

JAPANESE EARTH OBSERVATION DATA POLICY Past, Present and Future Prospects

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ABSTRACT

This is an introductory paper to the Japanese Earth observation data policy. In Japan, the framework for Earth observation activities is based on the United Nations Principles Relating to Remote Sensing of the Earth from Space, with other relevant domestic law affecting policy which fills in the gaps between law and reality. Policy is at present the most substantial means, under which most of the Earth observation activities are executed. The National Space Development Agency of Japan (NASDA) officially endorsed a so-called "two-tier" data policy in 1992, dividing data use into two categories, Research and General Purposes. It has been the basis for NASDA's Earth observation activities for the past years. However, there is still much room for this policy to be reviewed due to the technical and political changes in the world. Thus, a new data policy is currently under discussion and will be established in the near future. It will set the general objectives of Japan's Earth observation, while in turn dealing with three main factors: the purpose and nature of the satellite programme and each sensor, the levels of data/products and the purposes of data use. It should define these factors into certain categories, combining them to generate a comprehensive and coherent data policy that enables optimum data use.

I. INTRODUCTION

The dawn of Earth observation activities in Japan was in the mid 1970s.

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Since that time, the environment surrounding the Japanese space community has dramatically changed. Today, Japan has become one of the major space faring nations in the world, with a total annual budget of more than ¥250 billion.

The National Space Development Agency of Japan (NASDA), established in 1969, was the main body to carry out this task. The first step was to import existing technology from other countries, a process that perhaps underlies the entire history of Japanese modernisation. In these thirty years, Japan has built up indigenous technology for the development of its own Earth observation satellites. After the end of the Cold War, there has been a turn towards internationalisation and mutual co-operation in space activities. Furthermore, the private sector is growing to become a key element affecting the national space programme.

It has now become a common interest of the Japanese remote sensing community that the current data policy be reviewed in light of these changes. A new comprehensive data policy is currently under discussion and is to be given new birth in the coming years.

This paper is an introduction to the Japanese Earth observation data policy, its past history, the present legal and political framework and future prospects. In particular, it will examine the relation with the United Nations Principles Relating to Remote Sensing of the Earth from Space (the UN Principles)¹ and with domestic legislation. It will then focus on the world-wide trend of Earth observation data policy

and attempt to address the future direction to which the international community and Japan is heading towards.

This paper will discuss not only in legal but also in a wide range of political and technical terms. Data policy in Japan takes the form of an internal policy of NASDA, not a national legislation, since more dynamics has been formulated from the interaction between national policy and the space programmes, law still to follow. Thus, this approach should lead us to a better understanding and to a precise prediction of how law evolves in the future.

II. BACKGROUND AND HISTORY

1. Technical Background²

In an attempt to learn existing technologies from other countries, NASDA, in co-operation with the Japan Meteorology Agency (JMA) set forth the development of the Geostationary Meteorological Satellite (GMS), followed by the Marine Observing Satellite-1 (MOS-1) and the Japanese Earth Resources Satellite-1 (JERS-1). At the same time, it established the Earth Observation Center (EOC) to receive, process, distribute and archive the US Landsat and the French SPOT satellites. NASDA started to distribute the data acquired at EOC to the general public with the Remote Sensing Technology Center of Japan (RESTEC), a non-profit, non-governmental foundation established for this purpose.

GMS was launched in 1977, followed by a series of GMS satellites. MOS-1 was launched in 1987, MOS-1b in 1990, and JERS-1 in 1992. Japan developed a world-wide network of ground stations and joined the international community of Earth observation.

During this period, NASDA developed the H-II rocket, the Japanese first launch vehicle built solely by domestic technology. NASDA sent into space more than 40 satellites among which 13 were Earth observation satellites.

Since the beginning of 1990s, the space activities are becoming more inclined to the

use or applications of data derived from space activities and user needs, whereas for a long period in Japan the focus had been building hardware. Satellite projects also shifted their aims accordingly, such as the Advanced Earth Observing Satellite (ADEOS) launched in 1996 and the Tropical Rainfall Measuring Mission (TRMM) in 1997. With these satellites, NASDA expanded its role to the field of Earth science and environmental studies. In 1995 the Earth Observation Research Center (EORC) was established, which is now functioning as a focal point for collaboration with the scientists community.

At the same time, the validity of Earth observation data in various data applications was proved through a number of pilot projects. Those pilot projects were carried out jointly with ministries and local governments, and with countries especially in the Asia-Pacific region, in fields such as land use, agriculture, environment, fishery and vegetation.

Despite the setback of the loss of the ADEOS satellite in June 1997, NASDA is now developing the Advanced Earth Observing Satellite-II (ADEOS-II) scheduled for launch in November 2000, the Advanced Microwave Scanning Radiometer (AMSR-E) onboard NASA's EOS-PM1 scheduled for December 2000 and the Advanced Land Observing Satellite (ALOS) to be launched in 2002.

2. Data Policy

At the time of the launch of JERS-1, NASDA officially endorsed the Policy for Reception and Distribution of NASDA's Earth observation Satellites in July, 1992 (the 1992 NASDA Data Policy). It was a two-tier data policy, intended to be consistent with the discussions held in the Committee for Earth observation Satellites (CEOS)³ and the Earth observations International Coordination Working Group (EO-ICWG)⁴ for the Data Exchange Principles where it was agreed on open access to data and that data should be made available for researchers at the lowest

possible cost, or no more than the additional cost for resources. The 1992 NASDA Data Policy was adopted as an internal resolution of the Executive Directors' Meeting in NASDA.

The reason why it did not take the form of a legislation or an official internal regulation of NASDA, was presumably that the issue of data policy was yet to become a general debate in Japan nor NASDA at that time.

The 1992 NASDA Data Policy has been the basis for NASDA's Earth observation activities in the past years throughout MOS-1 to TRMM. It was developed into a more detailed form for ADEOS, incorporating some ideas from the IEOS Data Exchange Principles adopted in EO-ICWG, such as setting the category of Public Purposes⁵, and also some technical changes such as the rapid development of information network. Still, the general principles remain the same until today.

III. THE 1992 NASDA DATA POLICY

The outline of the 1992 NASDA Data Policy is as follows⁶:

Purpose NASDA will exclusively for peaceful purposes, globally acquire space-based Earth observation data as much as possible and data will be disseminated widely in order to promote the use of Earth observation satellite data. NASDA will accept the requests from data receiving organisations to receive and distribute data.

Data Distribution The distribution of data retained by NASDA (including data of foreign satellites) will be divided into two categories: use for Research Purposes and use for General Purposes. Data for Research Purpose use will be distributed from NASDA. For General Purpose use, data should be distributed through a Distributing Agency.

For Research Purposes, the price will be decided by NASDA at the cost of marginal cost of reproduction. On condition that there is a joint research collaboration between

NASDA, data should be provided for free⁷.

For General Purposes, the Distributing Agency will decide the price, taking into account its market price. NASDA will charge royalty to the Distributing Agency.

Data Reception Reception of data from NASDA satellites will also be divided into two categories: Research and General Purposes.

Reception fee for Research Purposes will be charged based on the additional operational cost for the data reception by other organisations, provided that the received data will only be distributed to researchers and that a report on the results of the research will be submitted to NASDA by the receiving station. In case that all data received at the receiving station is available to NASDA, or that the receiving organisation conducts a joint research with NASDA, no reception fee would be charged.

Reception fee for General Purposes will be decided by NASDA, taking into account the market price. Provided that all data received at the receiving station is made available to NASDA, the amount of the reception fee may be reduced. If the receiving organisation wishes to distribute the received data, NASDA will charge the receiving organisation a distribution fee. For such cases, the receiving organisation must accept NASDA's distribution policy as described above.

As for reception for both Research and General Purposes, the reception fee for the latter should apply.

IV. CURRENT STATUS AND ISSUES

1. National Law

The Law Concerning the National Space Development Agency of Japan The Law Concerning the National Space Development Agency of Japan (the NASDA Law)⁸ is the only existing legislation that governs the overall space activities of NASDA. However, it is not explicitly

addressed in this law how it should apply to Earth observation data use.

On the other hand, according to the references in the 1992 NASDA Data Policy, its status in relation with the NASDA Law is as follows:

The reception of the Landsat and SPOT satellites by NASDA and distribution of data for Research Purposes is pursuant to the NASDA Law providing the scope of NASDA's activities as the following:

“The development of artificial satellites and rockets for the launching of artificial satellites (hereinafter referred to as “artificial satellites, etc.”) and development of facilities and equipment necessary therefor.” (Art. 22, 1. (1))

Data distribution for General Purposes by the Distributing Agency is regarded pursuant to Art. 22, 1 (4) of NASDA Law providing that NASDA may execute such activities that are incidental to the Development Activities.

It is also important to note that in Art. 1 of the NASDA Law, the activities of NASDA is clearly defined to be exclusively for peaceful purposes. This in turn limits NASDA's Earth observation activities as well, only to peaceful purposes.

Other National Law The internal regulations of NASDA are based on relevant national legislation, as NASDA is a quasi-governmental organisation funded by governmental budget.

National law regarding Public Finance and National Property have implications on data policy through the finance regulations of NASDA. Earth observation data derived from NASDA satellites is considered as property of NASDA, which is regarded to be similar to governmental property. When the property is used by a private entity, NASDA should recover the additional cost for operation, and when the private entity uses the data for commercial activities, NASDA

should charge royalty to the private entity.

Under this perception, NASDA together with the distributor RESTEC, set a price to recover the costs of operation and charges royalty in selling Earth observation data to private users. NASDA gains an annual revenue of approximately ¥50 million from the cost recovery of Earth observation data for Research Purposes and royalty⁹.

However, it is also possible to argue that this concept does not necessarily apply to Earth observation data. Lately, there are stronger views that it should rather be dealt in light of the recent movement towards disclosure of government information, indicating open, non-discriminatory access to data at the cost of reproduction.

2. UN Principles

Let us now move on to the issue of the legal status of the UN principles with regard to the Japanese Earth observation data policy.

The 1992 NASDA Data Policy is clearly based on the provisions of the UN Principles, calling for open non-discriminatory access to remote sensing data. As previously described, there being no specific legislation regarding remote sensing activities in Japan, the UN Principles are certainly respected as a substantial instrument providing an international framework on Remote Sensing activities.

It is agreeable that the general principles provided in the former part of the 15 Principles, and some specific provisions such as avoiding invasion of the rights and interests of the sensed State¹⁰, promoting the protection of the environment and protection of humanity¹¹ are accepted as practice.

The main issues, however, would rise particularly from Principle XII, which gives right to a sensed State to gain access to data of its own territory, as soon as they are produced, on a non-discriminatory basis and on reasonable cost terms. This was a compromise to drop the condition of prior

consent by the sensed State in distributing data to third parties, in return of the provisions in Principle XIII that States should enter into consultations upon request of the sensed State. Issues of a similar nature also lie in the compromise that free access, or access without prior notice to the sensed State, was accepted in return that information be made available¹².

In the authors view, there are several points for discussion concerning the UN Principles as the following. First, since the UN Principles are contained in an UN General Assembly Resolution, it is still controversial if the Principles are legally binding. Second, the term "remote sensing" is defined in Principle I as "the sensing of Earth's surface from space... for the purpose of improving natural resources management, land use and the protection of the environment". Thus, there is yet room for discussion whether this is a comprehensive notion that includes such areas as intelligence activities by satellites or various other applications using particularly high-resolution satellite data information.

Furthermore, with regard to the Principles of sensitive compromise, it is difficult to argue that these provisions have become customary law. It is possible that there would be a greater potential for the UN Principles to be used by States that wish to gain access to data, in a serious way to challenge Earth observation data suppliers.¹³

In exploring further solutions regarding these issues of the UN Principles, it should be carefully considered which principles have become customary law. It might be useful to consider the different categories of users, purposes of use, and levels of data and defining the requirement that is the common denominator of the international society.

3. Copyright

The question of how copyright should apply to Earth observation data is frequently raised, especially in bilateral negotiations on data rights and publications of results. Here, I

will point out a few items that we should bear in mind for further discussions.

In Japan, it is a general assumption that while NASDA retains "intellectual property rights" to the data, copyright in particular is not necessarily applicable to Earth observation data, unless the data is highly processed into a certain form of fixed expression and has been added creativity so that obviously the concept of copyright would apply. However, there is no clear reference in law concerning copyright for satellite data, nor are there any such precedents. The protection of data rights is retained by conditions in respective contracts or agreements for the use or distribution of data in a way similar to copyright. For the time being, it is not argued, as in the US that governmentally owned Earth observation data is not subject to copyright¹⁴, nor is it indicated anywhere in the 1992 NASDA Data Policy that data should be protected though copyright or any legal form of intellectual property right. In Europe, there is a strong protection for copyright to data including Earth observation data, as "Earth observation data are also subject to the European Council Directive on legal protection of database."¹⁵ and as is also reflected in its Earth observation data policy¹⁶. The situation in Japan is not likely to evolve so rapidly.

4. Two-tier Pricing Policy

According to the pricing policy described previously, the price is the cost for reproduction for Research Purposes and commercial price for General Purposes. Specifically it would cost approximately ¥2,000-¥6,000 for Research Purposes, and the price would range from approximately ¥10,000-¥200,000 for General Purposes.

It is well discussed that free access to data does not necessarily expand the use of data, or the market, whereas appropriate pricing policies would lead to more incentives for the public sector to develop their business in this field, hence broadening the possibilities of business in the field of remote sensing. This approach is theoretically true, while it

is still now difficult to argue that in Japan, if a relatively high price of data is maintained, that the private sector will gain its own interest to be able to independently develop their business. The remote sensing private sector largely relies on the government and it is considered in Japan that it is still premature to let the private sector find their own way of development, especially provided that RESTEC, the main private entity in this field, is a non-profit agency.

When NASDA had set this two-tier policy in 1992, it was intended to be compatible with the international efforts to develop a world market for remote sensing data, such as SPOT Image, EOSAT or Eurimage at that time, while setting a regime that enables NASDA to give data for free or at a lower price to researchers, subject to the discussions held in CEOS and EO-ICWG. This is how the 1992 NASDA Policy came up with the compromise of the two-tier policy, which should be and is being reconsidered now, taking into consideration the changes in the international community and the limits of the two-tier data policy¹⁷.

V. FUTURE DATA POLICY

At last, I would like to introduce in this paper, the future direction where the Earth observation data policy of NASDA and Japan is likely to move towards in the near future.

Today, there are discussions in NASDA in pursuit of a new comprehensive data policy to establish a framework that would lead future satellite programmes to a success. Namely, ADEOS-II and AMSR-E would be launched by the end of next year, both of which can be regarded as satellites providing so-called "environmental data", data that are useful primarily for the purpose of environmental studies, such as climate change, atmospheric studies or oceanography. The ALOS satellite which will provide high-resolution imagery data with 2.5m panchromatic resolution, is to be launched in year 2002. The new data policy should be established in time to facilitate data use for these upcoming space projects.

In the US, it is defined that low-level data from government owned satellites will be distributed for the cost of fulfilling user request, while value added data is subject to the private sector¹⁸. On the other hand, in Europe the prices are defined by the categories of users, while at the same time data of higher levels are also given to the hands of the private sector¹⁹, Canada also taking a similar standing point²⁰.

Based on this view, it should be carefully considered which of the following two ideas is the true interest of the government and the taxpayers: (a) to benefit the general public by showing the taxpayers that they are recovering good value of their contribution, by making data and results openly and publicly available to all taxpayers and not charging users again for data from a system that they already paid for; or (b) to recover the cost of operation by setting higher prices to data and products derived from the data, for this is one of the rare occasions where NASDA is able to collect the return of the enormous amount of budget spent for its activities.

Another question rising from here is whether the purpose of Earth observation Activities is: (a) wide-spread open use of data to the broadest possible extent; or (b) protection of data rights, in turn enabling commercial space systems to set a higher price enough to recover cost and earn interest so that they eventually replace the governmental systems.

Setting a clear aim to these options will also clarify all the streams of issues flowing through data policy, also in turn helping identify the objectives and nature of the space crafts or data and its use, in other words the space projects themselves: whether to develop (a) an innovative satellite and to enable open access especially aiming to the use by the scientific community and the benefit of all humankind such as environmental studies; or (b) an operational series of satellites focusing on stable data continuity, with practical

applications that would lead to commercial interests such as land use, mapping or agriculture. To closely study and identify which needs is to be the central purpose of the policy, would be the first step in setting a truly effective data policy in Japan.

Based on these domestic and international situations, it is discussed in NASDA that a future data policy should further focus on open access to data, taking into account the evolution of the potential market or industry, and necessary protection of data. It would also be as flexible as possible, while retaining minimum requirements of NASDA, so that it would facilitate international co-operation to the greatest extent .

On one hand, in projects such as ADEOS, the satellite development itself is a joint project so that in the agreements concluded for joint development of the satellite should include provisions that are agreeable to both parties and at the same time that would maximise the use of data. On the other hand, for satellites such as ALOS, which would be developed solely by Japan but will construct a vast global framework of data utilisation, the agreement for such co-operation should be as flexible as possible so that the network would be developed to various regions without unnecessary barriers.

With these conditions, the next generation data policy to be defined in the near future, is expected to be one that sets the general objectives of Japan's Earth observation activities, while in turn dealing with three main factors: the purpose and nature of the satellite programme and each sensor, the levels of data/products and the purposes of data use. It should be able to define these factors into certain categories, combining them to generate a comprehensive and coherent data policy that enables optimum data use.

VI. CONCLUSION

The advancement of technology is rapid and dynamic that it sometimes does not allow law to keep up with the changes in a timely manner. We have seen in this paper, that in

Japan, the framework for Earth observation activities is based on the UN Principles, with the NASDA Law and other relevant law affecting the various forms of existing and developing policy filling in the gaps between law and the activities taking place in reality.

As a conclusion, policy is at present the most substantial means, under which most of the Earth observation activities are executed. Nevertheless, there is still much room for it to change and to be improved due to the technical and political changes dynamically taking place in the world. It should be necessary therefore, to keep track of this structure of the clutches of the law, policy and reality, if law is to be codified policy and policy to be an accumulation of management decisions for carrying out various programmes.

¹ United Nations, *Principles Relating to Remote Sensing of the Earth from Space*, General Assembly Resolution 41/65, 42 UN GAOR Annex (95th plenary meeting, 3 December 1986), UN Doc A/RES/41/65, 22 January 1987. [hereinafter, *UN Principles*]

² For more background on the Earth observation activities in NASDA, cf. National Space Development Agency of Japan, *For Earth observation Subcommittee to Evaluate NASDA's Earth observation Field*, Tokyo: NASDA, 1998, pp.8 -10.

³ *Satellite data exchange principles in support of global change research*, adopted at the sixth CEOS plenary meeting, December 1992, London.

⁴ *The International Earth Observing System (IEOS) Data Exchange Principles*, accepted by NASDA in February 1994.

⁵ *ibid.*, 3. (referring to "Operational Use for the Public Benefit")

⁶ For the outline of the 1992 NASDA Data Policy, cf. Haruyama, Yukio, "Earth observation Programs in Japan and Data Policy," in Simone Courtex, ed., *Droit Télédétection et Environnement*, Antony: SIDES, 1994, pp.153-173.

⁷ This refers to data use typically by the Principle Investigators (PI) and Internal use by NASDA researchers in collaboration with other entities.

⁸ Japan, *Law Concerning the National Space Development Agency of Japan*, Law No. 50, 23 June 1969.

⁹ Excluding commercial sales, which is the business of the distributor RESTEC.

¹⁰ *UN Principles, op. cit.*, Principle IV.

¹¹ *ibid.*, Principle X and XI.

¹² *ibid.*, Principle IX.

¹³ Harris, Raymond, *Earth Observation Data Policy*, Chichester: John Wiley & Sons Ltd, 1997, p 46.

¹⁴ Shaffer, Lisa, "US data policy for Earth observation s from space," in *Space in the service of the changing Earth*, vol. III, TD Guyenne and JJ Hunt eds., ESA SP-341, ESTEC, Noorwijk: 1992, pp.1477-81

¹⁵ Harris, Ray, "Earth Observation Data Policy and Europe (EOPOLE)," *Space Policy*, 15 (1999), pp.175-177.

¹⁶ European Space Agency. *ESA Envisat Data Policy*. ESA/PB-EO (97). rev. 3. Paris, 19 February 1998.

¹⁷ Shaffer, Lisa, and Peter Backlund, "Towards a coherent remote sensing data policy" *Space Policy* (February 1990), pp.45-50.

"The proposed continuation and extension of the two-tiered pricing policy...will hinder the achievement of the objectives of the Global Change Program and of EOS, and will be detrimental to the national interest. True non-discriminatory access, regardless of the user's interned end use, will generate more revenue and contribute to economic growth more than attempts at cost recovery through commercial data sales."

¹⁸ U.S., *Land Remote Sensing Policy Act*, 15 U.S.C., Ch.82, Sec. 5602, 1992.

¹⁹ European Space Agency. *ESA Envisat Data Policy*. ESA/PB-EO (97). rev. 3. Paris, 19 February 1998.

²⁰ Canadian Space Agency, *RADARSAT Data Policy*,