

## THE POLICIES IN REMOTE SENSING AND THE PRACTICES OF THE EUROPEAN SPACE AGENCY

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### 1. EUROPEAN POLICY IN REMOTE SENSING

The need to understand our Planet and its resources, along with the growing public awareness have contributed to the development Space remote sensing and therefore of principles of international law in this domain, up to a point where previously "unregulated" behaviour is now understood and dealt with under a widely recognised institutional framework.

Legal arrangements and practice are now supported by a sufficient enough level of experience to be considered established practice and respected principles. National and international legislative developments have helped this process.

Europe has achieved leadership in many areas of Earth Observation, notably in SAR imagery and the numerous applications of interferometry. The Envisat payload is now giving Europe a competitive advantage in pollution monitoring and atmospheric chemistry, which are likely to become keys to a number of political and industrial issues of the 21<sup>st</sup> century. This leadership in technologies and data processing software is further matched by a coveted modeling expertise. ECMWF, the European Center for Medium-Range Weather Forecasts, currently runs the best model available for mid-term forecasting and climate prediction and is well advanced in incorporating new satellite data into its official forecasts.

But having access to data from Earth Observing satellites is often expensive and always cumbersome. The use of these data is therefore restricted to governments, large companies and highly trained people and this is severely limiting the development of science, applications and services that space remote sensing programmes may be able to deliver. Delivery of the data to the end user is still quite complex and this does not facilitate applications requiring near real-time access.

The ESA policies have one ultimate objective: allowing for the sustainability of the next generation of operational Earth Observation satellites by increasing the use of EO data. It is a strategy, not another shopping list of satellites. It concentrates on defining a set of requirements from a set of users, as well as one or several mechanisms for achieving sustainability in providing Earth Observation data. In order to do so, one should increase the exposure of future users, scientists, value-adding companies, service providers, public authorities, European Commission, to the potential benefits of EO for their activities and responsibilities.

This approach is based on the evidence that the price of data must be determined by the benefits they provide rather than by the cost of producing them.

ESA policy and programmes will be a major contribution to the implementation of the European strategy under GMES since it will provide access to the space component of this Environment and Security Intelligence System which we are currently building with the European Commission, also based on the strong belief that the collective responsibilities of mankind regarding the evolution of the planet are going to be better defined and shared by

guaranteeing to all actors, the European Union, National Administrations, International Organizations, developing countries and NGOs an open and equitable access to space information where, when and however needed.

ESA present action is to plan and rationalize the acquisition, processing, archiving and distribution of data from all European Earth Observation satellites, in order to ensure their most effective exploitation. ESA aims at making available, equitably to all interested entities, the whole data set generated by European satellites, and to building, in cooperation with industry, a first core of services addressing public and private needs. Success in this enterprise will mean that, by 2010, we shall be in a position to implement a new constellation of coordinated EO satellites, which we will refer to as the GMES generation.

## 2. INTRODUCTION ON LEGAL CONCEPTS

- National Public / Private Law
- International law / National law (sovereignty over territory, airspace and territorial water)
- Public International law / Space law

- RS legal framework as an illustration of the greatest application of space law together with telecommunications.
  - Importance of RS for the development of the economy and the environment.
  - Issues as to economic and military security.

**A/RES/41/65 of 3 December 1986: The UN adopted the Principles Relating to Remote-Sensing of the Earth from Space:**

- Legality of Earth Observation (see the UN Principles in the Annex).

**Definitions:** Remote sensing: collection of information from a distance about an object or an area without any direct physical contact. E.g. of a remote sensor: our eyes.  
 Definition of RS by the 1986 United Nations Principles: **“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 national resources management, land use and the protection of environment.”** Principle I (e) defines remote sensing activities as all of the following: “the operation of remote sensing space systems, primary data collection and storage stations, and activities in processing, interpreting, and disseminating the processed data.”

**Relevance of remote-sensing activities in space:** Provide information on topographic features, soil types, crop species and health, mineral resources, water resources, water pollution, icebergs...

- ✓ Civil applications (disaster management, mapping, urban planning), military applications (reconnaissance, targeting), and scientific application (environments), geology and archeology)

**Relevance of remote-sensing for futures space activities:** commercialization of the data. Public and private actors do not have the same priorities.

**RS = major commercial space activity (after telecom) used for both civilian and military purpose.**

- Until now, States support the biggest part of the cost. In order to make this remote-sensing activity more profitable, demand from the private side is expected. Legal aspects, depending on the issues chosen, may play a great role in this RS market.

Classical Issue: sovereignty over national resources and freedom of dissemination of information.

The legal framework of remote-sensing is composed of three levels:

- the 1986 UN Principles;
- data policy (by country or through groups of countries like with ESA);
- international practice.

## 3. THE 1986 UN PRINCIPLES:

### **Contents of the UN Principles:**

UN Principles recall applicable rules; International law, Outer Space Treaty, UN Charter, ITU instruments (Principle III)

### Goal of these Principles and common interests:

- RS activities shall be carried out for the benefit and in the interest of all countries (Principle II)
- Improve national resources management, land use and protection of the environment (Principle I)
- Promote protection of Earth's natural environment (Principle X)
- Protect against natural disasters (Principle XI)

### Access to data and sensed state:

- States shall make available to other States opportunities to participate on equitable and mutually acceptable terms (Principle V)
  - **Freedom of observation**, no prior consent (derived implicitly from Principle XIII)
  - Permanent sovereignty of all states and peoples over their own wealth and national resources. Regard for legitimate rights and interests of sensed state (Principle IV)
- This provision does not give any power to the sensed state to prevent the activity to observe it from outer space.
- 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**. Same for analyzed information (Principle XII). As this right is not unlimited, it is of great concern for developing countries: the high cost of space activities limit their availability to these countries. This issue is common with access to all technologies for developing countries.

### Level of responsibility:

International responsibility for national space activities, like in the Outer Space Treaty, pillar

of space law (Principle XIV). In space law, any space activities is assumed as authorized by a government before it starts. A private company is unable to have a RS activity without the government consent on the territory of which it is established. See different licensing regimes depending on the country of jurisdiction. The licensing or authorization act is the consequence of this rule.

However the legal principle and norms on the State responsibility are not recognized as covering a complete liability for any indirect damages.

### **Relevance and strength of UNGA Resolution:**

Legality of remote-sensing activities but legal strength of a UN resolution in public international law? Can we consider these principles as an international custom, and consequently a binding source of law?

- A **resolution** is not a treaty, consequences: they are mere guidelines. Considered as guidelines by US, Europe and Japan and other main operators in the data policy documents.
  - Adoption by consensus on 3 December 1986 by the General Assembly: However, universally **adopted in practice** of remote sensing nations. Considered as valuable evidence of **international custom** by some authors.
  - Brief explanation on international custom as a source of law.
  - Constant respect of the Principles could lead to their acceptance as a source of law.

### **4. ESA PRINCIPLES AND PRACTICES**

UN Principles are considered as guiding legal principles. Many interests have to be safeguarded.

- There are two main legal principles:
  - Free access to the data on an open and non-discriminatory basis; wide availability of data to all interested users;
  - Freedom of observation over all territories of the world.
- Ownership: the full title over data to be delivered by ESA as the owner of the

satellite (ERS, ENVISAT and Earth explorers).

Electronic Databases. Better protection for the operator.

- Mechanism:
  - Application of the copyright on each unit of raw data distributed under the terms of ESA Agreements. The user has to be authorized in order to obtain the raw data.
  - Most of the time, each user holds a license. The license to use directly or to distribute is granted by ESA or by specially appointed distributor, to each final user or to the scientific users: Principal Investigators (PI). Agreements and licenses are non-exclusive.
- Advantages of this policy: protection of the data at the moment of the distribution, control by ESA of the data distribution to permit the wider distribution of these data, sound legal basis for the appointed distributors.
  - **Through this policy, creation of a precedent in Europe for Earth Observation data.**

ESA / ENVISAT data policy: "ENVISAT data shall be available in an open and non-discriminatory way, and distribution of the data shall be consistent with the United Nations Resolution on Principles relating to Remote Sensing of the Earth from Space."

- ✓ Same rules on ownership/copyright/license for ENVISAT.
- ✓ Take into account here the trend: increase in the commercial distribution. New appointments of commercial distributors for ERS and ENVISAT data and services.
  - **The ESA Earth Observation Data Policy has been aligned for all missions: ERS-1, 2 and ENVISAT, Earth explorers, GMES.**
- Distinction to keep in mind: **raw and processed data** (final product). The final product is protected fully by copyright laws, as data belonging to those who have processed it.
  - ✓ Database: application of copyright law, protection of the form.
  - ✓ Content of the Database : protection by a *sui generis* right, the information itself. European Community Directive 969 of 11 March 1996 on the Protection of

## 5. OTHER INTERNATIONAL PRACTICE

Besides the ESA Remote sensing missions, several other space agencies in the world carry out mission producing valuable data: NASA, NOAA, JAXA, CNES, ISRO, CSA, etc., All those actors in pursuit of scientific objectives, distribute and exchange remote sensing data and products and therefore form in their common behaviour plenty of relevant international common practice, to which ESA contributes as a provider of information and data or also as a partner forming and complying to shared procedures.

One notable and well-know example is the Committee on Earth Observation Satellite (CEOS), created in 1984:

### CEOS Mechanisms:

- 20 members and 4 observers
- The CEOS Plenary session has approved resolutions setting definitions and principles widely recognised in the space community
- The CEOS is an international co-operation system elaborated by national or international governmental organizations with three objectives on a voluntary basis:
  - ✓ Optimise the benefits of spaceborne Earth observations through cooperation of its Members,
  - ✓ Focal point for international coordination of space-related Earth observations activities,
  - ✓ Exchange policy and technical information to encourage complementarity and compatibility among spaceborne systems.

Their cooperation activities include also discussions on sensor capabilities, investigation to increase data cost-effectiveness, co-ordination of data acquisition, compatibility of data archives, presentation of plans for emerging satellite remote-sensing technologies and programs...

### Model of international co-operation:

- ✓ These objectives are stated in a text called **Terms of Reference** which does not constitute a binding agreement in international law, but rather a flexible method of law creation. Although "participation in the activities of CEOS will not be construed as being binding upon

spaceborne Earth observation system operators,” **the standards elaborated by the CEOS are strongly followed by its members.** Since most of the RS actors are part of this Committee and respect the recommendations, its importance should not be neglected.

- ✓ Once a governmental organization becomes a member of this Committee, it has access to all the data of the members on a reciprocity basis. It is in the interest of each of the member to comply with CEOS’ rules.
- This CEOS participates to the current trend: the production of international multilateral instruments containing non-binding principles of ethics or charters or terms of reference for specific groups. Many initiatives of international cooperation are not based on specific treaty but rather on common initiative, under the generic term of “soft law.”
- The lack of clear binding commitments from members in those groups cannot elect this practice enough to prove the existence of positive and codified international law. However, the legal instrument adopted are sufficiently finalised to contain rights and obligations.
- **Another specific example is the International Charter on Space and Major disaster:**

One of the latest examples. On 20 June 2000 a “Charter on cooperation to achieve the coordinated use of space facilities in the event of natural or technological disasters” was signed by founding members. The purpose is to promote cooperation among space agencies and space system operators in the use of space facilities as a contribution to the management of crises, arising from natural or technological disasters. It brings together space agencies having significant remote sensing activities that may be readily deployed in the events of crisis. A common mechanism is set up to supply, during period of crisis, all available space data and facilities to States or communities whose population, activities or property are exposed to a risk. Present members are ESA, CNES, the Canadian Space Agency, the Indian Space Research Organization, CONAE of Argentina. Without becoming members, other entities may be called to be cooperating or associated bodies to contribute to the coordination mechanism, or

else be a beneficiary body to receive data, associated information and services.

## **6. ESA DATA POLICY FOR EXPLOITING ITS SATELLITES**

The experience that Europe has gathered in its remote sensing activities has allowed the European Space Agency to establish a policy for the sensing from space and the distribution of data resulting from this activity.

Some space systems were developed within the framework of the European Space Agency and then passed onto operational customers, as was the case of Meteosat, now a successful EUMETSAT programme. Some other systems see ESA itself become a manager of remote sensing in the name of the interest of making the technological and scientific results widely available to the customers. That has been the reason for the existence of a large section of activities in ESA including data gathering and distribution to users as part of the Agency's mandatory activities. In giving a specific and permanent mandate to ESA in these activities, the European governments have recognized the high scientific priority to be given to remote sensing data gathering and distribution.

This has enabled ESA to acquire a specific knowledge and expertise in the complex situation of cooperation between European States. On this basis, European governments have entrusted ESA to develop and operate the first European Remote Sensing Satellite ERS-1 launched in 1991 and later on its twin ERS-2, still in active service.

In the discussions that led to the establishment of an ESA policy for the management of data resulting from these 2 missions, a number of concerns appeared obvious yet quite complex. Various requirements had to be met, some that did seem difficult to match together. Beyond the technological demonstration that ERS-1 and 2 were going to display, Europe needed a well-balanced set of arrangements that would allow many interests to be safeguarded and which are the basic concepts still valid today.

The mandate of ESA itself calls for the development and demonstration of space systems intended both for scientific and operational purposes. Since, the ERS programmes have managed to fulfill this difficult task where at the same time the technological, scientific and operational

requirements are satisfied, while the resources of the "tool" are maximized.

At the outset, we carried out a basic assessment of the international scene of remote sensing policies. In a world arena where some Earth Observation missions are exclusively scientific while others are predominantly commercial, ERS missions found its role in allowing a flexible use of its capabilities, without jeopardizing its commercial potentials.

ESA has based its data policy for both the ERS missions on two fundamental legal principles that have allowed the fulfillment of the above-mentioned objectives:

1. On one side, the respect of the widest availability of data to all interested users each of whom has free access to the data on an open and non-discriminatory basis. In doing so, we wished to conform and set a practice of conformity to the spirit of the well known "Principles relating to Remote Sensing of the Earth from Outer Space" approved in the United Nations framework in 1986. Although containing some only minimal concept, such provisions can and will be far reaching in the practice of States operating Remote sensing systems that are beneficial to the management of Earth's resources and can therefore help other States.
2. A second basic principle lies with private more than with public international law. This is the concept of ownership over the Remote sensing data identified as the result of the output of the sensors onboard the satellite along with its processed and derived products. I have indicated that this principle is more of a private law nature because of its legal essence and also because of the contractual approach, as this has so far been the way to follow in order to construe it. All ESA legal instruments contain to this effect a specific legal provision to be underwritten by the prospective user, whereby it is recognized by the user that the full title over the remote sensing data to be delivered is held by ESA as the owner of the satellite. Through this practice we have consistently established a precedent in term of a European legal policy for Earth Observation data.

A fact that deserves particular legal analysis is that, because of the success of the ERS missions, and the high request for its data, virtually any entity in the world community working in remote sensing has requested and is going to use these data. In order to do so, everybody has subscribed to the recognition of the principle of ownership of the data. Although it might still be debatable under national legislations meanings, a practice has been established, along with a consequence that we consider fundamental. That is the application of the copyright on each unit of raw data distributed under the terms of our agreements.

These legal instruments have been found useful to the construction of a data policy to the extent that they enable a broad protection scheme of the data at the moment of distribution and therefore allow the satellite operator and the data distributor to enjoy a more secure negotiating position at that stage. In this respect, we feel that the establishment of a legal policy based on the concepts of ownership, copyright and license, not only respond to the truth of the activities at stake, but also give the right value and offers the best chance for the economic development of this fundamental way to use outer space. It also prepares legally the ground for a future evolution when economic actor will be able to invest and generate a possible stream of revenues with their control over the data entitlements. As immediate advantage, through the concept of its ownership and copyright, ESA has been able to control the data distribution in order not to limit only to one or few users, but to develop the widest availability as one main objective of the programme.

A consequence of the idea of ownership is that the user has to be authorized in order to obtain the raw data and to be able to work with it. This happens through the act by the owners of licensing the use or the reproduction of the data. Each user holds a license, either directly from ESA as it is the case of the large scientific community of so called Principal Investigators, or through a specially appointed consortium who acts as ESA specially appointed distributor. In addition several international entities who are able to receive ERS data directly from the satellites through a ground receiving station, have requested access to ESA, and through an agreement, have been licensed to receive, archive, use and reproduce the same data. Data generated by the satellite is provided by ESA to the user. This is done after acceptance of the terms and conditions of use, containing the license and against the payment

of the marginal cost necessary to meet the request, called cost of reproduction.

The only exception is the free use by the scientific community for investigations whose results are made public in the interest of progressing of science. In principle any possible request of data for scientific purposes, has its own justification which is accepted and satisfied by ESA via a sound scientific programme of so called Principal Investigators (P.I.), providing a large amount of data free-of-charge and the resources, however important are limited compared to the world community. Therefore, requests are evaluated within the scope of the programme itself in order to obtain a financial support, and the scientific investigators bringing a contribution to the programme are accepted as P.I. In such approved cases the ESA programmes sustain the financial costs of the scientific uses.

Coming back to one of the two basic principles: freedom of access to everyone, the system of licenses has been implemented without any exclusivity. All the described agreements and licenses are non-exclusive. Nobody in the world can obtain a ESA originated R.S. data alone, restricting its use to any other.

In conclusion, ESA data distribution policy provides for a public availability although through recognized channels and licenses to use the data granted by the data owner. The non-exclusive formula is found the best scheme to encourage the widest possible access and use of the data to the largest number of potential users.

The latest development in ESA has been the recent approval, of the Data Policy applicable to all ESA missions including the current ERS+ ENVISAT mission and the next Earth Explorers to be launched: Cryosat, SMOS, GOCE, ADM-AEOLUS. Such missions, are complex and rich in data exploitation activity, which many users in the world are waiting for.

The principles of the overall ESA RS Data Policy (issued also on the ESA Webpage) remain similar to ERS as for ownership, copyright, licensing scheme and cost of reproduction.

This trend is similar to other space agency, who are moving from a tradition to develop one data policy for each satellite mission, into a more constant approach of an overall data policy of the Agency, applied to all its missions.

More detailed information on ESA policies, satellites and missions can be found on the web page ESA observing the earth at: <http://www.esa.int/export/esaSA/earth.html>

## 7. CONCLUSION AND FUTURE ISSUES

- Issue of the opportunity of the conversion of the Principles into a legally binding agreement.
- With the tendency toward commercialization of space activities, it may become difficult for governments to guarantee application of UN principle XII; access of sensed states on a non-discriminatory basis and on a reasonable cost.
- Question of the **developing countries**: with RS satellites, natural resources are not under their exclusive control any more.
- National restrictions: existence of increasing restrictions on access to remotely sensed data; the openness principle is weakened for commercial an military reasons; problem of open or closed society
- Dependence of the countries on space assets for commerce and national security.
- Data policies are different, depending on many economical, social, political factors, need to converge.
- How to conciliate the different data policies? See valuable effort by ISU, workshop report: "Toward an Integrated International Data Policy Framework for Earth Observations."

ANNEX

**SUGGESTED READINGS ON THIS TOPIC**

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