IAC-05-E6-1.08

THE SEARCH FOR NEW INSTITUTIONAL MODELS OF INTERNATIONAL REMOTE SENSING ACTIVITIES

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ABSTRACT

Since the adoption of the 1986 UN Remote Sensing Principles, the practice of the States and the international community in the area of remote sensing has changed significantly. The main changes result from the almost unlimited commercial access to raw data and analyzed information as well as the technical possibilities of sensing a specified area. Far-reaching technical development can also be identified in the sphere of collecting data on natural catastrophes and environmental phenomena.

The development in the past years shows, however, that in order to exploit these results, new international organizational and legal models seem to be necessary. The example of the Global Earth Observation System of Systems shows that various models of the exchange of environmental data would be possible. The question remains whether the model of a classical international organization would be the most effective basis for remote sensing activities or whether a more flexible and less structured model would better serve its purposes.

1. INTRODUCTION

Remote sensing of the Earth from outer space remains an important tool for recognizing significant environmental changes, water and soil quality, the presence of minerals or the danger of natural disasters. Although the UN Principles on Remote Sensing [i] were approved in 1986, there are, however, still significant differences regarding the international regime of the access and, more significantly, the distribution of data and information received on the basis of this complex of methods.[ii]

It seems that there is consensus among the States on the importance of providing non-discriminatory access to remote sensing data and to derived information at reasonable cost and in a timely manner. There is also consensus on the need to build capacity for the adoption and use of remote sensing technology, particularly to meet the needs of developing countries, as has been emphasized by the Scientific and Legal Subcommittee of COPUOS, most recently in its 42nd Session in 2005.[iii] The spectrum of the views on how to guarantee the implementation of this regime, however, has traditionally remained very wide. This was shown, *inter alia*, by the fact that the discussion on the future agenda of the Legal Subcommittee of

COPUOS took place in the same year during which Brazil withdrew its proposal on analyzing remote sensing practices "in view of the fact that the Subcommittee would not be in a position to reach consensus" on this item.[iv]

Despite this fact, the discussions on the legal background of remote sensing continue on the academic level. For example, the International Law Association devoted a substantial part of its report from its Berlin Conference in 2004 to this issue.[v] The subject "Legal Framework for Commercial Remote Sensing Activities" was examined by the Project 2001 at the University of Cologne[vi] and the question of the desirability of reviewing the 1986 UN Principles was analyzed by the IISL/ECSL Space Law Symposium in April 2005.

Not only is legal academia interested in the future developments of the remote sensing. One should keep in mind that, primarily, the international practice – the activities of States, international organizations, NGOs, other international entities as well as private firms in this area – has been developing its own rules, channels and structures suitable to respond its needs, despite the fact that the political sphere has been unable to reach consensus on the international regime for this technology. Among these international structures, two models seem to play the most significant role in the remote sensing area at present. One of them is the model of an international intergovernmental organization; for example, the FAO, the WMO and UNECSO are performing remote sensing activities. The second model is that of an international network without any rigid structure which seems to be prevailing in recent developments; as an example, the GEOSS can be mentioned.

These two institutional models of international structures dealing with remote sensing and the prospect of a third, mixed model are the substance of our present analysis.

2. Is There Any Necessity to Interconnect Remote Sensing Services?

In the 1980s, there were only a few States which had their own remote sensing projects. Today, a new generation of space faring-nations has appeared: Along with the USA and Russia, remote sensing programs are conducted by Algeria, Argentina, Brazil, China, Chile, India, Pakistan and Nigeria.[vii]

The advantage of the existence of autonomous space-based systems is their basic independence from each other. The less positive aspect of this development is the fact that the monitoring is carried out by a variety of more or less disconnected systems. It is no secret, for example, that there is little coordination between the more than fifty environmental satellites orbiting the globe, the thousands of land-based environmental stations on the ground and the thousands of data buoys in the oceans.[viii]

The earthquake and the devastating tsunami in the Indian Ocean that occurred in 2004 focused attention even more strongly on the need for global observation systems. They reemphasized the generally known fact that the efficiency of remote sensing systems increases not only with the opportunity to obtain *in situ* data from the observed countries, but also with the possibility of the interconnection of these systems. Thus, the task to ensure the consistency and interoperability between various observation systems – harmonizing methods and classifications and interconnecting them in an international structure – becomes a task of utmost importance.

3. THE MODEL OF AN "INTERNATIONAL INTERGOVERNMENTAL ORGANIZATION"

It is not necessary to stress that international intergovernmental organizations are international structures which, as a rule, interconnect the States as their Parties and/or, possibly, further international organizations. The founding treaty of an intergovernmental organization specifies, *inter alia*, its goals, the preconditions for membership, as well as the form of establishment and the competencies of its organs. This organizational form usually provides for a transparent institutional structure, better coordination of member activities, as well as respect for the common and national goals. Its disadvantages can include the length of the decision-making process associated with a lack of flexibility, the possibility of blockade of its activity by one or several members, and the – sometimes heavy – financial burden.

There were already attempts to create a universal remote sensing intergovernmental organization in the 1970s.[ix] Envisaged was a collection of all remote sensing data, made available to the States concerned, together with assistance to developing countries in this field. These plans proved unrealistic a general scale. However, several UN specialized agencies now conduct international programs making use of non-profit methods for the distribution of remote sensing data and information.

a) UNESCO

UNESCO promotes international cooperation among its 191 member states and six associate members in the fields of education, science, culture and communication.[x] Several of its institutions apply remote sensing data and information:

The Intergovernmental Oceanographic Commission (IOC) is committed to increasing the capacity of its member states to access, apply and exchange marine scientific data and information that is critical to sustainable use and development of their ocean and coastal areas. Its International Oceanographic Data and Information Exchange (IODE) facilitates the exchange of oceanographic data and information between participating member states in order to meet the needs of users for data and information. The IODE system forms a worldwide service-oriented network consisting of Designated National Agencies (DNAs), National Oceanographic Data Centers (NODCs), Responsible National Oceanographic Data Centers (RNODCs) and World Data Centers for Oceanography (WDCs). The traditional model of centralized data centers on a national or global scale is gradually being replaced by a decentralized network of data centers accessible and searchable over the Internet.

The Global Ocean Observing System's (GOOS) contributors are responsible for full, open and timely sharing and exchange of GOOS-relevant data and products for non-commercial activities. Their activities are based on the principle of exchange of data and information: A donation by an individual nation gains access to data from others as well as to products derived using all available data, such that the benefit of cooperation exceeds the cost.

b) The WMO

The World Meteorological Organization unites 187 member states and territories.[xi] It is the specialized agency of the United Nations not only for meteorology (weather and climate), but also for operational hydrology and related geophysical sciences. The WMO facilitates the free and unrestricted exchange of data and information, products and services in real-

or near-real-time on matters relating to societal safety and security, economic welfare and environmental protection. The WMO also coordinates the Global Climate Observing System (GCOS) which was established to ensure that the observations and information needed to address climate-related issues are obtained and made available to all potential users.

In order to investigate and assess atmospheric and climatic developments, the WMO relies, *inter alia*, on remote sensing data and information.

c) The FAO

The Food and Agriculture Organization has 187 member countries and one member organization, the European Community.[xii] In the framework of its main mandate to combat hunger, it helps developing countries and countries in transition to modernize and improve agriculture, forestry and fisheries practices and to raise nutrition levels. The FAO's main interest in remote sensing is to optimize its use as a tool for collection, archiving and processing of data on renewable natural resources and to provide information on the environment and food security.

d) The International Charter on Space and Major Disasters

The mechanism developed by the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters can perhaps serve as a first step toward an international organization founded within the UN framework. Today, it encompasses seven space agencies that have made their assets available to civil protection authorities responding to a major disaster. The UN Office for Outer Space Affairs was established as a cooperating body for the Charter, thus making it possible for any UN entity to request imagery from the space agencies associated with the Charter in order to facilitate relief efforts immediately following a natural or technological disaster.

The future aim of this mechanism is to serve as a basis for the implementation of an integrated, space-based global system for natural disaster management. One of the options for its development is to establish, within the framework of United Nations, an international organization for the coordination of disaster management.[xiii]

4. The Model of "Networked International Entities"

As already mentioned above, despite the lack of consensus on official international fora on the question of a universal legal regime for the access and distribution of remote sensing data and information, several international networks have been established. However, they were never intended to be international intergovernmental organizations, nor do their characteristics allow them to be described as such. Some of them seem to have expanded very quickly recently, and these should be examined, when considering the most efficient model for the access and dissemination of remote sensing data and information. The GTOS, GEO, and GEOSS are notable examples of such networks.

a) The GTOS[xiv]

The Global Terrestrial Observing System (GTOS) combines the activities of several international organizations and one NGO. As a system that aims at improving the quality and coverage of terrestrial ecosystem data, it facilitates access to this information so that global and regional environmental changes can be detected and managed. The GTOS was established by five co-sponsoring organizations – the FAO, the International Council of Scientific Unions (ICSU), UNEP, UNESCO and the WMO which are

responsible for the overall program development and implementation.

The program is currently hosted by the FAO, which also provides a secretariat. Each co-sponsor contributes to the annual operating costs of the program.

b) The GEO

The Group on Earth Observations (GEO) was established in 2002. It is expected to play a major role in establishing the Global Earth Observation System of Systems (GEOSS).[xv]

Membership in GEO is open to all interested States and the European Commission. It further permits the participation of organizations, international bodies, and individual experts. Presently, fifty-nine countries and the European Commission are members of GEO.[xvi] Further, forty-three organizations have joined GEO as participating organizations. Among them, several UN agencies (FAO, UNESCO, WMO), other international organizations (ESA, EUMETSAT) and other international (IISL, ICSU) or regional (African Association of Remote Sensing of the Environment, South Pacific Applied Geoscience Commission) NGOs are represented.[xvii]

On February 14, GEO gave its assent to a Standing Arrangement with the WMO to provide an administrative seat for the proposed GEO Secretariat, while the government of Switzerland declared its support for and contributions to its establishment in Geneva.[xviii] The consensus of its members serves as its main working method. An essential part of GEO activities involves consulting, coordinating and liaising with relevant UN specialized agencies and programs and international scientific organizations.[xix]

c) GEOSS

By establishing GEO in 2002, thirty-three nations and the European Commission signed a Declaration that signifies the political commitment to move toward development of a comprehensive, coordinated and sustained Earth-observation system, the GEOSS. During the discussions on the future shape of this network, it has been stressed repeatedly that this process does not imply an attempt to incorporate all Earth-observing systems into a single, monolithic, centrally controlled system. Rather, the intention is to improve the data supply to users without annexing existing observation and data distribution systems into a new international organization.[xx]

As its institutional predecessors, the Global Spatial Data Infrastructure (GSDI)[xxi] and Spatial Data Infrastructure (SDI) are concerned with data and information that is "geospatial", i.e. in relation to locations on the Earth.[xxii] Membership in GEOSS should be open to States, international organizations, other international bodies and individual experts. At present, the crucial condition for joining GEO is an endorsement of the GEOSS 10-Year Implementation Plan.[xxiii]

Regarding the relation of this future network to the UN and its specialized agencies, the UN would welcome an arrangement under which the governance of GEOSS eventually becomes integrated in the UN system, thus improving the various observational systems sponsored or co-sponsored by the FAO, UNESCO, UNEP, the WMO and other international agencies and programs such as the ICSU.[xxiv] The UN considers it vital that its own activities and this new effort by a group of countries initiated by the USA should be mutually recognized as fully complementary processes.[xxv]

The European contribution to GEOSS is expected to be the Global Monitoring for Environment and Security Initiative (GMES). Today, the GMES's functional architecture exists, but it lacks a defined management structure and, ultimately, a budget.[xxvi] Although the private side of

Europe's space sector is clustered around several large industrial consortia, the public sector is fractured into many more national authorities and several supranational organizations such as the ESA and EU branches.[xxvii] The difficulties in defining common policies between and within the private and the public sectors as well as the question of the funding of the project have to be settled in the future.

5. Which Model is Suitable to Which Purpose?

The overview of various international structures conducting remote sensing activities has shown that the model of an international intergovernmental organization tends to be more successful when emphasis is placed on fulfilling UN goals such as such as ensuring nutritional standards, protecting the environment, or monitoring the oceans and weather; when the protection against common danger such as natural disasters is crucial; and when the economic interests of the said activity do not dominate. This model guarantees both the participation of all members in the decision-making and their access to the results of remote sensing activities.

The other variant – a mixed international network of entities such as States, international organizations, NGOs, but also private entities and natural persons – seems to be attractive when significant investment is necessary or when the results of the observation are expected to be sold, even at a differentiated price. This model generally operates with minimal administration, minimal formalities, and should be able to react more promptly to the needs of its users. The drawbacks of this system seem to be similar to those of many present information networks: No guarantee of access to specific information, no right to be informed, and no legal sanctions against misuse.

In the evaluation of the positive and negative characteristics of both models – the international intergovernmental organization dealing with remote sensing and a non-state international network – a third possible model should be mentioned, namely, a mixed model. For instance, Intelsat[xxviii] or Inmarsat[xxix] are based on the parallel existence of an international intergovernmental organization and a private company, incorporated under national law. This model lends itself to the adoption of Public Service Agreements within the framework of these entities; thereby, the intergovernmental community may feel able to commit important regional or public service functions to privatized commercial entities, while maintaining an acceptable level of oversight. [xxx] Less promising, however, were the difficulties during period of restructuring of these entities into their new legal form. To mention only a few: the refusal of the major investors of the former Inmarsat to supply the capital for the future operation under the former, intergovernmental structure, the struggle over the protection of particular national needs, the difficulties of the search for a suitable corporate structure, the necessity to improve the governance of the whole system, as well as the discussion on the limitation of liability of the parties.[xxxi]

6. Concluding Remarks

The task to ensure the consistency and interoperability between various observation systems and to interconnect them in an international structure is still a task of an utmost importance. It has to be solved pragmatically, with respect to the various goals the systems are expected to fulfill. Even without the founding of any new intergovernmental international organization for the access to and the dissemination of remote sensing data and information, the coordinating role of the UN seems to be of paramount significance.

This is true, not only because of the global scale on which it acts, but also due to its expertise in precisely where the most recent satellite data and information is most needed and can be best put to use.

One final suggestion concerns the states parties of the 1967 Outer Space Treaty and their duty to "authorize" the outer-space activities of all their national entities, according to its Article VI. Possibly, they could standardize the conditions of this authorization as compliance with the 1986 UN Remote Sensing Principles in remote sensing activities, especially the common welfare principles laid down in Article X (protection of the environment) and Article XI (protection from natural disasters). Admittedly, the formal subjects of these Principles are States ("States participating in remote sensing shall..."), and this step would hardly prevent non-State entities from failing to comply with the content of these provisions. It could stress, however, their awareness of the usefulness of cooperation with UN agencies which strive to fulfill the common welfare goals by way of remote sensing methods.

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[i] U.N.G.A. Res. 41/65, adopted on Dec. 3, 1986.

[ii] *S. Marchisio*: The 1986 United Nations Principles on Remote Sensing: a critical assessment, in: Arangio-Ruiz, Gaetano: Studi di diritto internazionale in onore di Gaetano Arangio-Ruiz, 2004, p. 1312 et seq.

[iii] Report of the Scientific and Technical Subcommittee of COPUOS 2005, A/AC.105/848, p. 17.

[iv] Report of the Legal Subcommittee of COPUOS 2005, A/AC.105/850, 22-23.

[v] See *M. Williams*, Remote Sensing Earth Observation Satellites, in: International Law Association, 2004 Berlin Conference, Report of the Space Law Committee.

[vi] See Proceedings of the Project 2001 – Workshop on Legal Remote Sensing Issues, Toulouse, 1998.

[vii] See *M. Hofmann*, The International Framework of Remote Sensing in the Year 2005: Changed Conditions and Changed Needs? in: Proceedings of the IISL/ECSL Symposium, A/AC.105/C.2/2005/CRP.8, p. 8.

[viii] Working together to develop a comprehensive, coordinated, and sustained Earth observation system of systems, Earth & Space Week, 12-20 February 2005, p.1.

[ix] *F. Nozari*, The Law of Outer Space, Stockholm (1973), pp. 187 ff.

[x] See http://portal.unesco.org/en/ev.php-URL_ID=3328&URL_DO=DO_TOPIC&URL_SECTION=201.html.

[xi] See http://www.wmo.ch/index-en.html.

[xii] See http://www.fao.org/unfao/govbodies/membernations_reg_en.asp.

[xiii] United Nations, Report of the Committee on the Peaceful Uses of Outer Space, A/59/20.

[xiv] See http://www.fao.org/gtos/.

[xv] Speech of Mr. *Kojima*, Senior Vice Minister, Ministry of Education, Culture, Sports, Science and Technology, at The Earth Observation Summit III, February 16, 2005.

[xvi] Group on Earth Observation, http://earthobservations.org/members.asp, May 2005.

[xvii] Ibidem.

[xviii] Progress Report – From Tokyo to Brussels, European Commission, 15.02.05.

[xix] Joint Statement for the Third Earth Observation Summit (EOS-III) by FAO, UNEP, UNESCO and WMO, 2004, p. 2.

[xx] Declaration of the Earth Observation Summit, July 31, 2002, at: http://earthobservations.org/declaration.asp.

[xxi] See http://ww.gsdi.org.

[xxii] A key operational feature of the GSDI is its Clearinghouse network, which now includes over 400 catalogues where comprehensive metadata about available geospatial data is maintained. SDIs support component based, service-oriented architecture that provides interoperability based on open, international standards.

[xxiii] How to Join GEO, at: http:earthobservations.org/how_to_join.asp.

[xxiv] Joint Statement for the Third Earth Observation Summit (EOS-III) by FAO, UNEP, UNESCO and WMO, 2004, p. 2.

[xxv] Address by Mr. *K. Matsuura*, Director General of UNESCO, IOC/EC-XXXVII/3 prov. Annex B.

[xxvi] EO Business Summit Highlights GMES, Earth & Space Week, 12-20 February 2005, p.1.

[xxvii] Ibidem, p. 2.

[xxviii] *D. Hinson*, The Privatisation of Intelsat, in: International Organisations and Space Law, 1991, pp. 247 ff.

[xxix] *D. Sagar*, The Privatization of Inmarsat – Special Problems, in: International Organisations and Space Law, 1991, pp. 135 ff.

[xxx] Ibidem, p. 135.
[xxxi] Ibidem.