerned."

2. During the operational phase (two years), ESA assumes all the exploitation of the satellite: data processing, recording, archiving, transmission and dissemination. ESA also develops the ground sector of the program, coordinates the use of the Satellite by all acquisition stations and makes necessary arrangements with the participating States for the use of their processing facilities. ESA is thus performing tasks that would normally be done by Member States[57].

3. In counterpart, participating States commit themselves in the financial support of the operational phase, as well as of the different phases of the program. They are also recognized the right to exercise a number of prerogatives which are valid for the whole program: industrial economic return, intellectual property as well as communication and utilization rights, ownership of facilities and equipment manufactured or purchased and placed at the disposal of the Agency[58].

---

[57]. ESA Remote Sensing Programme Board - European Remote Sensing Satellite Programme - Implementing Rules - Ref: ESA/PB-RS(81)23, rev. 5, attached to ESA/C(83)86.

[58]. Excerpts from ESA Convention, Article VII.1: "The industrial policy which the Agency is to elaborate and apply ... shall be designed in particular to: (a) meet the requirements of the European space programme and the coordinated national space programmes in a cost-effective manner; (b) improve the world-wide competitiveness of European industry by maintaining and ... encouraging the rationalisation and development of an industrial structure ... making use in the first place of the existing industrial potential of all member States; (c) ensure that all Member States participate in an equitable manner, having regard to their financial contribution ...; ... the Agency shall, for the execution of its programmes, grant preference to the fullest extent possible to industry in all Member States...; (d) exploit the

II.6 - The Radarsat commercial remote-sensing program.

A. The Canadian Space program and commercial remote-sensing

A.1 - Earth remote-sensing as an area of dominant government concern

1. Canada became the third spacefaring power in 1962 with the launch of its first satellite, Alouette, a communications satellite which was successfully operated until 1972, several years after its projected lifespan had ended. Canada's first formal comprehensive space policy was adopted in 1974. Emphasis was already given to the transfer of space technology from the government to the private sector and from US content to Canadian content. This policy also underlined the need to follow national objectives and to develop partnerships with countries other than the USA where the emergence of space capabilities had been noted[59].

2. In January 1980, a five-year plan was adopted which confirmed the initial features of the space policy of the early 1970s and indicated that "remote-sensing should replace communications as the dominant area of government concern, and

---

advantages of free competitive bidding in all cases, except where this would be incompatible with other defined objectives of industrial policy ...".

[59]. John Kirton - Canadian space policy - Space Policy - February 1990 - p. 61/71.

that a stronger partnership with European space programs was necessary"[60]. Those objectives have since been reaffirmed with another five year plan in 1985/86.

3. Until now, Canadian space endeavours have been "selective and specialized, oriented almost entirely to terrestrially tied missions, and to practical, ultimately commercially profitable purposes"[61]. Presently, the Canadian space program consists in three major fields of activity:

- Communications, for which the MSAT project is the largest part ($126M),
- Earth-observation, whose flagship project is Radarsat ($441M),
- Robotics, which has benefitted from the Canadarm on the US shuttle in order to prepare the MSS on the Space Station ($1200M).

A.2 - Role of the CCRS

1. This program has benefitted from Canada's experience in acquiring data from orbiting satellites since the beginning of both Landsat and SPOT. Canada contributed by building two ground stations, one in Saskatchewan and one in Quebec, and by developing a "quick look" facility for the rapid processing of

---

[60]. See Kirton, supra.

[61]. See Kirton, supra.

Landsat data. "It was this nascent capability in high-speed image processing and the national need for regular surveillance of Canada's vast and forbidding territory that led the government to develop and ultimately finance Radarsat"[62].

2. Unlike the other remote-sensing programs, Radarsat has been conceived right from the beginning as a mixed project borrowing from both its prestigious predessessors, Landsat and SPOT. Remote sensing has been developed by CCRS (Canada Centre for Remote-Sensing) under the responsibility of the Ministry for Energy, Mines and Resources (EMR). Apart from supervising CCRS's activities, EMR also manages financial administration matters. It has adopted several orders during the 1980s prescribing the fees and charges to be paid for the provision of satellite products[63]. Such regulation aims at bringing the pricing of services which are currently offered by CCRS closer to international prices. However, the user group seems to be fairly small in Canada, and such increases in prices (between 20% and 90%) had been notified in advance to these users after consultation with the Canadian Advisory Committee on Remote-

---

[62]. See Kirton, supra.

[63]. For exemple: SOR/87-96, 18 February, 1987. Financial Administration Act. Satellite Remote Sensing Services Fees Order, 1987. Order prescribing the fees and charges to be paid for the provision of satellite remote sensing imagery, tapes and services. To be sited as the Satellite Remote Sensing Services Fees Order, 1987. In: Canada Gazette Part II, Vol. 121, No 5. page 652.

Sensing and government representatives.

3. CCRS was created in 1972 and is located in Ottawa. Its mission was to coordinate the government policy in remote-sensing through a national committee network linking departments and agencies. Among its first active missions, it started in 1972 to receive, process and distribute the first remote-sensing data gathered by Landsat, and then later on by SPOT. These data were received by two ground stations, one located in Gatineau, Quebec, and the other one in Prince Albert, Saskatchewan, both under the management of CCRS. Over the years, CCRS developed a strong program in technology and applications development and in technology transfer related to resource management. It became rapidly involved in the development program of a national remote-sensing satellite which led to the development of Radarsat.

4. The development of the project was turned over to the responsibility of the Canadian Space Agency after its creation. Commercialization is private under the responsibility of Radarsat International, a private Canadian firms conglomerate. It was also conceived to be established on cooperation basis with the US (launching) and the UK (satellite bus), but the UK participation vanished in 1988. Cooperation is also established in terms of support to and from the regions of Canada: while several provinces would

receive a share of the manufacturing part, those same provinces would contribute financially to the program[64].

5. An internationally balanced cooperation has been embodied by a partnership with the two major space agencies of the Western world, NASA and ESA, with which a new ten year agreement has been signed in 1989. Cooperation is also developped with Japan (remote-sensing data acquisition) and with the USSR (development of the Cospas/Sarsat search and rescue satellite system).

6. From a purely technical point of view, Radarsat has more in common with the European ERS-1 and the Japanese MOS-1 than with Landsat and SPOT. Scheduled to be launched in 1994 with a lifespan of five years, the project started in 1981 as the first Canadian remote-sensing satellite. It will be placed by the United States on a near-polar sunsynchronous orbit in 1994, at an 800 km altitude. It will circle the globe from pole to pole, scanning the entire surface in swaths ranging in width from 500 km (50 m resolution) down to 50 km (10 m resolution). It will cover most of Canada every 72 hours and the Arctic every 24 hours. It will circle the poles every 100 minutes. It is supposed to provide more detailed information

---

[64]. Jocelyn Mallett - Canada's space programme - Space Policy - February 1990 - p. 53/59 - Work allocation: Atlantic: 10%, Quebec: 35%, Ontario: 35%, Prairies: 10%, BC: 10%
Global funding participation of $53M for Quebec, Ont., Sask., BC.

than both Landsat and SPOT. It will use a microwave instrument extrapolated from the radar technology: a SAR or synthetic aperture radar, which is defined as an active sensor which can penetrate clouds and darkness. It is also aimed at producing the first stereoscopic geological map of the Earth. A memory system of its own will enable Radarsat to supply any type of data concerning any type of ocean within two hours following the sweeping by the satellite.

7. A technical feature to be noticed is that it will be "uniquely steerable and have a zoom lens to permit a detailed sensing of the Earth in various dimensions ... its missions will vary from national surveillance, and ice, shipping and wave reconnaissance, to forestry and crop monitoring, and geological exploration ... enthusiasts within Ottawa are also considering its potential for programs in arms control and environment verification"[65]. It is expected that manufacturers of Radarsat will closely monitor the ERS-1 experience after launch so that Radarsat may directly benefit from the Canadian participation in the European satellite venture[66].

---

[65]. See Kirton, supra.

[66]. Article 2.2 of the EMR/CSA/RSI 1990 MOU:
RSI agrees to meet the following obligations:
... e) in consultation with the CCRS ... to complete a final study after the launch of the ERS-1 satellite in order to take into account the latest SAR user awareness ...
f) when firm commitments are established by, and acceptable assurances are received from, federal departments and agencies that a high proportion of the processing capacity will be contracted for, to purchase an upgrade to the CCRS ERS-1 facility which

B. Commercial aspects of the Radarsat program

1. This aspect of the program is still under development since the satellite is still far from being operational, not before 1994-95. However, the cornerstone of its commercial dimension rests with two MOUs which have been signed, one between CSA and its American partners (NASA and NOAA) and which sets the whole framework for the Radarsat program, and the second between CSA EMR and Radarsat International. They will be commented upon from a legal point of view in the second part of this research. These important arrangements have set various objectives, among which:

* conducting a scientific monitoring of the environment, and

* managing a financially profitable commercial dissemination of data[67].

---

upgrade must be tested and commissionned against the mutually agreed final specifications before Radarsat satellite launch, and to operate and maintain the facility and the upgrade ...

[67]. Article 1 of the 1990 MOU between EMR, CSA and RSI:
"The major objectives of Radarsat SAR data distribution and marketing are as follows:
a) to promote globally the utilization of Radarsat SAR data and data products ... in such areas as global ice reconnaissance, etc...
b) to contribute to the overall development of a national and international commercially viable remote sensing industry,
c) to contribute to the maintenance and improvement of the Canadian industry world leadership and the high quality profile in the field of remote sensing, and
d) to generate a revenue stream to the CSA to offset the mission operating costs.

2. In order to reach the financial objectives, it was decided that commercialization would be private under the responsibility of Radarsat International, a private Canadian firms conglomerate (SPAR Aerospace - Montreal, MDA - Vancouver and COMDEV - Cambridge, Ont.). RSI agreed to develop a market of non-government users for Radarsat products, internationally and nationally, to find a US private sector financial partner, to collect all revenues generated by the use of Radarsat SAR data products and services, and to pay royalties to CSA[68].

---

[68]. See Article 2, in-extenso in Annex.

III - ANALYSIS OF THE NETWORK OF BILATERAL CONTRACTS BETWEEN PARTICIPATING ENTITIES

III.1 - Rationale for a network of ground stations

A. Technical constraints

1. Quite simply, there are moments when a remote-sensing satellite is physically out of contact with its national state ground tracking station for downlink communications. When a satellite is on the geostationary orbit at about 37,800 km from the Earth, it is estimated that three satellites are necessary to ensure a permanent coverage of the Earth, the three satellites offering a permanent liaison system, which is in essence what communication satellites do. At an altitude of about 800 km and on a totally different orbit, identified as being polar since the satellite revolves around the two poles, a much larger number of satellites orbiting around the Earth would be necessary to ensure this same permanent coverage.

Such a system does exist, offering a relay capacity between satellites. It is identified as a Tracking Data Relay Satellite System (TDRSS)[69]. The USA have organized such a system with four tracking satellites ensuring an almost total by-pass of ground stations, but at a very high cost, including

---

[69]. See in annex an exhibit showing the global actual coverage of the US TDRSS system, as well as the exhibit on the projected European Data Relay System.

the loss of one of these satellites on its way to be placed on orbit in the Challenger disaster. The European Space Agency also has a TDRSS project. Annex 9 and 13 show exhibits about the US and the European TDRSS systems, indicating that only two spacecrafts allow for the US to monitor the whole Earth, except for a vertical band covering parts of India, Pakistan and the USSR. Otherwise, the operating organization must arrange for the reception of satellite data through the intermediary of a few ground receiving stations sparsely disseminated on the surface of the globe in order to ensure a coverage of any designated area[70].

B. Technical and political partnerships

1. The remote-sensing operating nation and/or company is therefore compelled to negotiate a technical partnership with countries which will host a ground station dedicated to the acquisition of data transmitted by the satellite when it passes over the territory of that nation. Canada has played both roles in hosting two of these ground stations for the reception of data from Landsat, SPOT, MOS-1 and ERS-1, and in contemplating to entertain a network of contractual relations with other countries for the reception of Radarsat data when it is launched in 1994.

---

[70]. See the maps of current remote-sensing systems ground stations networks in annex: Landsat, Spot, Mos-1 and Ers-1.

2. It is worth noticing that this notion of *participating state* can be parallelled to that of *launching state* in the international treaties and conventions: in the treaties it refers to any state which directly or indirectly participates in the physical accomplishment of the launch and of the placing on orbit of a satellite. Here, it refers to the accomplishment of the functional requirements of the commercial remote-sensing satellite, i.e. all the necessary logistics which includes ground stations on foreign states territories, participating in the relay of satellite data transmission, interpreting the data, disseminating the unenhanced or enhanced data, etc[71].

III.2 - Main features characterizing Landsat's arrangements as a public commercial remote-sensing system.

A. Landsat's arrangements under NASA public administration

1. Due to the fact that the ground station is a 100% partner of the remote-sensing organization, this obligatory feature channels the potential for a commercial exploitation of data transmitted by the satellite. Similar to the previous developments of this research, arrangements concerning the Landsat system will be subsequently used as a reference for

---

[71]. Maps in appendix showing several networks of ground stations reveal that these networks are actually very similar to one another, since many stations are multifunctional as it will be shown further down in the legal analysis (for example, the two Canadian stations).

comparison purposes with the other remote-sensing systems.

2. Three periods may be distinguished in Landsat's history which materialized through the wording and the clauses of the arrangements passed by the operating remote-sensing agency with the host state:

- From 1971 to 1982 : eleven years of NASA administration.
- From 1983 to 1985: interim NOAA administration.
- From 1985 until now: EOSAT administration under NOAA.

The first ever agreement signed with a foreign partner in the field of remote-sensing was with Canada, which materialized by an Agreement signed on May 14, 1971 between the Department of External Affairs of Canada and the U.S. Secretary of State (22 UST - TIAS 7125), designing a general collaboration framework between Energy Mines and Resources (EMAR) and NASA.

With reference to the period under public administration, the author of this research has been able to track 17 arrangements down: Italy (1974), Iran (1974), Chile (1975), Zaire (1975), Argentina (1976/1981), ESA (3x1978), India (1978/1982), China (1980), Indonesia (1981), Japan (1983),

South Africa (1983), ESA (1984) and Canada (1984)[72].

3. During the first period under direct NASA administration, the commercial aspect of the arrangements is very restricted and even almost non-existent for several years. It timidly shows up around 1978, preparing the way for the NOAA takeover. From the beginning, the Landsat project is presented as being *experimental*, until and including the Indonesian memorandum of 1981.

- All arrangements until 1978 provide for direct and free access by the ground station to the data from the satellite, present and future, as well as availability to NASA of Landsat data acquired by the station. Then, starting with the first Indian arrangement in 1978, the wording "availability to NASA" is expanded with the expression "and others" which may be understood as preparing for a potential successor to NASA.

- In 1976 with the first Argentinian arrangement starts the payment of annual flat fees by the ground station, amounting to US$200,000.

- The purpose of the ground station from 1974 to the first Argentinian arrangement in 1976 is "the acquisition and

---

[72]. References for all these agreements or MOUs are listed in the bibliography under Paragraph 3.1.

processing of Landsat data as well as other non-space data of interest to (the station) entirely at its own cost". Then, starting with the first Indian arrangement in 1978, the station is supposed "to receive, process, archive and disseminate Landsat data ... at its own cost including the cost of the necessary communications with the NASA Landsat control center". Also, introducing a "dissemination" responsibility to the ground station, NASA was starting in 1978 some kind of commercialization process several years before the Landsat Act of 1984.

- From the beginning, arrangements provide that "data provided to NASA (by the station) will be made available to the public on precisely the same terms as data acquired directly by NASA". Since data was available from NASA free of charge, there was no commercialization possible. However, the first Argentinian arrangement which states that the station's responsibility is "for acquisition and processing of Landsat data" adds in a separate clause towards the end of the arrangement that (the station or its ruling agency) "will pursue a dissemination of Landsat data comparable to the dissemination policy maintained by NASA and the other US agencies participating in the program ... (and) ensure unrestricted public availability of all earth resources satellite data ... at a fair and reasonable charge, and in a non-discriminatory manner". Then, later arrangements starting

with the Indian text of 1978 have the same "fair and reasonable charge and in a non-discriminatory manner" clause, materializing the commercialization trend.

- The local station must provide NASA with quarterly listings of all Landsat data regularly received.

- A *de facto* exclusivity is granted to the ground station for the acquisition and processing of satellite data relative to its own territory, but also to any other ground station with which similar arrangements would be negotiated by NASA and which would consequently terminate the effect of the arrangement with the first ground station in relation to the territory of the other ground station. Such provisions can be found starting in 1974 with the Italian arrangement until and including the first Argentinian arrangement of 1976.

- Obligation is made to the local ground station to provide NASA with "quarterly reports in English" until and including the first Argentinian arrangement, while any reporting obligation seems to disappear starting with the Indian arrangement. On the other end, while the local station is not supposed to disseminate data in another fashion that the one NASA is using itself, these constraints disappear with the second Argentinian arrangement of 1981 since, in addition to an "unrestricted public availability", the local station will

make available to NASA "copies of any agreements signed ... concerning the sale of Landsat data (by the station)".

- Finally, while each arrangement, starting with the Italian one, provides that "NASA cannot make a firm commitment for future ERTS (the original name of Landsat and standing for Earth Resources Tracking System) type satellites" until and including the Indian arrangement, the Indian arrangement of 1978 adds that "NASA, however, undertakes to keep (the station) informed in good time of any modifications to the satellite design or to its plans for the Landsat series of satellites which may affect the implementation of this MOU" which was to be followed at the time of renewal by a letter announcing the "phased transfer from NASA to NOAA ... for (a) data pricing structure and for the establishment of (a) private sector system". All those latest arrangement clauses can be found in the Chinese, Indonesian and second Argentinian texts.

- Each of these arrangements until 1981 are set for a four year period with tacit renewal on mutual agreement. The last ones are set for shorter periods "until the turnover of the Landsat system from NASA or until September 30, 1983, whichever comes first" (Indonesian text). None of these arrangements includes an interpretation or dispute settlement clause, except the ESA MOU of 1978 which specifically provides

that such issue should "be referred to the NASA Administrator and to the Director General of ESA ... (or) ... to such other form of resolution or arbitration as they may agree".

B. Landsat under NOAA interim

From January 1983 until September 1985 the NOAA interim is effective with direct NOAA administration. Four memoranda of agreement have been tracked down and studied for this period: Japan (August 1983), South Africa (1983), ESA (1984) and Canada (1984). The commercialization policy is now firmly started:

> - What strikes at first sight is the presence of an annex which provides for the establishment of an annual access fee of US$600,000 - three times larger than under NASA administration - and of distribution fees which are proportional to the amount of satellite data sold[73].

---

[73]. Excerpts from the Annex of the Japanese MOU (1983). The corresponding parts of the South African and Canadian MOUs are identical:
".. an annual access fee of US$600,000 for the direct reception of Landsat data at each ground station and a distribution fee of US$5,00 for each photographic product and US$65,00 for each Computer Compatible Tape (CCT) derived from all Multi-Spectral Scanner (MSS) data and a fee of US$300 for each full scene of Thematic Mapper (TM) digital data and US$25,00 for each TM photographic product sold, transferred or otherwise distributed by the National Space Development Agency of Japan (NASDA) or its agent(s) to users". The annex provides further with a Payment Schedule which sets up a quarterly US$150,000 access fee payment and periodical payments of distribution fees based on reports submitted to NOAA at planned dates by NASDA.

- These arrangements now clearly state that the local space agency "will receive, process, archive and distribute data from ... the Landsat system which is managed by NOAA". There is a difference for the first time between the owner (NASA) and the operator (NOAA).

- The fundamentals for the cooperation are no longer the ones of an experimental undertaking. From now on, NOAA is bound to supply on request the local space agency with satellite data[74].

- An innovative clause appears with this series of MOUs, in effect totally waiving NOAA's liability as a consequence of the utilization of the Landsat data[75].

- Like for the previous period, the ESA memorandum distinguishes itself from the others by having a

---

[74]. Excerpts from section II of the Japanese MOU (1983): "NOAA, as manager of the Landsat system, through its National Environmental Satellite, Data, and Information Service (NESDIS), will ... program, as requested by NASDA, the Landsat MSS to cover areas within the acquisition radius of the NASDA ground station and transmit the data acquired directly to this station ...". Similar dispositions are provided for the Landsat Thematic Mapper.

[75]. Section II.C.3 of the Japanese MOU (identical to the two other MOUs): "NOAA does not warrant the suitability for any purpose of Landsat data, and shall not be liable for any damage or injury brought about by the use of the Landsat system".

specific dispute settlement clause which, again, provides for the intervention of both NASA and ESA chief executive officer or to "such other form of resolution or arbitration as they may agree".

- Finally, the duration of those four MOUs was "for a period of three years or until NOAA no longer retains management responsibility for the Landsat system should that occur first". Extension was provided for on a mutual agreement basis as before.

During this period of NOAA interim, it should be recalled that observers of space activities were publicly questioning the future, if any, of the Landsat remote-sensing system, since it was interpreted that the gradual shrinking of funds allocated by the Office of Management of Budget (OMB) of the US Government to space endeavours for being a *de facto* condemnation of the program. Those same observers later expressed the feeling that the arrival of SPOT initiated a reprisal of interest for the US program and helped motivating the US government bridge the funding gap and commit itself for the manufacturing of the next Landsat satellite[76].

III.3 - Landsat's arrangements under private administration

---

[76]. Opinion built from the reading of various articles from the air and space periodicals cited in the bibliography.

The signature of contract NA-84-DSC-00125 dated September 27, 1985, by the US Department of Commerce and EOSAT, for the purpose of our research, starts the EOSAT administration of Landsat's data dissemination with regard to Landsat 6. Landsat 4 and 5 data policy is still ruled by previous agreements that we already have studied. This document is identified as the "Prime Contract".

For reasons of access to information, it has only been possible to track down one such agreement between EOSAT and a local space agency, the Canada Centre for Remote-Sensing (CCRS), dated December 28, 1990. As at mid-1991, this agreement is still at the draft stage, but we were told that the probability is high that it will be formalized as it is now with little or no change. One may assume that the other agreements which may have been concluded by EOSAT are similar to this one. CCRS with its two stations located in Gatineau and in Prince Albert, is one out of a network of 14 stations located in foreign countries around the globe and identified under the IGRS acronym or International Ground Receiving Stations.

It is suggested that the study be conducted in a two-pronged manner:

- First, with a vertical or historical view, a comparison of the content of this agreement to the previous ones under the

NASA and NOAA administrations. Quite important changes due to the partial privatization process resulting from the Landsat Act of 1984 will emerge through this approach.

- Second, with a horizontal or synchronous approach, a comparison of the content of this agreement to others of a similar nature recently passed by CCRS with other commercial remote-sensing systems, such as ERS-1 (Draft, May 1991), SPOT (September 1989), MOS-1 (March 1989).

A. EOSAT's agreement compared to past NASA/NOAA agreements

A.1 - Adaptation of standard clauses

1. At first look, the agreement is about twice larger in volume (18 pages against 10) as compared to the previous one that CCRS signed with NOAA in 1984. Both agreements have an annex which is mostly dedicated to the fees. The agreement itself comprises nine articles, including a set of definitions, while its annex comprises another six sections, also including its own set of definitions. Also, two definitions are given for terms which often appear in the text: "Earth Station" which refers here to CCRS ground station and "Prime Contract" which refers to EOSAT contract passed as a licensee with NOAA and that we already have mentioned.

2. The introduction - "recitals" - specifically refers to Title IV (Licensing of Private Remote-Sensing Space Systems) of the Landsat Act of 1984 since EOSAT has been granted a licence. The agreement also refers to the Landsat satellite system as being "the Landsat 6 and any follow-on spacecraft and command and control ground system". The agreement enters into effect when the satellite starts being operational (launch scheduled for May 1992[77]), and for three years. In case of interruption, the station may see some of its obligations survive[78].

3. EOSAT's obligations, once Landsat 6 is launched, are limited by a series of events which could occur and bear a special impact on its action as a private organization by contrast to that of NASA and of NOAA[79]. Its obligations may

---

[77]. EOSAT - Landsat Data Users Notes - Launch Scheduled for May 1992 - December 1990 - p. 2.

[78]. Article II of the CCRS/EOSAT 1990 Agreement:
Term: This Agreement becomes effective on the first day of Landsat 6's operation as determined by EOSAT ... and remains effective for a period of three years thereafter; however, Earth Station's obligations in Sections C, D, G, H, I, N, and O survive until the expiration of EOSAT's exclusive rights to Landsat Data under the Act and the Prime Contract.

Here is a brief listing of these sections with their content:
C : sales of Landsat Data products, D: Data protection plan, G: payment of fees, H: listings of Landsat Data acquired, I: access to facilities, N: quality standards and control program, and O: archive of Landsat Data acquired.

[79]. Article III, Section B of EOSAT's/CCRS agreement:
EOSAT's obligations under this Agreement are limited by, and EOSAT shall have the right to suspend or terminate the transmission of

be listed as follows:

- As a Landsat Data provider: programming information;
- To appoint a technical representative to work with Earth Station;
- To inform Earth Station about new Landsat Data products for sale;
- To make its historical archives available;
- To adopt and communicate quality standards for Landsat Data products;
- To pay for certain reproduction and transmission costs incurred by Earth Station;
- To maintain and update a catalog of all Landsat Data products available.

Landsat Data because of:
1. The technical limitations and capabilities of the Landsat System, including temporary and permanent failures of the system;
2. The requirements of the Act and EOSAT's Prime Contract;
3. Action by the United States Government, under the Act or otherwise, or by any foreign government, which limits or precludes EOSAT's performance hereunder;
4. Conflicts between programming requests;
5. Noncompliance by Earth Station with its obligations as set forth herein, including but not limited to, nonpayment by Earth Station of the fees set forth in Article IV Section G; its failure to establish, implement, and enforce a Landsat Data protection plan and procedures for its implementation; and its failure to observe the requirement that all Landsat data Products be sold on a nondiscriminatory basis. Suspension or termination for any noncompliance by earth Station shall occur only after EOSAT has advised Earth Station that it is noncompliant and Earth Station has had a reasonable period in which to rectify the noncompliance.
6. Any cause which is beyond EOSAT's control and is not attributable to EOSAT's fault;

5. The local ground station (Earth Station) also has specific obligations[80].

- Some of these obligations are of a general standing and simply reproduced from earlier agreements between NASA or NOAA and local ground stations:

* Technical obligations: reception, processing and archiving, as well as communication links with EOSAT, must be performed at its own cost (Sect. A).
* Production of Landsat Data Products, including a Computer Compatible Tape (CCT) and imagery (Sec. B).
* Payment of fees, but prior authorization of Treasury Board and of Parliament of Canada is required (Sect. G).
* Quarterly listings of all Landsat Data acquired and sold (Section H).
* Quarterly listings of Data Grants (Sect. J).
* Resolve any radio frequency problem (Sect. K).
* Acquisition of Landsat Data in the form of HDDT (Sect. L).
* Appointment of a technical representative to work with EOSAT (Sect. M).

---

[80]. See Annex for Article IV of EOSAT/CCRS 1990 Agreement: Earth Stations's Rights and Obligations.

A.2 - A new set of obligations

Other obligations are new and can be considered as being the consequence of this relationship which has appeared in the wake of the commercialization process:

* A whole set of "sales terms and conditions", just like within the relationship of any manufacturer or wholesaler with its retailers (Section C). Comments will be specifically done on this matter further down.

* Design and implementation of a Data Protection Plan which must be approved by EOSAT (Section D). This seems to waive the copyright dimension of the data dissemination part of the activity. Here, the problem of the effectiveness of such a Plan must be addressed.

* No title, ownership or proprietary right is transmitted to the Earth Station which enjoys a "nonexclusive license to use, copy and distribute such Data for the purpose of performing this Agreement" (Section E). Together with the sales terms and conditions, that is a strong new paragraph which, undoubtedly, qualifies the Earth Station as a very active team player with EOSAT. However, the

accent given to the non-proprietary dimension raises doubt about the end interest of the Earth station in being induced to be so active.

* Information on projects of new Landsat Data Products should be sent to EOSAT shortly before market introduction (Section F). Again, Earth Station is supposed to be an active team player and profit contributor, but what about property interests attached thereto ?

* EOSAT requests (Section H) from Earth Station to have "access to its financial and inventory records regarding sales of Landsat Data Products". This obligation may seem to be fairly extravagant but stresses the need, this time, for the satellite manager to run a well audited business organization. We are no longer within the framework of an experimental venture as with the NASA agreements !

* This obligation is repeated at the following paragraph (Section I), with effect that EOSAT may be able "to verify that Earth Station is in compliance with ... (this) agreement ... including ... Data protection policy and product quality standards". This seems to be fair on the part of EOSAT, but also

partly wishful thinking, because the matter of copyright of what is a purely intellectual product is hard to implement. Evidence of the effectiveness of such a policy will not be found on the premises of Earth Station but on those whom it will have contracted with.

Also, this same paragraph raises another important issue which is mixed up with the previous one, even though it is not related: product liability. In the previous agreements under NASA, there was no commitment from either party in terms of product quality, and under NOAA agreements there was no warranty provided for "the suitability for any purpose of Landsat data and shall not be liable for any damage or injury brought about by the use of the Landsat system"[81]. Nor was the liability of the local ground station mentioned for anything. In the present document, the Earth Station's sees its responsibility errupting in the contractual relationship for the first time since the beginnings of the Landsat system. However, one may think that it would be hard to materialize in this field of activity.

---

[81]. Japanese, South African and Canadian agreements cited supra.

* Section N definitely raises a risk of tautology by repeating the product quality issue, but now as being subject to EOSAT's own quality standards. In essence, it may have been more appropriate to provide for "quality standards requirements" on the part of EOSAT and of "product quality goals" on the part of Earth Station, in order to avoid unclear considerations and with the quite obvious need for an as perfect match as possible between the two product quality issues.

* Archiving requirements are considered in Section O, which is a new item as compared to previous agreements. In essence, the Earth Station is required to store data for future sales and to notify EOSAT when it contemplates their destruction.

* Earth Station must meet all extra payments or taxes related to revenues generated by those sales (Section P).

* Finally (Section Q), "any delay in Earth Station's performance of its obligations ... other than its obligations to pay, shall be excused if due to any cause which is beyond Earth's Station control and is not attributable to Earth's Station's fault". Such

waiver for uncontrolled event is understandable, but one may notice that the payment obligation is absolute and not included in the waiver.

A.3 - Specific sales terms and conditions

1. Specific sales terms and conditions are imposed on CCRS which really transform the relationship between the Landsat licensee (EOSAT) and its contract partner into a full-fledged commercial relationship.

- "... Earth Station shall have the right to sell Landsat data products produced by Earth Station ... on a nonexclusive basis worldwide ... in accordance with the following terms and conditions ...". This really is all what the commercialization process is about.

* Under NASA rule, it was only in 1976 that some kind of commercialization appeared in favour of the local station who had to "pursue a policy of dissemination ... comparable to the dissemination policy maintained by NASA". Under NOAA direct rule, data acquired and archived was to be "available for sale or distribution on a public non-discriminatory basis ... at a fair and reasonable charge".

* From now on, the local station or its ruling

agency is clearly free to sell the satellite data it has received and processed, nonexclusively, i.e. on a competitive basis. With whom could such a competition happen ? The answer rests with the identification of who else could sell identical data. There seem to be four answers: (i) a station which would be situated in a national territory close to but different from the one of another station (situated in another territory), (ii) a station who would have a range which would overlap with the one of another station from the same territory, (iii) EOSAT itself. Starting with the first arrangements, one can easily notice a gradual withdrawal of the US administrative authorities. In NASA agreements before 1976, the two stations would not be allowed to overlap on same parts of territory and each would stop covering the other territory[82]. Starting with the Indian MOU (1978), a satisfying solution for all parties is encouraged[83]. Under

---

[82]. Italian MOU (1974), article 2.b): ... should another country in the region establish ERTS facilities, Telespazio's obligations to provide data ... in that country will terminate as soon as the new facilities are capable of providing this service ... Telespazio will continue to serve ... in countries within range of the station which do not have ERTS facilities unless and until alternative arrangements are concluded".

[83]. Indian MOU (1978), article 4.g): "When the expected coverage of a prospective Landsat ground station overlaps with that of the Hyderabad station, NASA will inform NRSA and will advise the prospective station operator of this NRSA/NASA MOU which provides for the unrestricted public availability of data of areas within

NOAA direct administration, the same solution is suggested, but the problem is introduced in a totally different manner[84]. In the Indian MOU, NASA informs the newcoming station, before finalizing the agreement, that overlapping will exist with a previously installed station (i.e. potential competition), while in the Japanese MOU, NOAA informs the already installed station that overlapping (i.e. potential competition) will happen with the newcomer, before finalizing the agreement with the newcomer. It seems that the NASA policy is to prevent unnecessary competition, while the NOAA policy is only to warn the more senior station that competition is coming.

* All these considerations disappear with the EOSAT agreement. Nowhere do provisions appear about

---

range of the Hyderabad station at a fair and reasonable charge. Should the prospective station operator choose to pursue plans for a station with substantial overlapping coverage, NASA will encourage the prospective station operator and NRSA to consult with a view toward reaching a mutually satisfactory understanding on responding to request for data of the overlapping coverage area". (Note to the reader, NRSA is the Indian remote sensing agency and Hyderabad is its ground station).

[84]. Japanes MOU (1983). Section II.C.5: "... When the expected coverage of a prospective Landsat ground station overlaps with that of the NASDA Landsat station, NOAA will inform NASDA before finalizing any agreement with the prospective station operator. NOAA will encourage NASDA and the prospective station operator to consult with a view toward reaching a mutually satisfactory understanding on responding to requests for data of the overlapping coverage areas". Note: NASDA is the Japanese space agency.

potential overlapping of Landsat stations, which may not be a total surprise since EOSAT is not managing the Landsat system but only its commercialization with the idea to make it profitable. But one must remember that the local ground station or its ruling agency does not contract with NASA or NOAA anymore, which implies that overlapping and possible direct competition from a nearby station (installed in a neighbouring state) is theoretically possible. For example, Pakistan and India, or Argentina and Chile, etc. The "nonexclusive" sales right actually is the new framework for this competition.

2. The "terms and conditions" list several requirements that must
be met by Earth Station and its staff:

* Dissemination of data is to be done on a nondiscriminatory basis according to the meaning which is given by the Landsat Act of 1984 and according to EOSAT's licensee contract.

* Information requests by customers must be answered within two working days following inquiry.

* Products must be delivered within thirty days

following order if data is archived, or within thirty days after data has been archived.

* Sales must be done pursuant to EOSAT's approved Data protection plan and procedure.

* Earth Station sales staff must have agreed in writing to these sales terms and conditions.

A.4 - Interruptions, disputes, assignment and fees

1. A discontinuity of service may lead to an adjustment of Access Fee payments on specified conditions, except in the case of a temporary and isolated interruption (Article V). This may cover an interruption of data transmission or a degraded service. Such a clause was not included in the NASA and NOAA previous agreements. However, EOSAT does not warrant the merchantability or fitness of data, nor does EOSAT "warrant that Landsat 6 or any successor System will be or remain operational during the entire term of this Agreement" (Article VII). This last disposition has been a standard feature since the first NASA agreement.

2. Brand new clauses, compared to NASA and NOAA agreements, provide for the settlement of disputes and of indemnification:

- Disputes should be resolved by arbitration in the Earth

Station country (at least in the present case) and according to the arbitration rules of the Law on International Commercial Arbitration (Article VI). However, the Agreement is governed by the laws of EOSAT's incorporation state, Delaware. And there is a waiver of whatever immunity may exist on both sides, from Earth Station and from EOSAT.

- Indemnification will be paid by Earth Station to EOSAT for third parties claims arising out of "any negligent or wilful act or omission of Earth Station or failure by Earth Station to perform its obligations to a third party" (Article VIII).

3. Also new are clauses which set forth that Earth Station's full rights and obligations cannot be validly assigned to another party without EOSAT's prior consent. No hidden "restriction, promise, warranty or undertaking ... other than those set forth or referred to herein and therein" may prevail over this Agreement which "supersedes any and all prior Agreements and undertakings between the parties with respect to such subject" (Article IX).

4. Annex 1 is principally devoted to the System Fees.

- Basic access fees are raised to US$1,000,000 (from US$600,00 under NOAA), and fixed at US$150,000 for each additional station in case Earth Station

desires a serial (and not simultaneous) transmission of data.

- Additional fees are also established based on frequency of transmissions, as well as periodical increases. Such schedule should be assessed from a purely technical perspective in order to measure the order of magnitude of the increase it represents when compared to fees under NOAA direct administration.

- Royalties are set equal to 10% of catalog price of all Landsat Data Products sold, with a scaled increase.

- Fees and royalties are to be paid on a quarterly basis, in some cases in advance. Interest may be charged on fees or royalty payments, at 2% above New York prime rate (which, incidentally, is a rate charged by banks to risky clients !...).

- Earth Station may also proceed to Data Grants, but on certain conditions explicitly laid down by Section 5 of the annex.

In conclusion to this survey of what could be considered as

being present EOSAT agreement conditions, one may temporarily conclude that they confirm a fairly strict approach of the relationship with ground stations viewed as team partners but also as funds suppliers.

Let us now turn to a synchronic approach of these same conditions as compared with similar ones emanating from other commercial remote-sensing organizations.

B. EOSAT's agreement compared to other agreements

In addition to the previously discussed agreement, Canada has signed or is in the process of signing three arrangements with other commercial remote-sensing organizations. In this part we will comment in a comparative approach on the following agreements:

1. Arrangement between the National Space Development Agency of Japan and the Canada Centre for Remote-Sensing for the direct reception and distribution of MOS-1 data. Signed March 8, 1988 and amended in 1989 and 1990.

2. Agreement regarding the reception and distribution of SPOT data in Canada between SPOT Image and the Minister of Energy, Mines and Resources. Signed September 26, 1989.

3. Landsat data downlink agreement between the Canada Centre for Remote-Sensing and Earth Observation Satellite Company. December 28, 1990. (Already studied in Part A).

4. Arrangement between the European Space Agency and the Department of Energy, Mines and Resources concerning the direct reception, archiving, processing and distribution of ERS-1 data. Draft, May 07, 1991.

For the sake of simplifying the discussion, we will identify each agreement with the name of the satellite operator: EOSAT, ESA, NASDA, SPOT. It may already be noticed that they all have a different legal status. Two of those operators are commercial organizations, one is totally private, EOSAT, and the other one is publicly controlled, SPOT (for SPOT Image), with a strong private participation. The two others are public bodies, one is a government space agency, NASDA, and the other one is a international organization, ESA. They all have contracted or will contract with a public body, a department of the Canadian Ministry for Energy, Mines and Resources, the Canada Centre for Remote-Sensing.

From a methodological point of view, and to avoid any copyright difficulties with the satellite

operating agencies, these agreements will not be reproduced here or in annex, in part or in total, restricting our input to an analysis of the provisions of these agreements.

B.1 - Overall appearance and purposes

1. From a general approach, one may comment on the overall appearance of each contract:

- EOSAT: 19 pages including 9 articles and 1 annex (financial).
- ESA: 21 pages in total, including 21 articles and 2 appendices (technical and financial).
- NASDA: 21 pages in total, including 10 articles and 3 amendments (financial).
- SPOT: 42 pages in total, including 27 articles and 2 annexes (technical and financial).

The very first approach to these contracts gives the impression that the SPOT contract has been tailored with extreme care and accuracy. Whatever the case, the formalization of the remote-sensing relationship has changed since the NASA agreements of the early 1970s which comprised only 4 pages[85].

---

[85]. See Italy NASA MOU (1974) in annex for mere comparison purposes.

2. Purposes vary with each contract:

- EOSAT: contract does not mention any specific purpose, presumably because of the long established cooperation between CCRS and the Landsat system.
- NASDA: contract is for experimental purposes and access by third parties.
- ESA: contract is to provide for acquisition of data, availability to user community, acquisition and dissemination of low bit rate data.
- SPOT: contract is to detail the archiving process, define the acquisition conditions by both parties, define the financial terms, sub-licensing conditions in Canada and provide for data related to the US territory.

B.2 - Technical provisions

1. As far as the technical aspects are concerned, all four contracts cover about the same rights and obligations:

(i) Right is given to the ground station to:
- receive, process and archive the data transmitted by the satellite (downlink communication);
- test the equipment and the whole reception procedure for a couple of weeks;

(ii) In counterpart, the ground station must:

- follow processing quality standards imposed by the satellite operator;
- maintain a catalogue of all satellite data which have been archived;
- supply the satellite operator with all data it requires and which are archived by the ground station;
- design and implement a Data protection plan, which must be approved by the satellite operator;
- eliminate all radio frequencies interferences;
- operate its ground stations totally at its own cost;
- supply the contracting satellite operator with the raw or primary data received from the satellite and be paid for that service at a price agreed with the operator.

(iii) The satellite operator is recognized the right:

- to terminate the contract for any reason beyond its control and which is not attributable to its fault;
- not to provide a warranty of merchantability or fitness;
- not to provide a warranty of suitability of the imagery for any use; in the NASDA contract, both parties do not provide any warranty of suitability;

- not to provide a warranty of continuity of the satellite service.

(iv) In counterpart, its obligation as a satellite operator are to:

- supply the ground station with all technical parameters in order to facilitate the communication;
- inform the ground station about new products to be sold.

2. Particular provisions may also be noticed for either party:

- NASDA also acknowledges the right of the ground station to interpret the satellite data.

- In the case of a "force majeure" situation, NASDA and SPOT list a series of events such as boycotts, labour disputes, floods, war, quotas, etc. which would excuse non performance of either party; the SPOT list of such events is noticeably longer than the NASDA one and also includes satellite malfunctions or failures. Provisions are indicated in order to set each party specific responsibilities, with rights and obligations.

- ESA requires that EMR (= CCRS) maintain its archives for ten years after the end of the ERS-1

mission, while rights and obligations of each party may survive three years after expiration or termination.

- SPOT provides for a detailed archiving procedure which must be updated on a quarterly basis, while the Minister (CCRS) must specify the Archiving Program for the next week. The technical appendix provides for the medium and formats to be used.

- SPOT must also be informed by the Minister, prior to any manipulation of the raw archive, who also must implement a data protection procedure which must be at least equal to that used for other satellite remote-sensing data. Also, SPOT expressly forbids that any part or totality of the raw archive be transferred or sold without its prior written approval.

- A particular clause in the SPOT contract says that the SPOT Image must, upon request by the Minister, provide data collected about the territory of Canada through the on-board tape recorder.

- All contracts mention specific quality requirements, but the SPOT contract stipulates that

if data was not delivered in compliance with such quality requests, a new delivery of data should be performed and be compliant with such specifications.

B.3 - Commercial aspects

1. Common commercial rights and obligations:

(i) Right is recognized for the ground station to:

- to make its catalogue listings public;
- sell the satellite data it has archived, about Canada in Canada: it is often a nonexclusive right (also called "license"), except for SPOT.

(ii) It is required from the ground station to:

- sell data on a nondiscriminatory basis;
- consider its right to use, copy and distribute as being non exclusive;
- give access to its financial and inventory records.

(iii) Right is acknowledged to the satellite operator to:

- have the original pictures be marked with its copyright, except for the EOSAT agreement which does not specifically provide for such a disposition. One may recall that the USA is not a signatory of the Berne Convention on the copyright, which may be a

reason why EOSAT requests from the ground station that it establishes a specific Data protection plan and that such plan be approved by EOSAT.

- (ESA and SPOT contracts) be informed by the ground station (or its ruling body) of any infringement and request its support for action when trademarks are unlawfully used by a third party or its assistance in taking legal action. SPOT may even subrogate itself in the Minister's rights at any moment of the procedure, and such capacity must be part of the sales contracts and provisions.

(iv) Value-added information (also called "derivative works and products", or "analyzed information", or "enhanced data") or anything added to the raw or primary information and which is external to the acquisition system, is generally recognized as granting a copyright to the value-adder, whether it be the local agency or a third party:

- ESA grants a non-exclusive license for the duration of the agreement for all the analyzed information process.

- NASDA recognises intellectual property on analyzed information involving inputs of data and knowledge

from other sources.

- EOSAT does not specifically refer to value-added information, but stipulates that the Earth Station may propose to EOSAT new Landsat Data products before they are introduced into the market. This equates to a *de facto* prior approval by EOSAT.

- SPOT recognizes the copyright of the Minister or of a third party in the event of the use of satellite data in the creation of derivative works and products. However, fees will still have to be paid to SPOT, except for class 3 products (see below). It should also be noticed that the Minister's copyright should be placed on all derivative work and product together with the CNES copyright and the year of reception.

2. But the satellite data commercialization policies differ on a few important points between the four satellite operators:

- EOSAT allows the ground station to propose new Landsat products.

- EOSAT and SPOT require from the ground station the right of access to its premises for technical and

commercial inspection while this is not mentioned for NASDA and ESA.

- EOSAT allows the ground station to make data grants to research and development organizations while none of the three others do.

- NASDA and CCRS have a non-exclusive distribution right of all their satellite data except on the national territory of one another. The NASDA agreement also requires that CCRS consult NASDA for its price list. However, NASDA's intent to have CCRS really sell MOS-1 data is not quite clear in its latest amendment where it states that CCRS will sell the above data at a reasonable price to third parties on a non-discriminatory basis provided that CCRS first notifies NASDA of its intent to release the above data, that CCRS obtains NASDA's written consent for such release and it pays to NASDA a distribution fee to be mutually agreed.

- ESA requires that EMR (CCRS) does not copy or sell its archives without its prior approval. ESA may even totally retain this right.

- In public relations or media event ESA requests

that the contribution of each party be clearly identified.

- At the beginning of the agreement, SPOT straightens the relationship with the Minister (CCRS) in a very clear pattern: it is an exclusive reproduction/distribution/sale sub-license in Canada of data about Canada to residents in Canada, while it is a non-exclusive production/reproduction and sale sub-license for derivative works and products in and outside Canada (not for raw SPOT data, for which SPOT is the sole distributor of Canada territory data outside Canada). To be noticed, sales in Canada of whatever type of raw data to non Canadian residents must be referred to SPOT.

- SPOT also stipulates that the Minister is not allowed to reserve any data for its exclusive use or the exclusive use of a particular customer.

- The SPOT contract also positions itself in a unique manner as compared to the other contracts by requiring an annual review of the volume of sales of the latest period, the setting of a sales volume objective for the following year, and by requesting from the Minister that corrective actions be taken

in case of significant deviations from the sales objectives.

- SPOT also requests that the Minister communicates all sales model documents, and that all data, of whatever type (i.e. raw or enhanced), delivered to a third party, be accompanied by a written undertaking by the third party that such third party shall respect CNES copyright interests and shall distribute, sell or copy the data.

- SPOT requests that the Minister participate in the annual meeting of the "Groupe des Opérateurs de Stations SPOT", the Group of SPOT Stations Operators, and that the Minister undertakes to publicize as much as possible, with SPOT support, the use of SPOT data and all its potential, including activities such as Canadian Remote-Sensing Symposia. SPOT support will include the training of new sub-licensees personnel.

- SPOT devotes a whole paragraph to the treatment of data covering the US territory. Quite simply, such data must be temporarily stored by the Minister and delivered to a company authorized by SPOT. The Minister may not keep in storage, or distribute or

sell any data about the USA without express SPOT consent. One must recall that SPOT Image has an affiliate US company, SICORP, which is supposed to take care of such responsibility, the USA being SPOT Image's second main target for international sales, after Europe.

B.4 - Fees and royalties

1. Fees to be paid by the ground station include:

(i) Access fees which must be paid to all satellite operators, but vary in amount:

- EOSAT: US$1,000,000 a year (it was US$800,000 until then). Adjustments in case of technical interruptions.
- NASDA: Y1,800,000 for each 100 orbits, or about US$15,000, which may be increased. In the case of Canada, based on an estimate of anticipated use, this could amount to US$200,000 a year.
- ESA: no access fee is apparently required because Canada is a participating member. A flat fee must certainly be required from other agencies of countries not participating, NASDA for example.
- SPOT: FF7,000,000 a year, or about US$1,200,000, which may benefit from a discount based on the

amount of data sold. Such amount is considered to be expensive.

(ii) Additional fees are also to be paid according to schedules established by each agreement.

2. Royalties are to be paid to the satellite operator and differ with each organization:

- EOSAT: 10% of the catalog price, net of local taxes.
- ESA, NASDA, SPOT: a complex schedule of fees is established.

3. Late payment will incur interest charges at a pre-established rate:

- EOSAT: Citibank New York prime rate + 2%
- NASDA: 8,25%
- ESA: 10% for each 30 day period of overdue payment
- SPOT: Bank of Canada rate + 1,25%

4. The satellite operators recognize their obligation to pay for specific services requested from the ground station, even on a routine basis.

B.5 - Structural rights and obligations

1. Common - or absence of - rights and obligations can also be

listed as follows:

- Disputes must be solved amicably or by arbitration; but in the NASDA and SPOT contracts, specific reference is made to Canadian and Japanese or French courts which such disputes would be addressed to.

- The ground station cannot assign the agreement or any part of it without the prior approval of the satellite operator;

- Some rights and obligations of both parties may survive the expiry or termination of the agreement;

- Amendments to the agreement may mutually be decided by both parties at any time.

- Default from either party, with or without wilful misconduct of the said party are also provided for with specific considerations.

2. Some differences may be noticed:

- EOSAT waives any immunity as a defense that any party may have;

- EOSAT provides there is no hidden promise, warranty or undertaking;

- EOSAT and SPOT assert that no member of the Canadian House of Commons may be admitted to any share of the agreement;

- EOSAT and SPOT assert that such agreement does not set any kind of partnership with the ground station;

- NASDA and SPOT assert, as a basic principle, that CCRS has no intellectual property rights on satellite data; however, in the case of analyzed and interpreted data, CCRS is recognized some rights depending on "the level of processing". SPOT goes deeper in giving details about the elements to be considered in assessing the degree to which the original satellite picture can still be recognized and distinguishes between "class 1", "class 2" and "class 3" pictures, the last class having no longer any connection with the original satellite picture.

- The NASDA and SPOT contracts specifically refer to Canadian and Japanese or French courts which disputes would be addressed to, in case of unsuccessful arbitration. SPOT specifies that the

Agreement is governed by the laws of France.

- Upon expiry or termination of contract, SPOT precisely details what to do with the archived data.

B.6 - A few odd observations.

Some odd observations can be made on some of these contracts:

- EOSAT imposes the ground station to transfer any archived data to itself before destroying it for freeing storage area (which is odd since EOSAT is the owner of the data anyway).

- NASDA asserts that the reception of data by CCRS is for experimental purposes, while a complex commercialization procedure with appropriate fees is established. The experimental aspect is strengthened by the mention of a Canadian project Team selected by CCRS "for the purpose of assessing the utility of MOS-1 data".

- NASDA asserts that data will be acquired only for peaceful purposes, but nothing specific provides for the "peaceful" use of the acquired information. Similarly, the SPOT contract recalls in its introduction that such satellite data is to be used for civil commercial purposes and in accordance with applicable international law relating to the peaceful uses of outer space, but no other provision covers such preoccupation,

and this did not preclude SPOT from stopping the dissemination of its satellite data during the recent Gulf crisis, thus revealing it had some doubt about the identity of the end-users of the data.

- The ESA agreement does not reflect any sense of commercial urgency as EOSAT or SPOT contracts do, which confirms the apparent predominantly scientific purpose of the project.

- The SPOT contract indicates in its financial appendix a sophisticated mathematical formula to be used when the contract price is to be revised every year, a formula which is based on economical statistical indices linked to the French economy. A similar provision (inflation adjustment) will be found further down with the RSI MOU, but the formula is far less elaborated. Incidentally, the financial appendix comprises 13 pages, almost a contract on its own.

III.4 - ESA as a service supplier, but also as a network manager

1. The European Space Agency plays a special role as a regional space agency. It has concluded agreements with national space agencies, first within the framework of its cooperation with NASA with the view of developing a European regional coordination network under its leadership for the reception, preprocessing, archiving and dissemination of data

from earth resources observation satellites, called Earthnet. It then had to accommodate local ground stations for the reception of data from the Landsat satellite series.

2. Later on, with the launch of other remote-sensing satellites, it had to negotiate a second series of agreements with local stations in order to provide for the reception of data from other satellites (SPOT, ERS-1, etc..). Through the membership of Italy, Sweden and Spain, ESA monitors three ground stations located at Fucino, Kiruna and Maspalomas which have become routine reception stations for most remote-sensing systems. Three MOUs or agreements have been signed in order to accommodate these stations with ESA. Also of interest is an MOU signed with NASA for the use of the Fairbanks ground station in Alaska. When its whole network becomes operational, it is envisioned that the ERS-1 ground station network could enlist more than 20 foreign stations (Annex 12).

3. The agreements under review are:

- April 28, 1982, MOU signed with Telespazio (Italy) for the use of the Fucino station;
- January 1986, MOU signed with NASA for the use of the Fairbanks station (reproduced as Annex 7);
- April 15, 1986, Agreement signed with the Swedish government for the use of the Kiruna station;
- November 21, 1988, Agreement signed with INTA

(Spain) for the use of the Maspalomas station[86].

Many of their features are similar to those of the other agreements tnat we have already surveyed. We will only pinpoint what gives them a particular outlook or what should be stressed again.

A. The Telespazio/Fucino MOU of 1982

1. Let it be mentioned first that Telespazio is "an exclusive concessionaire of the Italian Ministry of Posts and Telecommunications for the installation and exploitation of satellite communications, earth stations and systems". It is a "Landsat station" since the beginning of the Landsat series of satellites. We have already mentioned the 1974 agreement with NASA. ESA developed a cooperation with Telespazio since 1977, with regular renewal. The purpose of this agreement is to formalize Telespazio's participation to ESA's Earthnet program through the supply of various remote-sensing products and services.

2. This MOU is a guarantee that ESA may use Telespazio's Fucino ground station within Earthnet. This is to be implemented by the installation of ESA's own equipment at the station. Telespazio commits itself in hosting and maintaining

---

[86]. References of these agreements are provided in the bibliography.

this equipment while it is authorized by ESA to use it for its own activities. In addition, Telespazio's obligations are related to Landsat data under ESA's instructions, since at that time ESA had no specific satellite on orbit[87].

2. ESA's obligations are those of an interface between NASA and the local station[88]. ESA and the Italian company are to "jointly define a long-term development plan for the facilities and for any substantial modifications and adaptations of the existing facilities".

3. The dissemination policy is to be "accessible to all interested users, on an open and non-discrimination basis and taking into account the relevant NASA policy", while distribution of Earthnet products is the responsibility of the

---

[87]. Excerpts from Article 3 of the Telespazio agreement (1982): "... b) acquisition, archiving and preprocessing of Landsat ... data, in accordance with instructions and planning established by the Agency;

c) generation and dispatch of standard Earthnet products to the users in accordance with the operating and ordering procedures to be established by the Agency; ...".

Note: the other provisions, of a technical nature, are similar to those concerning the local station with other MOUS.

[88]. Excerpts form Article 4, Telespazio 1982 MOU:

"The Agency will be responsible in particular for:

a) the overall management of the Earthnet network;

b) the interface with the satellite operator, other Landsat station operators and the user community;

c) the elaboration of the station acquisition, archiving, preprocessing and data distribution planning ...

.....

g) the definition of the interfaces between the Fucino Landsat station and other elements of the Earthnet network.

Agency.

4. The agreement has a cross-waiver liability clause. Each party also mutually waives any third party claim against the other. Disputes are to be settled by mutual agreement. Italian law is to be applied for uncovered matters, with final and binding tribunal decision without appeal.

B. The NASA/Fairbanks MOU of 1986

1. This memorandum between ESA and NASA provides for ERS-1 data acquisition by NASA at its Fairbanks (Alaska) ground station. This was originated by an official request made by NASA to ESA for direct access to ERS-1 SAR data, thereby placing NASA in the unusual situation of that of a service offering entity.

2. This MOU is to define the terms and conditions of:

- direct access to ERS-1 data by the Fairbanks station;
- the availability of data acquired by the Fairbanks station;
- the scientific and technical collaboration between ESA and NASA during the ERS-1 development and exploitation phases.

3. On its part NASA is taking all the standard technical responsibilities, such as communications links, reception,

recording, processing, distributing, establishing a catalog of data acquired, solving radio frequency problems and a few technical responsibilities.

4. ESA takes charge of the programming responsibility, the validation of the station, the evaluation of products and a few other technical aspects. It is agreed that the ERS-1 program is experimental and preoperational while ESA made the usual non-commitment assertion as far as launching and continuity of program is concerned.

6. Standard clauses are also included about government funding preconditions, about exchange of technical information and about public relations declarations (mutual consultation). Disputes are to be submitted to the highest level of hierarchy in the standard NASA way or to other agreed ways. Also is included a standard cross-waiver liability clause.

C. The SSC/Kiruna MOU of 1986

1. This MOU is slightly different while pursuing the same objective. It could be classified as being of a general scope since it aims at providing for material needs to be covered by the station to the benefit of ESA. It started with an ESA Declaration on Phases C/D/E of the ERS-1 program providing for the construction of S-band tracking, telemetry and telecommand facilities at Kiruna, Sweden. The Swedish Space Corporation

(SSC) was designated as the official Swedish representative in the negotiation. The agreement was signed on April 15, 1986.

2. Basically, Sweden provides for the land - free of rent for ESA - for some equipment and telecommunications links, as well as for all administrative permits and support. Sweden also has to prepare the land in terms of infrastructure. Sweden has a right of option on any movable or dismountable equipment belonging to the Agency, against compensation.

3. ESA is allowed to organize this piece of Swedish territory according to its needs: facilities, roads, etc... with a right to bar and control access to the site.

4. Maintenance and operation of the site is granted to SSC in the name of the Swedish government.

5. Sweden is discharged of any liability which would stem from ESA's activity. However, in such event Sweden would "have a right of recourse against the Agency" (Article 9). Swedish law covers the activity of the Agency in Sweden when ESA's Convention provisions on privileges and immunities do not apply. The MOU provides for dispute settlement and for termination in a standard manner.

D. The INTA/Maspalomas Agreement of 1988

1. This agreement follows a long established cooperation with the "Comision Nacional de Investigacion del Espacio" in the late 1970s concerning the integration of the Maspalomas station, situated in the Canary Islands, to the Earthnet System. It was followed afterwards with separate MOUs signed by ESA with NOAA (Landsat) in 1984, with NASDA (MOS-1) in 1987 and with SPOT Image (SPOT) also in 1987. The purpose of this MOU is to update the previous MOUs and group them under one only document. It also provides for the US Nimbus and Tiros satellite programs.

2. We find here again ESA intervening as an interface between each of the satellite operators and the local ground station, while ESA conducts its own operations independently from those conducted by the individual satellite operators. However, a priority is specified by placing Earthnet activities first, and those of the other satellite systems in second position.

3. "Instituto Nacional de Tecnica Aeroespacial (INTA)" manages the local station and supplies the standard services that we already have found with other agreements (management, maintenance, acquisition, archiving, preprocessing, dispatch, catalogue, integration of new equipment and local authorizations). INTA also organizes the security of the premises.

4. ESA provides for:

- the overall management of Earthnet
- the Agency's remote-sensing missions
- the interface with the third party satellite operators
- all the various acquisition, archiving, preprocessing and data distribution planning,
- all upgrading specifications,
- new products,
- network review meetings,
- all interfaces.

5. The parties agree:

- on a joint long-term development plan;
- on accessibility of data to all interested users on an open non-discrimination basis;
- that distribution is of the responsibility of the Agency;

6. Each party is responsible for damages suffered by its employees.

Each party "guarantees the other against the right and claims which could be legally exercised by the victim, his heirs or his social security scheme ... except in case of gross negligence or wilful misconduct".

7. Disputes are to be settled by arbitration while Spanish law

is applicable for matters not included in this Agreement.

8. Amendment and extension conditions are standard features.

III.5 - The Radarsat network of arrangements

Canada has been - and still is - a "passive" player (so to speak) in the field of remote-sensing, in the sense that it is not present in space with its own remote-sensing satellite, even though it has been among the very first countries to launch telecommunication satellites of its own. The Canadian space program which has already been introduced aims at placing Canada into the group of "active" remote-sensing operating countries. Parallel to the development of Radarsat, the rules of the game, in terms of commercialization of the remote-sensing data, have been laid down mainly with the creation of a purely private entity, Radarsat International, a consortium of private Canadian space corporations.

Several documents rule the network of relationships which has been organized around this satellite. The fundamental document which, actually has a wider scope, is Bill C-16, which has created the Canadian Space Agency (CSA) and provides for responsibilities of this agency. The cornerstone of the whole Radarsat construction is a document established between the two partner nations, Canada and USA, and which rules the relationship between their agencies, CSA on one side, NASA and

NOAA on the other side. Finally, a third document rules the relationship between the Canadian Government (Energy, Mines and Resources) and CSA on one side, and Radarsat International (RSI) on the other side, and which describes the sharing of responsibilities in the commercialization process.

A. The role of CSA in relation to remote-sensing

A.1 - A legislative framework

1. The Canadian space policy is partly carried out by CSA which has been created by Bill C-16, an Act of the Canadian Parliament passed on December 15, 1989 "to establish the Canadian Space Agency and to provide for other matters in relation to space". This is a government agency whose objects "are to promote the peaceful use and development of space, to advance the knowledge of space through science and to ensure that space science and technology provide social and economic benefits for Canadians". However its powers are not without limits, since it "performs its duties and functions in relation to all matters concerning space ..... that are not ..... assigned to any other department, board or agency of the Government of Canada"[89]. Other government bodies or agencies may then carry out specific space projects.

---

[89]. Bill C-16 - An Act to establish the Canadian Space Agency and to provide for other matters in relation to space - As passed by the House of Commons, December 15, 1989.- Second Session, Thirty-fourth Parliament, 38 Elizabeth II, 1989.

2. This Act precisely provides for the commercialization of some segments of the space activity. The Agency is supposed to encourage the diffusion throughout the Canadian industry of space developments innovations[90].

The Act goes further in detailing the marketing means that the Agency may use in performing its functions, granting the Agency a large array of capabilities. In a few words, the Agency may manufacture, support financially any program, ensure that any project has a commercial potential, license or sell any kind of know-how, contract in the name of the government, borrow or lend funds and do anything which may help it attain its objectives[91] There is no doubt about the

---

[90]. Article 5.2 of the Canadian Space Agency Act:
"In carrying out its objects, the Agency shall:
a) assist the Minister to coordinate the space policies and programs of the Government of Canada;
b) plan, direct, manage and implement programs and projects relating to scientific or industrial space research and development and the application of space technology;
c) promote the transfer and diffusion of space technology to and throughout Canadian industry;
d) encourage commercial exploitation of space capabilities, technology, facilities and systems; and
e) perform such other functions as the Governor in Council may, by order, assign".

[91]. Article 5.3 of the Canadian Space Agency Act (1989):
"In carrying out its objects, the Agency may:
a) construct, procure, manage, maintain and operate space research and development vehicles, facilities and systems;
b) assist departments, boards and agencies of the Government of Canada to use and to market space technology;
c) make grants and contributions in support of programs or projects relating to scientific or industrial space research and development and the aplication of space technology, including projects designed to develop, test, evaluate or apply new and improved processes, products, systems or information relating to space science and

large mandate granted to the Agency.

A.2 - A mix of national and international contractual ties

While remote-sensing in general remains under the control of EMR as one of the three major development axis of the Canadian space program, the Space Agency has effectively become an operating arm of the commercial remote-sensing policy since it included the building of a purely Canadian remote-sensing satellite (to be compared with EMR/CCRS still being the operating arm for the non-Canadian remote-sensing satellites). This policy has been embodied in two agreements which are closely interrelated and that the Agency has passed in order to:

1) organize the cooperation of foreign space

---

technology with a view to determine the commercial potential of that science and technology, but not including any programs or projects relating solely to the commercial exploitation of space science or technology;
d) cooperate with the space and space-related agencies of other countries in the peaceful use and development of space;
e) provide services and facilities to any person;
f) license, sell or otherwise make available any patent, copyright, industrial design, trade-mark, trade secret or other like property right controlled or administered by tne Minister;
g) enter into contracts, memoranda of understanding or other arrangements in the name of Her majesty in right of Canada or in the name of the Agency;
h) acquire any money, securities or other personal property by gift or bequest and expend, administer or dispose of any such money, securities or property subject to the terms, if any, on which the gift or bequest was made;
i) administer any loans or guarantees made by the Minister pursuant to section 9; and
j) do all such things as are necessary or incidental to the attainmment of the objects of the Agency".

agencies in the reception of Radarsat signals (1991 IMOU);

2) organize the role of Radarsat International, the commercial arm of the Canadian remote-sensing program (1990 MOU), jointly with EMR.

B. The Memorandum of Understanding between CSA, NASA and NOAA

B.1 - Outlook of the Memorandum

This 32 page document was signed in Washington on February 27, 1991. It regulates the relationship between CSA on one side, and the two American space agencies on the other side, NASA and NOAA, in relation to the Radarsat Project.

This IMOU starts by reminding the interest of the Radarsat project: it is to extend the benefits of the Seasat mission which has already been mentioned in this research. The Radarsat is therefore "an advanced remote-sensing mission with a wide range of objectives". Since there are different parties with different technical capabilities and agency mandates, objectives vary for each party[92].

---

[92]. Excerpt form Article 1.3 of the 1991 Radarsat IMOU: "... the CSA primary need is to obtain data for pre-operational purposes, though a program which includes the participation of those Canadian provinces contributing to the project costs. For the US, the NASA primary need is to obtain experimental data to support global research and application demonstration efforts of its own and those of other US Government departments and Agencies; NOAA's

This IMOU integrates studies which had been conducted previously within the framework of an arrangement between EMR and NASA, dated September 29, 1982, and which had "led to the detailed specification and design of the Radarsat satellite". The object of the "mission is to collect, process and distribute data from the SAR ... (which) will be used for pre-operational and experimental purposes". All data is to be made available on a public non-discriminatory basis.

B.2 - Objectives and responsibilities

1. The IMOU details eleven objectives for the Radarsat project[93]. Quite obviously, the purely scientific aspect of the project is real (environmental and ocean monitoring) since its proponents have precisely identified it as the heir of Seasat, an exclusively scientific experiment of the late

---

global research and application demonstration efforts of its own and those of other US Government departments and Agencies; NOAA's primary interest is to ensure the availability of this data to US government and private users and promote its use on a widespread basis consistent with US law".

[93]. Excerpts from Article 4 of the 1991 Radarsat IMOU:
The objectives of the project are to create, collect or obtain:
"i) ... data ... for environmental monitoring,
ii) ... daily sea ice maps ...,
iii) .... SAR data ... for the purpose of crop forecasting,
iv) ... periodic SAR data coverage of Antartic sea ice ...,
v) ... a global set of stereographic SAR images for mapping,
vi) ... the first comprehensive map of the Antarctic ... ice sheet,
vii) ... SAR data in support of approved research studies ...,
viii) ... SAR data for experiments sponsored by the parties ...,
ix) ... and make available global data to any persons ...,
x) to develop applications ... in a pre-operational environment,
xi) by assigning distribution rights for SAR data to the private sector, to promote the world-wide use of the SAR data.

seventies.

2. Article 5 lists the responsibilities of the parties which may be summarized quite simply:

(i) For Canada, CSA:

- supplies the whole satellite and its communication means,
- operates the two Canadian acquisition stations,
- makes the SAR data available for its part,
- manages the satellite during its circling of the Earth, including its periodical reorienting needs.

(ii) For the USA, NASA:

- procures the launch,
- makes available its own ground support equipment,
- provides and operates its data acquisition station of Fairbanks in Alaska,
- supports application demonstrations for the use of SAR data for sea ice mapping.

(iii) Also for the USA, NOAA:

- facilitates the US Government use of SAR data,
- facilitates "the distribution of SAR data by ensuring that the US private sector has an adequate opportunity to participate in distribution rights to

this data and that all such arrangements are consistent with US law".

B.3 - Coordination, management and implementation of the project

1. Coordination is ensured by an International Steering Committee (ISC) which is chaired by CSA, composed of equal national representation and scheduled to meet at least one a year. Its main mandate is to ensure that the various part of the project enfold according to schedule and to advise for unexpected events, disputes or necessary changes in the program. It will also advise CSA for the continuation of the mission beyond its five year life projection and review arrangements relative to the distribution rights measures. It may also be required to perform any other function that the parties would entrust it with.

2. CSA will develop a Joint Project Implementation Plan covering various technical aspects of the program, as well as data acquisition and management.

B.4 - Satellite data management

1. Data acquisition time is limited to 28 minutes per orbit and requests to be allocated in proportion to the value of each party's contribution. Specific requests may be taken into

account for exceptional environmentally related events. Restraint is also requested with respect to the use of the on-board recording facilities which are primarily devoted to specific environmental missions.

2. Data reception, processing and distribution must be provided for by each party to this MOU. Mutual assistance should prevail in case of overlapping or missing territory coverage. CSA may also request the providing of back-up read-out of recorded data if it cannot take place at a scheduled receiving station.

3. Data quality will be verified throughout the mission. However, the parties do not guarantee data continuity, quality, availability or suitability for any particular purpose. Actually, this is a standard feature for all commercial remote-sensing agreements.

4. Data use for non commercial purposes is the object of a detailed article. Its main features provide that SAR data may be used for research programs and their cost be borne by their sponsors. SAR data will be made available for research and applications demonstration only, and solely for experiments which have been pre-approved. The results of those researches must be made available to the scientific community through publication in the appropriate publications. If these articles

bear a copyright, "the Parties will have a royalty-free right under the copyright to reproduce and use such copyrighted work for their own purposes". Parties have a free access to all Radarsat SAR data in the archives of the other party, provided that the extracted data be not sold or made available to third parties. "Parties may (also) delegate or subcontract their responsibilities for data acquisition, processing, archiving and distribution ... (but) ... private sector organizations gaining access to SAR data in this way may not use it to create value-added products for distribution except on behalf of the Government or agency concerned through a service contract".

5. Data distribution will be performed in accordance with a policy of non-discrimination. The implementation plan is to specify the data format as well as procedures for data quality control. Archives will be accessible in a primary data format and included in a total catalogue by CSA. While CSA's copyright is reaffirmed, the other party has rights of use. Distribution is performed by an entity to be designated (it was to be RSI) and which should include Canadian and US interests in proportion to the contributions of each country's parties to the project capital cost. Access of outside agencies and organizations would have to be dealt with subsequently but with a separate agreement, following negotiations with concerned parties (this was to be the

EMR/CSA/RSI MOU to be discussed further down in this research). Finally, no hidden sell, gift or free delivery of data will be done by the parties without the agreement of the Distributor.

6. Funding must be assured by each party up to its share of the project. Any potential non-availability of appropriated funds must be notified in writing to the other party.

7. Public relations will be conducted by CSA after consultation with the other party. Procurement of equipment by each party will be done in accordance with their respective procurement laws.

8. Liability.

(i) There is a cross-party waiver of liability which extends to the other party, its contractors and subcontractors. But nothing prohibits vertical claims, between a party and its own contractors and subcontractors[94].

---

[94]. Article 18 of the 1991 Radarsat IMOU:
"With respect to cooperative activities undertaken pursuant to this MOU, neither Party will bring a claim or suit against the other Party or the other Party's contractors or subcontractors for damages arising out of injury or death of its employees or damage to or loss of its property whether such injury, death, damages or loss arises through negligence or otherwise. The parties in their contracts with each other related to this MOU will include the said inter-party waiver of liability. Each Party will stipulate in any

(ii) There will be consultations in view of a sharing of liability in cases when the 1972 Liability Convention would apply[95].

(iii) In a situation of loan of equipment between parties, the receiving party will be responsible for this equipment until returning such items.

(iv) CSA is authorized by NASA to carry out its responsibilities for all inventions and processes covered by a US patent.

(v) A party supplying equipment will include an indemnity provision clause for any risk of patent infringement claim which would face the utilizing party. In such case, the utilizing party must inform the furnishing party as soon as practicable.

---

contract with a contractor related to cooperative activities under this MOU that that contractor will be responsible for injury to or death of its own employees and for damage to or loss of its own property and that that contractor will not bring a claim or suit against the other Party or the other Party's contractors or subcontractors for such injury, death, damage or loss. Each Party will require the said subcontractors to include the same provisions in contracts with subcontractors related to this MOU".

[95]. Article 18.4 of the 1991 Radarsat IMOU:
"In the event of damage resulting to persons or property for which there is joint and several liability under the Convention on International Liability for Damage Caused by Space Objects or otherwise under international law, the Parties, or other designated Government bodies, will consult on an equitable sharing of liability with a view to recommending to their respective governments a course of action".

(vi) CSA is responsible for frequency allocation and clearance, as well as for decisions to be taken in case of a shortening of the nominal lifetime of the mission after launch. In case of an extension of this lifetime, CSA will decide in consultation with the other party.

9. Conflicts.

(i) In case of conflicting obligations resulting for a party from entering into an arrangement relating to the Radarsat program "it is the responsibility of (that) party to take steps to resolve these conflicts in a manner which does not affect the good of the project".

(ii) Disputes should be settled within CSA's coordinating powers or "referred to the appropriate level of authority of the parties for consideration and action".

10. Entry into force will occur on the signature day of an agreement between the two governments. Termination may occur at any time by mutual consent after having given the other party at least a 180 days written notice of intent.

This memorandum was to be implemented on the Canadian side by an MOU between EMR, CSA and RSI which we now survey.

C. The MOU between EMR, CSA and RSI

This 27 page MOU was signed on September 24, 1990, with the idea to organize the distribution and marketing of Radarsat SAR data which, apart from the scientific objectives, sets specific commercial objectives[96].

RSI stands as an active partner if not the principal actor of the commercialization of Canadian remote-sensing. Its objectives are very clearly to develop the market, nationally and internationally[97]. It goes as far as finding a commercial

---

[96]. Article 1.1 of the 1990 MOU:
.....
b) to contribute to the overall development of a national and international commercially viable remote sensing industry,
c) to contribute to the maintenance and improvement of the Canadian industry world leadership and the high quality profile in the field of remote sensing, and
d) to generate a revenue stream to the CSA to offset the mission operating costs.

[97]. Article 2.1 of the 1990 MOU:
RSI will use its best efforts to:
a) stimulate the global use of Radarsat data and data products and services ... (i) developing an "international market" for Radarsat SAR data and data products and services that is separate from the national Governments requirements and the international research requirements of the parties to the IMOU; (ii) developing a "national market" made up of non-government users for Radarsat SAR data and data products and services.
b) stimulate, on a fair competitive basis, the global value-added markets for Radarsat Sar data products;
c) identify, and where financially and commercially viable, design and develop commercial national and international Radarsat SAR applications;
d) when commercially advisable, to design, finance and manage

partner in the United States.

C.1 - Radarsat International's obligations

1. They are severalfold:

(i) to be consistent with United Nations Resolution A/41/751 of December 1986 on the Principles relating to Remote-Sensing of the Earth from Space;

(ii) to distribute Radarsat SAR data to agencies of the parties of the IMOU, as well as to the Canadian federal departments and agencies, and to the Contributing and Participating Provinces at a specified cost and in specific conditions;

(iii) to organize certain technical studies and, particularly, to take into account the latest SAR user awareness after the launch of the European ERS-1 satellite;

---

domestic and international demonstration and simulation projects for the use of Radarsat SAR data and data products, and

e) in accordance with the provisions of the IMOU, article 12.5 to find a US private sector entity that will make an equity investment in RSI approximately proportional to the US contribution to the space segment costs.

(iv) to effectively process, distribute and market Radarsat SAR data and data products globally;

(v) to develop, maintain and manage an international catalogue of Radarsat SAR data and data products and to promote their international utilization;

(vi) to collect and share with CSA the reception fees received from foreign receiving stations;

(vii) to pay CSA a 15% global royalties on data and data product sales.

2. However, due to RSI's private statute and eventhough the MOU is mute about RSI's capacity to contract outside the Radarsat project for non-Radarsat issues, this company is also free to contract with anybody else provided that it does not contradict with its main obligations. An example of this capacity is provided by the signing on September 18, 1990 of a distribution contract of SPOT data with SPOT Image on the Canadian territory[98].

---

[98]. Radarsat International Inc. et Spot Image signent un contrat de distribution de données Spot sur le territoire canadien. Spot News - December 1990 - p. 19.

C.2 - Governmental obligations towards RSI

As represented by CSA and the Ministry of Energy, Mines and Resources, the Government of Canada is mostly bound by technical obligations and must provide for the legal framework within which RSI may commercially act:

1. CSA is committed for the technical side of the project and for providing any assistance to RSI's commercial interventions[99]. CSA must also grant RSI 40% of its access time to the data and grants RSI an exclusive distribution and marketing license for the satellite data and data products, including access to the archives[100].

---

[99]. Excerpts from Article 3.1 of the 1990 MOU:
CSA will use its best efforts to:
a) manage the design, build and launch activities ...
b) in negotiations with the parties to the IMOU,... ensure that the rights assigned to RSI ... are preserved;
c) wherever appropriate, assist RSI in its efforts to obtain access on a commercial basis to the reception and processing facilities...
d) in cooperation with RSI, develop parameters for contract negotiation with foreign receiving station operators ...
e) whenever feasible and possible, to cooperate and assist RSI in its domestic and international demonstration and promotion campaigns.

[100]. Excerpts from Article 3.2 of the 1990 MOU:
CSA agrees to meet the following obligations:
a) grant to RSI ... 40% of CSA prorata share of the total Radarsat SAR data acquisition time as defined ... by the IMOU;
b) grant to RSI the exclusive license to distribute and market global Radarsat SAR data and data products save for the rights granted ... for Government use under ... the IMOU, ... for international research ... by ... the IMOU ...

...

d) grant to RSI the exclusive license to market to customers, other than the parties to the IMOU ... Radarsat SAR collected and

2. Energy, Mines and Resources have also committed themselves in cooperating with RSI in the development of SAR applications and demonstration activities in order to lead to the development of new markets and in making available to RSI other CCRS facilities at cost.

This translates into specific obligations, such as free data reception, timely access to data archives and access to ERS-1 processing facilities with a global compensation mechanism for costs involved.

3. Conflicts in priority access will be handled according to a Policy to be developed by an International Steering Committee during the pre-launch period. However, "RSI agrees to guaranty priority access to Federal Government departments and agencies for their real-time or near real time Radarsat SAR processing requirements" (Article 4).

4. Agreements with receiving foreign stations will include quality standards requirements, unrestricted access for RSI to the archives, and an obligation to maintain an updated catalogue (Article 6).

5. RSI does not hold an exclusive right to sell value-added

---

archived by the parties to the IMOU and, for which purpose, RSI will have access to Radarsat SAR data in archives maintained by the parties to the IMOU ...

work and may not compete with value-added vendors[101]. Such provisions aim at encouraging RSI to sell such products without controlling its market, which observers estimate at being ten times larger than the one of raw data[102]. This approach has been adopted by SPOT Image.

6. Copyright is vested in CSA. RSI only holds a user right, like the other parties to the IMOU (Article 8). Any information considered as being commercially sensitive or confidential by a delivering party must be treated as such by the receiving party. If disclosure is required by law, Canadian or other, prior written notice must be provided to the delivering party (Article 14).

7. Coordination and management of the Radarsat program is performed by an International Steering Committee (ISC)[103].

---

[101]. Article 7 of the 1990 MOU:
7.1: RSI acknowledges that it does not have an exclusive right to sell Radarsat value-added products.
7.2: If RSI decides to enter the value-added market, contracts between RSI and its clients must include the cost of Radarsat SAR data and data products according to RSI published price list.
7.3: RSI agrees to support the development of the value-added industry by not competing with value-added vendors in the supply of value-added products to end-users where it is clear that value-added vendors are willing and able to service this market.

[102]. Guy M. Stephens - Remote sensing: Opportunity waiting to happen - As more attention is focussed on remote sensing, the opportunity for providing value-added services increase astronomically - Satellite Communications - May 1991 - p. 14/16.

[103]. Excerpts form Article 10 of the 1990 Radarsat MOU:
10.1: The senior level of program management of the Radarsat Project is the ISC. The ISC is responsible for ensuring that the

This Committee will intervene in matters of data rights conflicts and in conflicts resulting from priority access to the system. Canadian aspects will be monitored by a National Program Coordinating Committee (NPCC).

8. Liability (Article 11).

Similarly to other commercial remote-sensing arrangements, no guarantee is given for the continuity, quality, availability or suitability of Radarsat data. Except in cases of fault or negligence of CSA or those for whom it is responsible, (i) the Government of Canada waives its responsibility for anything related to the use and provision of Radarsat or its agents, and (ii) RSI will indemnify CSA and the Government from any third party claim alleging any damage resulting from the use of Radarsat data. Finally, a cross-waiver liability clause liberates the parties from any action of one against the other(s). Finally, such an agreement is not aimed at building

---

provisions of the IMOU are respected. In particular, this forum will be responsible for resolving conflicts regarding the data rights for Government use and for international research and conflicts regarding priority access to the system. Since the data rights of international partners and those assigned to RSI are potentially similar, RSI will be represented on the Data Policy Sub-Committee of the ISC.

10.2: The National Program Coordinating Committee (NPCC) will provide policy advice and planning guidance on Canadian aspects of the Radarsat Project in matters relating to the acquisition, processing and distribution of Radarsat data and data products, and the development of radar data applications within Canada. RSI will be represented on this Committee by its President.

...

10.4: The Parties agree to consult on a regular basis during the design, construction and operational phases of the Radarsat Project.

a joint venture or a partnership between the parties and RSI should not be considered as being an agent of the Government.

9. Duration of the arrangement (Article 12).

The entry into force will occur with the signatures of the parties. Termination may occur for any mutually agreed reason between the parties. The implementation contract will terminate five years after the launch of the satellite, unless extended by decision of CSA. In that situation, RSI will maintain its rights and privileges. In cases where either RSI, CSA or the Government of Canada terminates its participation or support of the program, the other parties are given rights on the remaining archives and other existing assets. If the Government terminates the project before launch, it will buy back any equipment the parties RSI may have acquired.

10. Reporting disclosure and audit rights (Article 13).

RSI must report to CSA on its activities on a quarterly basis and provide annual consolidated audited financial statements, with a yearly updated business plan. Deviations between the projected forecast and actual performance will have to be explained. CSA has d'rect access to all records that RSI and its sub-contractors, sub-licensees may have, as well as to those of foreign stations operators.

11. Public relations concerning the project will be conducted

by CSA after consultation with the other parties.

12. Financial terms and conditions (Appendix 2).

The financial schedule is quite simple and bears several similarities with the SPOT MOUs: RSI will pay CSA 60% of the foreign station receipts up to $1 million, 1988$ adjusted for inflation. Above this ceiling RSI will pay 15% of same revenues. In addition, RSI will pay CSA 15% of all gross revenues from Radarsat data and data products sales, after deduction of the price paid for value-added services.

IV - PROPRIETARY ASPECTS OF COMMERCIAL REMOTE-SENSING IMAGERY

IV.1 - What type of proprietary aspects ?

A. Industrial and commercial proprietary rights

1. There are at least two aspects to consider here, first the purely industrial property aspect mostly from a patent perspective which we will not deal with since it would take us far beyond the scope of our research. Dealing with proprietary aspects of industrial manufacturing in outer space which would be connected to remote-sensing imagery might be of interest only if new technical remote-sensing devices were to be conceived and manufactured in outer space and soon afterwards put into use on a remote-sensing satellite.

2. The second aspect deals with the problem of proprietary aspects relating to the end-product imagery itself, produced by remote-sensing satellites, i.e. signals received by the ground station as well as pictures reproduction, representation and enhancement by distributors or by value-added firms or by any other third party, or written analysis of images and data. This type of proprietary right has immediate important consequences in terms of commercial developments since it frames the conditions within which the end-product will generate sale revenues, in both volume and allocation. In Part III of this research, we have shown that

copyright provisions are included in all recent bilateral MOUs signed since the beginning of the commercialization era of remote-sensing imagery by the five selected operating agencies (EOSAT, SPOT Image, NASDA, ESA, and CSA) with their foreign partners which manage the receiving ground stations. We will now proceed in two parts:

- First, we will attempt to assess the specific aspects of remote-sensing imagery in terms of international protection as compared to other space activities having a literary or intellectual flavour with a direct and immediate commercial impact.

- Second, we will focus on the copyright provisions of the Part III bilateral agreements in a comparative law approach and assess each of them against the others, in order to attempt an evaluation of their effectiveness in international law.

We will invariably use the terms "pictures" and "signals" in order to identify the same physical elements, i.e. the bits or information elements transmitted by the satellite to relay stations, in outer space or on the ground.

B. Outer space or terrestrial proprietary rights ?

B. Outer space or terrestrial proprietary rights ?

1. Proprietary aspects attached to data flows directed to a relay station in outer space which we have introduced earlier in this research and identified as a Tracking Data Relay Satellite System (TDRSS) will not be dealt with since only one country so far has and can afford such costly equipment, the USA. However, one important comment should suffice to deal with this item. It is quite clear that such TDRSS provides the best and easiest way for the owner state or organization to ensure an autonomous operating protocol since it allows for the collection of the sensed information free from any allegiance to earth ground stations which are usually located on foreign territories. Therefore, a TDRSS provides an easy by-pass to potential proprietary claims that foreign states operating relay ground stations may have on sensed data, its strength being directly proportional to the *de facto* disappearance of the "prior access" principle of the 1986 Declaration on Remote-Sensing.

2. What we are looking at here is the standard situation whereby flows of data transit through ground stations located on territories which are foreign to the national state of the sensing operator, in reference to Landsat, MOS, SPOT, Radarsat and ERS-1. A last preliminary comment is to be done on the fact that we will also only look at the international legal dimension of those proprietary rights. We will therefore not

touch upon the national laws dimension of the problem.

IV.2 - International legal protection of commercial remote-sensing imagery

A. Copyright or "Droit d'auteur" ?

1. Copyright is an Anglo-Saxon concept which, in essence is a negative notion, defined as an exclusive property right of limited duration. "It is simply the right to prevent the copying of physical material and its object is to protect the owner of the copyright against any reproduction of that material which he has not authorized"[104]. Copyright has mostly an economic value and stands as a creature of statute which, as a consequence, has three statutory limitations:

- a limited duration, beyond which the work falls into the public domain;
- some uses of protected work are free, which are called "fair use";
- the owner of the right may not be given an absolute right but only a right to equitable remuneration for each use, which is named as a "compulsory license".

2. "Droit d'Auteur" is a Continental Europe concept of natural

---

[104]. Stewart Stephen M. - International Copyright and Neighbouring Rights - London - Butterworths - 1983 - 740 pages.

and individualistic essence. The protected right stems from the act of personal creation. There is an intellectual property which conveys an absolute right which, in theory, cannot be restricted. Major proponents of this vision have accepted a 50 years duration. This intellectual right is of a moral nature. The author is looked at as the weaker party, so that "droit d'auteur" is aimed at protecting the creator of the work.

3. In practice and throughout a one hundred year international codification process, the differences between the Copyright and the "Droit d'auteur" systems have narrowed so that both systems are nowadays largely overlapping each other. Several international conventions have incorporated this unification process of both protection systems which has been embodied by the simultaneous revision in 1971 of the Berne Convention ("droit d'auteur" countries) and of the Universal Copyright Convention (copyright countries), each convention being open for the signatures of member parties of the other convention and having effectively been signed by parties of the other convention. Of interest for satellite broadcasting and to a large extent for commercial remote-sensing are:

- the Berne Convention first signed in 1886 and amended several times until 1971 (Convention for the Protection of Literary and Artistic Works),

- the Universal Copyright Convention, first signed in 1952 and amended in 1971,

- the Rome Convention signed in 1961 (International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organisations),

- and the Satellite Convention signed in Brussels in 1974 (Convention Relating to the Distribution of Programme-Carrying Signals Transmitted by Satellite).

4. Without going deep into these conventions, it is possible to underline the main legal provisions which are of direct concern to remote-sensing organizations which intend to commercialize their end-product imagery, even though, it should be underlined that none of these conventions directly covers the matter of remote-sensing imagery. For the sake of simplicity, the expression "copyright" will be used hereunder indistinctively covering copyright", "droit d'auteur", and "droit moral" when they appear in the convention provisions under study.

B. Main clauses of current copyright conventions which apply to commercial remote-sensing

B.1 - The Berne Convention (1971)

1. There is no doubt that remote-sensing imagery is part of the general scope of Article 2 of the Berne Convention[105]. At least, the Convention covers the first imagery product after the bits transmitted by the satellite have been converted into a readable photography, which raises immediately the question of the protection of raw data. It has been reported that this question was first envisioned when the Jodrell Bank Observatory received video signals transmitted by Luna 9 and published them afterwards without authorization by the owner of the satellite and with a possible infringement of his copyright on the pictures. Apparently, the question was never answered which quite obviously may be interpreted as confirming that, if there was indeed a copyright infringement, the scientific nature of the publication may have justified it, which also was the characteristic of the early Landsat experiments as it appeared in the arrangements that we analyzed in Part III of this research.

2. In order to have this copyright be validly put forward for effectiveness, the Berne Convention provides that works must

---

[105]. Excerpts from Art. 2 of the Berne Convention (1971):
(1) The expression "literary and artistic works" shall include ... photographic works to which are assimilated works expressed by a process analogous to photography ... illustrations, maps, plans, sketches and three-dimensional works relative to geography, topography, architecture or science ..."

be "fixed in some material from"[106], and national legislations may not renege on their obligation to participate in such protection. Only news information are not covered by these provisions[107]. Incidentally, the Mediasat project which has been envisioned by several news organizations in the late eighties would have had to cope with this Art. 2-8 provision of the Berne Convention which specifically withdraws that type of satellite transmitted data from the scope of the copyright protection.

3. The extent to which automatic protection is afforded to the author is determined by the Convention in association with the country where protection is looked for[108]. The amount of

---

[106]. Excerpts form Art. 2, Berne Convention (1971):
"...
(2) It shall, however, be a matter for legislation in the countries of the Union to prescribe that works in general or any specified categories of works shall not be protected unless they have been fixed in some material form ...".

[107]. Excerpts from Art. 2, Berne Convention (1971):
"...
(6) The works mentioned in this Article shall enjoy protection in all countries of the Union. This protection shall operate for the benefit of the author and his successors in title.
...
(8) The protection of this Convention shall not apply to news of the day or to miscellaneous facts having the character of mere items of press information".

[108]. Excerpts from Art. 5, Berne Convention (1971):
"(1) Authors shall enjoy, in respect of works for which they are protected under this Convention, in countries of the Union other than the country of origin, the rights which their respective laws do now or may hereafter grant to their nationals, as well as the rights specially granted by this Convention.
(2) The enjoyment and the exercise of these rights shall not be subject to any formality ... the extent of protection, as well as

protection which is granted to a foreign work is based on the principle of national treatment which essentially states that the protection afforded in one country A to works elaborated in country B, both countries A and B being parties to the convention, is as ample as that provided by country A to works elaborated on its territory. In a parallel manner, for countries which are not members of those conventions and which are not deemed to be granting the Berne Convention national treatment, one may expect the worse in terms of copyright infringement unless a specific reference is made within the bilateral agreement to provisions of local legislation to the effect of protecting data received by the local ground station, which amounts to a *de facto* national treatment.

4. Finally, authors have the right to authorize "the reproduction of their works"[109] but this should not hamper their own interest. Quite obviously, the 38 articles and the appendix of the Berne Convention are mostly geared towards works that we encounter in everyday life so that one can think that remote-sensing imagery can hardly be protected only by

---

the means of redress afforded to the author to protect his rights, shall be governed exclusively by the laws of the country where protection is claimed ...".

[109]. Excerpts from art. 9, Berne Convention (1971):
"(1) Authors of literary and artistic works protected by this Convention shall have the exclusive right of authorising the reproduction of these works, in any manner or form ...
(2) ... provided that such reproduction does not conflict with a normal exploitation of the work and does not unreasonably prejudice the legitimate interests of the author ...".

this Convention provisions. The UCC brings some complementary elements to this protection.

B.2 - The Universal Copyright Convention (1971)

1. The visual aspect of the copyright is provided for with the appearance of the (C) special logo with the name of the beneficiary[110]. Therefore, end-product imagery must affix a visible indication of the copyright, its owner and the date of first use on each imagery item.

2. The duration of the copyright (author's lifetime plus twenty-five years) is shorter than in the case of the Berne Convention (fifty years beyond the author's lifetime), but is still of imposing length.

3. The other provisions of the UCC do not differ substantially from those of the Berne Convention and are mostly devoted to standard works of a literary or artistic nature.

4. It is considered however that the Berne Convention provides a higher standard of copyright protection than the UCC. As a

---

[110]. Excerpts from Art. III of the Universal Copyright Convention (1971):
"... from the time of first publication all the copies of the work published with the authority of the author or other copyright proprietor (must) bear the symbol (C) accompanied by the name of the copyright proprietor and the year of first publication placed in such a manner and location as to give reasonable notice of claim of copyright ...".

matter of fact, the UCC itself provides that if a nation is a member of both conventions, the terms of Berne will govern, and if a nation is a member of the Berne Convention, it cannot withdraw and be only a member of the UCC, loosing both membership in the same time.

B.3 - The Rome Convention (1961), the Phonogram Convention (1971) and the Satellite Convention (1974)

Strictly speaking, these conventions are of little or no interest at all to remote-sensing imagery protection since they are exclusively designed for the protection of the radio and satellite broadcasting of literary and artistic works, and since they also imply a public reception and distribution of "aural fixation of sounds of a performance or of other sounds" (article 3-b, Rome Convention).

However, from a purely doctrinal point of view, one may express several comments on several of their provisions which may have a potential application to the specific case of remote-sensing imagery[111]:

1) The national law-maker may reduce the extent of the copyright to that of a compulsory license: "the author's permission is no longer required and the broadcaster's only

[111]. André Kerever - Satellite broadcasting and copyright - Copyright Bulletin - vol XXIV, No 3, 1990 - p. 7/22.

duty is to ensure that the author receives remuneration customarily regarded as 'equitable', ... equity is the sole possible criterion for determining remuneration in the absence of balanced contractual discussions"[112]. Then, how far may a remote-sensing imagery products licensor go in terms of prescribing the rights and duties of the licensee as well as his remuneration ? Such potential restriction to the ability of the satellite operator to regulate the actions of its distributors, if it is transferred to remote-sensing by means of a specific convention, will certainly contradict with some established practices which go far beyond (SPOT Image, for example).

2) There is no doubt about the fact that "any operation whereby ... works are made available to the public constitutes an act of communication to the public, of public performance or of broadcasting. It therefore matters little whether the broadcaster uses a direct broadcasting satellite (DBS) or a fixed satellite system (FSS) if the signals are actually available to the public in both cases"[113]. Following this author, we may think that if remote-sensing imagery is made available to the public it automatically falls into the category of public broadcasting, which means that it falls within the scope of the 1974 Brussels Satellite Convention.

---

[112]. See Kerever, supra.

[113]. See Kerever, supra.

This author adds further that "copyright obligations depend solely on whether there has or has not been communications to the public, and not on the lawfulness of the conditions of public access from the standpoint of public telecommunication law". Such position has been supported by the European Commission on Human Rights in Strasbourg in relation to a 1988 case which it is not necessary to recall here. Particularly, "the Strasbourg Commission ruled that the nature of the message transmitted by the signal combined with the encoding or non-encoding of the signal determined whether it was intended for the public". The gap is easily bridged in the case of remote-sensing, since the bits which compose the message on the Computer Compatible Tape (CCT) request a very special handling by the receiver before it is made accessible to the public and can be considered as a *de facto* encoding. Therefore, one may directly question the validity of any kind of copyright on remote-sensing raw data from the position of the most recent copyright conventions. But as soon as this raw data is converted into visually accessible information, one may confirm that this is a copyrightable work. But such work would then have to be rendered accessible to the public while this is not the case when, for example here in Canada, it is still stored (and archived) at the Gatineau or Prince Albert CCRS ground station and even though it is perfectly readable for anybody with a minimum capacity to look at an aerial picture. It is beyond that point, when data is ready to be

stored and by the same token is ready to be sold, that a copyright may become necessary and justifiable.

3) Remote-sensing simplifies the debate which is going on about the applicable law and about the existence of an exclusive copyright as such questions must be addressed in the case of regular uplink and downlink satellite transmissions. The simplification arises from the technical fact that remote-sensing is generated by work done only in outer space which, in terms of international telecommunication, corresponds to a unilateral downlink transmission emanating from a satellite which remains under the total responsibility of the state of registration having granted an operational license to a closely controlled operating agency. But on the terrestrial segment of the whole operation - i.e. the marketing of the data - the operating agency is free to impose the law and the legal provisions of its choice when contracting with foreign ground stations.

4) In fact, the core of the copyright recognition problem for remote-sensing imagery lies around the nature of raw data. The World Intellectual Propriety Organization (WIPO) identifies four conditions which must be fulfilled so that a work may be

eligible for protection[114].

- The work must be unique and original, not the copy of some other work. Beyond any doubt, remote-sensing raw data is unique and original, this is clear.

- The work must be fixed on some material support. In that respect, remote-sensing looks like a live television report. In practice it seems that the protection of such a transmission is accepted, but the difficulty arises from the fact that there is no simultaneous public broadcasting. It must then be parallelled to a television report which is recorded in advance for future public broadcast.

- The work must be authored by somebody. In this vein, a provision of the Berne Convention provides for a collective authorship which may be what remote-sensing imagery is about.

- The work must be creative, which supposes the particular intervention of a human being. For regular remote-sensing or regular earth observation like the Meteosat system, one may argue that there is no human intervention, but only a well

---

[114]. Dutheil de la Rochère Jacqueline - Droit de l'espace (collective works) - Pedone - 1988 - 400 pages. Chapter 10: Protection des données et des inventions dans l'Espace - Marie-France Murphy et René Osterlinck - page 279/296.

programmed sophisticated equipment. But one may also argue that there is human intervention when the 2 steerable sensors of SPOT 1 and 2 are programmed according to client requests, or also when EOSAT ask their clients to specify what portion of the Earth surface the satellite sensor must be programmed for.

5. However, national laws which inevitably must be updated in order to relay the international copyright conventions do not seem to consider raw data as being original and of a creative nature[115]. The operating agencies may then protect their raw data by referring to the International Telecommunication Convention (ITC) which specifically makes it illegal to acquire signals when it is not duly authorized by the transmitting organization[116]. They may also use specific

---

[115]. Supra, M.F. Murphy and R. Osterlinck: "... il semble que dans la plupart des pays les données brutes originales ne soient pas considérées comme étant une création et par conséquent elles ne peuvent pas être protégées au titre du droit d'auteur ...".

[116]. International Telecommunication Convention - Final Protocol, Additional Protocols, Optional Additional Protocol, Resolutions, Recommendation and Opinions - Nairobi 1982 - I.T.U. - Geneva - 347 pages.
Excerpt from Article 23 on Establishment, Operation and Protection of Telecommunication Channels and Installations:
"...
2. So far as possible, these channels and installations must be operated by the methods and procedures which practical operatiiong experience has shown to be the best ...
3. Members shall safeguard these channels and installations within their jurisdiction.
4. Unless other conditions are laid down by special arrangements, each Member shall take such steps as may be necessary to ensure maintenance of those sections of international telecommunication circuits within its control".

encoding systems - and change them periodically - in order to make their satellite signals inaccessible for non-informed third parties.

6. Another way to look at the protection of raw data as soon as it is archived - i.e. as soon as it is received by the licensed ground station and stored in computer facilities - is under its database dimension as soon as it is archived. But one may argue that it is fairly late, since a pirate ground station may already have funnelled the information in its own computer facilities. Once it has been stored anywhere in the form of computerized archive, it is no longer a remote-sensing raw data copyright, but a plain database copyright for which a solution must be found with existing international conventions. But here, the question does not seem to be easier to be solved.

Just to mention a few obstacles, it appears that the remote-sensing operator which intends to have its archived raw information database copyrighted in the U.S. would not be protected as a database *per se*, but as a mere compilation of literary works[117] would face two types of hurdles[118]:

---

[117]. A compilation is "formed by the collection and assembling of preexisting materials or of data that are selected, co-ordinated, or arranged in such a way that the resulting work as a whole constitutes an original work of authorship". From 17 U.S.C. Par. 101 (1988).

- Registration difficulties, because US copyright law forces as many registrations as there are updates: "it allows for a single registration to apply to any database updates or revisions over a three-month period"; in other words, registration of an electronic database which is continually changing may become unmanageable.

- Publication difficulties (through dissemination), because "under US copyright law, what constitutes publication of a database is not entirely clear", by the own words of the Copyright Office[119].

Yet, with the Berne Convention the problem is not easier, since computer programs and databases where not much developed at the time of its revision, the convention refers to protection defined by the domestic law. And by extrapolation, this may be extended to any work of new technology, which certainly a downlink stream of remote-sensing raw data is:

---

[118]. Carol A. Motyka - Effects of U.S. adherence to the Berne Convention - Rutgers Computer & Technology Law Journal - Vol. 16 - 1990 - p. 195/225.

[119]. Cited in Motyka, supra: "It is unclear whether on-line availability with or without printers for the user constitutes publication of the work under copyright law". The decision of publication is made by the copyright owner. In: Copyright Registration for Automated Databases, Copyright Office Circular 65(1987), Copyright Law Report (CCH) 15,054.

"much confusion exists as to how the current text of the Berne Convention should be interpreted with respect to these works of new technology"[120]. And as if such lack of certitude was not sufficient, it is estimated that in the situation where a state party to the Berne Convention violates its obligation, the Convention's enforcement mechanisms are considered to be fairly weak[121], being left to each country's goodwill and appreciation in the matter[122].

7. A last resort for the protection of raw data lies with provisions which may be similar to those of the US Land Remote-Sensing Act and its sections 601-a and 603[123]. In

---

[120]. See Motyka, supra.

[121]. Article 16 of the Berne Convention (1971):
(1) Infringing copies of a work shall be liable to seizure in any country of the union where the work enjoys legal protection.
(2) The provisions of the preceding paragraph shall also apply to reproductions coming from a country where the work is not protected, or has ceased to be protected.
(3) The seizure shall take place in accordance with the legislation of each country.

[122]. Cited in Motyka, supra: Clayton Yeutter, U.S. Trade Representative, stated at Senate Hearings (100th Congress, 2nd Session 2-1988): "some countries don't want to enforce Berne because they've discovered that piracy pays".

[123]. Section 601 (a) and 603 of the U.S. Land Remote-Sensing Commercialization Act (1984):
"Sec. 601 - Nondiscriminatory data availability - (a) Any unenhanced data generated by any system operator under the provisions of this Act shall be made available to all users on a nondiscriminatory basis in accordance with the requirements of this Act.
Sec. 603 - Nonreproduction - In addition to such other terms and conditions as the system operator may set forth in compliance with section 601 of this Act, the system operator may require that unenhanced data not be reproduced or disseminated by any foreign or

other words this is a non-dissemination clause aimed at keeping raw data under the control of the satellite operator and equating to *de facto* copyright towards any buyer. However, in the case of a non-contracting station which would technically be able to receive the signals, there is no protection. It has been reported that the main reason such absence of protection by the US law-maker was to protect the value-added industry against potential abuses by the satellite operators[124]. The underlying motivation being that the risk for unleashed copying is far greater with enhanced work - more easily covered by the international conventions - than with raw data.

Quite obviously, there is no adequate and efficient protection of remote-sensing raw data in international law at the present stage. In the wake of the various copyright conventions, one may think that there is a need for such a specific convention, which may be a necessary step if the trend for the

---

domestic purchaser".

[124]. Supra, M.F. Murphy and R. Osterlinck, p. 287: "Une analyse détaillée des procès-verbaux du Congrès indique que la raison pour laquelle la loi n'a pas accordé cette protection aux données brutes vient du souci qu'ont eu à la fois la Chambre des Représentants et le Sénat de protéger les firmes dites 'à valeur ajoutée' - c'est-à-dire celles qui développent réellement le marché - des pratiques déloyales possibles des exploitants du satellite. Ils ont en plus estimé que la protection par droits d'auteur de ces données sans limitation du droit de monopole pourrait avoir des effets économiques néfastes: cela permettrait par exemple aux spéculateurs ayant accès aux données de faire des profits aux dépens de ceux qui n'ont pas accès aux données".

commercialization of remote-sensing is to be maintained in order to let private organizations be attracted by substantial profits to be made from the exploitation of raw data. There are observers which clearly state "that the Berne Convention itself is an inadequate mechanism" for new technologies[125], among which one may place without hesitation remote-sensing imagery.

IV.3 - A comparative assessment of Landsat, SPOT, MOS-1, ERS-1 and Radarsat actual copyright provisions.

Eventhough these provisions have been set up at approximately the same period in the late eighties, it is possible to draw lines between different sets of provisions which aim at protecting the satellite operator from uncontrolled dissemination of data through the intermediary of the contract partner, i.e. the agency in charge of the foreign local ground station, and from possible external abuses beyond the will of the foreign local partner. It is also of interest to analyze how these copyright provisions are translated at the client level through a plain sales contract.

A. Nominal and general restrictions to raw data ownership transfer

This is the first line of protection that all satellite

[125]. See Motyka, supra.

operators have set with their partner. However, important differences already appear at this minimal stage.

1. In the case of Landsat, it is not surprising with what has been described under IV.2 of this research that EOSAT does not mention the word "copyright" but asks for the station to "design and implement a Data protection plan" to be submitted and approved by EOSAT. In other words, protection is a matter to be designed case by case and a way to do it is to ask the other partner to submit its own views about it.

2. In the case of MOS-1, NASDA only faintly mentions a copyright: it specifies that "intellectual property rights ... are and will remain the property of Nasda", adding that the local agency "will refrain from registering or attempting to register any intellectual or industrial property rights, including, without limitation, copyright or patent rights". It can hardly be more general and vague as a restriction. NASDA also recognises that the local agency may have property rights on "analyzed information ... depending on the level of processing, analysis or interpretation which has been applied". No more precision is provided for in this respect.

3. For ERS-1, ESA explicitly asserts that the contract partner "acknowledges the copyright of ESA ... under the terms of this agreement and under the legislation and conventions concerning

copyright". Details are then given about how to let the "(C) ESA, year" logo appear on all ERS-1 data, as well as the "ERS-1-R" trademark logo, irrespective of its degree of analysis or its form. The local authority may also add its own (C) logo depending on its own amount of contribution to the analyzed information. One may have doubts about the effectiveness of such clause after having shown in IV.2 of this research that the conventions this agreement refers to are unprecise with regard to the specific situation of remote-sensing raw data.

4. For Radarsat, CSA simply says that "all copyright and ownership rights for SAR data will be vested or reserved solely in or to CSA, the other party having rights of use as described in this MOU to the extent permitted by the laws of the Parties". This restriction is general and vague, very much like the NASDA one.

5. It has already been shown that the SPOT contract is by far the most complete of the five agreements under study. The CNES copyright is asserted right away and it is specified that a clear mention of that copyright, with the (C),CNES,year logo must appear on all data and derivative works and products. The SPOT-R-year trademark logo must also be affixed to all pertinent documents. Interestingly, such copyright and trademark may co-appear with the one of the Canadian authority in charge of the supervision of the contract, in case

derivative works might be developed by such authority.

B. Complementary provisions

These provisions aim at strengthening the unavoidable flaws and weaknesses of international copyright conventions. This is really where the intention of contract writers shows up in their will to effectively fend off risks of uncontrollable dissemination of raw data.

1. The EOSAT contract contains a rather ambiguous clause stating that "neither title to nor ownership of the Landsat data transmitted to Earth Station under this Agreement is transferred to Earth Station" which is explained further down: "EOSAT grants to Earth Station a nonexclusive license to use, copy and distribute such Data for the purpose of performing this Agreement ...". This seems to equate to a right of use *as if* the station was the owner of the data, with the aim to act *as if* it was to market the data as the owner would do, without transferring the ownership of the data. This also is to be understood within the Data protection plan which has been mentioned in A above. It seems that such provisions do not ensure a real control of data dissemination by EOSAT through the whereabouts of the local station, which is not ensured of being the only one to use the data, since the license is nonexclusive. Therefore it seems to us that the legal

incentive to abide with EOSAT's restriction is not strong.

2. The NASDA contract does not accompany its general restriction clause about intellectual property with any other comments. In addition, there is only a confidentiality clause about the content of the contract requesting from the local agency not to disclose financial or technical terms of the contract.

3. ESA accompanies its copyright clause with the request to obtain from the local agency a model sales contract including "a written undertaking" that third parties "shall not distribute or sell ERS-1 SAR data and analyzed information" in their possession or copies thereof. This is an attempt to control what clients may do with the purchased raw data or value-added products. ESA also requests that all packagings of ERS-1 data and analyzed information be clearly marked that they are distributed by the agency "under ESA license".

4. CSA's copyright clause is straightforward, without much addition. Further protection is added in the International MOU with NASA and NOAA where CSA states that the participation of "agencies or organizations outside of the Governments of the Parties" will be subject of separate agreements with CSA and that such participants "will agree to support all project objectives, including ... restrictions on data distribution".

This is embodied in the MOU between CSA and RSI whereby RSI is instructed to keep CSA informed about any intention or activity it may have in relation to the value-added market. This is certainly a valuable clause when considering that SPOT Image has entered the value-added market, a possibility that RSI may also consider.

5. Finally, SPOT Image again has the most elaborate provisions. It really hires the local agent or station into a kind of common management of the SPOT raw data and value-added products:

* In addition to the copyright clause which has already been mentioned, a clause stipulates that the other party "agrees not to assert against CNES any right or claim whatsoever with respect to copyright on the Data", even if related to its own value-added contribution.

* The contracting partner must also provide SPOT Image with a model sales contract and must ensure that all sublicensees and customers will sign such sales contract where it says that they must comply with the terms of this agreement.

* Raw data and value-added work delivered to a third

party must include "a written undertaking that such third party shall respect CNES copyright interests and ... shall not distribute or sell" those data or work or copies thereof.

* The contracting partner must make every effort to be informed "of any infringement or suspected infringement of CNES copyright interests and ... trademarks".

* Should such infringements occur, both parties must consult "in order to reach an agreement concerning the measures to be taken" including "the bringing of legal actions by one or both of the parties against the infringer or suspected infringer of the copyright interests or trademarks".

* If such event occurs with a sub-licensee, the contracting partner "will at its own cost take any action including legal proceedings" without undermining CNES or SPOT Image ability to undertake similar actions or to subrogate to the other party's rights against the infringer.

* Finally, each party agrees to join the other in such an action.

* Also of interest for copyright are clauses subjecting the assignability of part or total of this agreement, as well as the granting of sub-licenses to prior written agreement from SPOT Image.

Whether this much wider array of legal provisions is more efficient than the less detailed protection clauses of the other agreements remains to be tested in practice. It appears so far that SPOT's legal advisers have designed a series of converging provisions which, quite obviously, aim at filling the giant gaps that international copyright conventions have in reference to remote-sensing raw data.

C. Actual copyright provisions as they appear on sales contracts

The actual intention of the contract makers do appear here at client level while it is translated into everyday sales conditions. The analysis is restricted to EOSAT and SPOT Image since only those two organizations have been operational out of the five which have been studied in this research.

C.1 - EOSAT's sales contracts

1. The Agreement for Purchase and Protection of Satellite Data that EOSAT signs with its clients appears in-extenso in Annex 14. Out of the 6 sections and the accompanying order form on

its back (not reproduced here), only one is of interest to us, named "Confidentiality of Satellite Data".

- One may notice that no mention of any copyright of any form is mentioned anywhere. Satellite Data is presented as a "special, valuable and unique asset of EOSAT" and is "confidential information which is disclosed in confidence to Purchaser". This is the justification of the sale and such clause sets the framework within which the sale is performed. Ironically, it stands just opposite to a free access data policy.

- Client may "use, translate, enhance or display" the data for an "authorized purpose", which must be "related to its established activities or lines of business". This clause allows for a transformation or raw data sold to the client as far as it is related to the authorized use, and this includes free dissemination within the client's organization as long as the receivers are juridically dependent on the purchaser. Part of the clause seems hard to apply from a purely commercial point of view, stating that data should not be disclosed to a client's competitor, since EOSAT is a privately run business organization whose purpose is to return a profit and the client does not hold an exclusive licence.

- A fairly weak clause (d) by which the client "agrees to take

appropriate action" in case of inadvertent disclosure of information reminds us of SPOT's similar but much stronger clause by which the foreign agency should take legal action against offenders of the non-dissemination restriction. While the need for such a provision is easily understood, one may wonder about its effectiveness.

- A copy of the warning which appears on the satellite data package is inserted in this sales agreement, in a very similar manner to most software products in North America. In essence, data is presented as a "confidential trade secret of EOSAT". Again, no copyright is specifically mentioned, the data being presented as "proprietary information", but nothing is said about the owner of the information. Infringement of this disclosure restriction is presented as a violation of Section 603 of the Landsat Act of 1984[126] and is therefore illegal. In the end, that is the only legal protection that EOSAT may claim on its satellite data.

2. Brokerage services are also offered by EOSAT, a sample contract of which appears in Annex 15. EOSAT acts as an intermediary between a purchaser of archived satellite pictures and the ground stations (IGRS) located in 14 countries around the globe. Such sale is deemed to be

---

[126]. See supra, discussion on the content of this section which essentially allows the system operator to request that unenhanced data be reproduced or disseminated.

performed by the IGRS itself, notwithstanding the intervention of EOSAT as agent of the purchaser. Such intervention enables the purchaser not to disclose its identity to the local IGRS. It is interesting to note that such brokerage services were not mentioned in the sole example of MOU passed by EOSAT with a foreign agency that we have analyzed in this research.

As far as copyright privileges are concerned, there is no specific restriction which is mentioned in this contract. One can only point out a general clause in Section 1.B which refers to a transfer of rights from the IGRS to the purchaser[127]. One may question the meaning of such clause, would the purchaser have a right on such purchase of archived data ? This induces us to think that EOSAT proprietary rights on satellite data are restricted to raw data, before being archived and may confirm EOSAT's own view about the uselessness of any type of copyright clause.

C.2 - SPOT Image's sales contracts

1. The sales conditions which pertain to France and possibly Europe are reproduced in Annex 16. It is a fourteen clauses document which has an order form printed on its back (not

[127]. Excerpts from Section 1.B of EOSAT Brokerage Services Agreement: "Title to all IGRS Data purchased pursuant to this agreement shall pass directly from the IGRS to Purchaser, and EOSAT shall acquire no rights or liabilities with respect to such IGRS Data except as expressly stated herein". (See full text in annex).

reproduced in annex). Proprietary provisions are included in clauses 10, 11, 11bis and 12.

The contract states first that the purchaser does not enjoy any exclusive right of any sort on the data that he has acquired. The "droit d'auteur" of CNES is very clearly mentioned relative to SPOT data. Commercial products sold by SPOT Image are derived from those data and the purchaser may use them only for internal purposes. He may neither pass, lend nor transfer them, temporarily or permanently, to a third party, not even copies of them. Any commercialization of those products or of products which are derived therefrom is subject to prior SPOT Image approval and is the object of a specific contract.

This does not include reproduction of SPOT data mainly for educational or scientific purposes, provided that the CNES copyright and logo are clearly indicated on such reproductions.

Finally, a sale of SPOT data does not attribute any right to the user over these data, or the company logo.

As a general comment, one may say that such conditions are, obviously, much in tune with what we have commented upon earlier. They do not appear to be very stringent since such

sales are supposed to be performed on French territory. As far as the territory is concerned, these conditions may also be similar for most of the E.E.C. territory, or they should be similar starting in 1993.

2. In the U.S.A., the Agreement on General Terms and Conditions for SPOT Data User Licenses appears in Annex 17. Such agreement is subject to SICORP (SPOT Image Corporation) exclusive right in the United States to license SPOT data acquired by SPOT satellites. It reasserts in its introductory paragraph that CNES holds all U.S. and worldwide copyrights covering SPOT data.

As expected from our earlier analysis of the SPOT MOU, copyright considerations represent a large part of SICORP's agreement, four sections out of the 12 section document, or in volume, about half of the whole document.

The bulk of these provisions is composed of section 2 which organizes the ways under which the Licensee (the client, who is granted a non-exclusive license) may use the data. This section is composed of eight sub-sections identified from A to H, which successively attempt at covering the most important situations. They are organized around three basic principles:

(i) Internal freedom.

Freedom to analyze, process, display and copy SPOT data strictly for internal purposes and as long as it does not create any digital reproduction. One backup copy is allowed but not available to anybody. All copies must bear the CNES copyright logo.

(ii) Data is available to external identified partners. Data may be made available to outside contractors, consultants or joint-venturers only if such person are bound in writing by the same restrictions and if they agree to return such data to the Licensee as soon as requested.

(iii) No copy is allowed unless authorized.
Copy of data provided in photographic form, or transmission of data to media, or preparation of textual reports and of non-image materials based on data, or commercial reproduction, or distribution of derived products, or any kind of transfer of rights are forbidden, unless previously authorized by SICORP in a written form.

Any breach of the above-mentioned and of the other clauses of the agreement is deemed to be unlawful.

A specific section is devoted to the physical appearance of

the CNES copyright. It is considered to be "a material term of this contract and of all agreements entered into by Licensee" provided that such agreement has been approved by SICORP. Third parties of these agreements must agree to abide with these provisions.

All these considerations confirm the general impression that we derived from the earlier analysis of the weaknesses of the copyright conventions as applied to the specific case of remote-sensing data. However, it is interesting to point out that, even though the USA have signed the Berne Convention, EOSAT does not make any reference to any copyright aspects of the data but concentrates its efforts around the notions of confidentiality of information and of trade secret protection, whereas SPOT Image attempts at strengthening the copyright notion as part of a more general contract obligation.

V - CONCLUSION

This research has focused on the few commercial remote-sensing systems which are now operating in the early nineties. This conclusion aims at making an appraisal about the evolution of those systems, about the existence of other legal aspects which may gain in importance as time lapses, and about the integration of present commercial remote-sensing practices within an appropriate international framework.

A. A marked evolution with three distinctive periods

- A first phase has been identified, mainly under NASA dominance in the 1970s and characterized by remote-sensing considered as scientific experiments with a fairly generous access of concerned national scientific agencies to collected data.

- A second phase during the 1980s, with the NOAA interim and the fairly rapid burst of roughly half a dozen of "commercial" remote-sensing systems in North America, Europe and the Far East, but the whole remote industry is not yet strong enough to ensure a rapid consolidation of the first operational systems. There is a split between the structural aspects which remain under national responsibility and the commercial side which tends to be under increasing private control.

- A third phase with the 1990s has just begun. The

consolidation of the private remote-sensing industry may occur rapidly helped by the development of the value-added sector. This industry is mostly interested in what is called "geographic information systems" or GIS, which is not new but could benefit from remote-sensing. Industry officials see GIS as a growth area: "all of our projects merge GIS and remote-sensing data" says an official from the Missouri-based Earth Observation Commercialization Applications Program, a NASA-affiliated organization[128] [129]. This is crucial, especially since the latest US funding difficulties which periodically (once a year, at the time of budget approval) threaten the future of such an important program as the international space station, not to mention the future of other space programs such as future public involvement in the Landsat project.

B. Other legal considerations to gain in importance

---

[128]. Lori Keesey - Value-Added Firms Eye Geographic Sector Growth - Space News - December 3-9 1990 - p.8

[129]. The author of this research has had access to corporate-published information about two precise exemples of GIS also called SIRS in French (Système d'Information à Référence Spatiale). Information was supplied:
* In Montreal (Quebec), by SNC, an important engineering firm which is actively involved with several other Canadian partners in a project called PROGERT about forest management in Canada based on space imagery.
* In Sophia-Antipolis (France), by SYSAME, a value-added firm which specialises in spatial maps, environmental studies and land surveys from space and from the air on all continents.

B.1 - Warranty and liability aspects of commercial remote-sensing

1. This important aspect of the legal dimensions of remote-sensing contracts, whether with local ground stations, with purchasers of data or with any third party has not been dealt with. One immediate reason is that the whole remote-sensing industry is still in infancy stage, as far as its commercial dimension is concerned. One could even assert that its full-fledged commercial phase has not yet started, notwithstanding all EOSAT and SPOT Image claims, joined by all the value-added industry claims that the remote-sensing industry market is estimated to be several hundred million $ market. The only reason why such a surprising assertion can easily be done may be that all contracts, agreements, MOUs and other texts having a binding effect have a no-warranty clause. All those contractual documents expressly mention as the SPOT contracts do, that the satellite data "are provided without warranty of any kind, whether express or implied, including implied warranties of merchantability and fitness for a particular purpose, even if SPOT Image is advised of such purpose"[130].

2. However, this represents progress when compared to those contracts (early Landsat, MOS-1 and ERS-1) where it was mentioned that the purpose of the transmission of data was for

---

[130]. Excerpt from SICORP's GTCA, section 5 on "Limited Warranty and Limitation of Liability".

scientific purposes only, because the mere presence of a sophisticated schedule of fees to be paid to the satellite operator or image distributor, in our opinion, does not alleviate any exposure of the satellite imagery distributor to a tort or civil action claiming for a compensation of damage or prejudice generated by wrong, defective or misleading data. This will inevitably happen, may be sooner than expected, with the recent introduction by SPOT Image on the market of value-added products of such items as "ready-to-use" imagery called SPOT QuadMaps, SPOT CountyViews and SPOT BasinViews, which are designed to update and replace standard US Geological Survey maps[131].

3. It is not unreasonable to think that if such practices develop, legal actions may be brought against service providers in a manner similar to what is already well established in the field of aeronautical charts. Such actions will be brought by both, third parties and contract partners. GIS, which has already been mentioned, provide documents where one can read very precise information such as on a standard aerial map which are superimposed to a satellite picture. Such cases may not be very numerous since they only number at less than ten in the field of aeronautical charts. There seems to be no hesitation from the judge in those cases to accept those maps as a "product" for purposes of Section 402A strict

---

[131]. see Lori Keesey, supra.

liability of the Restatement (Second) of Torts (1965)[132].

4. Other aspects of remote-sensing potential damages are not related to the end-product imagery while having a direct impact on it, i.e. related to the physical dimension of the satellite such as its fall on Earth on a vital area, or potential interferences in Outer Space with other satellites such as radio interferences or a collision as the probability will rise as time lapses, or its own destruction for an external reason of human or non-human origin. Standard liability procedures emanating from the Liability Convention (1972) will apply with all their strength and weakness in the same time[133]. Otherwise, courts will have to adapt their own judiciary practice and decide on a case by case basis[134].

B.2 - Freedom of information, newsgathering, civil liberties issues, state security, etc...

Another field where some jurisprudence exists relative to issues which are connected to remote sensing is with regard to

---

[132]. David L. Abney - Liability for Defective Aeronautical Charts - Journal of Products Liability - Vol. 9 - 1986 - pp. 211/231.

[133]. See Foster's article in the Canadian Yearbook of International Law, 1972, on the Liability Convention, which presents a striking catalogue of the flaws of this international agreement.

[134]. Larry S. Kaplan - Space specific remedies for torts in Outer Space: What path will US law follow? - The International Lawyer - Winter 1986 - Vol. 22 - No 4 - p. 1145.

press law which is a totally unforecasted development in terms of international space treaties, conventions or principles.

1) The recent Gulf crisis has brought under focus a dimension of remote sensing activities which had not been stressed so far and which may still be underrated: it is newsgathering by satellite. A few technical observations will help grasp the coming capacities which are to be available: Landsat 7 is supposed to offer media customers in 1994 a 5 m. resolution satellite which is right now currently being marketed. A wide spectrum of legal problems are already envisioned, ranging from national security to the average citizen's personal privacy. The debate is interesting enough since newsgathering does not seem to be included in any of the United Nations Resolutions - even though it has already been at the root of the debate about the "New Information Order" within UNESCO commissions[135] - or international agreements which explicitly or implicitly identify remote sensing activitities only in terms of natural resources and Earth's environment: Principle I of UNGA Resolution 41/65 identifies remote sensing as meaning "the sensing of the Earth's surface from space by making use of the properties of electromagnetic waves .... for the purpose of improving natural resources management, land

---

[135]. Stephen Raube-Wilson - The New World Information and Communication Order and International Human Rights Law - Boston College International & Comparative Law Review - 1986 - 107/130.

use and the protection of the environment".

2) Clearly, when the CNN network was broadcasting the world over from Baghdad during the Gulf war, such activity was not covered by the UNGA 41/65 Resolution and one must go back to treaties which are more general in scope, such as the Outer Space Treaty, to be able to frame the development of such unprecedented activities. When the United States State Department and the Department of Defence force the journalists to comply with specific rules derived from national security considerations (which however are acknowledged by the United Nations and international public law treaties), the United States government departments are threatened to be brought to courts by media networks which invoke amendments of the United States Constitution and the Universal Declaration of Human Rights in their defence[136]. The Landsat Act and subsequent regulations only leave available the withdrawal of the licence of the mediasatellite's operator if it constitutes a threat to national security interests, but apart from the fact that the whole problem is of relevance to press law, it may also constitute a strong deterrent to new potential investors in a field where private money is acutely needed. Some authors even think that the Espionage Act should be fully implemented with

---

[136]. Robert P. Merges and Glenn H. Reynolds - News Media Satellites and the First Amendment: a Case Study in the Treatment of New Technologies - High Technology Law Journal - 1989 - 1/31.

respect to legally channel the freedom of action of news media[137]. And the question takes a formidable dimension when it comes to foreign operators of such satellites: what about a possible impact of the anti-trust United States legislation ? and, more generally, what about the potential extra-territorial effects of United States laws and regulations ?

C. Integration within an appropriate international framework

C.1 - Cohabitation with the 1986 UN Declaration on Remote-Sensing

1. The 1986 United Nations Declaration on Principles relating to Remote-Sensing of the Earth from Space is, so far, the only international text which specifically refers to remote-sensing.

Copy of its text appears in Annex 1. However, it does not have any binding effect since it is only a Declaration, but it carries a certain weight since it has been adopted by consensus of the General Assembly. One may consider this text as having a moral influence, eventhough the bear mention of any "moral" stance that a declaration may have sometimes nowadays draws smiles on some faces. Some observers even see it at being a first step towards a future international

---

[137]. Luc Frieden - Newsgathering by Satellites: a New Challenge to International and National Law at the Dawn of the Twenty-First Century - Stanford Journal of International Law - 1989 - 103/193.

convention on remote-sensing, which is exactly what happened during the last thirty years for all international space law conventions which have been preceded by a declaration on the topic they are supposed to charter.

2. It can be asserted that all general statements made by this Declaration in relation to the advancement of humanity, the participation of developed nations to the development of others, the respect of foreign nations integrity, and more generally the respect of all principles of international law and, more specifically, of space law, are respected by the remote-sensing satellite operators and data distributors which pass agreements or grant licenses to clients, whether they are foreign ground stations or mere users of satellite imagery. Particularly of interest is the principle of international responsibility of the registration state which applies to all agreements or MOUs under review in this research and explains why each operator of remote-sensing systems is heavily subject to national laws and regulations.

3. Out of the five sets of agreements that we have analyzed in this research, one can draw a line between those which have been developed for predominantly scientific purposes, such as ERS-1, and possibly Radarsat and MOS-1, and the two others, Landsat and SPOT, for which the commercial aspect is dominant. For the first group, agreements' provisions are openly in tune

with the 1986 UN Declaration on Remote-Sensing fairly generous dissemination and access principles, which is reflected by their financial clauses which are not very elaborated. For the second group, one may think that it is the opposite, since they include fairly sophisticated clauses which have been devised to help the operating agencies turn a profit out of their involvement in this type of business. However, one must not forget that Principle XII asserts the non-discriminatory access on condition of *reasonable cost terms* to the primary and processed data relative to the territory of the concerned state. Analysts have already expressed the view that such condition was, in effect, considerably reducing the impact of the prior access doctrine and totally killing the free access principle advocated by the Bogota Declaration countries. The debate then sums up to the extent of defining what *reasonable* means, which is where these organizations tend to develop a business of their own. In the end, international institutions develop within a liberal frame of mind which legitimates the notion of profit as long as it is acceptable and reasonable.

C.2 - Credits to the present system

1. From an International Law point of view, the present system may be credited with the following achievements:

- A practice has developed to facilitate the use of

remote-sensing data by anybody on a non discriminatory basis. It has been acknowledged that such a situation has contributed to help developing countries modify their original claims of sovereignty, to focus now not on access to data but on the manner in which data is used[138]. Such acceptance by developing countries is helping integrate current remote-sensing practices into customary international law.

- The concerned states practice a close supervision of the private companies which they encourage to embark in this domain, and a link still remains which they can relinquish at any time, since those commercialization companies closely depend on their national state and government, either directly on a ministry or indirectly through a national space agency.

- One may consider that an international *de facto* cooperation system is organizing itself, much like ICAO with its 3 groups of states, by which three groups of closely interrelated partners may be identified:

. the satellite operating states, being the

---

[138]. For an overview of the evolution of remote-sensing in international law and on the evolution of the developing countries position, please see: Patrick Salin - Legal Impact of Remote Sensing - Unpublished Air and Space Law Writing Requirement - McGill University - Institute of Air and Space Law - April 1991 - 107 pages.

initiators;

. the reception capacities states, being unavoidable intermediaries;

. and the interpretation capacities states (this last group however is still mixed with the second group either through industrial alliances or institutional membership like in ESA).

2. The present corpus of space regulations contains a series of positive features as regards an increased participation of private corporations in space activities:

- space treaties do not expressly forbid private space activities;
- free enterprise can only develop if it is self-supported;
- freedom of enterprise need only be strictly connected to State responsibility;
- most, if not all, of space activities have commercial downfalls;
- space activities need to be directed towards greater comfort for mankind;
- private space activities need to be adapted to the non-appropriation principle;
- close international cooperation is the basis for a harmonized development of space activities, beyond

national or private egotisms;

- the Moon Treaty should be the basis for an international regime of outer space activities. In that respect, the consensus which has recently been gathered for the signature in the Fall of 1991 of an international Protocol which maintains the interdiction of any industrial exploitation for the next fifty years on the Antarctic continent is encouraging and may bring some hope that the USA and the USSR will some day ratify the Moon Treaty of 1979;

- the concept of Common Heritage of Mankind should gradually be introduced to and become an effective concern to every citizen's life[139].

C.3 - Towards an international institution

1. When EOSAT, SPOT Image, ESA and the others find a cruising speed, able to compensate by their own sales for the diminishing or even lack of public funding support, one can expect that an INTELSAT-type arrangement will be worked out since these organizations already cooperate on a regular basis. However, a conceptual evolution should occur in order to reflect the fact that the 1970s and the 1980s which have opened the way to enlarged "commercialization" have only

---

[139]. Sylvia Maureen Williams - Recent Trends on the Commercialization of Space Activities - Liber Amicorum Nicolas M. Matte - 1989 - 329/338.

slightly transformed the established practice to see government-sponsored entities acting in a private style manner and behaving much like private businesses. If the privatization trend strengthens, it will then be more accurate to refer to "privatization" of remote-sensing and, more generally, of space activities, still under the control of the national state just like on any state's territory[140]. This national state would only have to maintain a tight grip, a monopoly, on one vital aspect of space activity, similar to the control Nasa operates on shuttle flights without which little could be done in outer space and which materializes with the signature of a "Joint Endeavour Agreement" between the private commercial party and the public agency *maître d'oeuvre*[141].

2. One could also think of setting up a specialized United Nations agency which would focus on remote-sensing activities in all its variety of aspects and practical uses, not only commercial. A project named ISMA (International Satellite Monitoring Agency) has been studied by the United Nations in

---

[140]. Some authors think that pure and total "privatization" is inevitable. See: S. Neill Hosenball - Nasa and the Practice of Space Law - Journal of Space Law - 1985 - 1/7.

[141]. J. Henry Glazer - The Expanded Use of Space Act Commercialization Through Advanced Joint Enterprises between federal and Non-Federal Constituencies - Rutgers Computer & Technology Law Journal - 1987 - 339/405.

the early 1980s, following a French proposal, in the field of arms controls, but this project has not yet produced anything tangible. France again presented a Working Paper in August 1989 at the Conference on Disarmament which in essence proposes to pool all the available imagery resources, whether military or commercial, with the aim to control international crises, disarmament and natural catastrophes[142].

3. Time may be ripe, as several authors suggest, to envision another United Nations agency, which would be identified as a World Space Organization with a much more elaborate liability system and dispute settlement provisions than those which have been laid down so far. Such an organization would specifically regulate all space-related matters, including remote-sensing. It would function "as a clearinghouse and a central repository for technical, scientific, economic and operational information on past, current and future space activities ... eventually, ... the organization might provide a framework to develop and recommend standards ... (make) recommendations for specific issues ... and (propose) the formulation and

---

[142]. 1. The Implications of Establishing an International Satellite Monitoring Agency - United Nations - Report of the Secretary-General - 1983 - 110 pages.

2. L'espace au service de la vérification: proposition d'agence de traitement des images satellitaires. Document de travail présenté par la France devant la Conférence du désarmement (août 1989). In: Simone Courteix - Documents d'études sur le droit de l'espace - No 3.04 - 1990 - 3/47.

enforcement of regulations ..."[143]. Since, remote-sensing activities and other space-related enterprises may uncover new dimensions of activities to be derived in the future, such a World Space organization would also have to chart the boundaries of any new developments. An example could be a Declaration of Principles Governing the Activities of Satellites dedicated to newsgathering from Space which would very aptly complement the 15 principles Declaration on Remote-Sensing[144].

---

[143]. Stephen J. Doyle - International Space Plans and Policies: Future Roles of International Organizations - Journal of Space Law - 1990 - 124/137.

[144]. See Luc Frieden - supra.

Annex 1. Land Remote-Sensing Commercialization Act (1984)

I.A.2(i)

LAND REMOTE-SENSING COMMERCIALIZATION ACT OF 1984

Library of Congress Cataloging in Publication Data

Main entry under title

United States space law

1 Space law 2 Aeronautics - Law and legislation - United States I Gorove, Stephen
JX5810 U56 341 47 81 - 22465
ISBN 0-379-20695 1 AACR2

Manufactured in the United States of America

I.A.2(1)

PUBLIC LAW 98-365 [H R 5155], July 17, 1984

LAND REMOTE-SENSING COMMERCIALIZATION ACT OF 1984*

An Act to establish a system to promote the use of land remote-sensing satellite data, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Land Remote-Sensing Commercialization Act of 1984".

Land Remote Sensing Commercialization Act of 1984
Communications and telecommunications
15 USC 4201 note

TITLE I—DECLARATION OF FINDINGS, PURPOSES, AND POLICIES

FINDINGS

Congress
15 USC 4201

SEC. 101 The Congress finds and declares that—

(1) the continuous civilian collection and utilization of land remote-sensing data from space are of major benefit in managing the Earth's natural resources and in planning and conducting many other activities of economic importance,

Landsat system

(2) the Federal Government's experimental Landsat system has established the United States as the world leader in land remote-sensing technology,

(3) the national interest of the United States lies in maintaining international leadership in civil remote sensing and in broadly promoting the beneficial use of remote-sensing data,

Defense and national security

(4) land remote sensing by the Government or private parties of the United States affects international commitments and policies and national security concerns of the United States,

(5) the broadest and most beneficial use of land remote-sensing data will result from maintaining a policy of nondiscriminatory access to data,

(6) competitive, market-driven private sector involvement in land remote sensing is in the national interest of the United States,

(7) use of land remote-sensing data has been inhibited by slow market development and by the lack of assurance of data continuity;

(8) the private sector and in particular the "value-added" industry, is best suited to develop land remote-sensing data markets

(9) there is doubt that the private sector alone can currently develop a total land remote-sensing system because of the high risk and large capital expenditure involved

(10) cooperation between the Federal Government and private industry can help assure both data continuity and United States leadership,

(11) the time is now appropriate to initiate such cooperation with phased transition to a fully commercial system,

(12) such cooperation should be structured to involve the minimum practicable amount of support and regulation by the

* As amended by Title III (Amendments to the Land Remote-Sensing Commercialization Act of 1984) of the 1987 NASA Authorization Act (P.L. [illegible])

Federal Government and the maximum practicable amount of competition by the private sector while assuring continuous availability to the Federal Government of land remote-sensing data,

(13) certain Government oversight must be maintained to assure that private sector activities are in the national interest and that the international commitments and policies of the United States are honored, and

(14) there is no compelling reason to commercialize meteorological satellites at this time

PURPOSES

15 USC 4202

SEC. 102 The purposes of this Act are to—

(1) guide the Federal Government in achieving proper involvement of the private sector by providing a framework for phased commercialization of land remote sensing and by assuring continuous data availability to the Federal Government

Defense and national security

(2) maintain the United States worldwide leadership in civil remote sensing preserve its national security, and fulfill its international obligations,

(3) minimize the duration and amount of further Federal investment necessary to assure data continuity while achieving commercialization of civil land remote sensing,

(4) provide for a comprehensive civilian program of research development, and demonstration to enhance both the United States capabilities for remote sensing from space and the application and utilization of such capabilities, and

(5) prohibit commercialization of meteorological satellites at this time

POLICIES

15 USC 4203

SEC. 103 (a) It shall be the policy of the United States to preserve its right to acquire and disseminate unenhanced remote-sensing data

(b) It shall be the policy of the United States that civilian unenhanced remote-sensing data be made available to all potential users on a nondiscriminatory basis and in a manner consistent with applicable antitrust laws

Defense and national security

(c) It shall be the policy of the United States both to commercialize those remote-sensing space systems that properly lend themselves to private sector operation and to avoid competition by the Government with such commercial operations while continuing to preserve our national security, to honor our international obligations, and to retain in the Government those remote-sensing functions that are essentially of a public service nature

DEFINITIONS

15 USC 4204

SEC. 104 For purposes of this Act

(1) The term "Landsat system" means Landsats 1, 2, 3, 4, and 5 and any related ground equipment systems, and facilities and any successor civil land remote-sensing space systems operated by the United States Government prior to the commencement of the six-year period described in title III

(2) The term "Secretary" means the Secretary of Commerce

(3)(A) The term "nondiscriminatory basis" means without preference, bias, or any other special arrangement (except on the basis of national security concerns pursuant to section 607) regarding delivery, format, financing or technical considerations which would favor one buyer or class of buyers over another.

(B) The sale of data is made on a nondiscriminatory basis only if (i) any offer to sell or deliver data is published in advance in such manner as will ensure that the offer is equally available to all prospective buyers, (ii) the system operator has not established or changed any price, policy, procedure, or other term or condition in a manner which gives one buyer or class of buyer de facto favored access to data, (iii) the system operator does not make unenhanced data available to any purchaser on an exclusive basis, and (iv) in a case where a system operator offers volume discounts, such discounts are no greater than the demonstrable reductions in the cost of volume sales. The sale of data on a nondiscriminatory basis does not preclude the system operator from offering discounts other than volume discounts to the extent that such discounts are consistent with the provisions of this paragraph.

(C) The sale of data on a nondiscriminatory basis does not require (i) that a system operator disclose names of buyers or their purchases, (ii) that a system operator maintain all, or any particular subset of, data in a working inventory, or (iii) that a system operator expend equal effort in developing all segments of a market.

(4) The term "unenhanced data" means unprocessed or minimally processed signals or film products collected from civil remote-sensing space systems. Such minimal processing may include rectification of distortions, registration with respect to features of the Earth, and calibration of spectral response. Such minimal processing does not include conclusions, manipulations, or calculations derived from such signals or film products or combination of the signals or film products with other data or information.

(5) The term "system operator" means a contractor under title II or title III or a license holder under title IV.

TITLE II—OPERATION AND DATA MARKETING OF LANDSAT SYSTEM

OPERATION

15 USC 4.

SEC. 201. (a) The Secretary shall be responsible for—

(1) the Landsat system, including the orbit, operation, and disposition of Landsats 1, 2, 3, 4, and 5, and

(2) provision of data to foreign ground stations under the terms of agreements between the United States Government and nations that operate such ground stations which are in force on the date of commencement of the contract awarded pursuant to this title.

(b) The provisions of this section shall not affect the Secretary's authority to contract for the operation of part or all of the Landsat system, so long as the United States Government retains—

(1) ownership of such system,

(2) ownership of the unenhanced data, and

(3) authority to make decisions concerning operation of the system.

CONTRACT FOR MARKETING OF UNENHANCED DATA

15 USC 4212.

SEC. 202. (a) In accordance with the requirements of this title, the Secretary by means of a competitive process and to the extent provided in advance by appropriation Acts, shall contract with a United States private sector party (as defined by the Secretary) for the marketing of unenhanced data collected by the Landsat system. Any such contract—

(1) shall provide that the contractor set the prices of unenhanced data;

(2) may provide for financial arrangements between the Secretary and the contractor including fees for operating the system, payments by the contractor as an initial fee or as a percentage of sales receipts or other such considerations;

(3) shall provide that the contractor will offer to sell and deliver unenhanced data to all potential buyers on a nondiscriminatory basis;

(4) shall provide that the contractor pay to the United States Government the full purchase price of any unenhanced data (except in the case of research and development activities conducted in accordance with section 504) that the contractor elects to utilize for purposes other than sale;

(5) shall be entered into by the Secretary only if the Secretary has determined that such contract is likely to result in net cost savings for the United States Government; and

(6) may be reawarded competitively after the practical demise of the space segment of the Landsat system as determined by the Secretary.

(b) Any contract authorized by subsection (a) may specify that the contractor use, and at his own expense maintain, repair, or modify such elements of the Landsat system as the contractor finds necessary for commercial operations.

Congress.

(c) Any decision or proposed decision by the Secretary to enter into any such contract shall be transmitted to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives for their review. No such decision or proposed decision shall be implemented unless (A) a period of thirty calendar days has passed after the receipt by each such committee of such transmittal or (B) each such committee before the expiration of such period has agreed to transmit and has transmitted to the Secretary written notice to the effect that such committee has no objection to the decision or proposed decision. As part of the transmittal, the Secretary shall include information on the terms of the contract described in subsection (a).

(d) In defining "United States private sector party" for purposes of this Act, the Secretary may take into account the citizenship of key personnel, location of assets, foreign ownership, control, influence, and other such factors.

CONDITIONS OF COMPETITION FOR CONTRACT

15 USC 4213.

SEC. 203. (a) The Secretary shall, as part of the advertisement for the competition for the contract authorized by section 202, identify and publish the international obligations, national security concerns (with appropriate protection of sensitive information), domestic

[1] As amended by Title III (Amendments to the Land Remote Sensing Commercialization Act of 1984) of 1987 NASA Authorization Act (P.L. 100-147, Sec. 304).

legal considerations, and any other standards or conditions which a private contractor shall be required to meet

(b) In selecting a contractor under this title, the Secretary shall consider—

(1) ability to market aggressively unenhanced data,

(2) the best overall financial return to the Government, including the potential cost savings to the Government that are likely to result from the contract,

(3) ability to meet the obligations concerns considerations, standards, and conditions identified under subsection (a),

(4) technical competence, including the ability to assure continuous and timely delivery of data from the Landsat system,

(5) ability to effect a smooth transition with the contractor selected under title III, and

(6) such other factors as the Secretary deems appropriate and relevant

Report

(c) If, as a result of the competitive process required by section 202(a) the Secretary receives no proposal which is acceptable under the provisions of this title, the Secretary shall so certify and fully report such finding to the Congress As soon as practicable but not later than thirty days after so certifying and reporting the Secretary shall reopen the competitive process The period for the subsequent competitive process shall not exceed one hundred and twenty days If, after such subsequent competitive process, the Secretary receives no proposal which is acceptable under the provisions of this title the Secretary shall so certify and fully report such finding to the Congress In the event that no acceptable proposal is received the Secretary shall continue to market data from the Landsat system

(d) A contract awarded under section 202 may, in the discretion of the Secretary, be combined with the contract required by title III pursuant to section 304(b)

SALE OF DATA

15 USC 4214

SEC. 204. (a) After the date of the commencement of the contract described in section 202(a) the contractor shall be entitled to revenues from sales of copies of data from the Landsat system, subject to the conditions specified in sections 601 and 602

(b) The contractor may continue to market data previously generated by the Landsat system after the demise of the space segment of that system

FOREIGN GROUND STATIONS

15 USC 4215

SEC. 205. (a) The contract under this title shall provide that the contractor shall act as the agent of the Secretary by continuing to supply unenhanced data to foreign ground stations for the life and according to the terms, of those agreements between the United States Government and such foreign ground stations that are in force on the date of the commencement of the contract

(b) Upon the expiration of such agreements or in the case of foreign ground stations that have no agreement with the United States on the date of commencement of the contract the contract shall provide—

(1) that unenhanced data from the Landsat system shall be made available to foreign ground stations only by the contractor and

(2) that such data shall be made available on a nondiscriminatory basis

TITLE III—PROVISION OF DATA CONTINUITY AFTER THE LANDSAT SYSTEM

PURPOSES AND DEFINITION

15 USC 4221

SEC. 301. (a) It is the purpose of this title—

(1) to provide, in an orderly manner and with minimal risk for a transition from Government operation to private commercial operation of civil land remote-sensing systems, and

(2) to provide data continuity for six years after the practical demise of the space segment of the Landsat system

(b) For purposes of this title, the term "data continuity" means the continued availability of unenhanced data—

(1) including data which are from the point of view of a data user—

(A) functionally equivalent to the multispectral data generated by the Landsat 1 and 2 satellites, and

(B) compatible with such data and with equipment used to receive and process such data, and

(2) at an annual volume at least equal to the Federal usage during fiscal year 1983

(c) Data continuity may be provided using whatever technologies are available

DATA CONTINUITY AND AVAILABILITY

Contracts with U.S. 15 USC 4222

SEC. 302. The Secretary shall solicit proposals from United States private sector parties (as defined by the Secretary pursuant to section 202) for a contract for the development and operation of a remote-sensing space system capable of providing data continuity for a period of six years and for marketing unenhanced data in accordance with the provisions of sections 601 and 602. Such proposals, at a minimum, shall specify—

(1) the quantities and qualities of unenhanced data expected from the system

(2) the projected date upon which operations could begin

(3) the number of satellites to be constructed and their expected lifetimes

(4) any need for Federal funding to develop the system

(5) any percentage of sales receipts or other returns offered to the Federal Government

(6) plans for expanding the market for land remote-sensing data and

(7) the proposed procedures for meeting the national security concerns and international obligations of the United States in accordance with section 607

AWARDING OF THE CONTRACT

15 USC 4223

SEC. 303. (a)(1) In accordance with the requirements of this title the Secretary shall evaluate the proposals described in section 302 and by means of a competitive process and to the extent provided in

advance by appropriation Acts, shall contract with the United States private sector party for the capability of providing data continuity for a period of six years and for marketing unenhanced data.

(2) Before commencing space operations the contractor shall obtain a license under title IV.

(b) As part of the evaluation described in subsection (a), the Secretary shall analyze the expected outcome of each proposal in terms of—

(1) the net cost to the Federal Government of developing the recommended system,

(2) the technical competence and financial condition of the contractor;

(3) the availability of such data after the expected termination of the Landsat system,

(4) the quantities and qualities of data to be generated by the recommended system,

(5) the contractor's ability to supplement the requirement for data continuity by adding, at the contractor's expense, remote-sensing capabilities which maintain United States leadership in remote sensing,

(6) the potential to expand the market for data,

(7) expected returns to the Federal Government based on any percentage of data sales or other such financial consideration offered to the Federal Government in accordance with section 305,

(8) the commercial viability of the proposal,

(9) the proposed procedures for satisfying the national security concerns and international obligations of the United States,

(10) the contractor's ability to effect a smooth transition with any contractor selected under title II, and

(11) such other factors as the Secretary deems appropriate and relevant.

Congress

(c) Any decision or proposed decision by the Secretary to enter into any such contract shall be transmitted to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives for their review. No such decision or proposed decision shall be implemented unless (1) a period of thirty calendar days has passed after the receipt by each such committee of such transmittal, or (2) each such committee before the expiration of such period has agreed to transmit and has transmitted to the Secretary written notice to the effect that such committee has no objection to the decision or proposed decision. As part of the transmittal, the Secretary shall include the information specified in subsection (a).

Report

(d) If, as a result of the competitive process required by this section, the Secretary receives no proposal which is acceptable under the provisions of this title, the Secretary shall so certify and fully report such finding to the Congress. As soon as practicable but not later than thirty days after so certifying and reporting, the Secretary shall reopen the competitive process. The period for the subsequent competitive process shall not exceed one hundred and eighty days. If, after such subsequent competitive process, the Secretary receives no proposal which is acceptable under the provisions of this title, the Secretary shall so certify and fully report such finding to the Congress. Not earlier than ninety days after such certification and report, the Secretary may assure data continuity by procure-

ment and operation by the Federal Government of the necessary systems, to the extent provided in advance by appropriation Acts.

TERMS OF CONTRACT

15 USC 4224

SEC. 304. (a) Any contract entered into pursuant to this title—

(1) shall be entered into as soon as practicable, allowing for the competitive procurement process required by this title;

(2) shall, in accordance with criteria determined and published by the Secretary, reasonably assure data continuity for a period of six years, beginning as soon as practicable in order to minimize any interruption of data availability;

(3) shall provide that the contractor will offer to sell and deliver unenhanced data to all potential buyers on a nondiscriminatory basis;

(4) shall not provide a guarantee of data purchases from the contractor by the Federal Government;

(5) may provide that the contractor utilize, on a space-available basis, a civilian United States Government satellite or vehicle as a platform for a civil land remote-sensing space system if—

(A) the contractor agrees to reimburse the Government immediately for all related costs incurred with respect to such utilization, including a reasonable and proportionate share of fixed, platform, data transmission, and launch costs; and

(B) such utilization would not interfere with or otherwise compromise intended civilian Government missions as determined by the agency responsible for the civilian platform; and

(6) may provide financial support by the United States Government, for a portion of the capital costs required to provide data continuity for a period of six years, in the form of loans, loan guarantees, or payments pursuant to section 305 of the Federal Property and Administrative Services Act of 1949 (41 U.S.C. 255).

(b)(1) Without regard to whether any contract entered into under this title is combined with a contract under title II, the Secretary shall promptly determine whether the contract entered into under this title reasonably effectuates the purposes and policies of title II. Such determination shall be submitted to the President and the Congress, together with a full statement of the basis for such determination.

(2) If the Secretary determines that such contract does not reasonably effectuate the requirements of title II, the Secretary shall promptly carry out the provisions of such title to the extent provided in advance in appropriations Acts.

MARKETING

15 USC 4225

SEC. 305. (a) In order to promote aggressive marketing of land remote-sensing data, any contract entered into pursuant to this title may provide that the percentage of sales paid by the contractor to the Federal Government shall decrease according to stipulated increases in sales levels.

(b) After the six year period described in section 304(a)(2), the contractor may continue to sell data. If licensed under title IV, the

contractor may continue to operate a civil remote-sensing space system

REPORT

SEC 306 Two years after the date of the commencement of the six year period described in section 304(a)(2), the Secretary shall report to the President and to the Congress on the progress of the transition to fully private financing ownership and operation of remote-sensing space systems together with any recommendations for actions, including actions necessary to ensure United States leadership in civilian land remote sensing from space 15 USC 4226

TERMINATION OF AUTHORITY

SEC 307 The authority granted to the Secretary by this title shall terminate ten years after the date of enactment of this Act. 15 USC 4227

DISPOSITION OF GOVERNMENT ASSETS

SEC. 308 Following the completion of a contract made pursuant to this title, the Secretary may upon 30 days advance notice to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives, dispose of assets (other than real property) under the control of the Secretary in a manner which best ensures the continuation of the contractor's commercial activity Contracts 15 USC 4228

TITLE IV—LICENSING OF PRIVATE REMOTE-SENSING SPACE SYSTEMS

GENERAL AUTHORITY

SEC 401 (a)(1) In consultation with other appropriate Federal agencies, the Secretary is authorized to license private sector parties to operate private remote-sensing space systems for such period as the Secretary may specify and in accordance with the provisions of this title 15 USC 4241

(2) In the case of a private space system that is used for remote sensing and other purposes the authority of the Secretary under this title shall be limited only to the remote-sensing operations of such space system

(b) No license shall be granted by the Secretary unless the Secretary determines in writing that the applicant will comply with the requirements of this Act, any regulations issued pursuant to this Act, and any applicable international obligations and national security concerns of the United States

(c) The Secretary shall review any application and make a determination thereon within one hundred and twenty days of the receipt of such application If final action has not occurred within such time, the Secretary shall inform the applicant of any pending issues and of actions required to resolve them Review date

(d) The Secretary shall not deny such license in order to protect any existing licensee from competition

CONDITIONS FOR OPERATION

SEC. 402 (a) No person who is subject to the jurisdiction or control of the United States may, directly or through any subsidiary or affiliate, operate any private remote-sensing space system without a license pursuant to section 401 15 USC 4242

(b) Any license issued pursuant to this title shall specify, at a minimum that the licensee shall comply with all of the requirements of this Act and shall—

(1) operate the system in such manner as to preserve and promote the national security of the United States and to observe and implement the international obligations of the United States in accordance with section 607. Defense and national security

* As amended by Title III (Amendments to the Land Remote-Sensing Commercialization Act of 1984 of the 1985 NASA Authorization Act P L 98-14 Sec 301

(2) make unenhanced data available to all potential users on a nondiscriminatory basis,

(3) upon termination of operations under the license, make disposition of any satellites in space in a manner satisfactory to the President,

(4) promptly make available all unenhanced data which the Secretary may request pursuant to section 602,

(5) furnish the Secretary with complete orbit and data collection characteristics of the system, obtain advance approval of any intended deviation from such characteristics, and inform the Secretary immediately of any unintended deviation,

(6) notify the Secretary of any agreement the licensee intends to enter with a foreign nation, entity, or consortium involving foreign nations or entities,

(7) permit the inspection by the Secretary of the licensee's equipment, facilities and financial records,

(8) surrender the license and terminate operations upon notification by the Secretary pursuant to section 403(a)(1), and

(9)(A) notify the Secretary of any 'value added' activities as defined by the Secretary by regulation) that will be conducted by the licensee or by a subsidiary or affiliate, and

(B) if such activities are to be conducted provide the Secretary with a plan for compliance with the provisions of this Act concerning nondiscriminatory access

ADMINISTRATIVE AUTHORITY OF THE SECRETARY

15 USC 4243

SEC 403 (a) In order to carry out the responsibilities specified in this title the Secretary may—

(1) grant, terminate, modify, condition transfer, or suspend licenses under this title, and upon notification of the licensee may terminate licensed operations on an immediate basis, if the Secretary determines that the licensee has substantially failed to comply with any provision of this Act with any regulation issued under this Act, with any terms conditions or restrictions of such license or with any international obligations or national security concerns of the United States,

(2) inspect the equipment, facilities, or financial records of any licensee under this title,

(3) provide penalties for noncompliance with the requirements of licenses or regulations issued under this title including civil penalties not to exceed $10 000 (each day of operation in violation of such licenses or regulations constituting a separate violation)

(4) compromise modify, or remit any such civil penalty

(5) issue subpenas for any materials documents or records or for the attendance and testimony of witnesses for the purpose of conducting a hearing under this section

(6) seize any object record or report where there is probable cause to believe that such object record or report was used is being used or is likely to be used in violation of this Act or the requirements of a license or regulation issued thereunder and

(7) make investigations and inquiries and administer to or take from any person an oath affirmation or affidavit concerning any matter relating to the enforcement of this Act

(b) Any applicant or licensee who makes a timely request for review of an adverse action pursuant to subsection (a)(1) and or

(a)(6) shall be entitled to adjudication by the Secretary on the record after an opportunity for an agency hearing with respect to such adverse action Any final action by the Secretary under this subsection shall be subject to judicial review under chapter 7 of title 5 United States Code 5 USC 701 et seq

REGULATORY AUTHORITY OF THE SECRETARY

SEC 404 The Secretary may issue regulations to carry out the provisions of this title Such regulations shall be promulgated only after public notice and comment in accordance with the provisions of section 553 of title 5, United States Code 5 USC 553

AGENCY ACTIVITIES

SEC 405 (a) A private sector party may apply for a license to operate a private remote-sensing space system which utilizes, on a space-available basis, a civilian United States Government satellite or vehicle as a platform for such system The Secretary, pursuant to the authorities of this title, may license such system if it meets all conditions of this title and— 15 USC 4245

(1) the system operator agrees to reimburse the Government immediately for all related costs incurred with respect to such utilization, including a reasonable and proportionate share of fixed, platform, data transmission, and launch costs, and

(2) such utilization would not interfere with or otherwise compromise intended civilian Government missions, as determined by the agency responsible for such civilian platform

(b) The Secretary may offer assistance to private sector parties in finding appropriate opportunities for such utilization

(c) To the extent provided in advance by appropriation Acts, any Federal agency may enter into agreements for such utilization if such agreements are consistent with such agency's mission and statutory authority, and if such remote-sensing space system is licensed by the Secretary before commencing operation

(d) The provisions of this section do not apply to activities carried out under title V

(e) Nothing in this title shall affect the authority of the Federal Communications Commission pursuant to the Communications Act of 1934, as amended (47 U S C 151 et seq) 47 USC 609

TERMINATION

SEC 406 If, five years after the expiration of the six-year period described in section 304(a)(2), no private sector party has been licensed and continued in operation under the provisions of this title, the authority of this title shall terminate 15 USC 4246

TITLE V—RESEARCH AND DEVELOPMENT

CONTINUED FEDERAL RESEARCH AND DEVELOPMENT

SEC 501 (a)(1) The Administrator of the National Aeronautics and Space Administration is directed to continue and to enhance such Administration's programs of remote-sensing research and development 15 USC 4261

(2) The Administrator is authorized and encouraged to—

(A) conduct experimental space remote-sensing programs (including applications demonstration programs and basic research at universities)

(B) develop remote-sensing technologies and techniques (including those needed for monitoring the Earth and its environment and

(C) conduct such research and development in cooperation with other Federal agencies and with public and private research entities (including private industry universities State and local governments foreign governments and international organizations) and to enter into arrangements (including joint ventures) which will foster such cooperation

(b)(1) The Secretary is directed to conduct a continuing program of—

(A) research in applications of remote-sensing

(B) monitoring of the Earth and its environment and

(C) development of technology for such monitoring

(2) Such program may include support of basic research at universities and demonstrations of applications

(3) The Secretary is authorized and encouraged to conduct such research monitoring and development in cooperation with other Federal agencies and with public and private research entities (including private industry, universities State and local governments, foreign governments, and international organizations) and to enter into arrangements (including joint ventures) which will foster such cooperation

(c)(1) In order to enhance the United States ability to manage and utilize its renewable and nonrenewable resources the Secretary of Agriculture and the Secretary of the Interior are authorized and encouraged to conduct programs of research and development in the applications of remote sensing using funds appropriated for such purposes

(2) Such programs may include basic research at universities demonstrations of applications and cooperative activities involving other Government agencies private sector parties and foreign and international organizations

(d) Other Federal agencies are authorized and encouraged to conduct research and development on the use of remote sensing in fulfillment of their authorized missions using funds appropriated for such purposes

Report

(e) The Secretary and the Administrator of the National Aeronautics and Space Administration shall within one year after the date of enactment of this Act and biennially thereafter jointly develop and transmit to the Congress a report which includes (1) a unified national plan for remote-sensing research and development applied to the Earth and its atmosphere, (2) a compilation of progress in the relevant ongoing research and development activities of the Federal agencies and (3) an assessment of the state of our knowledge of the Earth and its atmosphere, the needs for additional research (including research related to operational Federal remote-sensing space programs) and opportunities available for further progress

15 USC 4262

RESEARCH AND DEVELOPMENT ACTIVITIES OF FEDERAL AGENCIES

SEC 502 Each Federal agency is authorized and encouraged to provide data gathered in experimental remote-sensing space pro-

gram, to related research and development programs funded by the Federal Government (including application programs) and to cooperative research programs if the Federal agency involved determines that the data will not be used—

(1) for any commercial purpose or

(2) in substantial competition with data available from a licensee under this Act

except pursuant to section 503.

SALE OF EXPERIMENTAL DATA

Sec 503 Data gathered in Federal experimental remote-sensing space programs may be sold en bloc through a competitive process (consistent with national security interests and international obligations of the United States and in accordance with section 607) to any United States entity which will market the data on a nondiscriminatory basis. [illegible]

RESEARCH AND DEVELOPMENT ACTIVITIES OF SYSTEM OPERATORS

"Sec 504 Notwithstanding section 601, any system operator under title II, III, or IV of this Act, or any marketing entity under section 503 of this Act, may provide data for any research and development programs if— 15 USC 4264

(1) a complete and timely disclosure of the results of such research and development is made in the open technical literature or is otherwise made publicly available,

"(2) the system operator or marketing entity provides to the Secretary an annual report of all research and development data transactions including the nature of any cooperative agreements and the prices charged for data, and — Reports

"(3) the data are not used for commercial purposes or in substantial competition with data available from a licensee under this Act."

TITLE VI—GENERAL PROVISIONS

NONDISCRIMINATORY DATA AVAILABILITY

Sec 601 (a) Any unenhanced data generated by any system operator under the provisions of this Act shall be made available to all users on a nondiscriminatory basis in accordance with the requirements of this Act — Public availability. 15 USC [illegible]

(b) Any system operator shall make publicly available the prices policies, procedures and other terms and conditions (but in accordance with section 104(3)(C) not necessarily the names of buyers or their purchases) upon which the operator will sell such data

ARCHIVING OF DATA

Sec 602 (a) It is in the public interest for the United States Government— 15 USC 4272

(1) to maintain an archive of land remote-sensing data for historical, scientific and technical purposes, including long term global environmental monitoring,

(2) to control the content and scope of the archive, and

(3) to assure the quality, integrity and continuity of the archive

(b) The Secretary shall provide for long term storage, maintenance and upgrading of a basic global, land remote-sensing data set (hereinafter referred to as the "basic data set") and shall follow reasonable archival practices to assure proper storage and preservation of the basic data set and timely access for parties requesting data The basic data set which the Secretary assembles in the Government archive shall remain distinct from any inventory of data which a system operator may maintain for sales and for other purposes

---

[1] As amended by Title III (Amendments to the Land Remote-Sensing Commercialization Act of 1984) of the 1987 NASA Authorization Act (P L 100-147), Sec 305.

[2] Ibid Sec 307

(c) In determining the initial content of or in upgrading the basic data set the Secretary shall—

(1) use as a baseline the data archived on the date of enactment of this Act

(2) take into account future technical and scientific developments and needs

(3) consult with and seek the advice of users and producers of remote sensing data and data products

(4) consider the need for data which may be duplicative in terms of geographical coverage but which differ in terms of season spectral bands resolution or other relevant factors

(5) include as the Secretary considers appropriate unenhanced data generated either by the Landsat system pursuant to title III or by licensees under title IV

(6) include as the Secretary considers appropriate data collected by foreign ground stations or by foreign remote-sensing space systems and

(7) ensure that the content of the archive is developed in accordance with section 607

(d) Subject to the availability of appropriations the Secretary shall request data needed for the basic data set and pay to the providing system operator reasonable costs for reproduction and transmission A system operator shall promptly make requested data available in a form suitable for processing for archiving

Marketing

(e) Any system operator shall have the exclusive right to sell all data that the operator provides to the United States remote-sensing data archive for a period to be determined by the Secretary but not to exceed ten years from the date the data are sensed In the case of data generated from the Landsat system prior to the implementation of the contract described in section 202(a) any contractor selected pursuant to section 202 shall have the exclusive right to market such data on behalf of the United States Government for the duration of such contract A system operator may relinquish the exclusive right and consent to distribution from the archive before the period of exclusive right has expired by terminating the offer to sell particular data

Public availability

(f) After the expiration of such exclusive right to sell or after relinquishment of such right the data provided to the United States remote-sensing data archive shall be in the public domain and shall be made available to requesting parties by the Secretary at prices reflecting reasonable costs of reproduction and transmittal

(g) In carrying out the functions of this section the Secretary shall to the extent practicable and as provided in advance by appropriation Acts use existing Government facilities

NONREPRODUCTION

15 USC 4273

Sec 603 In addition to such other terms and conditions as the system operator may set forth in compliance with section 601 of this Act the system operator may require that unenhanced data not be reproduced or disseminated by any foreign or domestic purchaser

REIMBURSEMENT FOR ASSISTANCE

15 USC 4274

Sec 604 The Administrator of the National Aeronautics and Space Administration the Secretary of Defense and the heads of other Federal agencies may provide assistance to system operators under the provisions of this Act Substantial assistance shall be reimbursed by the operator except as otherwise provided by law

ACQUISITION OF EQUIPMENT

15 USC [illegible]

Sec [illegible] The Secretary may by means of a competitive process allow a licensee under title IV or any other private party to buy lease or otherwise acquire the use of equipment from the Landsat system when such equipment is no longer needed for the operation of such system or for the sale of data from such system Officials of other Federal civilian agencies are authorized and encouraged to cooperate with the Secretary in carrying out the provisions of this [illegible]

[illegible] Amendments to the Land Remote-Sensing Commercialization Act [illegible] NASA Authorization Act [illegible] Sec [illegible]

RADIO FREQUENCY ALLOCATION

SEC 606 (a) Within thirty days after the date of enactment of this Act, the President (or the President's delegee, if any, with authority over the assignment of frequencies to radio stations or classes of radio stations operated by the United States) shall make available for nongovernmental use spectrum presently allocated to Government use, for use by United States Landsat and commercial remote-sensing space systems The spectrum to be so made available shall conform to any applicable international radio or wire treaty or convention, or regulations annexed thereto Within ninety days thereafter, the Federal Communications Commission shall utilize appropriate procedures to authorize the use of such spectrum for nongovernmental use Nothing in this section shall preclude the ability of the Commission to allocate additional spectrum to commercial land remote-sensing space satellite system use

President of U S 15 USC 4276

(b) To the extent required by the Communications Act of 1934, as amended (47 U S C 151 et seq), an application shall be filed with the Federal Communications Commission for any radio facilities involved with the commercial remote-sensing space system

47 USC 609

(c) It is the intent of Congress that the Federal Communications Commission complete the radio licensing process under the Communications Act of 1934, as amended (47 U S C 151 et seq), upon the application of any private sector party or consortium operator of any commercial land remote-sensing space system subject to this Act, within one hundred and twenty days of the receipt of an application for such licensing If final action has not occurred within one hundred and twenty days of the receipt of such an application, the Federal Communications Commission shall inform the applicant of any pending issues and of actions required to resolve them

(d) Authority shall not be required from the Federal Communications Commission for the development and construction of any United States land remote-sensing space system (or component thereof), other than radio transmitting facilities or components, while any licensing determination is being made

(e) Frequency allocations made pursuant to this section by the Federal Communications Commission shall be consistent with international obligations and with the public interest

CONSULTATION

SEC 607 (a) The Secretary shall consult with the Secretary of Defense on all matters under this Act affecting national security The Secretary of Defense shall be responsible for determining those conditions, consistent with this Act, necessary to meet national security concerns of the United States and for notifying the Secretary promptly of such conditions

Defense and national security 15 USC 4277

(b)(1) The Secretary shall consult with the Secretary of State on all matters under this Act affecting international obligations The Secretary of State shall be responsible for determining those conditions, consistent with this Act, necessary to meet international obligations and policies of the United States and for notifying the Secretary p omptly of such conditions

(2) Appro,riate Federal agencies are authorized and encouraged to provide re note-sensing data, technology, and training to developing nations as a component of programs of international aid

(3) The Secretary of State shall promptly report to the Secretary any instances outside the United States of discriminatory distribution of data

(c) If as a result of technical modifications imposed on a system operator on the basis of national security concerns, the Secretary, in consultation with the Secretary of Defense or with other Federal agencies determines that additional costs will be incurred by the system operator, or that past development costs (including the cost of capital) will not be recovered by the system operator the Secretary may require the agency or agencies requesting such technical modifications to reimburse the system operator for such additional or development costs, but not for anticipated profits Reimbursements may cover costs associated with required changes in system performance, but not costs ordinarily associated with doing business abroad

AMENDMENT TO NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION, 1983

SEC 608 Subsection (a) of section 201 of the National Aeronautics and Space Administration Authorization Act 1983 (Public Law 97-324, 96 Stat 1601) is amended to read as follows

15 USC 1517 note

"(a) The Secretary of Commerce is authorized to plan and provide for the management and operation of civil remote-sensing space systems which may include the Landsat 4 and 5 satellites and associated ground system equipment transferred from the National Aeronautics and Space Administration to provide for user fees and to plan for the transfer of the operation of civil remote-sensing space systems to the private sector when in the national interest "

AUTHORIZATION OF APPROPRIATIONS

15 USC 4278

SEC 609 (a) There are authorized to be appropriated to the Secretary $75 000,000 for fiscal year 1985 for the purpose of carrying out the provisions of this Act Such sums shall remain available until expended, but shall not become available until the time periods specified in sections 202(c) and 303(c) have expired

(b) The authorization provided for under subsection (a) shall be in addition to moneys authorized pursuant to title II of the National Aeronautics and Space Administration Authorization Act 1981

15 USC 1517 note

TITLE VII—PROHIBITION OF COMMERCIALIZATION OF WEATHER SATELLITES

PROHIBITION

President of U S 15 USC 4291

SEC 701 Neither the President nor any other official of the Government shall make any effort to lease sell, or transfer to the private sector, commercialize, or in any way dismantle any portion of the weather satellite systems operated by the Department of Commerce or any successor agency

Annex 2. United Nations Principles on Remote-Sensing (1986)

Principles Relating to Remote Sensing of the Earth from Space

Principle I

For the purposes of these principles with respect to remote sensing activities

(a) The term "remote sensing" means the sensing of the Earth's surface from space by making use of the properties of electromagnetic waves emitted, reflected or diffracted by the sensed objects for the purpose of improving natural resources management, land use and the protection of the environment,

(b) The term "primary data" means the raw data that are acquired by remote sensors borne by the space object and that are transmitted or delivered to the ground from space by telemetry in the form of electromagnetic signals by photographic film magnetic tape or any other means,

(c) The term "processed data" means the products resulting from the processing of the primary data, needed to make such data usable,

(d) The term "analysed information" means the information resulting from the interpretation of processed data, inputs of data and knowledge from other sources,

(e) The term "remote sensing activities" means the operation of remote sensing space systems, primary data collection and storage stations, and activities in processing, interpreting and disseminating the processed data

Principle II

Remote sensing activities shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic, social or scientific and technological development and taking into particular consideration the needs of the developing countries

Principle III

Remote sensing activities shall be conducted in accordance with international law, including the Charter of the United Nations, the [1967] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and other Celestial Bodies and the relevant instruments of the International Telecommunications Union

Principle IV

Remote sensing activities shall be conducted in accordance with the principles contained in article I of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies, which, in particular provides that the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and stipulates the principle of freedom of exploration and use of outer space on the basis of equality These activities shall be conducted on the basis of respect for the principle of full and permanent sovereignty of all States and peoples over their own wealth and natural resources, with due regard to the rights and interests, in accordance with international law, of other States and entities under their jurisdiction Such activities shall not be conducted in a manner detrimental to the legitimate rights and interests of the sensed State

Principle V

States carrying out remote sensing activities shall promote international cooperation in these activities To this end they shall make available to other States opportunities for participation therein Such participation shall be based in each case on equitable and mutually acceptable terms

Principle VI

In order to maximize the availability of benefits from remote sensing activities, States are encouraged through agreements or other arrangements, to provide for the establishment and operation of data collecting and storage stations and processing and interpretation facilities, in particular within the framework of regional agreements or arrangements wherever feasible

Principle VII

States participating in remote sensing activities shall make available technical assistance to other interested States on mutually agreed terms

Principle VIII

The United Nations and the relevant agencies within the United Nations system shall promote international co-operation, including technical assistance and co-ordination in the area of remote sensing

Principle IX

In accordance with article IV of the Convention on Registration of Objects Launched into Outer Space and article XI of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies a State carrying out a programme of remote sensing shall inform the Secretary-General of the United Nations It shall moreover, make available any other relevant information to the greatest extent feasible and practicable to any other State, particularly any developing country that is affected by the programme, at its request

Principle X

Remote sensing shall promote the protection of the Earth's natural environment To this end States participating in remote sensing activities that have identified information in their possession that is capable of averting any phenomenon harmful to the Earth's natural environment shall disclose such information to States concerned

Principle XI

Remote sensing shall promote the protection of mankind from natural disasters To this end States participating in remote sensing activities that have identified processed data and analysed information in their possession that may be useful to States affected by natural disasters, or likely to be affected by impending natural disasters, shall transmit such data and information to States concerned as promptly as possible

Principle XII

As soon as the primary data and the processed data concerning the territory under its jurisdiction are produced, the sensed State shall have access to them on a non-discriminatory basis and on reasonable cost terms The sensed State shall also have access to the available analysed information concerning the territory under its jurisdiction in the possession of any State participating in remote sensing activities on the same basis and terms, taking particularly into account the needs and interests of the developing countries

Principle XIII

To promote and intensify international co-operation, especially with regard to the needs of developing countries, a State carrying out remote sensing of the Earth from space shall upon request, enter into consultations with a State whose territory is sensed in order to make available opportunities for participation and enhance the mutual benefits to be derived therefrom

Principle XIV

In compliance with article VI of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies States operating remote sensing satellites shall bear international responsibility for their activities and assure that such activities are conducted in accordance with these principles and the norms of international law, irrespective of whether such activities are carried out by governmental or non-governmental entities or through international organizations to which such States are parties This principle is without prejudice to the applicability of the norms of international law on State responsibility for remote sensing activities

Principle XV

Any dispute resulting from the application of these principles shall be resolved through the established procedures for the peaceful settlement of disputes

ITALY

Remote Sensing: Acquisition of Satellite Data

Memorandum of understanding signed at Washington and Rome April 16 and May 9, 1974;
Entered into force May 9, 1974.

MEMORANDUM OF UNDERSTANDING BETWEEN THE ITALIAN TELESPAZIO (S.P.A.) AND THE UNITED STATES NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

1 The purposes of this agreement are to set forth the responsibilities of the parties and the procedures for providing for (a) direct access, by a ground station to be built and operated in Italy by Telespazio in a project designated TERRA, to NASA ERTS-1 and ERTS-B satellite data and to the data from any future ERTS experimental satellites which NASA may launch, and (b) availability to NASA of data acquired by the Telespazio station pursuant to (a) above, subject to the provisions which follow

2 For its part, Telespazio will use its best efforts to.

(a) Develop and operate a facility at Fucino for acquisition and processing of ERTS data as well as other non-space data of interest to Telespazio entirely at its own cost, including the cost of the necessary communication links with the NASA ERTS OCC/NDPF (Operations Control Center/NASA Data Processing Facility) at the Goddard Space Flight Center

(b) Provide during Phase B, as described below, processed data to ERTS Principal Investigators duly selected by NASA whose test sites are in range of the Telespazio data acquisition station for the period of coverage promised to them and under the same conditions as NASA provides data to Principal Investigators Should another country in the region establish ERTS facilities, Telespazio's obligation to provide data to Principal Investigators in that country will terminate as soon as the new facilities are capable of providing this service Telespazio will continue to serve Principal Investigators in countries within range of the Telespazio station which do not have

ERTS facilities unless and until alternative arrangements are concluded

(c) Provide, to the best of its ability, any support requested by NASA in a spacecraft emergency condition, such as the provision of data indicated in paragraph 2(e) below should the on-board tape recorders fail

(d) Provide quarterly reports in English to NASA on the progress and results of the TERRA experiment with respect especially to the experience with a multi-purpose, flexible facility, the ability to apply data and analyses obtained to real-time decision making, and the principal applications made

(e) Make available to NASA, on a cost-free basis and in the NASA-preferred format (negative imagery format with identifying annotation) such copies of the ERTS data it acquires and processes as NASA may request in reasonable quantities (except in emergency conditions as noted in paragraph 2(c) above) These data provided to NASA by Telespazio will be made available to the public from U.S sources on precisely the same terms as data acquired directly by NASA These provisions apply as well to selected duplicate compatible tapes Public requests (for data) from the area covered by the Fucino station will be referred as appropriate to Telespazio or to other regional facilities which may be established in the area Coordination among such facilities would be highly desirable

(f) Include as output data from the Fucino station Computer Compatible Tapes (CCT's) and 70mm roll film.

3 For its part, NASA will use its best efforts to

(a) Program ERTS-1 and any subsequent experimental ERTS-type satellites to acquire data in areas accessible for direct read-out by the Telespazio station. The frequency of such programming will be subject to mutual agreement by the Project Managers (see below) It will be limited to test purposes in Phase A and expanded as agreed in Phase B

(b) Provide to Telespazio as necessary antenna pointing elements for acquisition of the ERTS spacecraft transmitted signal and updated definitive orbital information for use in processing the data

(c) Process, on a time-available basis and as may be agreed by the Project Managers, a limited number of data tapes acquired by Telespazio in Phase A for initial evaluation and calibration of the station's performance

(d) Continue to provide, during Phase A, ERTS data to NASA-selected Italian Principal Investigators to the extent of the time-coverage promised for them.

(e) Make available, for comparison purposes, a limited number of selected NASA data tapes covering portions of the area accessible to the Telespazio station

(f) Keep Telespazio informed of other prospective ERTS facilities in the area so that regional coordination can be effected.

4. The course of the project will be divided into two phases Phase A is for the test and checkout of the Fucino station. Phase B is for the following period of routine data acquisition and processing at the Fucino station Phase A will begin when the Project Managers agree on the readiness of the technical and operational interfaces required to carry out the project and on a schedule for accomplishing Phases A and B Phase A will be concluded and Phase B begun by mutual agreement of the Project Managers

5 To implement the agreement, Telespazio and NASA will each designate Project Managers to be responsible for coordinating the agreed functions and responsibilities of each side with the other. The Project Managers will be co-chairmen of a Joint Working Group (JWG) which will be the principal instrument for assuring the execution of the TERRA project and for keeping both sides continuously informed of the project status The Joint Working Group may establish such committees as required to carry out the project.

6 The following additional understandings are confirmed

(a) Telespazio will resolve any radio frequency difficulties to the satisfaction of the parties concerned so this cooperation can proceed without difficulty

(b) The responsibility for spacecraft control, health and status will remain with NASA throughout the program

(c) There will be no exchange of funds between Telespazio and NASA for ERTS 1 operations This agreement assures Telespazio access to the ERTS-B satellite throughout its design life of one year without charge by NASA It is understood, however, that NASA may thereafter establish some cost-sharing arrangement, such as users' fees, for participating ground stations.

(d) It is understood at this stage that NASA cannot make a firm commitment for future ERTS-type satellites

(e) Decisions taken by the International Telecommunications Union require that radio frequencies for future operational ERTS satellites will differ from those currently used for experimental satellites

(f) It is understood that Telespazio and the other Italian agencies participating in the program will pursue an ERTS open-data policy comparable to that of NASA and other U S. agencies participating in the program, particularly with respect to the public availability of data. Telespazio will thus ensure unrestricted public availability of the earth resources satellite data at a fair and reasonable charge based on actual cost.

(g) Training and exchange of technical personnel will take place as mutually agreed

(h) Telespazio and NASA will freely share and exchange data and technical information as mutually agreed and consistent with the laws and regulations of the two countries.

(i) It is understood that this project is experimental in character and subject to change in accordance with changes in technical requirements and opportunities.

(j) Telespazio and NASA will use their best efforts to arrange for free customs clearance for equipment required in the program

(k) Telespazio and NASA may each release general information to the public regarding the conduct of their own portion of the project as desired and, insofar as participation of the other agency is concerned, after suitable coordination.

(l) Telespazio and NASA will assure that the project is appropriately recorded in still and motion picture photography and that the photography is made available to the other agency upon request for public information purposes

(m) It is understood that the ability of Telespazio and NASA to carry out the responsibilities of this agreement is subject to the availability of appropriated funds.

7 This Memorandum of Understanding shall enter into force upon signature by Telespazio and NASA and shall continue in force for four years, subject to extension as may be agreed by Telespazio and NASA

For Telespazio	For the National Aeronautics and Space Administration
TELESPAZIO	
S p A per le Comunicazioni Spaziali Presidente: Amministratore Delegato	
MARCELLO RODINO	JAMES C. FLETCHER
	James C Fletcher *Administrator*
Date. 9-V-74	Date. 4/16/74

EUROPEAN SPACE AGENCY

LEGAL DOCUMENTS

MEMORANDUM OF UNDERSTANDING

between the European Space Agency

and the National Oceanic and Atmospheric Admin'stration (NOAA)

The Memorandum of Understanding between the Agency and the National Oceanic and Atmospheric Administration (NOAA) of the United States Departmert of Commerce concerning the reception of Landsat data was signed on 31 January 1984 by Mr J. V. Byrne for NOAA and on 23 February 1984 by Mr E. Quistgaard for the Agency. In accordance with Section III of the MOU, the latter entered into force on 1 February 1983 with the exception of Annex I which entered into force on 1 October 1982 and remains valid until 30 September 1984.

It will be remembered that a Memorandum of Understanding was signed on 7 October 1978 between NASA and ESA concerning the reception of data from the Landsat Earth resources satellites for a duration of four years from 9 May 1978 (see ESA/LEG/2). The MOU was extended by an exchange of letters of 17 June 1982. Since responsibility for the Landsat system was handed over by NASA to NOAA on 31 January 1983, the Agency's access to Landsat data needed to be ensured by a new legal instrument.

The Executive and NOAA therefore began negotiations which led to the drawing up of a draft Memorandum that was studied by the ESA delegate bodies on 27 and 28 May 1983 (AFC) and 7 June 1983 (PB-RS). At its meeting on 21, 22 and 23 September 1983, the AFC considered the draft MOU (ESA/AF(83)30) as final and recommended Council to approve it. Finally, Council authorised the Director General to sign the Memorandum of Understanding (see ESA/C(83)88 - ESA/AF(83)30, Annex, rev. 1).

MEMORANDUM OF UNDERSTANDING

BETWEEN THE

EUROPEAN SPACE AGENCY

AND THE

UNITED STATES DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Section I: Purpose

The National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce and the European Space Agency (ESA) recognizing:

- that the United States National Aeronautics and Space Administration (NASA) and ESA concluded a Memorandum of Understanding providing for direct access to the signals generated by the Landsat spacecraft;
- that NASA has transferred to NOAA the responsibility for the management of the U.S. civil remote sensing satellite program (hereafter referred to as the Landsat system) and the command and control of the Landsat spacecraft on January 31, 1983;
- that NOAA, under certain conditions, provides for direct reception of data from these satellites by stations operated outside the United States; and
- that ESA has established the EARTHNET System for the reception, pre-processing, archiving, and distribution of data from earth resources observation satellites, and has concluded appropriate agreements with Telespazio of Italy and the Swedish Board for Space Activities, under authority given to it by its member States including Italy and Sweden,

for the operation of Landsat ground stations in Fucino (Italy) and Kiruna (Sweden);

have decided to enter into this Memorandum of Understanding which, subject to the following terms and conditions, provides for (a) the continuation of direct access to NOAA's Landsat satellites by the EARTHNET System and (b) making available to NOAA and others Landsat data acquired by the ground stations of this System.

Section II: Undertakings of the Parties

A. NOAA, as manager of the Landsat system, through its National Environmental Satellite, Data, and Information Service (NESDIS), will use its best efforts to provide operational Landsat service for the duration of this Memorandum of Understanding and will:

1. Program, as requested by ESA, the Landsat system Multi-Spectral Scanner to cover areas within the acquisition radii of the ground stations of the EARTHNET System and transmit the data acquired directly to these stations. Programming details will be arranged by mutual agreement of the technical representatives provided for in Section II.C.1 of this Memorandum of Understanding;

2. Program, as requested by ESA, the Landsat system Thematic Mapper to cover areas within the acquisition radii of the ground stations of the EARTHNET System to the extent that such requests can be accommodated by the NASA Thematic Mapper program. Programming details to meet such requests will be arranged by mutual

agreement of the technical representatives provided for in Section II.C.1 of this Memorandum of Understanding, based on arrangements between NOAA and NASA;

3. Provide the ground stations of the EARTHNET System with orbital elements for calculating the antenna pointing angles necessary to acquire the Landsat system spacecraft transmitted signal and for processing the data acquired; and

4. Reserve the right to curtail or terminate transmission of data to the ground stations of the EARTHNET System in the event of spacecraft or NOAA ground equipment limitations requiring such actions. In this case, NOAA will notify ESA and discuss the planned action in the most expeditious manner possible.

B. For its part, ESA, as manager of the EARTHNET System, will use its best efforts to:

1. Operate the EARTHNET System, including the above mentioned stations at Fucino (Italy) and Kiruna (Sweden), for the reception, processing, archiving, and distribution of Landsat data at its own cost, including the cost of establishing and operating the necessary communication links with NOAA's Landsat Operations Control Center located at the NASA Goddard Space Flight Center, Greenbelt, Maryland;

2. Ensure that all Landsat data acquired by the ground stations of the EARTHNET System are available for sale or distribution on a public, non-discriminatory basis. This applies to all Landsat data acquired under this Memorandum of Understanding, as well as Landsat

data acquired under previous Memoranda of Understanding with NASA. ESA will ensure that the principle of public, non-discriminatory availability of these data is written into any legal instrument that it concludes with third parties;

3. Pay to NOAA the fees contained in Annex I to this Memorandum of Understanding for the direct reception and distribution of all Landsat data acquired and archived after October 1, 1982;

4. Provide to NOAA quarterly listings, in an agreed format, of all Landsat data acquired by the ground stations of the EARTHNET System. These catalog listings will be made available publicly through NOAA data facilities;

5. Use its best efforts to ensure that any radio frequency problem occurring in relation to data reception by the ground stations of the EARTHNET System is resolved to the satisfaction of the parties to this Memorandum of Understanding. Questions concerning radio frequency interference by the Landsat system spacecraft raised by parties in third countries will be referred to the U.S. Government and NOAA for reply. NOAA will use the following frequencies for sensor data transmission from the Landsat system spacecraft:

Multi-Spectral Scanner - S-Band (2200 - 2300 MHz)
and X-Band (8025 - 8400 MHz)

Thematic Mapper - X-Band (8025 - 8400 MHz); and

6. Make available to NOAA on request reasonable quantities of Landsat data for key U.S. Government programs in the form of station tapes or high density digital tapes. Cooperative support arrangements

in the form of exchanges of letters between the NOAA Assistant Administrator for Environmental Satellite, Data, and Information Services and the Director of Applications Programmes of ESA will define the procedure for such requests and all details regarding the data tapes to be provided within the limits of the provisions of this Memorandum of Understanding.

C. It is further understood and agreed that:

1. NOAA and ESA will each designate technical representatives to be responsible for the technical implementation of this Memorandum of Understanding. The technical representatives, or their deputies, will participate in the Landsat Ground Station Operations Working Group. This group, chaired by NOAA, will serve as a forum for the exchange of technical and management information of a general nature among station operators and NOAA. In particular, through this group, NOAA and ESA may work together to develop a market strategy for the promotion of Landsat data which will take the interests of both parties into account. Also, stations and NOAA may exchange, as mutually agreed, limited numbers of Landsat data tapes and related documentation for the purposes of intercomparison of equipment performance. Supplemental meetings between ESA and NOAA will be held by mutual agreement;

2. The obligations of ESA and NOAA under this Memorandum of Understanding are subject to the national laws and regulations of each party and the availability of appropriated funds. In the event of one of the parties meeting with funding difficulties it will immediately enter into consultations with the other party;

3. NOAA does not warrant the suitability of Landsat data for any purpose and shall not be liable for any damage or injury brought about by the use of the Landsat system;

4. The NOAA Assistant Administrator for Environmental Satellite, Data, and Information Services and the Director of Applications Programmes of ESA are authorized to enter into and modify as necessary technical, financial, and management implementing agreements within the limits of the provisions of this Memorandum of Understanding to cover arrangements such as possible access to the Landsat spacecraft through a mobile station;

5. In the event that NOAA receives requests for specific Landsat scenes, products, or specific information on its holdings, NOAA will supply the data and/or information requested. However, NOAA will include with all responses to requests for Landsat data acquired in the EARTHNET System ground stations' coverage zones a statement noting that the ground stations of the EARTHNET System should have available more complete data;

6. When the expected coverage of a prospective Landsat ground station overlaps with that of the ground stations of the EARTHNET System, NOAA will inform ESA before finalizing any agreement with the prospective station operator NOAA will encourage ESA and the prospective station operator to consult with a view toward reaching a mutually satisfactory understanding on responding to requests for data of the overlapping coverage area

7 The provisions concerning the access and distribution fees to be paid by ESA and the payment schedule are contained in the Annex

attached hereto which forms an integral part of the Memorandum of Understanding;

8. The terms of this Memorandum of Understanding may be modified at any time with the express written consent of both parties subject to their respective internal procedures. The Annex attached hereto may be modified through exchanges of letters between the NOAA Assistant Administrator for Environmental Satellite, Data, and Information Services and the Director of Applications Programmes of ESA subject to their respective internal procedures; and

9. Any disputes as to the interpretation or implementation of the terms of this Memorandum of Understanding shall be referred to the NOAA Administrator and the Director General of ESA for settlement. Should the NOAA Administrator and the ESA Director General be unable to resolve such disputes, they will be submitted to such other form of resolution or arbitration as they may agree.

Section III: Entry into Force

A. Subject to its signature by the legal representatives of NOAA and ESA, this Memorandum of Understanding shall enter into force on February 1, 1983, with the exception of the provisions of Annex I which will enter into force retroactively on October 1, 1982. The Memorandum of Understanding shall remain in force for a period of three years or until NOAA no longer retains management responsibility for the Landsat system should that occur first. NOAA will keep ESA informed of any plans or arrangements for the transfer of the U S. civil operational land remote sensing satellite system to the private sector, both at the time of any initial decision to this end and at pertinent points

of Applications Programmes of ESA prior to the implementation of the proposed change.

II. Payment Schedule

Payments for each station will be made payable to the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, in U.S. Dollars and to any U.S. bank according to the following schedule:

Date	Payments Due
September 30, 1983	$150,000 access fee for each station for October 1, 1983 - December 31, 1983.
December 31, 1983	Distribution fee for July 1, 1983 - September 30, 1983, based on report submitted October 15, 1983.
	$150,000 access fee for each station for January 1, 1984 - March 31, 1984.
March 31, 1984	Distribution fee for October 1, 1983 - December 31, 1983, based on report submitted January 15, 1984.
	$150,000 access fee for each station for April 1, 1984 - June 30, 1984.

June 30, 1984	Distribution fee for January 1, 1984 - March 31, 1984, based on report submitted April 15, 1984
	$150,000 access fee for each station for July 1, 1984 - September 30, 1984.
September 30, 1984	Distribution fee for April 1, 1984 - June 30, 1984, based on report submitted July 15, 1984.
	$150,000 access fee for each station for October 1, 1984 - December 31, 1984.

All payments must be received within 30 days from the date of invoice. In this regard NOAA will use its best efforts to ensure timely delivery of invoices to ESA. Charges for late payment will be at the U.S. Treasury Department prevailing rate on the overdue balance for each 30 day period or portion thereof that payment is delayed. Unanticipated and/or reasonable delays in payment or receipt of invoice will be taken into account Payments should be sent to:

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
AT/GSM331 Attn: NOAA Collection Official
6010 Executive Boulevard
Rockville, Maryland 20852
U.S.A.

Distribution fee payments will be based on quarterly distribution eports delivered via air mail or cable to NOAA by ESA within two weeks after he end of each quarter. Detailed definition of the contents of the quarterly istribution reports will be arranged by the technical representatives esponsible for the implementation of this Memorandum of Understanding.

II. Contingencies

Should spacecraft or NOAA ground equipment limitations degrade or preclude regular transmission of Landsat data to the ESA ground stations, NOAA, n consultation with ESA, will appropriately adjust fee payments.

NOAA reserves the right to terminate transmission of Landsat data to ESA at any time ESA is in arrears in its payments to NOAA provided that NOAA notifies ESA 30 days in advance of its intention to terminate transmission for this reason.

IV Duration of Annex

This Annex will remain in effect until September 30, 1984, and may be extended or revised by mutual agreement of NOAA and ESA through exchanges of letters between the NOAA Assistant Administrator for Environmental Satellite, Data, and Information Services and the Director of Applications Programmes of ESA subject to their respective internal procedures. NOAA will provide reasonable notification in writing of financial terms and conditions proposed for the period beginning October 1, 1984, which take into account the budget cycles of the parties to the Memorandum of Understanding.

(a) Satellite data available from SDSD include

(1) Data from the TIROS (Television InfraRed Observational Satellite) series of experimental spacecraft, much of the imagery gathered by spacecraft of the NASA experimental NIMBUS series, full-earth disc photographs from NASA's Applications Technology Satellites (ATS) I and III geostationary research spacecraft; tens of thousands of images from the original ESSA and current NOAA series of Improved TIROS Operational Satellites, and both full-disc and sectorized images from the Synchronous Meteorological Satellites (SMS) 1 and 2, the current operational geostationary spacecraft. In addition to visible light imagery, infrared data are available from the NIMBUS, NOAA, and SMS satellites. Each day, SDSD receives about 239 negatives from the polar-orbiting NOAA spacecraft, more than 235 SMS-1 and 2 negatives, and several special negatives and movie film loops

(2) Photographs (both color and black-and-white) taken during the three SKYLAB missions (May through June, 1973, July through September, 1973, and November 1973 through February 1974)

(b) Queries should be addressed to Satellite Data Services Division, World Weather Building, Room 606, Washington, DC 20233, tel 301-763-8111

§ 950.9 Computerized Environmental Data and Information Retrieval Service.

The Environmental Data Index (ENDEX) provides rapid, automated referral to multidiscipline environmental data files of NOAA, other Federal agencies, state and local governments, and universities, research institutes, and private industry A computerized, information retrieval service provides a parallel subject-author-abstract referral service A telephone call to any EDIS data or information center or NOAA library will allow a user access to these services

PART 960—LICENSING OF PRIVATE REMOTE-SENSING SPACE SYSTEMS

Subpart A—General

Subpart B—Application Process

Subpart C—Enforcement Procedures

AUTHORITY 15 U S C 4244

SOURCE 52 FR 25970, July 10, 1987, unless otherwise noted

Subpart A—General

§ 960 1 Purpose.

These regulations establish the minimum practicable procedures and informational requirements to license and supervise the operation of a private remote-sensing space system under Title IV of the Land Remote-Sensing Commercialization Act of 1984 (The Act) They are intended to facilitate the policy of the Act by encouraging development of private sector-owned remote-sensing space systems and promotion of commercialization of land remote-sensing systems in the United States while complying with the requirements of the Act, including

(a) To preserve and promote the national security of the United States,

(b) To ensure that data from private operational remote-sensing s, ace systems will be sold on a nondiscriminatory basis; and

(c) To fulfill the international obligations of the United States.

To the extent there is a tension between the policy of promoting the commercial use of remote-sensing systems and the policies of promoting national security interests as determined by the Secretary of Defense or international obligations as determined by the Secretary of State, the Secretary of Commerce may, in his or her discretion, undertake reasonable efforts to satisfactorily resolve the matter in favor of commercialization.

§ 960 2 Scope.

The Act and these regulations apply to any person subject to the jurisdiction or control of the United States who operates a private remote-sensing space system either directly or through an affiliate or subsidiary. For the purposes of these regulations, a person, affiliate, or subsidiary is subject to the jurisdiction or control of the United States if such person is:

(a) An individual who is a citizen of the United States;

(b) A corporation, partnership, association or other entity organized or existing under the laws of the United States or any state, territory or possession thereof; or

(c) Any other private space system operator having substantial connections with the United States or deriving substantial benefits from U S law that support its international remote-sensing operations. Relevant connections include using a U S launch vehicle and/or platform, operating a spacecraft command and/or data acquisition station in the U S., and processing the data at and/or marketing it from facilities within the U.S The following examples are intended to illustrate the application of this paragraph.

EXAMPLE 1 A non-U.S corporation launches an operational remote sensing space system using a U.S operated launch vehicle and/or a platform launched from U S territory The company operates no spacecraft command ground station in the U S although it has technicians and supervisors present in the U S to ensure integration of the foreign built satellite or space system with the launch vehicle The company acquires data directly from the space system and processes and distributes it from facilities outside the U S., although it advertises the availability of data and/or information in U S publications

The company is not subject to U S jurisdiction or control and requires no license for its remote sensing activities

EXAMPLE 2 A company's operation is the same as in Example 1 except that it acquires, processes and distributes the data to U S and foreign customers from one or more facilities within the U S

The company is subject to U S jurisdiction or control and requires a license

Where ground activities in the U S are less extensive than those described above, such as mere operation of a data acquisition facility or a small retail distribution outlet for U S customers, the Administrator will decide on an individual basis whether the operator is subject to U S jurisdiction or control for purposes of Title IV In such cases, the use of a U S launch vehicle and/or platform may be significant although such use alone is not a sufficient connection

Interested persons with questions may request a formal, binding opinion from the Administrator concerning the application of these regulations to their operation Informal opinions by agencies should not be relied upon

§ 960 3 Definitions

For purposes of these regulations, the following terms have the following meanings

Act means the Land Remote Sensing Commercialization Act of 1984 (Pub L. 98-365, 15 U S C 4201 *et seq*),

Administrator means the adinistrator of NOAA, or his designee,

Affiliate means any person (a) Which owns or controls more than 5% interest in the applicant or licensee, or (b) which is under common ownership or control with the applicant or licensee,

Application means any written request submitted under this part for (a) Issuance of a license for the operation of a private remote sensing space system, (b) transfer or renewal of any such license, or (c) an amendment to any such license as a result of a substantial change in any of the specified terms and conditions of the license,

Basic data set means data collected by any licensed private remote sensing space system that (a) has been selected to be maintained by the United

States Government in a pubic archive, and (b) shall remain distinct from any inventory of data that a system operator may maintain for sales and for other purposes Section 602 of the Act ("Archiving of Data") sets forth the Government s interest and criteria for determining the "basic data set,"

Experimental data means data collected by the United States Government in experimental remote-sensing programs,

Measured values mean the assigned numbers, shades or colors, which represent, in some standardized system, an amount of electromagnetic radiation sensed in a spectral band

NESDIS means the National Environmental Satellite, Data, and Information Service,

NOAA means the National Oceanic and Atmospheric Administration,

Person means any individual (whether or not a citizen of the United States), corporation, partnership, association, or other entity organized or existing under the laws of any nation. "Person" does not include any government or intergovernmental organization or agency thereof

Remote-sensing space system means any instrument or device or combination thereof and any related ground based facilities capable of sensing the Earth's surface from space by making use of the properties of the electromagnetic waves emitted, reflected, or diffracted by the sensed objects For purposes of these regulations, small, hand-held cameras shall not be considered remote-sensing space systems.

Subsidiary means an entity whose controlling interest is held by the applicant or licensee

Unenhanced data means unprocessed or minimally processed signals or film collected from a licensed remote-sensing space system, or minimally processed film products derived from such signals Such mimimal processing includes but is not limited to rectification of distortions, registration with respect to features of the Earth, and calibration of spectral response Such minimal processing does not include conclusions, substantial and irreversible manipulations, or calculations derived from such signals or film products or the combination of the signals or film products with other data or information in such manner as to effect a substantial and irreversible modification thereof

Value-added activity means any activity that substantially and irreversibly changes the information content of the unenhanced data by (a) Altering or replacing the measured values of an unenhanced data product or (b) combing unenhanced signals or film products with other data or information Production of unenhanced data products through minimal processing of signals and converting assigned values from one unit of measurement to another do not constitute value-added activities Increasing the marketability or the price of an unenhanced data product does not by itself constitute a value-added activity The product derived may be for sale, for any other form of distribution, or for the internal use of the system operator.

Subpart B—Application Process

§ 960.4 Pre-application consultation.

(a) Applicants are encouraged to consult with NOAA and other relevant federal agencies at the earliest possible planning stages Such consultation may reveal design or data collection requirements that may be accommodated early at low cost or avoid costly changes in design or data collection characteristics Consultation at the time a license application is being prepared may prove useful in defining informational requirements and in expediting review.

(b) *Consultation.* The Administrator shall consult upon request with any prospective applicant to assist the applicant in

(1) Properly preparing the application, and

(2) Contacting other Government agencies involved in the application review process in order to discuss the prospective application

(c) *Request.* A prospective applicant who wishes to have a pre-application consultation should make such request in writing to the Assistant Administrator, National Environmental Satellite, Data and Information Service, Washington, DC 20233

§ 960.5 General

(a) *Where to file.* Applications and all related documents shall be filed with the Assistant Administrator, National Environmental Satellite, Data, and Information Service (NESDIS), NOAA, Washington, DC 20233

(b) *Form.* No particular form is required but each application must be in writing, must include all of the information specified in this subpart, and must be signed as follow.

(1) For a corporation By a principal executive officer at least the level of vice president

(2) For a partnership or a sole proprietorship: By a general partner or proprietor, respectively, or by any authorized principal executive officer of any corporate general partner.

(3) For an association or other entity By a principal executive officer

(c) *Number of copies* Eight (8) copies of each application must be submitted.

§ 960.6 Information to be submitted with application.

The following information on the applicant, and its affiliates and subsidiaries shall be provided by the applicant:

(a) The name, mailing address, telephone number and citizenship of the applicant and any affiliates or subsidiaries, and of each director or owner of greater than five (5) percent interest

(b) A copy of the charter or instrument by which the applicant was formed and authorized to do business. If the applicant is a corporation its charter shall be certified by the Secretary of State or other appropriate authority of the jurisdiction in which incorporated.

(c) The name, address, and telephone number of a person upon whom service of all documents may be made.

(d) Adequate operational information regarding the applicant's remote-sensing space system on which to base review to ensure compliance with national security and international requirements including,

(1) The date of intended commencement of operations and the expected duration of such operations,

(2) The method of launch and the name and location of the operator of the launch vehicle and the launch site,

(3) The range of orbits and altitudes requested for authorized operation,

(4) The range of spatial resolution or instantaneous field of view requested, and

(5) The spectral bands requested for authorized operation

The applicant may wish to include information concerning the extent to which data to be acquired from the applicant's system could be acquired from foreign competitors who are not subject to these regulations

(e) The applicant's intended data acquisition and distribution plans including

(1) Plans for data transmission to the ground,

(2) Method of data distribution including scheduling plans and procedures,

(3) Location of major data distribution outlets,

(4) Data reproduction policy,

(5) Pricing policy,

(6) The names and addresses of any parties that will engage in the marketing of data on a contractual basis with the applicant, or its affiliates and subsidiaries, and

(7) Any other information necessary to satisfy the requirements of section 601 of the Act

(f) Any plans that the applicant, or any affiliate or subsidiary may have for engaging in value-added activities, including a plan and pricing policy for ensuring nondiscriminatory access to unenhanced data

(g) All existing or anticipated agreements regarding system operation between the applicant, its affiliates and subsidiaries, and any foreign nation, entity or consortium

(h) Proposed method of disposition of any remote-sensing satellites owned or operated by the applicant

In the case of an application for an amendment to an existing license, only modifications or additions to previously submitted information need be provided

§ 960 7 Amendment, withdrawal, and termination of an application

(a) If information in an application becomes materially inaccurate or incomplete after it is filed but before the license application proceeding is completed, the applicant must promptly file an amendment that contains the corrected or additional information The applicant should follow the procedures specified in § 960 5 for an original filing

(b) If the Administrator determines that any amendment constitutes a major and substantial change to the applicant s original proposal, the Administrator may

(1) Incorporate the amendment into the original application and, if necessary, extend the time period prescribed in the Act and in these regulations for processing the application by no more than 60 days, or

(2) Require the applicant to submit a new license application

(c) An applicant may withdraw an application at any time before the license application review is completed by delivering or mailing a written notice of withdrawal to the Administrator

(d) The Administrator shall terminate review of a license application if

(1) The application is withdrawn before the decision approving or denying it is issued, or

(2) The applicant, after written notice by the Administrator pursuant to § 960 9(c), does not provide adequate additional information to complete the application within the time stated in the written notice

§ 960 8 Confidentiality of information

(a) Any person who submits information pursuant to this part, considered to be a trade secret or commercial or financial information that is privileged or confidential may request in writing that the information be given confidential treatment Such request should

(1) Be submitted at the time of submission of the information, and

(2) State the period of time for which confidential treatment is desired (e g , until a certain date, or until the occurrence of a certain event or permanently)

(b) Information for which confidential treatment is requested must be clearly marked with a legend such as "Proprietary Information" or "Confidential Treatment Requested " Where such marking proves impracticable, a cover sheet containing such legend must be securely attached

(c) If a request for confidential treatment is received after the information itself is received, NESDIS will try to associate the request with copies of the information, but cannot guarantee that such efforts will be effective

(d) Any request for confidential treatment may include a written justification stating why the information is a trade secret, or commercial or financial information that is privileged or confidential, and describing

(1) The commercial or financial nature of the information,

(2) The nature and extent of the competitive advantage enjoyed as a result of possession of the information,

(3) The nature and extent of the competitive harm that would result from public disclosure of the information;

(4) The extent to which the information has been disseminated to employees and contractors of the person submitting the information,

(5) The extent to which persons other than the person submitting the information possess or have access to the same information, and

(6) The nature of the measures that have been and are being taken to protect the information from disclosure

(e) Request for disclosure

(1) Requests for disclosure of information submitted, reported or collected pursuant to this part shall be in accordance with 15 CFR 903 7

(2) NOAA will not usually determine whether confidential treatment is warranted until it receives a request for disclosure of the information unless it would encourage the submission of information not required to be submitted under this part

(3) Upon receipt of a request for disclosure of information for which confidential treatment has been requested the Administrator will notify immediately the person who submitted the information and

(i) Inform such person of the date by which NOAA must determine whether confidential treatment is warranted in order to comply with the request for disclosure (usually within 10 working days of receipt of the request), and

(ii) Inquire whether such person continues to request confidential treatment

(4) If the person waives or withdraws a request for confidential treatment in full or in part, the person shall deliver to NOAA a written statement to that effect If the person confirms the request for confidential treatment, such person is strongly encouraged to deliver to NOAA a written statement in sufficient time for NOAA to fully consider it in making its formal determination (generally not later than the close of business on the fourth working day after being notified under paragraph (e)(3) of this section) Such statement may

(i) Address the issues listed in paragraph (d) of this section, describing the basis for believing that the information is deserving of confidential treatment, if such a statement was not previously submitted,

(ii) Update or supplement any statement previously submitted under paragraph (d) of this section, and

(iii) Present arguments against disclosure of the information

(5) To the extent permitted by applicable law, part or all of any statement submitted under this section will be treated as confidential if so requested by the person submitting the response

§ 960 9 Review procedures

(a) The Administrator shall immediately forward a copy of any application or a summary thereof to the Department of Defense the Department of State and any other Federal agencies determined to have a substantial interest in the proposed activity such as the National Aeronautics and Space Administration and the Department of Transportation The Administrator shall advise such agencies of the deadline prescribed by paragraph (b) of this section to require additional information from the applicant

(b) Within 21 days after the receipt of an application, the Administrator shall determine whether the application appears to contain all of the information required by Subpart B of these regulations In making this determination the Administrator shall consider timely comments provided by the Federal agencies consulted under paragraph (a) of this section

(c) If the Administrator determines that all of the required information is not contained in the application the Administrator may require by written notice to the applicant that the applicant file further information, analysis, or explanation

(d) If the Administrator requires further information under paragraph (c) of this section the time limitations prescribed by section 401(c) of the Act do not begin to run until the date on which the Administrator determines that the application appears to be complete and so notifies the applicant

(e) Within sixty days of receipt of a complete application each Federal agency consulted under paragraph (a) of this section shall recommend approval or disapproval of the application in writing

(1) If the Secretary of Defense or the Secretary of State determines that the application may not be approved without modifications or conditions consistent with national security concerns or international obligations the determination shall clearly state why the modifications or conditions are necessary to accomplish the intended purpose

(2) If any other agency recommends disapproval it shall state why it believes the application does not comply with any law or regulation within its area of responsibility and how it believes the application may be amended or the license conditioned to comply with the law or regulation in question

(f) All determinations and recommendations shall be made a part of the public record for that application If the recommendation contains classified material, the public record shall reflect at what point in the document deletions have been made

§ 960.10 Timely approval or denial of application and issuance of license

(a) The Administrator shall approve or deny a complete application as soon as practicable. If final action has not occurred within one hundred and twenty days after receipt, the Administrator shall inform the applicant of any pending issues and of actions required to resolve them.

(b) If the Administrator denies the application, he or she shall provide the applicant with a concise statement in writing of the reasons therefor. Within 30 days after receipt of a notice of denial, the applicant may appeal by written notice to the Administrator and may request either an informal hearing or a formal hearing to be held in accordance with the procedures set forth at 15 CFR Part 904, Subpart C.

(c) As soon as practicable after the close of a hearing or, in the case of a formal hearing, the issuance of a recommended decision by the Administrative Law Judge, the Administrator shall issue the final decision and serve notice thereof on the applicant. This decision shall be considered final agency action.

§ 960.11 Criteria for approval or denial

Before approving an application and issuing a license or an amendment to a license, the Administrator shall find in writing that:

(a) The licensee will operate the system in a manner consistent with national security and the international obligations of the U.S.;

(b) The licensee will make available unenhanced data to all potential users on a nondiscriminatory basis in accordance with sections 104(3) and 601 of the Act;

(1) If the licensee or any affiliate or subsidiary will engage in any value-added activities, the plan required by section 402(b)(9)(B) of the Act must clearly identify all such value-added activities, whether conducted by the license itself or by any affiliate or subsidiary, and ensure that any unenhanced data generated by the system will be made available to all potential users on a nondiscriminatory basis;

(2) Where the value-added activity described in the plan required by section 402(b)(9) of the Act consists of processing data for general publication, the plan shall satisfy the requirements of this section if:

(i) Publication is timely;

(ii) The medium in which the imagery will be published will be available to any potential subscriber on a nondiscriminatory basis; and

(iii) All unenhanced data from which the imagery is derived will be available on a nondiscriminatory basis at the time of publication or within a reasonable time thereafter;

(c) The licensee will make available to the Administrator at the reasonable cost of reproduction and transmission all unenhanced data which the Administrator may request for a basic data set pursuant to section 602 of the Act; and

(d) If the space system will utilize a space platform owned or operated by the license, the licensee has agreed to dispose of such platform in a satisfactory manner.

In making the findings required by paragraph (a) of this section, the Administrator shall be entitled to rely upon the written recommendations of the Departments of Defense and State described in § 960.9(e).

§ 960.12 Contents of license

Each license issued by the Administrator for the operation of a remote-sensing space system shall specify:

(a) The name and address of the person to whom the license is being issued, and the name and address of the agent for service of documents, if different;

(b) The effective date of the license and its duration;

(c) The characteristics of the system approved, including specifically:

(1) The range of orbits and altitudes authorized for operation;

(2) The range of spatial resolution or instantaneous field of view authorized; and

(3) The spectral bands authorized;

(d) Terms and conditions necessary to ensure:

(1) Compliance with any national security concerns and any international obligations specified by the Departments of Defense and State respectively;

(2) Adherence to the approved plans described in § 960.6(f) for the licensee to make unenhanced data available to all potential users on a nondiscriminatory basis;

(e) That the licensee will make available to the Administrator any data requested for a basic data set on reasonable terms and conditions;

(f) That the licensee will notify the Administrator of any agreement which it intends to enter into with any foreign nation or entity or any consortium involving a foreign nation or entity at least 30 days before concluding such an agreement;

(g) That the licensee will allow the Administrator or other appropriate federal officials access at any reasonable time to any facility or site of the licensee or any contractor of the licensee located within the jurisdiction or control of the United States:

(1) To verify that the space system conforms to representations made in the license application, or

(2) To monitor activities of the licensee under the license including the inspection of equipment, facilities and other records and ensure compliance with the terms of the license;

(h) That the licensee will surrender the license and terminate all operations immediately upon notification that the Administrator has determined under section 403(a)(1) of the Act that the licensee has substantially failed to comply with any of the requirements listed in section 403(a)(1);

(i) If the space system will utilize a civilian U.S. Government platform, that the licensee will reach an agreement with the appropriate agency to reimburse the Government for all related costs and to ensure that the use of the platform will not interfere with the government's mission;

(j) Appropriate provisions governing the disposition of any space platforms owned or operated by the licensee, including at a minimum sufficient advance notification to the Administrator of such disposition to allow review and approval of the procedures proposed;

(k) The conditions that require an amendment of the license including any change:

(1) In ownership of the licensee;

(2) In citizenship of the president, proprietor, or other chief executive officer of the licensee and if the licensee is a corporation, the chairman of the board of directors, or if the licensee is a partnership, a general partner;

(3) In the operations of the licensee that would result in sensing activities outside the range of orbits and altitudes, the range of spatial resolution or instantaneous field of vision or the spectral bands approved under paragraph (c) of this section except in case of an emergency posing an imminent and substantial threat of harm to human life, property, the environment or the remote sensing space system itself, in which cases the licensee shall attempt to obtain oral approval from the Administrator;

(l) That the licensee will notify the Administrator of any value added activities that will be conducted by the licensee or by a subsidiary or affiliate.

Subpart C—Enforcement Procedures

§ 960.13 General

Section 403(a) of the act authorizes the Administrator to take actions adverse to a licensee if the licensee fails to comply with the Act, these regulations, or any terms conditions or restrictions in the license. These adverse actions are:

(a) License sanctions, including modification, suspension, and termination of any licensee;

(b) Civil penalties not to exceed $10,000 for each day of operation in violation of a license, regulation, or the Act, and

(c) Seizure of any object, record, or report if there is probable cause to believe that such object, record, or report is being or is likely to be used to commit a violation.

This subpart establishes uniform rules and procedures for these adverse actions.

§ 960.14 License sanctions

(a) If the Administrator determines, on the basis of available information,

that the licensee is not in compliance with any applicable provision of the Act, any regulation, or any license condition or restriction, the Administrator may issue the licensee a Notice of License Sanction (NOLS) proposing to

(1) Terminate the license,

(2) Suspend the license for a specified period of time or until certain stated requirements are met, or both, or

(3) Modify the license, to aid future enforcement efforts

(b) The NOLS will contain,

(1) A concise statement of the facts believed to show a violation,

(2) A specific reference to the provisions of the Act, regulation, or license allegedly violated,

(3) The nature and duration of the proposed sanction, and

(4) The effective date of the sanction which is 30 days after the date of the NOLS unless the Administrator requires immediate termination of some or all licensed activities under paragraph (e) of this section or unless the licensee requests a hearing under paragraph (d) of this section

(c) The NOLS also may propose to assess a civil penalty in accordance with § 960 15

(d) Within 30 days after receipt of the NOLS, the licensee may request a hearing by serving a written request on the Administrator either in person or by certified or registered mail, return receipt requested, at the address specified in the NOLS Such hearing shall be held in accordance with the procedures set forth at 15 CFR Part 904, Subpart C

(e) If the Administrator determines that the licensee has substantially failed to comply with any provision of the Act, these regulations or with any term, condition or restriction of the license the NOLS will include a finding to this effect and may require immediate termination of some or all licensed operations For purposes of this section, 'substantially fails to comply" means

(1) Any failure to comply with a material term or condition of a license or of the Act or these regulations, which the Administrator has reasonable basis to believe is willful or intentional,

(2) Any failure to comply after notice by the Administrator;

(3) Any failure to comply with a material term or condition of a license which the Secretary of Defense determines clearly poses a threat to the national security or which the Secretary of State determines clearly poses a threat to international obligations of the United States

(f) Any request for a hearing under paragraph (d) of this section will not delay immediate termination under this paragraph and the licensee is entitled to treat the finding as final agency action for purposes of judicial review

§ 960 15 Civil penalties

Section 403(a)(3) of the Act authorizes the Administrator to assess civil penalties of up to $10,000 for any violation of any requirement of the Act, these regulations or any term or condition of a license Each day of operation in violation constitutes a separate violation Such penalties will be assessed in accordance with the procedures set forth at 15 CFR Part 904, Subpart B

§ 960 16 Seizure

(a) If the Administrator determines that there is probable cause to believe that any object, record, or report was used is being used or is likely to be used in violation of the Act, these regulations or the requirements of any license, the Administrator may seize any such item and issue the licensee a Notice of Seizure (NOS) containing

(1) A description of the object, record or report seized,

(2) A concise statement of the facts believed to show use or possible use in a violation, and

(3) A specific reference to the provisions of the Act, regulation or license allegedly violated

(b) Within 30 days after receipt of a NOS, the licensee may request a hearing by serving a written and dated request on the Administrator either in person or by certified or registered mail, return receipt requested, at the address specified in the notice Such hearing shall be held in accordance with the procedures set forth at 15 CFR Part 904, Subpart C For good cause shown, the Administrator may in his or her sole discretion return the seized item pending the outcome of the hearing

EUROPEAN SPACE AGENCY

LEGAL DOCUMENTS

MEMORANDUM OF UNDERSTANDING

Between ESA and NASA
concerning
ERS-1 SAR Data Acquisition at Fairbanks

1

It will be recalled that on 4 January 1985 NASA made an official request to ESA for direct access to ERS-1 SAR data (ESA/PB-RS(85)1), to which the participating States gave positive replies.

A draft Memorandum has been negotiated between the Executive and NASA on direct access by the NASA Station at Fairbanks to ERS-1 SAR data. The draft was studied and discussed at several PB-RS meetings in 1985: on 20 and 21 May (ESA/PB-RS(85)7), 3 July (ESA/PB-RS(85)20) and 16 October (ESA/PB-RS(85)28). It was unanimously approved at the meeting on 10 and 11 December 1985 (ESA/PB-RS(85)28, rev. 2).

It was also discussed by the AFC at its meeting on 13 November 1985 and recommended to Council subject to some modifications (ESA/AF(85)87).

Submitted to Council on 12 and 13 December 1985, it was unanimously approved by delegations, which authorised the Director General to sign it (ESA/C(85)124).

The Memorandum of Understanding was signed in Washington on 14 January 1986 by Mr Reimar Lüst on behalf of ESA and Mr W. R. Graham on behalf of NASA.

In accordance with its Article 8, it entered into force on the date of signature.

MEMORANDUM OF UNDERSTANDING
BETWEEN THE EUROPEAN SPACE AGENCY AND
THE UNITED STATES NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONCERNING THE ACQUISITION OF ERS-1 SAR DATA AT FAIRBANKS

The European Space Agency established by the Convention opened for signature in Paris on 30 May 1975 (hereinafter referred to as "ESA"),

and

The United States National Aeronautics and Space Administration (hereinafter referred to as "NASA"),

RECALLING the longstanding and fruitful cooperation between ESA and NASA in the field of experimental Earth Observation, witnessed by the acquisition by ESA/Earthnet of data from the NASA Seasat, the Heat Capacity Mapping Mission and Nimbus 7 satellites,

RECALLING also the acquisition by ESA/Earthnet of data from the pre-operational NASA Landsat satellites,

RECALLING that Member States of ESA established on 11 July 1984 a declaration accompanied by its annexes concerning Phases C/D/E of the European Remote Sensing Satellite ERS-1 which is presently scheduled for launch in April 1989,

RECOGNISING the world-wide interest of both the scientific and application communities in this oceanographic mission,

RECOGNISING that NASA has proposed to ESA a scientific collaboration during the development and exploitation phases of the ERS-1 mission and that major opportunities for such collaboration will be offered by the planned coincident time frame of ERS-1 and NASA's NROSS scatterometer missions,

RECOGNISING that NASA has also proposed to ESA the direct read-out of ERS-1 SAR data at a planned NASA ground station in Fairbanks (Alaska),

RECOGNISING the benefit for the scientific and application communities interested in polar ocean and ice research of this additional acquisition capability allowing quasi-complete coverage of the Arctic zone, together with the ground station of ESA (Kiruna) and a ground station in Canada,

HAVE AGREED AS FOLLOWS:

1. The purpose of the present Memorandum of Understanding is to define the terms and conditions of:
   a) direct access to ERS-1 SAR data by the Fairbanks Station.
   b) the making available of data acquired by the Fairbanks Station.
   c) the scientific and technical collaboration between ESA and NASA during the ERS-1 development and exploitation phases.

2. For its part, NASA will use its best efforts to:
   a) Have the Fairbanks Station facility commissioned and operated under its authority for the acquisition and processing of the ERS-1 SAR data.
   b) Establish and maintain the necessary communications links between Fairbanks and the ESA's ERS-1 mission management and control center.
   c) Receive, record, process and, beginning at a mutually agreed time, distribute, in ESA-designated format, ERS-1 SAR data to ESA selected Principal Investigators conducting SAR research and applications programmes in areas within range of the Fairbanks receiving station under the same conditions as ESA provides data to ERS-1 Principal Investigators or as mutually agreed by ESA and NASA.
   d) After notification by ESA that the validation period is completed for the ERS-1 SAR sensor, receive and record ERS-1 SAR data at Fairbanks in response to ESA approved acquisition requests.
   e) Make available to ESA, upon request and within a reasonable time period, without any restriction on use, one copy, in ESA-designated format, of all NASA received ERS-1 raw data. In addition, in reasonable quantities, NASA will process upon ESA's request ERS-1 SAR data which it receives and provide copies to ESA without any restrictions on use.
   f) Establish and maintain a catalog of ERS-1 data acquired at the station as well as of Standard products generated from the raw data. NASA will provide ESA with a copy of the catalog and timely updates without any restrictions on use.
   g) In cooperation with the responsible national and international authorities, take appropriate measures so that any radio frequency problem occuring in relation to ERS-1 SAR data reception within the Fairbanks coverage zone is resolved to the satisfaction of the parties to this Memorandum of Understanding.
   h) Provide ESA with Ku-band scatterometer data in terms of geophysical data products from NROSS to better relate backscatter data to marine winds.

i) Participate in validation and calibration activities including the acquisition of in situ and remotely-sensed data from ships, buoys, aircraft and Shuttle.

j) Perform tracking of ERS-1 from laser stations as mutually agreed by ESA and NASA.

3. ESA, for its part, will use its best efforts to:

a) Programme ERS-1 to acquire and read-out to the Fairbanks ground station, SAR data of areas within the coverage zone of the Fairbanks Station antenna. This programming for ERS-1 SAR will be in support of mutually agreed requirements and will comply with the ERS-1 mission operations plan established by the Mission Manager. The programming will be scheduled by ESA to take into account spacecraft conditions (with a view to maximizing the longevity of the spacecraft) and other factors.

b) Validate the Fairbanks ground station for the purpose of ERS-1 SAR reception and provide the Fairbanks ground station with orbital elements for calculating the antenna pointing angles necessary to acquire the signal transmitted from ERS-1 and to process the data acquired.

c) Evaluate a limited number of data products (tape and film) produced by the Fairbanks Station for initial evaluation and calibration of that station's performance.

d) Make available to NASA for comparison purposes, a limited number of ESA processed data products (tape and film) covering selected portions (as defined by NASA) of the Fairbanks coverage zone.

e) Provide the necessary auxiliary information required to process SAR data.

f) Enable NASA to have access to the ERS-1 data catalog and regular updates.

g) Provide NASA with C-band scatterometer data in terms of geophysical data products from ERS-1 to better relate backscatter data to marine winds.

h) Participate in validation and calibration activities including the acquisition of in situ and remotely-sensed data from ships, buoys, aircraft and Shuttle.

4. The following additional understandings are confirmed:

a) The ERS-1 programme is experimental and preoperational in character and subject to change in accordance with changes in technical requirements and opportunities.

b) ESA makes no commitment regarding the exact launch date of ERS-1 and the launching of future ERS-1 type satellites.

c) The responsibility for spacecraft control, health and status is with ESA throughout the programme.

d) There will be no exchange of funds under the MOU. ESA and NASA will each bear the cost of discharging their respective responsibilities, including data exchanges, travel and subsistence for its own personnel and transportation charges on all equipment for which it is responsible.

e) The ability of ESA and NASA to carry out their responsibilities under this MOU is subject to their respective funding procedures. Should either Party encounter financing problems in the course of its respective internal procedures which may affect the activities carried out under this MOU, that Party will notify and consult with the other Party in a timely manner.

f) The data acquired by NASA in connection with this MOU may also be used by the U.S. Government exclusively for research and application demonstration activities and will not be sold or made available free of charge by either the U.S. government or the third parties involved in these activities.

g) NASA and ESA will exchange, upon request, technical information including software programmes as may be mutually agreed, as is necessary for the implementation of this Memorandum of Understanding, and is consistent with the export regulations of the exchanging countries. To ensure compatibility between data supplied to ERS-1 investigators by NASA and by ESA, this may include technical information on ESA data processing plans for ERS-1.

h) In addition, ESA and NASA will make available to each other selected limited data from NASA's Shuttle Imaging Radar and from ESA's ERS-1 on a mutually-agreed basis for scientific and intercalibration purposes.

i) NASA shall submit to the ERS-1 Mission Manager for approval, in accordance with paragraph 3. a) above, NASA requests which involve coverage, within the Fairbanks coverage zone, additional to those given in para 2.c) and d) above.

j) ESA and NASA may each release general information to the public regarding their own undertakings under this MOU as desired and, insofar as the other party is concerned, after suitable consultation.

k) To implement this project, ESA and NASA will each designate technical representatives to coordinate the agreed functions and responsibilities of each side with the other.

ARTICLE 1 MAJOR OBJECTIVES

1.1 The major objectives of RADARSAT SAR data distribution and marketing are as follows:

a) to promote globally the utilization of RADARSAT SAR data and data products (as defined in Appendix 7) and related information of the earth's surface in such areas as global ice reconnaissance, ocean monitoring, the monitoring of renewable and non-renewable land resources, the monitoring of the natural environment, and the protection of human life and property from natural disasters,

b) to contribute to the overall development of a national and international commercially viable remote sensing industry,

c) to contribute to the maintenance and improvement of the Canadian industry world leadership and the high quality profile in the field of remote sensing, and

d) to generate a revenue stream to the CSA to offset the mission operating costs.

ARTICLE 2 RSI RESPONSIBILITIES AND OBLIGATIONS

2.1 RSI will use its best efforts to:

a) stimulate the global use of RADARSAT data and data products and services inter alia for the improvement of maritime operations, the proper management of natural resources, the improved surveillance of the environment, and the warning against disasters by actively and vigorously pursuing a sales and marketing campaign aimed at:

i) developing an "international market" for RADARSAT SAR data and data products and services that is separate from the national Governments requirements and the international research requirements of the parties to the IMOU,

ii) developing a "national market" made up of non-government users for RADARSAT SAR data and data products and services.

b) stimulate, on a fair competitive basis, the global value-added markets for RADARSAT SAR data products,

c) identify, and where financially and commercially viable, design and develop commercial national and international RADARSAT SAR applications,

d) when commercially advisable, to design, finance and manage domestic and international demonstration and simulation projects for the use of RADARSAT SAR data and data products, and

e) in accordance with the provisions of the IMOU, Article 12.5, to find a U.S. private sector entity that will make an equity investment in RSI approximately proportional to the U.S. contribution to the space segment costs,

2 *RSI agrees to meet the following obligations:*

a) *process and/or have processed, distribute and sell RADARSAT SAR data and data products globally in a manner which is consistent with the United Nations Resolution A/41/751 of December 3, 1986 on the Principles Relating to Remote sensing of the Earth from Space,*

b) *when required, in accordance with the CSA responsibilities under the data access articles in the IMOU, to distribute RADARSAT SAR data to the agencies of the parties to the IMOU at the cost of reproduction and distribution, as defined in Appendix 2, Article 3.1.*

c) *when required, to process and distribute RADARSAT SAR data and data products to the Canadian Federal departments and agencies at the cost of processing and distribution as defined in Appendix 2, Article 3.1,*

d) *when required, to process and distribute to the Contributing Provinces and the Participating Provinces, the equivalent of up to four complete "standard radar image coverages" of their territory at a cost of processing and distribution as defined in Appendix 2, Article 3.1. Any additional scenes above the limit specified in the applicable agreement with the province will be sold according to RSI's published price,*

e) *in consultation with the Canada Centre for Remote Sensing (CCRS), CSA, Federal and Provincial departments planning to make use of the data and data products and, the domestic and international commercial customers, to undertake a preliminary study to determine the throughput capacity and other specifications of the SAR processor upgrade which study must be completed within 12 to 18 months following the award of the RADARSAT Phase C/D contract to Spar Aerospace Ltd. and to complete a final study after the launch of the ERS-1 satellite in order to take into account the latest SAR user awareness (the scope of the studies and the final specifications and schedule for the upgrade must be mutually agreed upon by the Parties),*

f) *when firm commitments are established by, and acceptable assurances are received from, Federal departments and agencies that a high proportion of the processing capacity will be contracted for, to purchase an upgrade to the CCRS ERS-1 facility which upgrade must be tested and commissioned against the mutually agreed final specifications before RADARSAT satellite launch, and to operate and maintain the facility and the upgrade (terms and conditions of availability to RSI of the ERS-1 processing and related facilities will be mutually agreed and covered under a separate agreement between CCRS/EMR and RSI),*

g) *to acquire and/or obtain access to facilities and/or expertise necessary to effectively process, distribute and market the RADARSAT SAR data and data products and services globally,*

h) *to develop, maintain and manage, an international catalogue which complies with mutually agreed standards and formats in support of RSI's distribution and marketing objectives for archived RADARSAT SAR data and data products,*

i) *to promote the international utilization of RADARSAT SAR data and data products and services by negotiating, in cooperation with CSA, under predetermined parameters, agreed between the Parties, contracts with the operators of foreign receiving stations authorizing them to read out RADARSAT SAR data directly, which contracts will be co-signed by CSA,*

j) *to collect and share with the CSA, on a quarterly cash accounting basis, the reception fees actually received from the foreign receiving station operators as per the provisions stated in Appendix 2, Article 1, and*

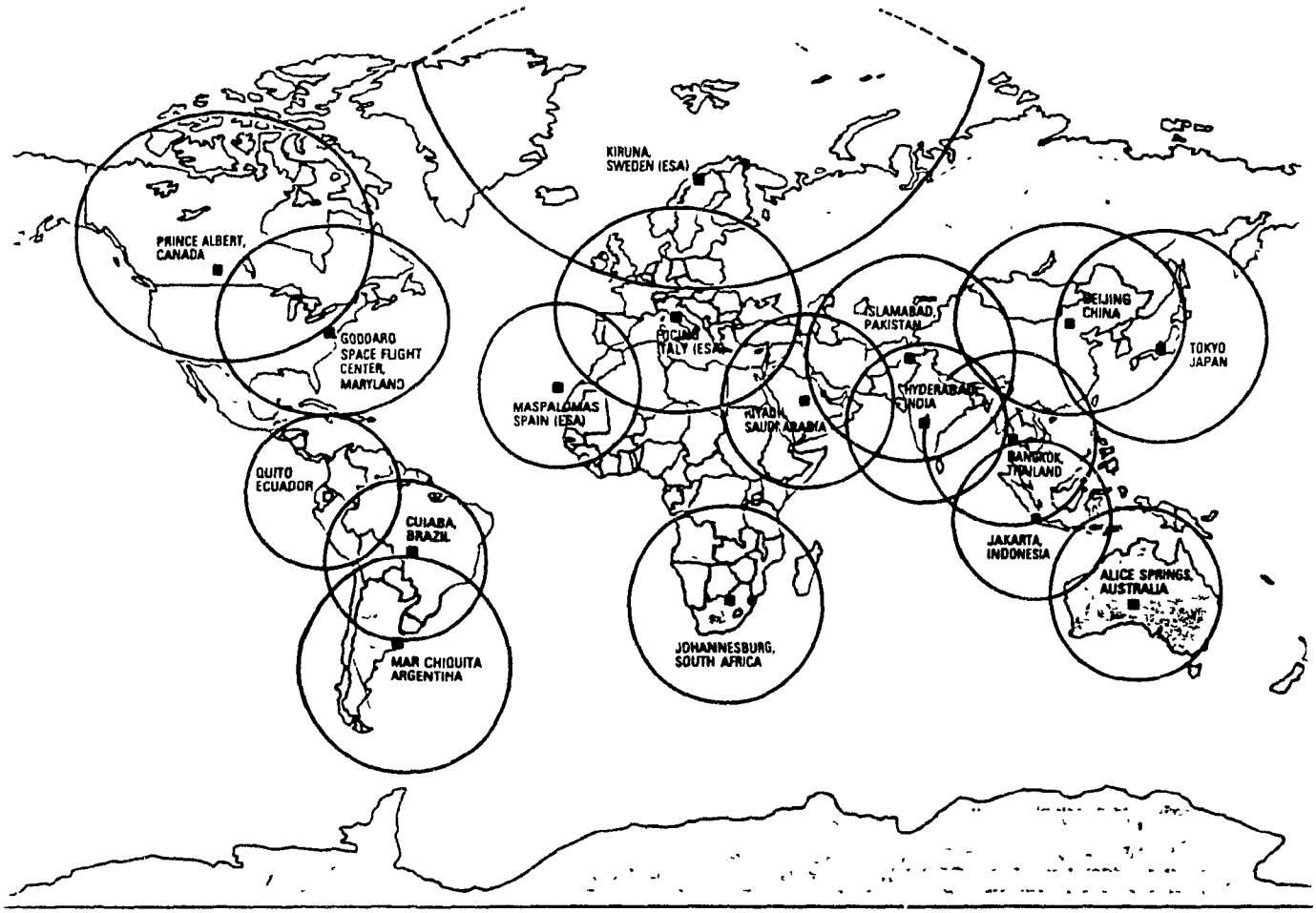
k) *to pay to the CSA, on a quarterly cash accounting basis, a royalty of 15% on the global RADARSAT SAR data and data product sales made directly and/or indirectly by RSI and its distributing agents as per the provisions stated in Appendix 2, Article 2.*

212

Annex 9. LANDSAT network of ground stations and TDRSS coverage

LANDSAT 4/5 COVERAGE

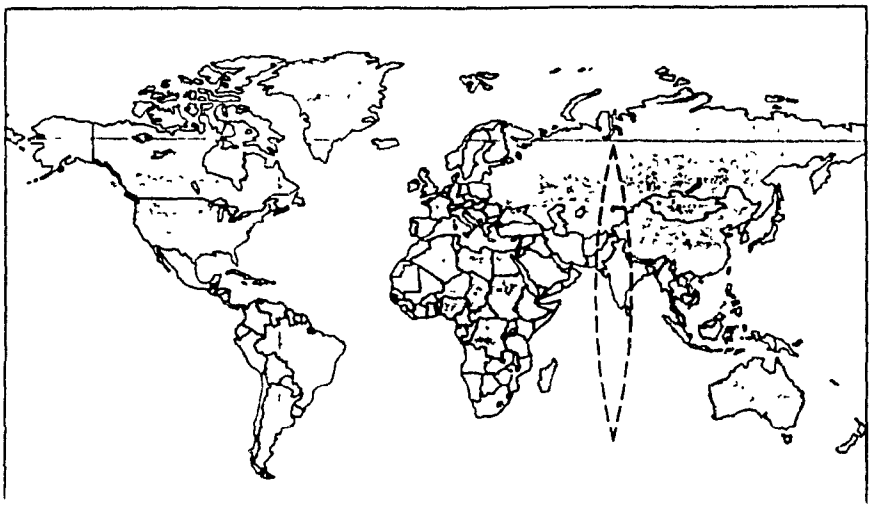
LEGEND: ■ Receiving Stations In Operation □ Receiving Stations Planned



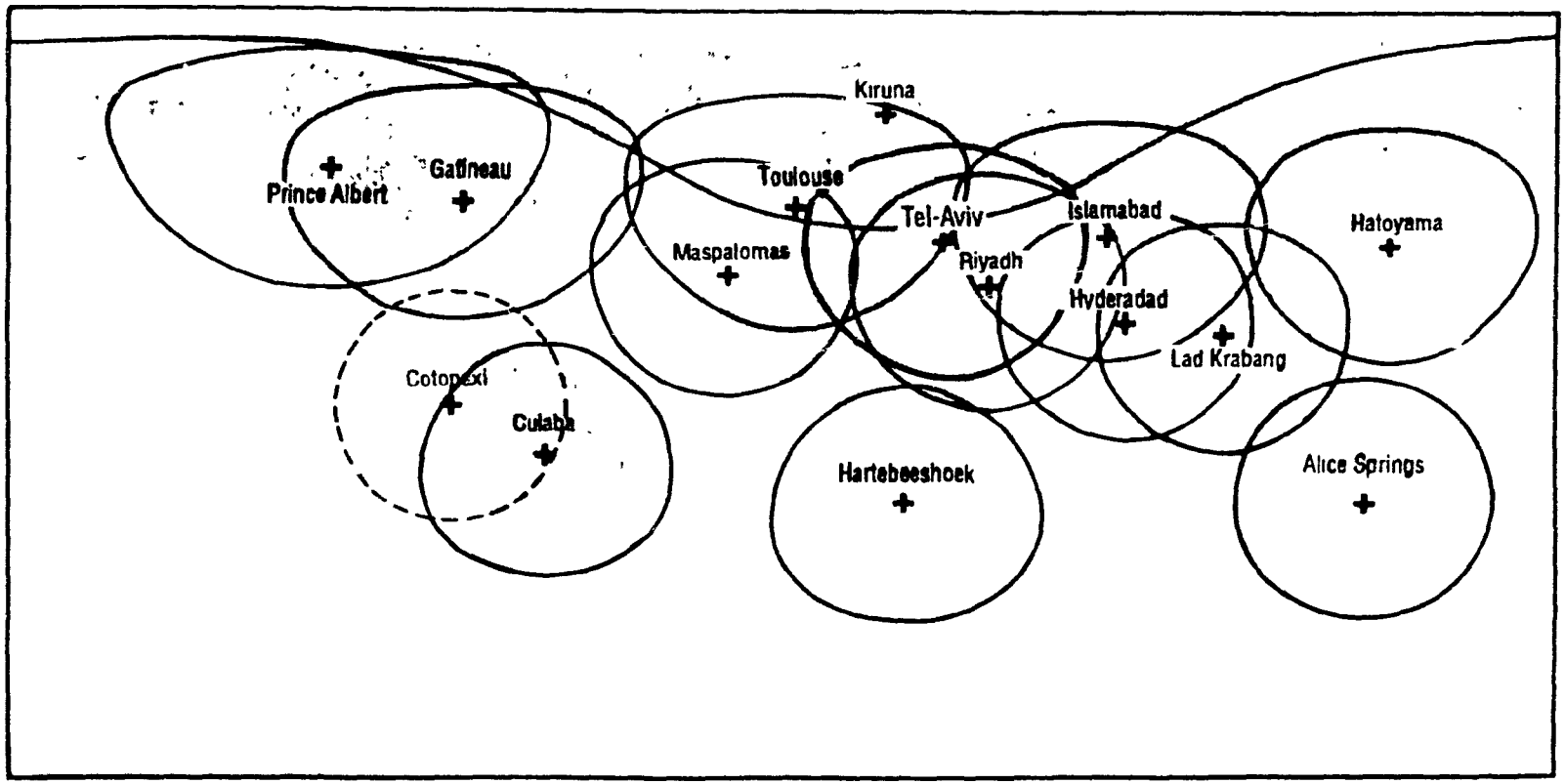
TDRSS COVERAGE WORLDWIDE

COVERAGE WITH 2 SPACECRAFT (TDRSS East & West)

LEGEND: ◊ Zone of no TDRSS Coverage



SPOT Receiving Station Network



——— in operation — — — being negotiated

Main receiving stations are Kiruna and Toulouse

Annex 11. MOS-1 ground track and instrument configuration

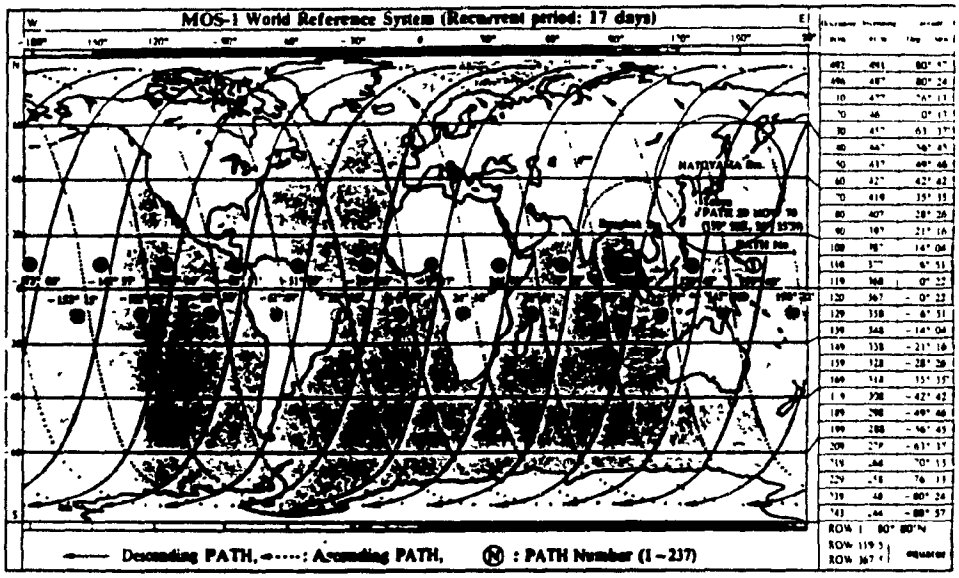
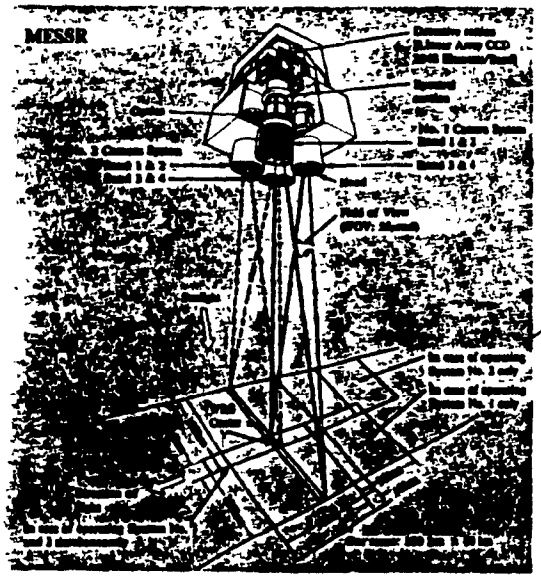
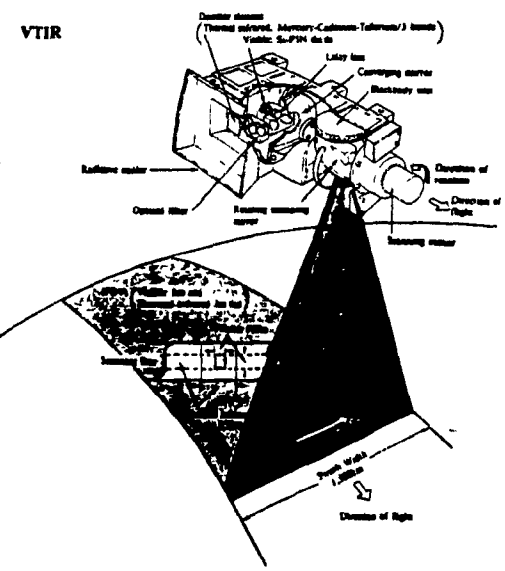


Figure 2 — MOS 1 ground track The spacecraft circles the Earth 14 times in 24 h, returning to its starting point in 237 orbits



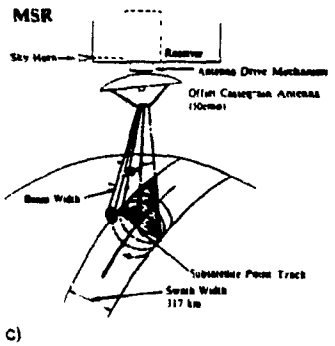
a)

Figure 3a — MESSR instrument configuration and ground track The two instruments are installed at a 5.46° cant angle



b)

Figure 3b — VTIR instrument configuration and ground track



c)

Figure 3c — MSR instrument configuration and ground track

Annex 12. ERS-1 network of ground stations with ground segment and user interfaces

Figure 9 Coverage zones for proposed ERS-1 ground stations

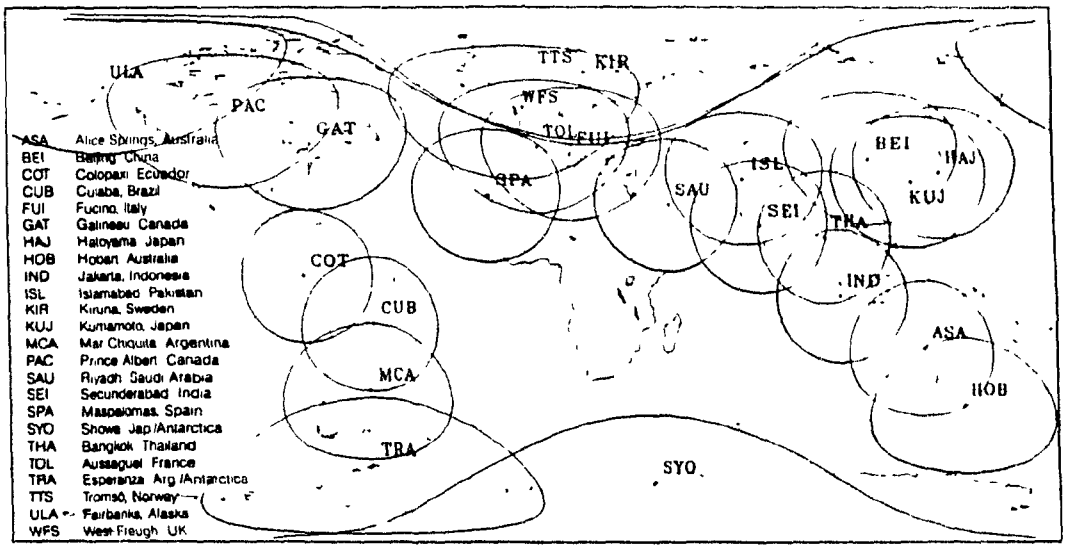
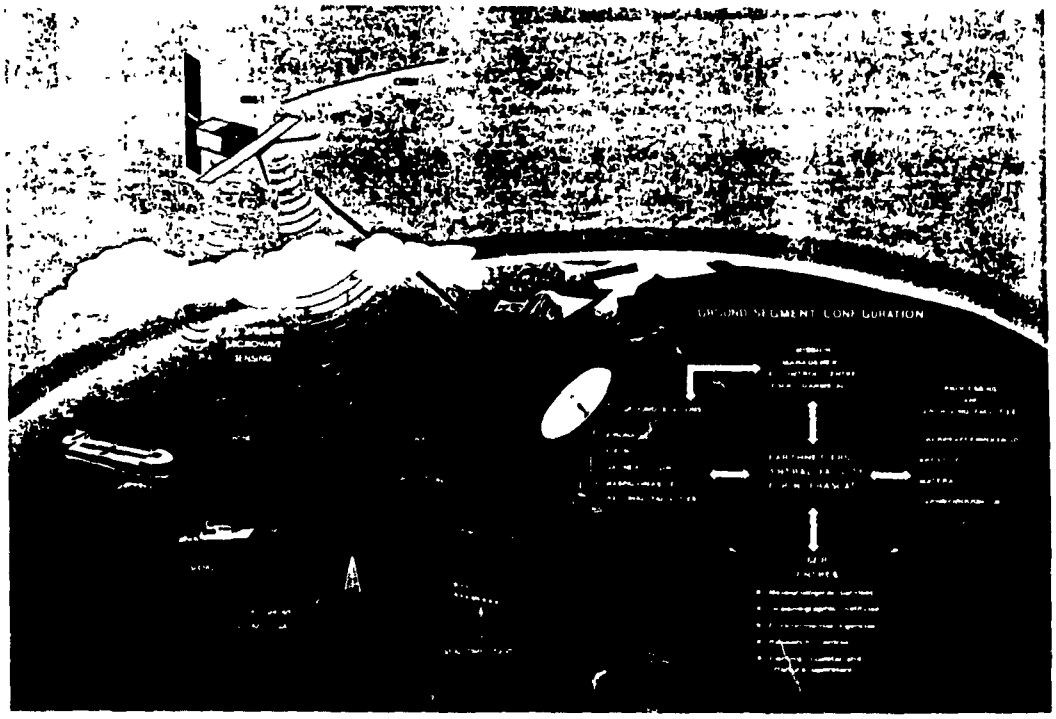


Figure 8 The ERS-1 Ground Segment and user interfaces



Annex 13. Projected ESA Data Relay System

Figure 1 — Elements of the Data Relay System

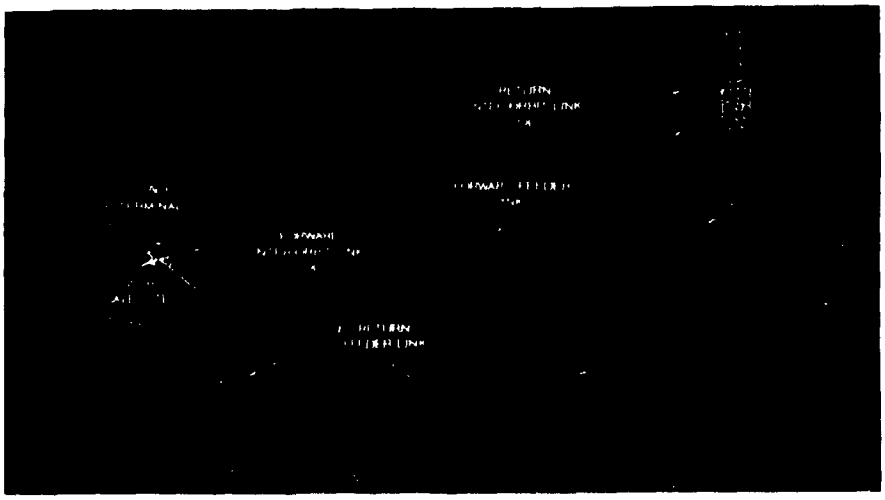
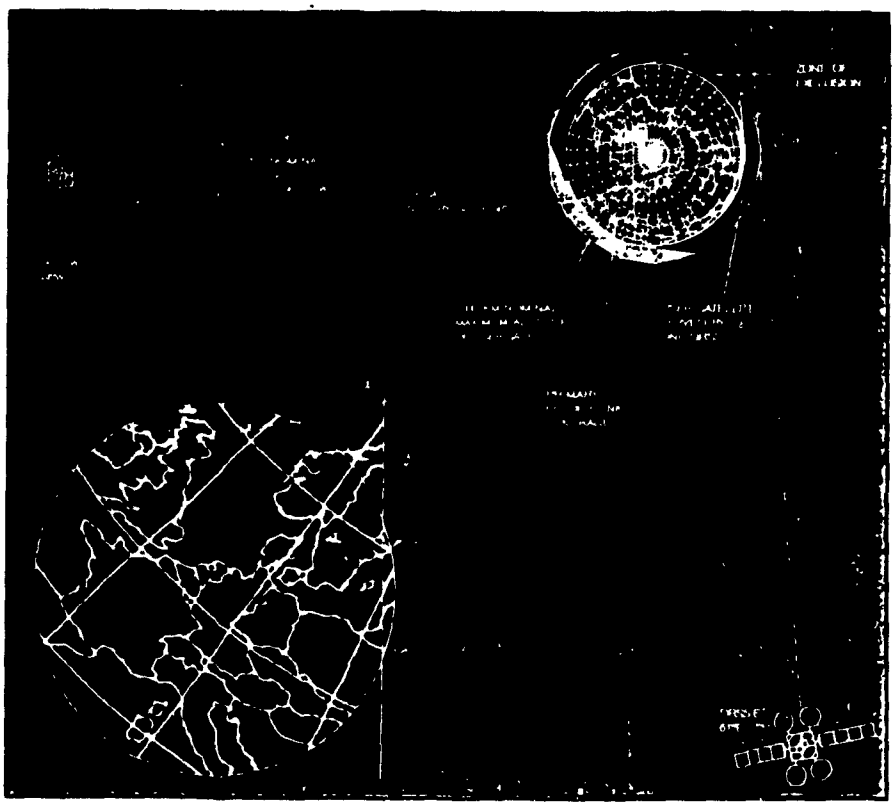


Figure 2 — Coverage geometry of the Data Relay System



Annex 14. EOSAT: Agreement for Purchase and protection of Satellite Data

Agreement for Purchase and Protection of Satellite Data

This Agreement covers sales by Earth Observation Satellite Company (EOSAT") to Purchaser of information sent to Earth by LANDSAT satellites ('Satellite Data ')

Section 1 **Purchaser's Orders** Satellite Data may be ordered by Purchaser at the prices payment and delivery terms established from time to time by EOSAT Purchaser s orders shall specify the Satellite Data desired and may be submitted on forms provided by EOSAT Purchaser may also use its own forms but such forms shall be used for convenience only, and any terms and conditions they contain are of no force or effect EOSAT reserves any right it may have to accept or reject any order from Purchaser

Section 2 **Confidentiality of Satellite Data** Purchaser acknowledges that Satellite Data is a special valuable and unique asset of EOSAT and that Satellite Data is confidential information which is disclosed in confidence to Purchaser under this Agreement With respect to each purchase made under this Agreement, so long as EOSAT retains rights to Satellite Data pursuant to federal law

a Purchaser agrees to use translate enhance or display the Satellite Data purchased hereby only for its own authorized purposes which purposes shall be directly related to its established activities or lines of business

b Purchaser agrees not to reproduce or permit reproduction of Satellite Data Enchancement of Satellite Data shall not be considered reproduction

c Purchaser agrees not to permit access to, disclose or otherwise make available any Satellite Data to any person for any purpose except to Purchaser employees, affiliates contractors and consultants for purposes directly related to Purchaser s authorized use of the Satellite Data but not in any event to Purchaser s competitors

d Purchaser agrees to take appropriate action, by instruction agreement or otherwise with any persons permitted access to Satellite Data so as to enable Purchaser to satisfy its obligations under this Agreement including appropriate security measures to prevent inadvertent disclosure

e Without limiting the generality of the foregoing, Purchaser agrees to abide by the limitations on the package warning and not to separate the package warning from the Satellite Data except as may be necessary to use the Satellite Data as contemplated hereby A copy of EOSAT s Package Warning appears below

Section 3 **Limited Warranty** Unless otherwise indicated in a statement accompanying Satellite Data delivered hereunder EOSAT warrants that the Satellite Data it provides will cover the area of the Earth and spectral bands specified in Purchaser s order and will be radiometrically or geometrically corrected if requested in Purchaser s order In addition EOSAT warrants that the media used to carry the Data shall be free from defects in materials and workmanship under normal use for 90 days from the date of delivery to Purchaser THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTA BILITY AND FITNESS FOR A PARTICULAR PURPOSE

Section 4 **Limitation of Remedies** If the Satellite Data is not as warranted by EOSAT in Section 3 upon return of such Data EOSAT shall replace the Satellite Data or refund the purchase price paid therefor at EOSAT s option Such replacement or refund shall be the Purchaser s exclusive remedy for any delivery or non-delivery of Satellite Data EOSAT S LIABILITY FOR DAMAGES TO THE PURCHASER FOR ANY CAUSE WHATSOEVER AND REGARDLESS OF THE FORM OF ACTION WHETHER IN CONTRACT OR IN TORT AND WHETHER OR NOT EOSAT WAS NEGLIGENT ACTIVELY OR PASSIVELY SHALL IN NO EVENT EXCEED THE PURCHASE PRICE PAID BY THE PURCHASER FOR THE DEFECTIVE SATELLITE DATA In no event will EOSAT be liable for any lost profits lost savings or other consequential damages even if EOSAT has been advised of the possibility of such damages

Section 5 **Term** This Agreement may be terminated with or without cause by either party upon written notice However this Agreement covers orders received and accepted prior to termination

Section 6 **General** This Agreement is the complete final and exclusive statement of terms of the agreement between the parties and supersedes all proposals prior agreements and understanding between the parties relating to the subject matter of this Agreement It is Agreement cannot be modified or rescinded nor may any of its terms be canceled or waived except by a written instrument signed by both parties Purchaser s rights and obligations under this Agreement are not assignable or transferrable without the prior written consent of EOSAT or its successor and any attempt to assign or transfer such rights and obligations without such written consent is void This Agreement shall be governed by Delaware law and the parties subject themselves to the jurisdiction of the State and Federal Courts of Delaware with respect to any dispute or claim arising under it

_____ Purchaser	Earth Observation Satellite Company _____ Date
By _____ Authorized Signature	By _____ Authorized Signature
(Title) _____ TYPE OR PRINT	(Title) _____
Name _____	Name _____
Company Name _____	TWX _____
Address _____	Tel No _____

PACKAGE WARNING

(TO BE ATTACHED TO SATELLITE DATA MEDIA SHIPMENTS AND CONTAINERS)

THESE SATELLITE DATA CONSTITUTE A CONFIDENTIAL TRADE SECRET OF EOSAT USE OF THESE DATA BY ANYONE OTHER THAN THE PURCHASER CONSTITUTES MISAPPROPRIATION OF A TRADE SECRET THESE DATA ARE PROPRIETARY INFORMATION AND HAVE BEEN DISCLOSED IN CONFIDENCE TO THE PURCHASER AND REPRODUCTION IS PROHIBITED REPRODUCTION OF THESE DATA VIOLATES RIGHTS GRANTED EOSAT BY SECTION 603 OF THE LAND REMOTE-SENSING COMMERCIALIZATION ACT OF 1984

For questions regarding the above Agreement please call 1 800 344-9933 or (301) 552-0500

Annex 15. The electromagnetic spectrum

QU'EST-CE QUE LA TÉLÉDÉTECTION?

Les satellites d'observation de la Terre et les systèmes aeroportes de collecte de donnees sont des éléments de la télédétection, ils nous permettent d'observer et de mesurer notre environnement a distance

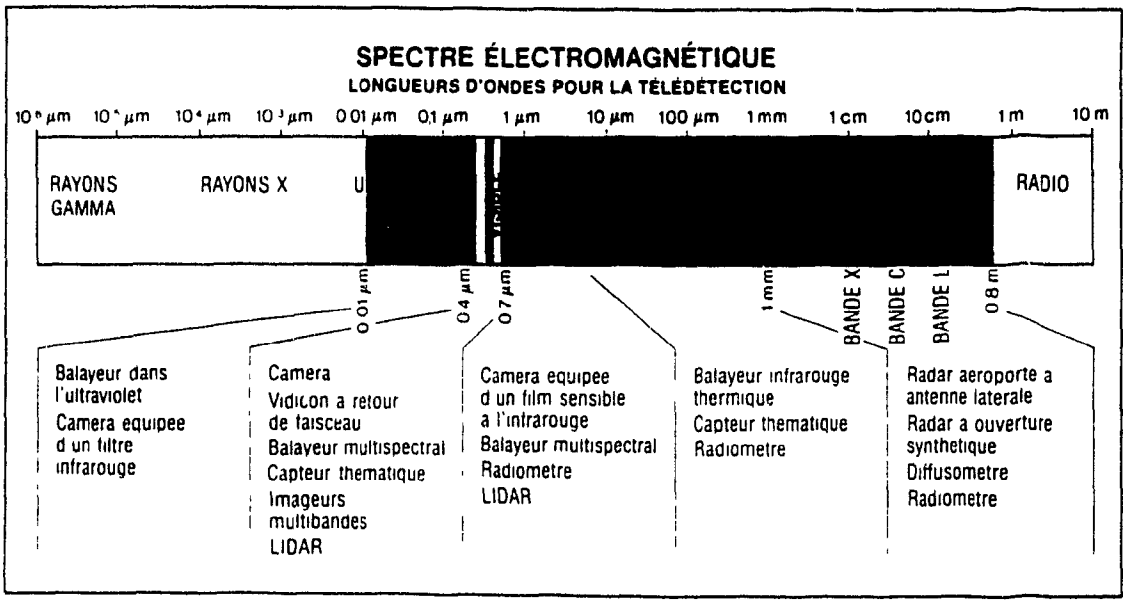
L'œil ne perçoit qu'une portion tres restreinte du spectre electromagnetique Cette portion est appelée «visible» ou «domaine du visible» Les appareils photographiques fonctionnent dans le domaine du visible et produisent un enregistrement permanent de ce que l'œil perçoit D'autres capteurs ont ete mis au point pour observer les domaines du spectre dont les longueurs d'ondes sont plus courtes que celles du visible (ultraviolet) ou plus longues (infrarouge et hyperfrequences) Les pellicules photographiques sensibles à l'infrarouge proche les détecteurs a infrarouge pouvant enregistrer la temperature d'un objet à distance, ainsi que les radars, capables de voir à travers les nuages, sont des exemples de capteurs fonctionnant dans les domaines du spectre qui nous sont invisibles

Les donnees acquises par satellite couvrent de grandes surfaces et permettent des observations a repetition, resultats difficiles à obtenir par d'autres moyens Par exemple, une image de l'île de Baffin prise par satellite nous montre 34 000 km² d'une region eloignee Obtenir un resultat comparable par avion necessiterait de nombreuses heures de vol et l'assemblage d une centaine d'images distinctes Certaines de ces images seraient prises a des heures tres differentes des autres, de sorte qu a cause des variations dans la couverture nuageuse, l'angle de vue et l'éclairage, on ne pourrait comparer avec precision une partie de la mosaique a une autre

Les données obtenues par satellite ont cependant une resolution (aptitude à «voir» le detail) moindre que celles obtenues par avion En outre, on peut parfois avoir besoin de donnees plus frequemment que ne le permet le cycle invariable des orbites d'un satellite Pour obtenir des donnees tres détaillées et des observations frequentes, il faut avoir recours à l'avion Ces donnees peuvent être utilisees de façon indépendante ou comme complement aux donnees de satellite

Afin de tirer le plus d'information possible de l'imposant volume de donnees recueillies par les satellites et les avions, les methodes ordinaires d'interpretation visuelle des images doivent être complétées par des methodes automatisees On peut, en utilisant ces dernieres, traiter un volume considérable de donnees de façon rapide, precise et repetitive.

Le CCT poursuit constamment d'interessants projets d'étude en vue de mettre au point de nouvelles methodes d'acquisition, d'analyse et d'application des donnees de teledetection



Annex 15A. EOSAT: Brokerage Services Agreement (Sect. 1 to 4)

EOSAT BROKERAGE SERVICES

EOSAT offers customers a brokerage service for where EOSAT does not act as a sales representative to assist them in obtaining data collected by those Landsat International Ground Receiving Stations (IGRS) worldwide EOSAT acts only as a broker for the customer in such transactions and any order for data from an IGRS pursuant to the Brokerage Services Agreement (see below) will not constitute a sale of data from EOSAT rather a sale of data from the particular IGRS

The following is EOSAT's Brokerage Services Agreement that describes this arrangement in full

BROKERAGE SERVICES AGREEMENT

This agreement establishes the general terms and conditions under which Earth Observation Satellite Company ("EOSAT") will perform brokerage services for Purchaser, for the acquisition of Landsat satellite data received and processed by International Ground Receiving Stations (" IGRS Data")

Section 1. GENERAL

A. EOSAT will act as broker for Purchaser for the purchase of IGRS Data in accordance with the Data Requests submitted to EOSAT by Purchaser Purchaser appoints EOSAT as its agent for this purpose EOSAT SHALL NOT DISCLOSE THE IDENTITY OF PURCHASER TO THE INTERNATIONAL GROUND RECEIVING STATION UNLESS AUTHORIZED BY THE PURCHASER TO DO SO

B. EOSAT's participation as agent in the acquisition of IGRS Data shall not constitute a sale of data to Purchaser by EOSAT Title to all IGRS Data purchased pursuant to this agreement shall pass directly from the International Ground Receiving Station to Purchaser, and EOSAT shall acquire no rights or liabilities with respect to such IGRS Data except a expressly stated herein

Section 2. FEES

A. The amount payable to EOSAT for data ordered pursuant to this agreement shall be equal to the sum of (i) the price (in U S Dollars, at the exchange rate then in effect), of the International Ground Receiving Station for the products identified in the Data Request, (ii) a handling charge equal to thirty percent of the amount described in (i) above (minimum $150 00 U S per order) (iii) the total amount of all international shipping charges, (iv) all sales, use, excise, or other similar taxes applicable to the IGRS Data, its acquisition sale or use, imposed by any international taxing authority or jurisdiction whatsoever and (v) all applicable U S and international import or export duties, fees, or charges

B. All charges and expenses imposed by the International Ground Receiving Station shall be paid by EOSAT

C. Payment of all fees shall be made in currency of the United States of America Any item described in paragraph A above which is incurred in foreign currency shall be converted to U S dollars at the Noon Citibank N A , New York Exchange Rate

D. Purchasers located outside the United States must submit payment with the Data Request in an amount equal to items (i) and (ii) in paragraph A above, the balance due will be billed by EOSAT on delivery of the IGRS Data Purchasers located in the United States will be billed by EOSAT on delivery of the IGRS Data except that EOSAT may, at its discretion, require advance payment as provided in the preceding sentence Fees may be paid in the form of cash, advance deposit with EOSAT, letter of credit confirmed by a bank acceptable to EOSAT or (in the case of domestic purchasers only) bank check

Section 3. EOSAT'S UNDERTAKING

A. EOSAT shall use its best efforts to obtain the requested IGRS Data in a timely manner

B. EOSAT will visually inspect the IGRS Data for physical damage prior to repackaging it for shipment to Purchaser and will return it to the International Ground Receiving Station for replacement or other adjustment if visibly damaged

C. This Agreement applies to the acquisition of archive data only If the requested IGRS Data or any portion thereof are currently unavailable from an existing archive EOSAT will promptly notify Purchaser and return to Purchaser any applicable payments theretofore received

Section 4. PLACEMENT OF DATA REQUESTS

Data Requests shall be made by the submission of an executed purchase order to EOSAT Telephone requests will be honored provided they are followed up the same day by telex confirmation and by the mailing of a purchase order within three business days thereafter

Annex 15B: EOSAT: Brokerage Services Agreement (Sect. 5 to 8)

Section 5. WARRANTIES

A. EOSAT warrants that its order for IGRS Data, as submitted to the International Ground Receiving Station, will conform to the product identification contained in the Data Request as set forth in the telex confirmation If such order fails to conform to the Data Request, EOSAT shall at its own expense, submit a corrected order to the International Ground Receiving Station

B. Purchaser acknowledges that EOSAT has no control over the acquisition or processing of data by the International Ground Receiving Station THEREFORE, EOSAT MAKES NO WARRANTY WHATSOEVER, EXPRESS OR IMPLIED CONCERNING THE AVAILABILITY OF IGRS DATA, THE TIMELINESS OF ITS DELIVERY BY THE INTERNATIONAL GROUND RECEIVING STATION, THE QUALITY OR FORMAT OF IGRS DATA (INCLUDING THE EXTENT OF CLOUD COVER), THE QUALITY OR CONDITION OF THE MEDIUM IN WHICH THEY ARE RECORDED, OR THE ACCURACY OF THE INTERNATIONAL GROUND RECEIVING STATION IN PROVIDING THE DATA ORDERED BY EOSAT IN ACCORDANCE WITH THE DATA REQUEST Each product delivered to Purchaser pursuant to this Agreement shall bear the notice set forth in the margin below

C. In the event that IGRS Data are damaged or defective upon receipt by Purchaser, or do not conform to the Data Request, EOSAT's sole obligation (except as provided in paragraph A above), shall be to use its best efforts to assist Purchaser to obtain redress from the International Ground Receiving Station or from the carrier which transported the IGRS Data, as appropriate EOSAT'S LIABILITY FOR DAMAGES TO PURCHASER FOR ANY CASE WHATSOEVER, AND REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT OR IN TORT AND WHETHER OR NOT EOSAT WAS NEGLIGENT, ACTIVELY OR PASSIVELY, SHALL IN NO EVENT EXCEED THE AMOUNT OF THE FEE SPECIFIED IN SECTION 2 OF THIS AGREEMENT FOR BROKERAGE SERVICES

Section 6. TERM

This Agreement may be terminated with or without cause by either party upon written notice However, this Agreement shall govern orders received and accepted prior to termination

Section 7. INTERNATIONAL GROUND RECEIVING STATION RESTRICTIONS

Purchaser shall comply with any and all restrictions or requirements imposed by the International Ground Receiving Station upon the IGRS Data, its use or disposition, and shall indemnify EOSAT for any loss, liability or damage which EOSAT may incur by reason of Purchaser's failure to do so

Section 8. MISCELLANEOUS

This is the complete and final agreement between the parties, which supersedes all prior agreements and understandings relating to the subject matter thereof This Agreement cannot be modified except by a written instrument signed by both parties Purchaser's rights and obligations under this Agreement are not assignable or transferable without the prior written consent of EOSAT or its successor This Agreement shall be governed by the laws of the state of Delaware, U S A and the parties subject themselves to the jurisdiction of the State and Federal Courts of the state of Delaware, U S A with respect to any dispute or claim arising under it

_____	EARTH OBSERVATION SATELLITE COMPANY
PURCHASER	
BY _____	BY _____
AUTHORIZED SIGNATURE	AUTHORIZED SIGNATURE
(TITLE) _____	(TITLE) _____

PACKAGE LABEL

These data have been acquired by EOSAT on behalf of the Purchaser from a ground receiving station which is not owned or operated by EOSAT, and have not been processed by EOSAT EOSAT has no control over the processing of such data, over their quality or format or over the quality of the medium in which they are recorded and makes no warranty express or implied with respect thereto In no event shall EOSAT be liable for or in connection with any defect in the data or in the medium

Pour commander des produits à SPOT IMAGE, veuillez compléter ce bon de commande et l'envoyer à l'adresse indiquée
Pour remplir le bon de commande vous voudrez bien vous reporter à la Liste de Prix SPOT IMAGE en vigueur ainsi qu'aux documents Produits SPOT et Codes Produits

Pour remplir les cases du bon de commande :

1. Indiquez ici le numéro de la feuille si vous devez en utiliser plusieurs pour une même commande
2. Numéro d'identification des scènes référencées au catalogue SPOT IMAGE
   Commandes multiples
   Si vous commandez des produits différents de la même scène (ex. CCT + film ou film + papier, ou CCT + film + papier) utilisez une ligne par produit avec le code correspondant en répétant le numéro (NID) de la scène et le niveau de prétraitement (qui reste le même)
   Si vous désirez plusieurs exemplaires du même produit voir 5
3. Niveau de prétraitement
   Cochez la case correspondant au niveau de prétraitement désiré. Voir documents Produits SPOT et Codes Produits
4. Voir Liste des Codes Produits
5. Quantité d'exemplaires supplémentaires
   Indiquez dans cette colonne le nombre de copies éventuellement demandées
6. Les prix unitaires sont indiqués dans la Liste des Prix SPOT IMAGE en vigueur à la date de la commande
7. **Utilisez cet espace pour indiquer**
   - Pour le niveau 2B la projection cartographique désirée et l'échelle des documents cartographiques (minimum 1/100000)
   - Pour le niveau 2A la projection cartographique désirée
   - Pour les niveaux 2 l'altitude moyenne pondérée de la scène
   - Pour le niveau S le numéro d'identification (NID) de la scène de référence et son niveau de prétraitement
   - Pour les quarts de scène standards Q1 Q2 Q3 ou Q4
     Pour les quarts de scène spéciaux QS les coordonnées géographiques choisies du centre du quart de scène
   - Pour un redécoupage de 2 scènes le long de la trace (RE) la latitude du centre de la scène choisie

Coût transport et assurance

- **Les tarifs SPOT IMAGE s'entendent hors taxes, départ usine, Incoterms 1990, emballage standard inclus.**
- **SPOT IMAGE peut souscrire pour votre compte le contrat de transport et d'assurance. Dans ce cas, veuillez contacter :**

SPOT IMAGE Service Logistique Tél. (33) 61 27 45 14

Mode de paiement

- **À la commande, virement par anticipation.**
- **En francs français.**
- **Les coordonnées bancaires de SPOT IMAGE sont précisées dans l'accusé de réception de commande.**
- **Pour toute autre modalité de paiement, consultez SPOT IMAGE, Département Clientèle.**

CONDITIONS GÉNÉRALES DE VENTE

1 DISPOSITIONS GÉNÉRALES
[illegible] spéciales ayant fait l'objet d'une acceptation [illegible] de notre part. Toutes les ventes de produits tels [illegible] dans la liste des prix de SPOT IMAGE sont réglées [illegible] dispositions générales

[illegible] conditions contraires figurant sur le papier [illegible] sont inopposables à SPOT IMAGE

[illegible] particulière conclue avec un acquéreur déroge [illegible] à l'une des présentes conditions générales de [illegible] conditions demeurent applicables

2 COMMANDES
[illegible] commande ne sera prise en compte qu'[illegible] tout support permettant d'identifier sans [illegible] sociale de l'acquéreur

Scènes référencées au catalogue de SPOT IMAGE
[illegible] SPOT IMAGE adresse à l'acquéreur [illegible] l'ensemble des caractéristiques [illegible] accusé de réception emporte [illegible] aux conditions générales de vente de SPOT IMAGE et vaut confirmation de commande

Aucune modification ou annulation d'une commande de scène [illegible] catalogue ne sera possible passé un délai de 24 heures à compter de l'émission de l'accusé de réception de commande

SPOT IMAGE se réserve le droit de refuser toute commande [illegible] délais de livraison qu'elle juge irréalisables

Scènes non référencées au catalogue de SPOT IMAGE
[illegible] commande SPOT IMAGE adresse au client [illegible] de commande décrivant les moyens de [illegible] du satellite. L'acquéreur confirme par écrit son [illegible] ou son refus de cette confirmation dans les délais [illegible]

L'acceptation des termes de la confirmation de commande emporte l'adhésion expresse de l'acquéreur aux présentes Conditions Générales de Vente et l'engage irrévocablement à acheter toutes les scènes obtenues qui y sont conformes
La confirmation de commande ne constitue pour SPOT IMAGE qu'une obligation de mise en œuvre de moyens
Dès lors que le satellite aura été programmé l'acquéreur ne pourra prétendre à aucune indemnité en cas de non obtention de scènes pour tout ou partie de la commande
SPOT IMAGE se réserve le droit de refuser toute commande qui sera jugée irréalisable dans les conditions normales d'exploitation

3 DÉLAIS
Les délais de livraison proposés ne sont donnés qu'à titre indicatif. Un éventuel dépassement n'autorise pas l'acquéreur à refuser la livraison totale ou partielle des produits ni à prétendre à quelque indemnité que ce soit
Si pour une raison quelconque SPOT IMAGE se trouve dans l'impossibilité de livrer les produits commandés le client ne peut prétendre qu'à la restitution du prix sans indemnité de quelque nature que ce soit

4 PRIX
Pour chaque commande le prix applicable est celui en vigueur à la date de confirmation de commande par SPOT IMAGE. Les prix de la Liste des Prix SPOT IMAGE s'entendent en francs français hors taxes départ usine Incoterms 1990 emballage standard inclus

5 TRANSPORTS
Les produits voyagent dans tous les cas aux risques et périls de l'acquéreur. Il appartient donc au destinataire en cas de nécessité de faire dans les délais légaux les réserves d'usage auprès du transporteur

6 RÉCLAMATIONS ET CONTRÔLE
Toutes réclamations relatives à la qualité et/ou à la quantité des produits livrés devront, sous peine d'irrecevabilité, être formulées par lettre recommandée au plus tard dans les 7 (sept) jours ouvrables de la réception des produits, soit à l'aéroport du lieu de destination pour les ventes hors de France soit chez l'acquéreur pour les ventes en France
Sans l'accord préalable formel de SPOT IMAGE aucun retour de produits ne sera accepté

7 RÈGLEMENTS
Les règlements se font au crédit du compte de SPOT IMAGE figurant sur la confirmation de commande
Toutes sommes impayées à l'échéance porteront de plein droit et sans qu'une mise en demeure préalable soit nécessaire intérêt au taux d'escompte de la Banque de France à l'échéance majoré de 4 (quatre) points depuis l'échéance jusqu'à la date du paiement
Toute somme restée impayée à l'échéance entraînera l'application d'une indemnité de 15% (quinze pour cent) de la somme due outre les intérêts de retard calculés d'après le taux de base de la Banque de France majoré de 4 points que l'acquéreur défaillant s'oblige à payer en sus des frais de procédure et des frais pour art été dus par ailleurs

8 DÉCHÉANCE DU TERME
De convention expresse toute échéance non couverte ou renouvelée chez l'acquéreur entraîne ipso facto annulation des délais de paiement éventuellement accordés lors de la confirmation de commande. SPOT IMAGE pourra alors réclamer le paiement comptant de toutes les factures en cours. En ce qui concerne les quantités non livrées SPOT IMAGE pourra soit exiger le paiement avant enlèvement soit résilier le solde de la commande sans préjudice de tous autres dommages et intérêts

9 RESPONSABILITÉ ET GARANTIE
L'acquéreur fait son affaire de toute utilisation des produits commercialisés par SPOT IMAGE sans que la responsabilité de SPOT IMAGE puisse en aucun cas être engagée quant à la convenance de ces produits aux fins de telle ou telle utilisation
En conséquence l'acquéreur renonce à tout recours contre SPOT IMAGE pour toutes pertes ou tous dommages directs ou indirects résultant de l'utilisation des produits
La garantie de SPOT IMAGE se limite soit au remplacement des produits comportant une malfaçon si ceux-ci sont disponibles soit à leur remboursement

10 NON-EXCLUSIVITÉ
Aucun acquéreur ne pourra se prévaloir d'un usage exclusif sur les données SPOT

11 COPYRIGHT
Le Centre National d'Études Spatiales (CNES) est seul titulaire des droits d'auteur sur les données SPOT. Les produits commercialisés par SPOT IMAGE sont élaborés à partir de ces données.
L'acquéreur n'utilisera les produits que pour ses besoins internes et s'interdit sauf accord écrit préalable de SPOT IMAGE de mettre à disposition d'un tiers que ce soit gratuitement ou contre rémunération, temporairement ou en permanence ces mêmes produits ou des reproductions de ces produits. La commercialisation de ces produits, de leur reproduction et des produits qui en sont dérivés est soumise à l'accord préalable de SPOT IMAGE et fait généralement l'objet de contrats spécifiques

11 bis EXEMPTIONS DE DROITS D'AUTEUR
Cependant aucune redevance ne sera due au titre du copyright pour
a) Les reproductions de données et produits dérivés SPOT lorsqu'ils sont reproduits et vont qu'illustration à un texte se rapportant à leur analyse par procédés d'impression dans les revues scientifiques ou professionnelles spécialisées les rapports de recherche les actes de symposia ou congrès les thèses. Les présentations sur diapositives ou transparents dans le cadre de manifestations scientifiques aux fins de promotion de la télédétection
Dans ces cas la mention du copyright CNES année [illegible] distribution SPOT IMAGE doit clairement apparaître et les droits ne peuvent en aucun cas être transférés à l'éditeur

12 MARQUE
La vente consentie à l'acquéreur par SPOT IMAGE ne confère à ce dernier aucun droit d'utilisation des marques et logotypes SPOT et SPOT IMAGE

13 CLAUSE RÉSOLUTOIRE
À défaut de paiement de tout ou partie du prix à l'échéance convenue ou de l'exécution de l'une quelconque des conditions générales ou particulières la vente et toutes les autres ventes en cours d'exécution sont résolues de plein droit si une lettre recommandée exprimant la volonté de SPOT IMAGE de se prévaloir de la présente clause est restée sans effet par l'acquéreur pendant les quinze jours qui suivent la date de sa présentation
Dans ce cas la résolution des ventes peut être constatée et la restitution des marchandises ordonnée par le juge des référés compétent. Les acomptes versés sur le prix des ventes résolues restent acquis à SPOT IMAGE sans préjudice de tous autres dus frais, intérêts ou dommages intérêts auxquels l'acquéreur pourrait être condamné

14 ATTRIBUTION DE COMPÉTENCE EN CAS DE LITIGE
Tous différends découlant de la vente seront de la compétence du Tribunal de Commerce de Toulouse. La loi applicable sera la loi française
L'émission éventuelle de traites ne constitue ni novation ni dérogation à la présente clause attributive de compétence

07/1991

Annex 17A. SICORP: Agreement on General Terms and Conditions for SPOT Data User Licenses (Sect. 1 to 5)

07/16/91 08 36 ☎ 703 648 1813 SPOT IMAGE CORP ☑ 05

Agreement on General Terms and Conditions for SPOT Data User Licenses

SPOT Image Corporation ("SICORP") has the exclusive right to license in the United States remotely sensed SPOT Data acquired by SPOT satellites. The SPOT satellites are operated by the Centre National d'Etudes Spatiales ("CNES") of France, which holds all United States and worldwide copyrights covering such SPOT Data. This is an Agreement on General Terms and Conditions ("GTCA") between SPOT Image Corporation and

_____ (Name of "Licensee")

Licensee may wish to obtain licenses from time to time to make limited use of specific SPOT Data. Each such license will require a license request from Licensee that, if accepted by SPOT Image Corporation, will give rise to a License Agreement. The purpose of this GTCA is to govern the use of all SPOT Data or works derived therefrom and to establish where appropriate general terms and conditions that will be part of any specific License Agreement into which the parties may enter in the future.

1. **License Granted.**
   A. A nonexclusive License will exist between the parties with respect to requested SPOT Data when and if SICORP accepts a license request from Licensee, by delivering the SPOT Data requested by Licensee.
   B. The License Agreement for any requested SPOT Data will consist of the license request or any request to acquire or use SPOT Data, as accepted by SICORP, the terms and conditions contained in this GTCA together with the terms and conditions of any addendum hereto.
   C. In the case of a license request made by telephone, a written confirmation by SICORP will be deemed a correct statement of the license request unless a written correction to the confirmation is received by SICORP within three business days after the date of Licensee's receipt of such confirmation. In such event, Licensee's corrected request will be treated as a new license request if SICORP accepts the corrected request.
2. **Scope of License.**
   The license granted by SICORP under the copyright and its other rights in the requested SPOT Data authorizes the Licensee to make personal or, in the case of an organization, internal use of the licensed SPOT Data as follows:
   A. Licensee may analyze, process, and display the licensed SPOT Data and may make such SPOT Data and the results of such analysis or processing available to employees of Licensee. For these purposes, Licensee may make, for internal business use only, an unlimited number of copies of the SPOT Data in any manner which does not involve digital reproduction of data provided in digital form, provided that all copies include the copyright notice affixed to the original SPOT Data and described in paragraph 8.
   B. If the SPOT Data are provided in photographic print form, Licensee shall *not* make any copies in any media of the Data without prior express written consent of SICORP. In the event such consent is given, Licensee shall take all necessary steps to ensure that the copyright notice is affixed to any such copies in the form described in paragraph 8.
   C. If the SPOT Data are provided in a photographic film form, Licensee shall not duplicate the film product and shall not create any digital record of the film so provided without the prior express written consent of SICORP. Licensee may make prints from the SPOT Data film for internal use only provided that Licensee shall take all necessary steps to ensure that the copyright notice is affixed to any such prints in the form described in paragraph 8. Licensee may create a maximum of twenty (20) print copies of the SPOT Data for market development purposes. However, Licensee shall not sell any copies made by Licensee for such market development purposes.
   D. If the licensed data are provided in digital form, Licensee may make one digital copy of the SPOT Data for use as a Backup Copy; however, the Backup Copy is for protection purposes only, and Licensee agrees not to use or allow others to use the Backup Copy for any purpose other than to replace the original SPOT Data if it is lost or damaged. Licensee may make additional digital copies of the SPOT Data only to the extent authorized by this GTCA and any addendum hereto, provided that all copies include the copyright notice affixed to the original SPOT Data and described in paragraph 8 or any such addendum. Licensee may create a maximum of twenty (20) print or film copies of the SPOT Data for market development purposes. However, Licensee shall not sell any copies made by Licensee for such market development purposes.
   E. Licensee may make the licensed SPOT Data available to contractors, consultants, and joint venturers who are not employees of Licensee, but only for use by a contractor or consultant on behalf of Licensee, or for use by a joint venturer (only if such joint venturers are identified on the license request) solely on behalf of the joint venture and in the furtherance of the purposes thereof, and only if each such person agrees in writing with the Licensee:
      (i) to be bound by the same limitations on use as apply to Licensee, and
      (ii) to return to Licensee all SPOT Data upon completion of the contracting, consulting, or joint venture agreement.
   F. Licensee may prepare textual reports and other non-image materials based upon the licensed SPOT Data and publish, sell or distribute such materials, but only if such materials do not reproduce in any way the licensed SPOT Data without direct written permission from SICORP.
   G. Licensee may not copy or externally distribute licensed SPOT Data in any way not expressly authorized by the preceding paragraphs. Without limiting the generality of the foregoing, no license is granted to commercially reproduce and/or distribute any imagery that is included in the SPOT Data or derived therefrom unless specifically provided in an addendum hereto.
   H. Licensee may not, without the prior written consent of SICORP, transfer its rights under any License Agreement to any other person or organization.
3. **License Fees.**
   The fee for any license granted in accordance with this Agreement will be determined on the basis of the current SPOT Image Corporation Fee Schedule, and, unless the parties agree specifically on credit terms, payment terms will be in accordance with such Fee Schedule. All amounts due from Licensee to SICORP shall be "Net 30-days" from the date of invoice. Any variation to the standard SICORP Fee Schedule shall be set forth in an addendum to this GTCA.
4. **Delivery.**
   Licensed SPOT Data will be delivered free of charge to any destination within the United States. SICORP will choose the method of delivery and will use its best efforts to deliver licensed SPOT Data as rapidly as possible.
5. **Limited Warranty and Limitation of Liability.**
   A. SICORP will use its best efforts to ensure that any SPOT Data provided to Licensee conform to the SPOT Data requested and that the medium in which the SPOT Data are delivered is free of physical defect. If any data or media do not meet the foregoing standards, Licensee's sole and exclusive remedy will be to return such SPOT Data or media to SICORP within thirty (30) days of Licensee's receipt thereof. If Licensee returns SPOT Data or media within such period and if SICORP reasonably determines that such data or media at the time they were delivered to Licensee, failed to meet such standards, SICORP will, at its discretion, either:
      (i) retain the SPOT Data or media and refund the applicable licensee fee paid with respect to them, or
      (ii) replace or repair the SPOT Data and return them to Licensee.

over

Annex 17B. SICORP: Agreement on General Terms and Conditions for SPOT Data User Licenses (Sect. 6 to 12)

B. EXCEPT AS PROVIDED IN THE PRECEDING PARAGRAPH, ANY SPOT DATA LICENSED PURSUANT TO THIS AGREEMENT ARE PROVIDED WITHOUT WARRANTY OF ANY KIND, WHETHER EXPRESS OR IMPLIED, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, EVEN IF SPOT IMAGE CORPORATION IS ADVISED OF SUCH PURPOSE. SPOT IMAGE CORPORATION'S LIABILITY WITH RESPECT TO ANY SUCH DATA WILL, IN ANY CASE, BE LIMITED TO A REFUND OF THE LICENSE FEE PAID FOR SUCH DATA. IN NO EVENT WILL SPOT IMAGE CORPORATION BE LIABLE TO LICENSEE FOR ANY SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS RESULTING FROM ANY DEFECT IN ANY SPOT DATA OR ANY DELAY IN DELIVERY.

6. **Lawful Use.**
Licensee represents and warrants that it will not use any SPOT Data licensed pursuant to this GTCA or any addendum hereto in any way that is unlawful or in breach of the legal rights of any third party.

7. **Nonexclusivity.**
No license governed by these terms and conditions will be an exclusive license, and SICORP may grant to other licensees nonexclusive licenses for any or all of the SPOT Data licensed under this Agreement. SICORP may also grant to other licensees, with respect to any or all of the SPOT Data licensed pursuant hereto, exclusive or nonexclusive licenses for the commercial reproduction and distribution of such SPOT Data. No such exclusive license, however, will diminish the rights of Licensee under this Agreement.

8. **Copyright Notice.**
During each use of SPOT Data or any copies thereof for any of the purposes stated in this GTCA or any Addendum hereto Licensee shall include the following notice:

© 19__ CNES
Licensed by SPOT Image Corporation
Reston, Virginia

The foregoing copyright/acknowledgment notice is considered to be a material term of this contract and of all agreements entered into by Licensee with any third party (if approved by SICORP). It is the obligation of Licensee to strictly adhere to these notice provisions and to ensure that any approved third party be given notice of and agree to abide by the terms of this Section.

9. **Indemnification.**
Licensee agrees to indemnify and save SICORP harmless from any third party claim, action, liability, or suit arising from the use of SPOT Data by Licensee as well as from all damages and costs including reasonable attorneys fees arising out of any actual or threatened breach by Licensee of this GTCA.

10. **Order Of Precedence.**
In the event of any conflict between this GTCA and any Addendum hereto in the absence of any wording to the contrary, the terms of any Addendum hereto shall control.

11. **Arbitration.**
Any dispute arising out of this GTCA or any addendum hereto and upon thirty (30) days notice, shall be resolved by binding arbitration to be conducted in the Commonwealth of Virginia in accordance with the rules of the American Arbitration Association then in effect, the loser to bear the winner's cost of arbitration.

12. **General.**
A. This Agreement supersedes all previous oral or written agreements or representations concerning the subject matter of this Agreement.
B. Either party may terminate this Agreement by written notice to the other party. Termination of this Agreement shall not terminate or affect any license granted in accordance with this Agreement and in effect at the time of such termination.
C. All changes to this GTCA shall be in writing and shall have no force and effect unless agreed to in writing by Licensee and SICORP.
D. If any provision of this Agreement is held invalid, illegal or unenforceable the validity, legality, and enforceability of the remaining provisions will not be in any way affected or impaired.
E. This Agreement will be governed by the laws of the Commonwealth of Virginia.
F. The Licensee hereby submits to the jurisdiction of any competent state or federal court located in Virginia with respect to any dispute or claim relating to this Agreement.

For Licensee Name and Title (Please type or print)	For SPOT Image Corporation Name and Title
Signature Date	Signature Date

(Rev 6/90

Annex 18. Historical review of commercialized remote-sensing

1969: United States astronauts land on the Moon. President Nixon inaugurates the Landsat program in September and declares that it will "be dedicated to produce information not only for the United States but also for the world community".

1970: first reported Soviet remote-sensing activities during the manned Soyuz 9 flight.

1972: Nasa starts an open access policy for the data collected by their Landsat remote-sensing satellites. All are equipped with multispectral scanner (MSS) capable of a resolution of 80 meters for L1 to L3, while L4 and L5 are equipped with a thematic mapper (TM) capable of a 30 m. resolution in seven spectral bands. Landsat 2 and 3 are launched in 1975 and in 1978. Still revolving around our planet are Landsat 4 and 5 launched in 1982 and in 1984. However, in 1981 the Landsat program starts facing financial difficulties coming the OBM.

Also in 1972, signature and entry into force of the Convention on International Liability for Damage Caused by Space Objects (The Liability Convention).

1976: the Bogota Declaration by which several Latin American countries assert their proprietary inalienable rights to segments of the geostationary orbit.

Also in 1976, signature and entry into force of the Convention on Registration of Objects Launched into Outer Space (The Registration Convention).

1978: Nine socialist states ratify the Moscow Convention on the Transfer and Utilization of Remote-Sensing Data of the Earth from Space to cooperate in the distribution of collected information from their own remote-sensing satellites. This program connects the Soyuz space vessels to Salyut orbital stations and to Cosmos automatic photo satellites, together with Meteor and Meteor Priroda satellites multiband television channels.

Also in 1978, NASA launches two meteorological satellites which are on two complementary polar-orbits, one covering the "morning-orbit" and the other one the "afternoon orbit", sweeping continuously a 3000 km-wide swath with a ground resolution of 1 square km. They are still in operation and known under the Earthnet operational name. Their transmitted data have been archived under the Meteosat system and are available to anybody through the Earthnet User Services.

1979: the Carter Administration declares that the commercialization of Landsat is a goal to be reached.

Also in 1979, signature of the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (The Moon Treaty).

1981: France creates SPOT Image, a private corporation owned by a majority of public controlled interests in order to commercialize the data collected by the French remote-sensing satellite SPOT which is not yet in orbit. Opinions are emitted in the United States criticizing the shaky support of the United States government to the Landsat program, thereby inducing other countries to launch their own remote-sensing program in order to secure the availability of remote-sensing data in the long run.

1983: the Reagan Administration implements the commercialization process by transferring the Landsat system from the control of Nasa to the National Oceanic and Atmospheric Administration (NOAA).

1984: the US Land Remote-Sensing Commercialization Act privatises the gathering and dissemination of data by a bidding process. The purpose of the Act is to provide for the "phased orderly commercialization of land remote-sensing technologies". It seems that this United States policy may have alleviated some fears originally expressed by developing countries with regard to prior consent and to the dissemination of information.

1985: SPOT is launched by an Ariane rocket and placed in orbit. Its spectrometers offer one of the best available resolution: 10 meters in panchromatic mode (black and white). Opinions start being expressed in the United States criticizing the shaky support of the United States government to the Landsat program, thereby inducing other countries to launch their own remote-sensing program in order to secure the availability of remote-sensing data in the long run.

Also in 1985, an offer from EOSAT, a joint venture company controlled by RCA and Hughes Aircraft, is accepted EOSAT becomes the first licensee under the Land Remote-Sensing Commercialization Act of 1984.

1986: Beginnings of the commercialization of SPOT produced data by SPOT Image and creation of SPOT Image Corporation, SICORP, a US affiliate.

Also in 1986: UNGA Resolution 41/65 is adopted by consensus. It contains the Declaration on the 15 Principles on Remote-Sensing of the Earth to Space.

1987: Japan places its MOS-1 maritime satellite (ocean observation) on a sunsynchronous polar orbit at a 904 km

altitude.

Also in 1987, the Soviet Union launches the largest civilian Earth resources satellite ever placed in orbit. Weighing 20 tons, its radars and sensors will assist in crop forecasting, ice monitoring, mining, mapping and ocean scanning among various activities. The Soviet Union also starts commercializing its satellite picture products through Soyuzcarta.

1988: a Soviet remote-sensing satellite is docked to the Soviet Mir space station.

Also in 1987, NOAA announces that it will no longer be able to fund the Landsat program beyond March 1989, starting making pressures on EOSAT to increase its share of the funding. A joint Landsat/SPOT program is initiated with discussions between NOAA and CNES (French space agency). NOAA threatens further to hand all Landsat activities to the private sector.

Also in 1988, signature of the Agreement on the Space Station. The US Land Remote-Sensing Commercialization Act (1984) is amended.

1989: Glavcosmos enters a joint-venture with Space Commerce Corporation, a Houston-based (Texas) corporation which is aimed at selling Soviet space products and services in the Americas.

1990: Space analysts note that Soviet Earth observation missions tend to increase in length of time.

Also in 1990, President Bush approves a new National Space Policy Directive which further encourages the growth of the United States private sector space activities.

1991: The Gulf Crisis gives to remote-sensing activities an unprecedented dimension which had hardly been foreseen until then, mostly for strategic observation and for media coverage.

Also in 1991, launching of ERS-1 (July), the first European Earth observation satellite based on the radar technology, which is aimed to be operational by the end of 1991. Its main purpose is to monitor the environment.

The Soviet Union is supposed to sign a commercialization agreement with Space Commerce Corp. for the dissemination of Earth observation pictures taken by Almaz, a Soviet remote-sensing satellite.

UEO (Union de l'Europe Occidentale) decides to create a common center for satellite pictures interpretation based on SPOT and

Helios imagery.

1992: Landsat 6 to be launched by EOSAT which plans to make available a 5 m. resolution imaging capability for media customers by 1994.

China and Brazil are in agreement to launch a 2.5 ton Earth imaging satellite on a Chinese rocket.

France to launch a military observation satellite series, Helios, in association with Italy and Spain. Helios which is supposed to have a 1 or 2 m. resolution (similar to the current United States military satellites). It is also supposed to monitor radar systems. In addition, launch of SPOT 3 is scheduled.

1994: Radarsat, the first radar remote-sensing satellite, to be launched by Canada, with a resolution varying from 10 m to 50 m depending on swath width. The extensive development or radar satellites (Synthetic Aperture Radar - SAR) is planned by all major space powers by France.

Also in 1994 is scheduled the launching by Japan of ADEOS, an advanced Earth Observation Satellite which should embark stratospheric ozone and greenhouse effect gas observation sensors.

Scheduled launch of SPOT 4 by France.

1996: First launch of a United States polar-orbital EOS (Earth Observing System) platform.

1997: First European polar platform launched by ESA.

1998: Second United States polar platform with Japanese equipment.

2000: Spatial imagery resolution for commercialization expected to be in the 3 to 5 m. range (presently used for military purposes).
Second ESA polar-orbital platform. Total EOS system (4 platforms) in place resulting from cooperation between NASA, ESA and NASDA (Japan). The EOS program is budgeted for 17 billion $ over 15 years, a project which rivals the Shuttle program and the Space Station program. When in operation, the four platforms are expected to send 1 million pictures a day down to Earth, the equivalent of the Library of Congress every day, with a promised availability to scientists within 48 hours; data distribution will represent 60% of the EOS program budget.

Annex 19. Some technical considerations about remote-sensing and the electromagnetic spectrum

* Sweeping or push-broom satellites. Theses satellites are used in order to ensure a regular coverage of all parts of the Earth. They are mainly used for four types usages: navigation, radio search, telecommunications and Earth observation (meteorology and remote-sensing). The sweeping effect of the surface of the Earth is performed as a result of the conjunction of two complementary movements: the un-clockwise movement of the Earth, coupled with the orbital circular movement of the satellite.

* The radiation source: Remote-sensing satellites catch the emission of electromagnetic waves in the infra-red and microwave range through optical sensors. Techniques have been improved with the spreading use of the radar technology which enables to sense through clouds and in the dark, both obstacles that optical sensors can not overrun.

* The orbit can be geostationary, polar (low or elliptical), or slightly sloped. According to Lubos Perek: "The orbital elements of the typical 900 km Landsat orbit have been chosen so as to compensate the annual rotation of the Sun-Earth line with perturbations caused by the flattening of the Earth. The essential characteristics of the orbit, called sunsynchronous, is the crossing of the equator always at about 9:30 local time. Thus, advantage is taken of a better chance of clear skies in the morning hours and morning shadows can be used as an important indicator of ground features"[145].

* The sensing device: plain cameras were used at the beginning and were improved afterwards. Optical sensors have been used since the beginning of the Landsat series, and now the radar technique, which consists in sending electromagnetic waves towards the observed target, tends to be used more and more.

* The swath: the track of the satellite on Earth, which is adjustable according to the combination of resolution, wideness and periodic (frequency of satellite passages) parameters which depend on both the satellite capacity and the requirements of the user.

* Optical resolution: a compromise between frequency and sharpness.

* Ground stations: obligatory relays all over the world (re than 20 each for Landsat and SPOT).

---

[145]. Interaction Between Space Technology and Space Law - Lubos Perek - Journal of Space Law - 1990 - p. 19.

* The electromagnetic spectrum:

Annex 20. Practical illustrations of remote-sensing applications[146]

Applications had a purely scientific flavour at the beginning, but they now take a much more commercial tone, while in the background the military dimension of remote-sensing activities has dominantly prevailed since the beginning and still is omnipresent[147]. As a consequence, many remote-sensing activities which have a strong military or political flavour can easily be identified as having a commercial potential and reciprocally.

* Globally, remote-sensing enables the user of the information to observe the Earth with a little more than just a bird's eye view! But it is conceptually different than aerial photography which is limited in scope, done by an aircraft which is temporarily in the air, restricted to the visible spectrum (wavelengths which are accessible to the human eyes) and analog in format (photographic prints or transparencies). By contrast, remote-sensing is based on the detection and analysis of electromagnetic waves emitted, reflected or diffracted by the sensed object. Performed from a satellite which is usually placed on a low polar orbit so that it may vertically scan the Earth while the Earth is revolving on its axis. It enables a synoptic view of the areas which are covered and since it always follows the same path, it covers the whole Earth after a few passages: for example, Landsat satellites circle the globe fourteen times a day at a 913 km circular and sun-synchronous orbit, with a 200 km wide swath. The format of the pictures is digital which enables to process them by computer afterwards, a stage which is called "interpretation" and is of importance since almost nothing would be recognizable from that altitude for the human eye.

* The main fields of human activity which have already directly benefited from remote-sensing activities are:

Land use planning, meteorology, civil aviation, environmental control, agriculture, fishing, oil drilling, journalism, military reconnaissance and verification of arms control agreements, etc... For

---

[146]. These examples are quoted from various articles in Air & Cosmos, Ad Astra and Aviation Week and Space Technology, the references of which are indicated in the bibliography.

[147]. La légalité coutumière de l'observation spatiale militaire Ilias I. Kuskuvelis - Revue Française de Droit Aérien et Spatial - No 3 - 1990 - 297/322.

example, it is reported that remote-sensing already enabled Bolivia to modify a pipeline project, Brazil to organize the settlement of interior regions, Pakistan to discover copper deposits in 1975. It also supplied valuable information after the Armenia earthquake of December 1988, provided the first images of the Chernobyl nuclear disaster in 1986, helped India (through its own IRS-1 satellite) to locate a 37 mile extension of a fault line containing lead and zinc deposits, helped locate the remains of Pan Am Flight 103 at Lockerbie in 1988. Remote-sensing also currently helps locating clear air turbulence for the benefit of air navigation and the evolution of the Amazonian Rain Forest, the lungs of the Earth.

* Observation satellites also provide a regular coverage of events like conflicts, crises and catastrophes:

- In 1986, SPOT imagery enabled to uncover preparations for a round of underground nuclear weapons testing at a Soviet nuclear testing facility at Semipalatinsk, the photos of which were immediately aired on the ABC, CBS and NBC networks;
- In 1987, ABC used SPOT imagery to show evidence that the Soviets were violating the ABM Treaty at their Krasnoiarsk radar facility; also in 1987, the news coverage of important forest fires in North-Eastern China;
- The coverage in 1987 of one of the S.U. largest mobile missile complexes at Yurya housing SS20s and SS25s which are of interest for the INF Treaty,
- The coverage of the Kashua Pakistanese nuclear facility in 1987;
- A Swedish firm found evidence of the Soviet shuttle program about six months before their Buran shuttle was launched at Baikonur in November 1988;
- All major media networks used SPOT imagery in early 1989 to show evidence that Lybia's Rabta chemical weapons factory was not destroyed in spite of its leader's assertion of the contrary.
- The discovery in 1988 of a nuclear waste management disaster at Kushtum in the Soviet Union (possibly dating back to the late 1950s);
- The measurement of the shrinking of the Aral sea by one-third its original size between 1972 and 1987;
- The evidence of the desertification of the Sahel area in 1989;
- In late 1990, it was announced that Thailand uses SPOT imagery to track and map clandestine opium fields in its Northern region.

* In the U.S., Nasa's Office of Commercial Programs

specifically funds an Earth Observations Commercialization Applications Program.

Between 1987 and 1990, 20 research projects have thus received $12 million. 12 new programs have just been selected and are budgeted to receive $6 million in new research funding for the period 1991-1993. This program will cover the following fields: hazardous waste detection - urban infrastructure mapping - land use changes - remote-sensing software system - real-time disaster assessment - enhanced hydrologic forecasting - oil seep surveys - geographic data bases - pipeline monitoring - Pacific fisheries data - agricultural production data - wetland areas data -

* Referring now to recent political outbursts in the Middle-East:

In 1987 and 1988 ABC News used SPOT imagery to announce that Iraq was developing a network of missile sites in the Persian Gulf, which the Pentagon confirmed ten days later; the monitoring of the whole war theatre during the recent Gulf crisis was performed by several KH-11 polar orbit satellites jointly operated by the US Air Force and by the CIA and providing hundreds of photographs through a dozen of passages during a day over the area. In addition, 3 GOS DSP satellites equipped with a powerful infrared telescope of 3,65 m which have been placed on their orbit during 1990, while in the middle of last December these satellites relayed information about military exercises involving SCUD missiles, similar to others which had already been spotted last April. It was estimated that a total of six or seven United States spacecrafts were producing every 2-4 hours high and broad area resolution imagery of Iraq and Kuwait. This imagery was instantaneously relayed to the United States for interpretation and then relayed back to senior military commanders in the Gulf area. In addition, more selected imagery was provided to Army and Marine commanders in the field using small portable image readout systems which only required a few minutes to print out a picture about the enemy positions. Among the latest discoveries by remote-sensing satellites, it has been discovered that Iraq had displayed fighter aircrafts in the close vicinity of Ur, an ancient city which is credited to be the cradle of humanity and which goes back to the 20th century BC. Meanwhile, space analysts have noticed that during 1990 the Soviet Union has increased launches of ocean surveillance and of strategic reconnaissance satellites especially during the last weeks of

December[148].

[148]. Information obtained from various issues of Air & Cosmos, Ad Astra and Aviation Week and Space Technology, the references of which are given in the bibliography.

VII - BIBLIOGRAPHY

Note: References for all texts, books and periodicals are sorted (i) in chronological order of year of most recent revision, publication or signature, and (ii) in alphabetical order of author's name when several works have been published within the same year.

1) Legal texts of international significance

- Declaration on Principles of Remote-Sensing of the Earth from Space. U.N.G.A. Resolution 41/65, December 4, 1986. U.N. Doc. A/41/20.

- Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (The Moon Treaty of 1979). U.N. Doc. A/Res./34,68, 14 dec. 1979; in force since 1984.

- International Telecommunication Convention - Final Protocol, Additional Protocols, Optional Additional Protocol, Resolutions, Recommendation and Opinions - Nairobi 1982 - I.T.U. - Geneva - 347 pages.

- The Convention on the Transfer and Use of Data of Remote-Sensing of the Earth from Outer Space (The Moscow Convention of 1978). United Nations Document A/33/162, June 29, 1978.

- Convention on Registration of Objects Launched into Outer Space (The Registration Convention of 1976). Adopted in U.N.G.A. Res. 3235(XXIX), 12 Nov. 1974; 28:1 U.S.T. 695 (1976-7), T.I.A.S. 8480; (1976) CanT.S. No 36; opened for signature 14 Jan. 1975; entered into force 15 Sept. 1976.

- Convention Relating to the Distribution of Programme-Carrying Signals Transmitted by Satellite. Signed in Brussels on May 21, 1974, entered into force on August 25, 1979.

- Convention on International liability for Damage Caused by Space Objects (The Liability Convention of 1972). Adopted in U.N.G.A. Res. 2777(XXVI), 29 Nov. 1971; 24:3 U.S.T. 2389 (1973); T.I.A.S. 7762; opened for signature 29 Mar. 1972; entered into force 9 Oct. 1973.

- Convention for the Protection of Literary and Artistic Works. Signed in Berne, September 9, 1886, in force in 1887. Revised in 1908, 1928, 1947, 1967 and on July 24, 1971 in Paris. Also called the Berne Convention and its member parties belong to the Berne Union.

- The Universal Copyright Convention. Signed in Geneva in 1952, entered into force September 16, 1955 and revised in

Paris on July 24, 1971.

- Treaty on Principles Governing the Activities of States in the Exploration and use of Outer Space including the Moon and Other Celestial Bodies (The Outer Space Treaty of 1967). Adopted in U.N.G.A. Res. 222(XXI), 19 december 1966; 610 U.N.T.S. 206 (1967); 18.3 U.S.T. 2410 (1967), T.I.A.S. 6347; (1967) Can.T.S. No 19; opened for signature 27 Jan. 1967; entered into force 10 Oct. 1967.

- International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organisations. Signed in Rome on October 10, 1961, entered into force on May 16, 1964.

2) Legal texts of regional significance

- Agreement between the European Space Agency and the Instituto Nacional de Tecnica Aerospacial (INTA) concerning the use of the Maspalomas Station for the handling of data from remote-sensing missions. Signed November 21, 1988. ESA/LEG/112.

- Agreement on tracking, telemetry and telecommand facilities and stations for the acquisition, processing and distribution of data at Kiruna (Sweden). Signed April 15, 1986. ESA/LEG/85.

- Memorandum of Understanding between ESA and NASA concerning ERS-1 SAR data acquisition at Fairbanks. Signed January 14, 1986. ESA/LEG/83.

- Memorandum of Understanding between the European Space Agency and the National Oceanic and Atmospheric Administration (NOAA). Signed February 23, 1984. ESA/LEG/61.

- Memorandum of Understanding between the Agency and Telespazio concerning the use of the facilities at Fucino for the reception and prepocessing of data from remote-sensing of the Earth by satellite. Signed April 28, 1982. ESA/LEG/52.

- Memorandum of Understanding between NASA and ESA concerning the eart resources satellites, Landsat, Nimbus-G and Seasat-1. Signed October 7, 1978. ESA/LEG/2.

- ESA Remote-Sensing Programme Board - European Remote-Sensing Satellite Programme - Implementing Rules - Ref: ESA/PB-RS(81)23, rev. 5, attached to ESA/C(83)86.

- Declaration on the European Sensing Satellite Programme. Drawn up 24/03/82, updated 16/06/82, amended 19/07/83. ESA/PB-RS/XVIII/Dec. 1 (Final).

- Resolution concerning a European Remote-Sensing Satellite Programme. ESA/C/L/res. 5 (Final).

- Convention of the European Space Agency and Rules of Procedure of ESA Council - Signed on 30 May 1975 and entered into force on 30 October 1980 - ISSN 1010-5697.

3) Legal texts of national significance

3.1 United States

- National Oceanic Atmospheric Administration - General Regulations of the environmental data service - Licensing of private remote-sensing space systems - 15 CFR Ch. IX (1-1-91 Edition) - Part 960.

- Canada - Landsat Data Downlink Agreement Between the Canada Centre for Remote-Sensing and Earth Observation Satellite Company. December 28, 1990.

- Commercial Space launch Act Amendments of 1988
Public Law 100-657 (H.R. 4399), November 15, 1988.

- Commercial Space Launch Act of 1984
Public Law 98-575 (98 STAT. 3055), October 30, 1984.

- Canada - Memorandum of Understanding between the Canada Centre for Remote-Sensing and the United States Department of Commerce, National Oceanic and Atmospheric Administration. Signed June 22 and July 26, 1984.

- Land Remote-Sensing Commercialization Act of 1984
Public Law 98-365 (H.R. 5155); July 17, 1984.

- South Africa - Remote-Sensing: Landsat System.
Memorandum of Understanding signed at Washington and Pretoria September 19 and October 19, 1983. Entered into force October 19, 1983. TIAS 10797.

- Japan - Remote-Sensing: Landsat System.
Memorandum of Understanding signed at Washington and Tpkyo July 5 and August 11, 1983. Entered into force August 11, 1983. TIAS 10784.

- Indonesia - Remote-Sensing: Landsat System.
Memorandum of Understanding signed at Washington and Jakarta July 13 and 30, 1981. Entered into force July 30, 1981. UST Vol. 33, TIAS 10228.

- People's Republic of China - Remote-Sensing: Landsat System. Memorandum of Understanding signed at Beijing January 24,

1980.
Entered into force January 12, 1981. TIAS 11054.

- India - Remote-Sensing: Acquisition of Satellite Data.
1) Memorandum of Understanding signed at New Delhi January 3, 1978. Entered into force January 3, 1978. With related note. UST Vol 29, TIAS 9074.
2) Extension agreement signed April 6 and 19, 1982. Effective January 3, 1982. TIAS 10383.

- Argentina - Remote-Sensing: Landsat System.
1) Memorandum of Understanding signed at Washington and Buenos Aires August 6 and October 7, 1986. Entered into force October 7, 1976. TIAS 10586.
2) Extension agreement signed April 6, 1981. Entered into force April 6, 1981. TIAS 10587.

- Chile - Remote-Sensing: Acquisition of Satellite Data.
Memorandum of Understanding signed at Santiago and Washington July 24 and September 8, 1975. Entered into force September 8, 1975. UST Vol. 26, TIAS 8211.

- Zaïre - Remote-Sensing: Acquisition of Satellite Data.
Memorandum of Understanding signed at washington january 6, 1975 and at Kinshasa january 31, 1975. Entered into force January 31, 1975.
UST Vol. 26, TIAS 8129.

- Iran - Remote-Sensing: Acquisition of Satellite Data
Memorandum of understanding signed at Washington and Tehran July 25 and October 29, 1974; entered into force October 29, 1974.
UST Vol. 26 - TIAS 8203.

- Italy - Remote-Sensing: Acquisition of Satellite Data
Memorandum of understanding signed at Washington and Rome April 16 and May 9, 1974; entered into force May 9, 1974.
UST Vol. 26 - TIAS 8213.

- Canada - Remote-Sensing from Satellites and Aircraft
Agreement effected by exchange of notes. Signed at Washington may 14, 1971. Entered into force May 14, 1971. UST Vol. 22. TIAS 7125.

Extension by exchange of notes. Effective May 14, 1975. Signed at Ottawa March 19 and 22, 1976. Entered into force March 22, 1976. UST Vol. 27. TIAS 8247.

Extension by exchange of notes. Effective May 14, 1980. Signed at Washington October 20 and November 6, 1980. Entered into force November 6, 1980. UST Vol. 32. TIAS 9939.

- National Aeronautics and Space Act of 1958, as amended Pub. L. No 85-568, 72 Stat. 426. Amended in 1985, 1986 and 1989.

3.2 Canada

- Arrangement between the European Space Agency and the Department of Energy, Mines and Resources concerning the direct reception, archiving, processing and distribution of ERS-1 data - Draft - May 7, 1991.

- Memorandum of Understanding between the Canadian Space Agency, the National Aeronautics and Space Administration, and the Natioal Oceanic and Atmospheric Administration - Signed on February 27, 1991.

- Landsat Data Downlink Agreement between the Canada Centre for Remote-Sensing and Earth Observation Satellite Company - Draft - December 28, 1990.

- Arrangement between the National Space Development Agency of Japan and the Canada Centre for Remote-Sensing for the Direct Reception and Distribution of MOS-1 Data. September 28, 1990.

- Memorandum of Understanding signed between Energy, Mines and Resources, the Canadian Space Agency and Radarsat International. Signed on September 24, 1990.

- Bill C-16 - An Act to establish the Canadian Space Agency and to provide for other matters in relation to space - As passed by the House of Commons, December 15, 1989.- Second Session, Thirty-fourth Parliament, 38 Elizabeth II, 1989.

- Agreement regarding the reception and distribution of SPOT data in Canada. September 26, 1989.

- Memorandum of Understanding between the Canada Centre for Remote-Sensing and the United States Department of Commerce National Oceanic and Atmospheric Administration. July 26, 1984.

4) Books, special studies and bulk documentation

* Patrick Salin - Legal Impact of Remote-Sensing - Unpublished Air and Space Law Writing Requirement - McGill University - Institute of Air and Space Law - April 1991 - 107 pages.

* EOSAT - Earth Observation Company - Marketing documents:
1) Landsat Products and Services catalog I - September 1990 - 40 pages.
2) Landsat Products Ordering and Pricing Information catalog

II - March 1991 - 8 pages - and various loose pamphlets.

* SYSAME (Sophia-Antipolis, France) - Corporate publication about fields of intervention in the field of value-added remote-sensing services - 1991.

* Programme spatial canadien.
Agence spatiale canadienne - Documentation - 1990

* Marc Giget - World Space Industry Survey - Euroconsult - Paris - 1990 -396 pages.

* David P. Gump - Space Enterprise beyond Nasa - Praeger - New York - 1990 - 220 pages.

* Michael Harr, Rajiv Kohli - Commercial Utilization of Space - An International Comparison of Framework Conditions - Battelle Press - Columbus (Ohio) - 1990 - 157 pages.

* SNC (Montreal, Qc) - PROGERT - Corporate document about a forest management project based on satellite imagery - October 1990 - 75 pages.

* Diane Thompson - The Commercialization of Remote-Sensing in Canada 1972-1990 - Paper presented at 23rd International Symposium on Remote-Sensing of Environment - Bangkok, Thailand, 18-25 April 1990 - 15 pages.

* Radarsat International - Providing Worldwide Resource Management Information - Corporate publication - 8 pages.

* ERS-1 A new tool for global environment monitoring in the 1990s.
ESA BR-36 - November 1989 - 38 pages.

* R.A. Ryerson - The Remote-Sensing Industry in Canada: A Profile - EMR/CCRS - Presentation to the 12th Canadian Symposium on Remote-Sensing, Vancouver BC, July 1989 - 7 pages.

* SPOT Image - Catalogue des produits SPOT et des services - 1989 - 54 pages.

* SPOT - Instrument de gestion et de décision - Quelques exemples réalisés par des opérateurs français et étrangers - Novembre 1988 - 43 pages.

* Institut Français de Relations Internationales - L'Espace, un enjeu pour l'Europe (collective works) - 1988 - In particular: L'expansion des activités spatiales: la télédétection, p. 110.

* Jacqueline Dutheil de la Rochère - Droit de l'espace (collective works) - Pedone - 1988 - 400 pages. Two chapters are of particular interest.
Chapter 8: Aspects juridiques de la télédétection spatiale - Olivier de Saint-Lagier - page 225/253.
Chapter 10: Protection des données et des inventions dans l'Espace - Marie-France Murphy et René Osterlinck - page 279/296.

* European Space Agency - Commercial Opportunities for Remote-Sensing with Polar Platforms - Proceedings of an ESA Workshop held at Frascati, 4/5 September 1986 - ESA SP-269 - April 1987 - 75 pages.

* Antoinette Le Gall - La France et la télédétection par satellite des ressources de la Terre: Le système SPOT - Thèse de maîtrise - Institut de Droit Aérien et Spatial - Université McGill - Montréal - 1986 - 270 pages.

* Stephen M. Stewart - International Copyright and Neighbouring Rights - London - Butterworths - 1983 - 740 pages.

* United Nations - The Implications of Establishing an International Satellite Monitoring Agency - Report of the Secretary-General - 1983 - 110 pages.

* A. Piradov - Le Droit International de l'Espace - Ouvrage collectif sous la direction de - Éditions du Progrès - Moscou - 1976 - 370 pages.

5) Articles from legal periodicals

===== 1991 =====

* André Lucas - Copyright in the European Community: The Green Paper and the Proposal for a Directive Concerning Legal protection of Computer Programs - Columbia Journal of Transnational Law - Vol. 29 - 1991 - p. 145/167.

* Léopold Peyrefitte - Le régime de la télédétection spatiale - Revue française de droit aérien et spatial - Avril/Juin 1991 - p.183/208.

* Guy M. Stephens - Remote-sensing: Opportunity waiting to happen - Satellite Communications - May 1991 - p. 14/16.

===== 1990 =====

* Simone Courteix - Régime juridique de la télédétection par

satellites - in: Documents d'études sur le droit de l'espace - No 3.04 - 1990 - 3/47.

* Simone Courteix - L'espace au service de la vérification: proposition d'agence de traitement des images satellitaires. Document de travail présenté par la France devant la Conférence du désarmement (août 1989). In: Documents d'études sur le droit de l'espace - No 3.04 - 1990 - 3/47.

* Vers un droit des stations spatiales.
Mireille Couston - Revue Française de Droit Aérien et Spatial - 1990 - 39/55.

* Thomas E. Cremin. - Security in the Space Age - Space Policy - February 1990 - p. 33/44.

* International Space Plans and Policies: Future Roles of International Organizations. Stephen E. Doyle - Journal of Space Law - 1990 - 124/137.

* La station spatiale et son régime juridique - André Farand - Annales IASL - 1990 - 309/329

* The Growth of Domestic Space Law - Stephen Gorove - Journal of Space Law - 1990 - 99/111.

* New National Space Policy Directive of September 5, 1990 Journal of Space Law - 1990 - 217/218.

* Legislation on Inventions in Outer Space - Journal of Space Law - 1990 - 218/219.

* Lori Keesey - Value-Added Firms Eye Geographic Sector Growth - Space News - December 3-9 1990 - p.8

* André Kerever - Satellite broadcasting and copyright - Copyright Bulletin - vol XXIV, No 3, 1990 - p. 7/22.

* John Kirton - Canadian space policy - Space Policy - February 1990 - p. 61/71.

* La légalité coutumière de l'observation spatiale militaire. Ilias I. Kuskuvelis - Revue Française de Droit Aérien et Spatial - No 3 - 1990 - 297/322.

* Levy Louis J., Chodakewitz Susan B. - The commercialization of satellite imagery - Space Policy - August 1990 - p. 209/220.

* Jocelyn Mallett - Canada's space program - Space Policy - February 1990 - p. 53/59.

* Carol A. Motyka - Effects of U.S. adherence to the Berne Convention - Rutgers Computer & Technology Law Journal - Vol. 16 - 1990 - p. 195/225.

* Interaction Between Space Technology and Space Law
Lubos Perek - Journal of Space Law - 1990 - 19/29.

* Qizhi He - Certain legal Aspects of Commercialization of Space Activities - Annals of Air and Space Law - 1990 - p. 333/340.

* Lisa R. Schaffer, Peter Backlund - Towards a coherent remote-sensing data policy - Space Policy - February 1990 - p. 45/52.

* Scanning into the future of copyrightable images: computer-based processing poses a present threat
Benjamin R. Seecof - High Technology Law Journal - 1990 - 371/400.

* Leonard S. Spector - Not-so-open skies - Space Policy - February 1990 -p. 9/18.

* Open Skies: Overview of Relevant Legal Instruments - Jason Reiskind
85/102 - and Creating an Open Skies Regime - Colleen Driscoll Sullivan
in: Open Skies: Technical, Organizational, Legal and Political Aspects - Centre for International and Strategic Studies, York University - 1990.

* Legal Regulation of Space Activities: Which Way Will It Advance Further? V.S. Vereshchetin - Journal of Space Law - 1990 - 11/18.

* Dr. Wolff Eckart - Rechtliche Aspekte der Entwicklung, des Laus und der Nutzung des Erderkundungssatelliten ERS-1 - Zeitschrift für Ausländisches Öffentliches Recht und Völkerrecht - 1990 p. 360/375.

===== 1989 =====

* Hamilton DeSaussure - Remote-Sensing Satellite Regulation by National and International Law - Rutgers Computer & Technology Law Journal - 1989 - p. 351/381.

* The United States-Brazilian Informatics dispute.
John J. Gallagher - The International Lawyer - Summer 1989 - 505/522.

* The U.N. Principles on Remote-Sensing: Focus on Possible Controversial Issues. Stephen Gorove - Liber Amicorum

Professor Matte - 1989 - p. 105

* Implications of Commercial Activities in Outer Space, Especially for the Developing Countries
Ph. Diederiks-Verschoor - Journal of Space Law - 1989 - 115/127.

* Newsgathering by Satellites: a New Challenge to International and National Law at the Dawn of the Twenty-First Century - Luc Frieden - Stanford Journal of International Law - 1989 - 103/193.

* John J. Gallagher - The United States-Brazilian Informatics Dispute - The International Lawyer - Summer 1989 - 505/522.

* News Media Satellites and the First Amendment: a Case Study in the Treatment of New Technologies.
Robert P. Merges and Glenn H. Reynolds - High Technology Law Journal - 1989 - 1/31.

* Spaced Out: The Third World Looks for a Way in to Outer Space - Mark Orlove - Connecticut Journal of International Law - Spring/Summer 1989 - 597/634.

* Sylvia Maureen Williams - Recent Trends on the Commercialization of Space Activities - Liber Amicorum Nicolas M. Matte - 1989 - 329/338.

* The Advent of Commercial Space: Comments on a Joint Venture Agreement - Wiliam B. Wirin - Journal of Space Commerce - 1989 - 61/66.

* Spar, maître d'oeuvre de Radarsat.
Electronique industrielle et commerciale - septembre 1989

===== 1988 =====

* Michel Bourély - Legal Problems Posed by the Commercialization of Data Collected by the European Remote-Sensing Satellite ERS-1 - Journal of Space Law - 1988 - p. 129/146.

* Michel Bourély - Space Commercialization and the law - Space Policy - May 1988 - p. 131/142.

* Michel Bourély - Les tendances actuelles du Droit de l'Espace -
Revue Française de Droit Aérien - 1988 - 12/27.

* Remote-Sensing and International Space Law
Carl Q. Christol - Journal of Space Law - 1988 - 21/44.

* Jeff Kingwell - Data relay satellites and remote-sensing - Space Policy - May 1988 - p. 103/107.

* Aspects juridiques de la télédétection spatiale - in Droit de l'espace (collective works)
Olivier de Saint-Lager - Pedone - 1988 - p. 225

===== 1987 =====

* Commercial Space Activities: Their growing influence on Space Law - Karl-Heinz Bockstiegel - McGill Annals of Air and Space Law - 1987 - 175/190

* Brender Mark E. - Remote-sensing and the First Amendment - Space Policy - November 1987 - p. 293/297.

* DalBello Richard, Williamson Ray A. - Gathering news from Space - Space Policy - November 1987 - p. 298/306.

* Glazer J. Henry - The Expanded Use of Space Act Commercialization Through Advanced Joint Enterprises between Federal and Non-Federal Constituencies - Rutgers Computer & Technology Law Journal - 1987 - 339/405.

* VoÛte Caesar - Some consequences of the commercialization of satellite remote-sensing - Space Policy - November 1987 - p. 307/312.

* Licensing of private remote-sensing space systems (Excerpts) - Space Policy - November 1987 - p. 355/358.

* McElroy John H. - The future of Earth observations in the USA - Space Policy - November 1987 - p. 313/325.

===== 1986 =====

* David L. Abney - Liability for Defective Aeronautical Charts - Journal of Products Liability - Vol. 9 - 1986 - pp. 211/231.

* Larry S. Kaplan - Space specific remedies for torts in Outer Space:
What path will US law follow? - The International Lawyer - Winter 1986 - Vol. 22 - No 4 - p. 1145.

* Michel Bourély - Quelques réflexions sur la commercialisation des activités spatiales - Annales IASL - 1986 - 171/184.

* Principes de la télédétection spatiale
Claude-Albert Colliard - Annuaire Français de Droit

International - 1986 - 697/714.

* The New World Information and Communication Order and International Human Rights Law - Stephen Raube-Wilson - Boston College International & Comparative Law Review - 1986 - 107/130.

===== 1985 =====

* Transborder Data Flow: Regulation of International Flow and the Brazilian example - Dorine R. Seidman - The Journal of Law and Technology - 1985 - 31/66.

* Intellectual Propertry and Space activities - Barbara Luxenberg and Gerald J. Mossinghoff - Journal of Space Law - Journal of Space Law - 1985 - 8/21.

* Legal and Foreign Policy Implications of the Landsat Commercialization Act - Douglas A. Doetsch - Columbia Journal of Transnational Law - 1985 - 103/132.

* Nasa and the Practice of Space Law - S. Neil Hosenball - Journal of Space Law - 1985 - 1/7.

* Selling Satellites: The Commercialization of Landsat - Christopher Joyner, Douglas Miller - Harvard International Law Journal - W 1985 - p. 63/102.

* Private Sector Activities in Outer Space
Art Dula - International Lawyer - Winter 1985 - 159/187.

===== 1984 =====

* Current issues in Remote-Sensing
Dr. Dideriks-Verschoor - Michigan Yearbook of International Legal Studies - 1984 - 305/316.

* Remote-sensing by satellites - in Space Activities and Emerging International Law (collective research)
Nicolas Mateesco Matte - CRASL McGill University - 1984 - 389/419.

===== 1983 =====

* Chappez J. - Arianespace: première société commerciale de transport spatial - Journal du droit international - 1983 p. 695/727.

6) Articles from specialized aerospace magazines

Ad Astra

===== 1990 =====

* Laying a Legal Foundation for Space Development - Glenn H. Reynolds - February 1990 - p. 30
* The Orbital Anchordesk - Diane C. Taylor - March 1990 - p. 14
* Database Earth - Frank Sietzen Jr. - April 1990 - p. 9
* EOS: the $17 billion question - Lori Keesey - April 1990 - p. 17
* Turning Space into Dollars, Canada Finds Profit in the Stars - Royce Dalby - November 1990 - p. 14

===== 1989 =====

* Landsat's Tale of Woe - James V. Taranik - April 1989 - p. 3
* Remotely Incensed: The Search for Profits - Charlie Knox - p. 22
* ESA's Next Decade - Ian Pryke - May 1989 - p. 16
* Remote-Sensing is looking down - Dr. Mark Chartrand - May 1989 - p. 23
* Open Skies Tested - Donald F. Robertson - June 1989 - p. 7
* Space Commerce, Soviet Style - Jan Goldberg - December 1989 - 24/30
* Marketing the Proton - Seth Arenstein - December 1989 - 31/34

Aviation Week and Space technology

===== 1991 =====

* Firms Selling Remote-Sensing Data Forecast Double-Digit Sales Growth - Craig Covault - January 7, 1991 - p. 32
* Soviet Increase Military Launches - January 7, 1991, p. 65
* Recon Satellites Lead Allied Intelligence Effort - Craig Covault - February 4, 1991 - p. 25
* Soviets Launch Largest Earth Resources Satellite on Modified Salyut Platform - April 8, 1991- p. 21
* Soviets Display Military Spacecraft Offered for Commercial Missions - April 8, 1991 - p. 24

===== 1990 =====

* "Earth Watch" Could Boost Interest in Shuttle Missions - Craig Covault * December 24, 1990 - p. 53

Air & Cosmos

===== 1991 =====

* SPOT traque l'opium - 24 déc./6 janv. 1991 - p. 11
* Mir observe le Golfe - 11 février 1991
* USA: l'espace au privé - 25 février 1991 - p. 25
* L'Urss a lancé "Almaz-1" - 8 avril 1991 - p. 32
* SPOT Image: croissance de 33% - 15 avril 1991 - p. 14
* Almaz filme la terre au radar - 15 avril 1991 - p. 36
* Guyane, lancement d'ERS-1 - 17 juin 1991 - p. 9
* L'URSS et Space Commerce - 1er juillet 1991 - p. 20
* UEO: création d'un centre d'interprétation satellitaire - 8 juillet 1991 - p. 28.

===== 1990 =====

* Satellite d'alerte DSP lancé par une Titan 4 - 19/26 novembre 1990 - p. 53
* Logiciels d'exploitation pour SPOT 4 et Hélios - 3/9 décembre 1990 - p. 39
* Missiles SCUD Irakiens à l'exercice - 10/16 décembre 1990 - p. 39
* Images Landsat soldées - 10/16 décembre 1990 - p. 46

===== 1989 =====

* La space station construite par un androïde - 13 mai 1989 - p. 29

===== 1988 =====

* Le satellite d'observation Hélios aura une résolution de 1 à 2 m. - 13 février 1988 - p. 30
* Divergences sur l'intérêt commercial des images à haute résolution - Pierre Langereux - 20 fevrier 1988 - p. 34
* L'URSS a lancé IRS-1A - Pierre Langereux - 19 mars 1988

===== 1987 =====

* La satellite d'observation Hélios espionnera aussi les radars - 4 avril 1987 - p. 36

===== 1986 =====

* Satellite de télédétection IRS (Inde) en essai chez Intespace - 27 sept. 1986 - p. 52
* SDI: les satellites défensifs - Albert Ducrocq - 4 octobre 1986 - p. 40

Science & Technology in Japan

===== 1991 =====

* Space Development Systems and Japan's Space-related Budget - February 1991, p. 8/11.

* Space Development program (established in May 1990) - Major Points and Present Situation - February 1991 - p. 4/7.

===== 1989 =====

* Satellite Images Lead to Gold Strike - July 1989 - p. 59.

===== 1988 =====

* US to Cooperate in Monitoring of Japan's ERS-1 - June 1988 - p. 55.
* Space Development in Japan - Present Status: Earth Observation - August/September 1988 - p. 12.
* Satellites under Development - NASDA: MOS-1b, ERS-1 - August/September 1988 - p. 25.
* Sensors for Earth Resources satellite - August/September 1988 - p. 29.
* Promoting Earth System Science - August/September 1988 - p.57.
* NASDA Proceeds with Development of MOS-1b - November 1988 - p.46.

===== 1987 =====

* Establishment of the Remote-Sensing Promotion Council - April/June 1987 - p. 41.
* Succesful launch of the First Marine Observation Satellite (MOS-1) - April/June 1987 - p. 43
* Earth Resources Satellite-1 (ERS-1) - August 1987 - p. 40.
* Improvement of NASDA Satellite Tracking and Control System - August 1987 - p. 41.

SPOT Newsletter

* Press Information - CNES-NOAA explore a joint remote-sensing satellite programme - June 1989 - p. 13.

* SPOT Imaging Services PTY LTD - June 1989 - p. 14.

* ACRES: Australian Centre for Remote-Sensing - June 1989 - p. 15.

* Scot Conseil - June 1990 - p. 21.

* La Société Italienne Telespazio entre dans le capital de SPOT Image - December 1990 - p.5.

* Radarsat International Inc. et SPOT Image signent un contrat de distribution de données SPOT sur le territoire canadien - December 1990 - p. 19.

* Programme d'application SPOT au Brésil - June 1991 - p. 13.

EOSAT - Landsat Data Users Notes

* Launch Scheduled for may 1992 - December 1990 - p. 2.

ESA Bulletin

* Duchossois G. - The ERS-1 Mission Objectives - February 1991 - p. 16/25.

VIII - INDEX

Names of the five satellites under study and of their parent organizations and countries have not be indexed since they often appear in the current text.