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**Regional Disaster Monitoring by Remote Sensing:
A law and policy perspective¹**

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1. Introduction

Remote sensing technology is to play an increasing role in gathering information that lay the foundation for international regimes, not only for purposes such as arms control verification and environmental monitoring, but also for non-legal international frameworks such as disaster monitoring. There is little doubt that a steady or increasing amount of resources are to be allocated on space-based research and data gathering for these purposes in the coming decade.

As we turn to the political settings surrounding regional disaster monitoring, we can observe a situation where space-faring nations are “jockeying” for position to provide regional benefit and security. International and regional frameworks, such as the Global Earth Observation System of Systems (GEOSS), the International Charter “Space and Major Disasters”², UN SPIDER, APSCO and “Sentinel Asia”, are primarily initiatives driven by the space agencies to demonstrate space systems utilities for societal purposes, rather than user-oriented initiatives. These facts raise significant questions: *How can we utilise this political force for the benefit of regional disaster management; and how can international law/policy guide the way?*

The point here is the relationship between legal and policy frameworks and the actual programmes – and coordination at the global, international, regional and national levels. This paper will review such coordination efforts at different levels, particularly the International Charter at the international level, and then introducing the project “Sentinel Asia” for

regional disaster monitoring in the Asia Pacific region. It will further consider the status with regard to international law and data policy issues, concluding that it is important to identify the underlying international obligations and to clarify the procedures, and to address the policy issues in order to establish a working regional framework.

2. International and the Asia Pacific Region

2.1 The International Level: International Charter “Space and Major Disasters”

The International Charter is a framework to promote contributions from space organizations to help areas affected by disasters by providing Earth observation satellite data. The International Charter of Space and Major Disaster aims at providing a unified system of space data acquisition and delivery in the event of a (natural or man-made) disaster. The members of the charter are space agencies of Canada, Europe, France, Argentina, USA, England and Japan (CSA, ESA, CNES, ISRO, NOAA/USGS, DMC, China and JAXA) (Fig. 1). An “authorized user” is able to call a single telephone number to request the mobilization of space and ground resources and obtain data and information on a disaster; Day and night, an operator (named On-duty Operator (ODO)) is available to receive calls and, after checking the identity of the requester, passes the request on to an emergency on-call officer; This person analyses the request and prepares a plan for new data acquisition using available satellites and archive material, taking into account the type of disaster; A project manager will then be assigned to assist the user in processing and

applying the provided data (Fig. 2).

JAXA joined the International Charter in February 2005, with the purpose of promoting contribution to disaster management by Earth observation satellites³. After the successful launch of the Advanced Land Observing Satellite (ALOS) in January 2006, JAXA has provided satellite images to the International

Charter, and to the Asian Disaster Reduction Center (ADRC) – as part of the Asian regional initiative “Sentinel Asia”, described in the next section. In this way, from a Japanese perspective, the International Charter is functioning as an international framework for ALOS data distribution for disaster management support.

Fig. 1

Charter Member Agencies



Fig. 2 International Charter Space and Major Disaster

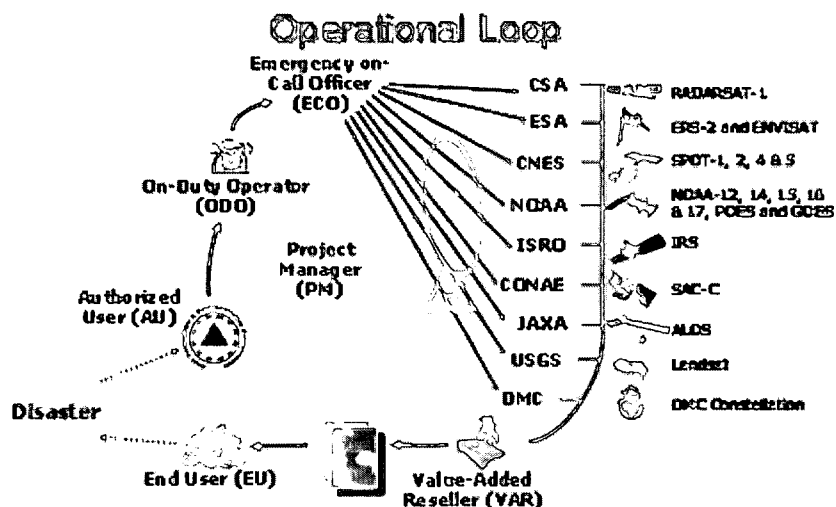
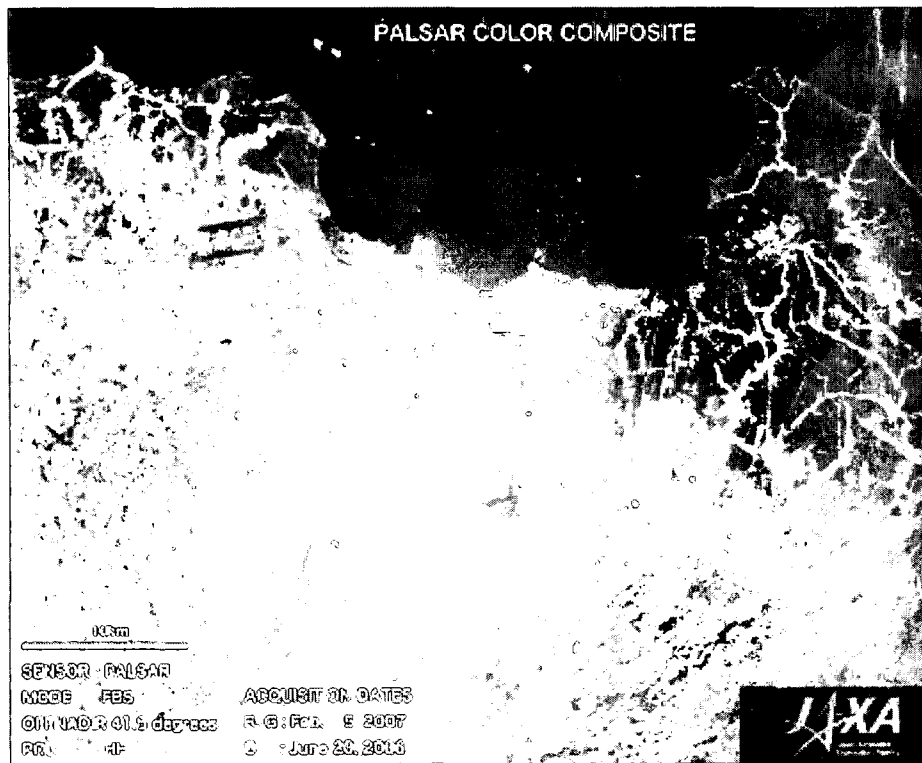


Fig. 3 Flood in Jakarta, Indonesia (Feb. 2007)



Courtesy METI, JAXA

2.2 The Regional Level: "Sentinel Asia"

"Sentinel Asia" is a project to establish a network using data acquired from satellites (ALOS; and MODIS onboard NASA's Terra satellite) for disaster management. It was established as a "disaster management system in the Asia-Pacific Region", which was agreed upon at the 12th Asia-Pacific Regional Space Agency Forum (APRSF-12) of October 2005.

For example, when Jakarta, Indonesia was heavily flooded in Feb. 2007, JAXA activated the ALOS/PALSAR based on the request from Sentinel Asia, and succeeded to image the area on Feb. 5 2007 (Fig.3: PALSAR colour composite).

In this way, the space agencies, the international community, disaster related organizations, and universities member to Sentinel Asia will cooperate in constructing an information-sharing platform to extract and share disaster information (Fig. 4). The vision for Sentinel Asia is that it will be a fundamental

service distributing, in near real-time where possible, disaster-related data products/images in the Asia-Pacific region. An information-sharing platform based on the Internet and Geographic Information System, "Digital Asia", will be utilized for this purpose. Member organizations will also cooperate in capacity building, including disaster status analyses, and training and education. The basic structure of Sentinel Asia consists of three nodes: Data Provider Node; Research and Training Node; and Local Service Provider Node. To promote Sentinel Asia, a Joint Project Team (JPT) is organised, which, as of Oct. 2007, consists of 59 organisations from 20 countries. JPT is open to all the APRSAF member countries, disaster related organizations and regional or international organizations who wish to participate in disaster information sharing activities.

The procedures of "Sentinel Asia" are as follows: once disaster occurs in Asian countries, request of image and data in damaged area is sent to the ADRC (Asian Disaster Reduction

Center); ADRC accepts such order from Member Countries and notifies JAXA; JAXA develops a plan of Action, and JAXA acquires image and data of the damaged area by ALOS and distributes those image and data to the

Asian countries through ADRC using communication satellites; and/or JAXA notifies Partner Agencies to support Asian countries (Fig.5).

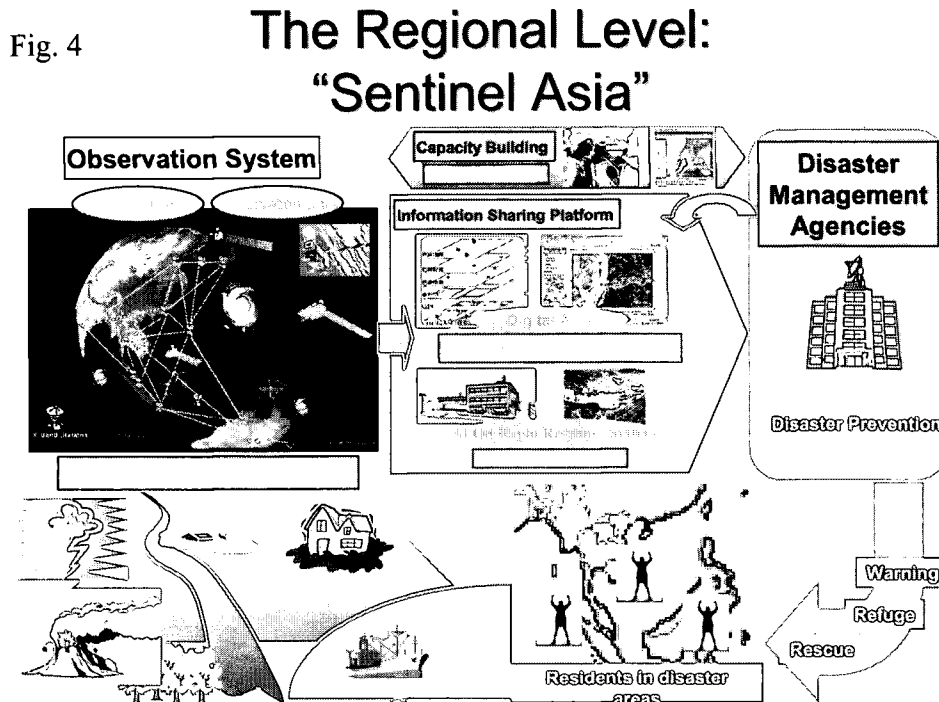
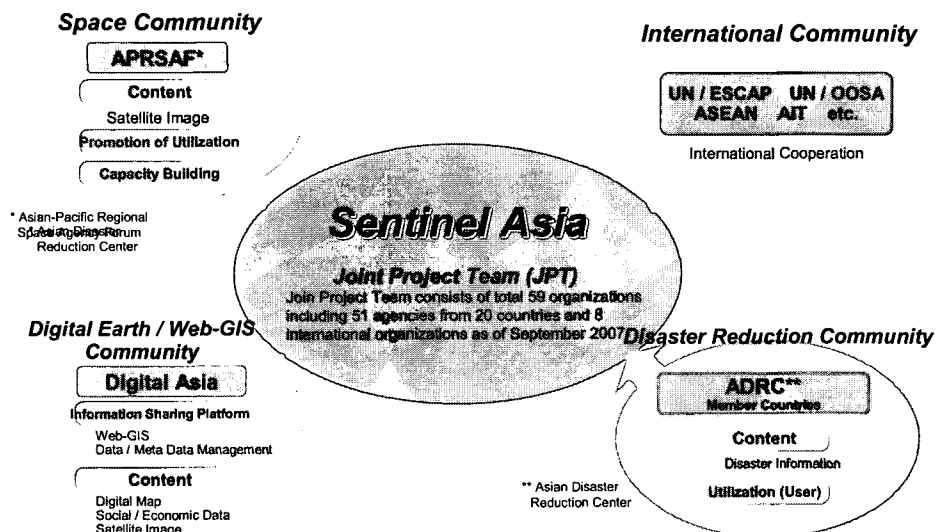


Fig. 5 Framework of Sentinel Asia



3. International Law and Data Policy Issues

3.1 International Law, Institutions and Disaster Management

In general, international human rights law, humanitarian law and refugee law provide the underlying principles for the objectives of the International Charter⁴. Such principles are applicable to space activities under the provisions of Article III of the Outer Space Treaty⁵, which states as follows:

“States Party to the Treaty shall carry on activities in the exploration and use of outer space [...] in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding”.

This is the underlying basis for the provisions of Principle XI of the UN Remote Sensing Principles⁶:

“Remote Sensing shall promote the protection of mankind from natural disasters. To this end, States participating in RS 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.”

However, unlike multilateral treaty frameworks on human rights or environmental law, there are no legal multilateral international agreements in this field⁷. Apart from some bilateral treaties or in particular domains such as for communications⁸, there is no comprehensive treaty or legal framework on natural disasters to date⁹. The activities through the International Charter, as well as projects such as “Sentinel Asia”, are based on voluntary cooperation by participating countries.

In the absence of a legal framework, or a formal institution that calls for state obligations to render support as to disaster management support, it would be more appropriate to

discuss this issue in the broader sense of international governance and the implementation of international regimes – rather than just focusing on the legal dimensions – and to look into the performance of international space applications in a situation without formal or legally binding instruments or institutions.

3.2 Data Policy Issues

In considering data policy issues with regard to disaster management, three points may be considered: balance of cost and humanitarian assistance; data rights; and responsibility and liability.

Firstly, provision of satellite data does not come without a cost. Thus, the balance between the cost of data provision and the need of humanitarian assistance is a persisting issue for space agencies operating satellite missions. It is necessary to identify the various phases of warning, rescue, refuge, hazard, mitigation, and prevention and the role of Earth observation satellite data, and to agree on setting a line, if necessary, taking into account both the financial and technical capabilities of data providers, and the benefit of providing the data for humanitarian assistance.

Secondly, open access to data, as is often the case for disaster monitoring, conflicts with data rights protection, which is a necessary prerequisite for data sales. There is a need to carefully determine the terms and conditions of data use, where commercial data distribution is planned. Especially, if the data on disasters is to be open to the public, there is a need of government support or compensation to the commercial sector. The satellites listed for the International Charter are government-owned and partly commercialized in their data distribution activities in many cases. While it is generally welcome to space agencies that their data is utilized for public purposes, they should be careful not to deprive the opportunities of the commercial distributor in expanding the role of public purpose data distribution – unless the data is solely governmentally owned and

considered as common property. A possible solution to this matter is that the government purchases data from the distributor to provide it to the international framework, and to agree on data rights conditions with the commercial sector. Rather than having the space agency directly provide the data, this would create the incentive for private companies to enhance their capabilities in data applications, which often exceeds the role and capability of space agencies. This is an issue common in any other field of Earth observation as well. It is crucial for government space agencies to study and determine the optimal policy for public and private relations in satellite data distribution.

Finally, one should pay attention to responsibility and liability issues in case of data flaws, or misuse or misinterpretation in applying satellite data to practical disaster relief implementations. While the members of the International Charter agree to waive any liability¹⁰, the liability regime applicable to the use of Earth observation data in general remains unclear. Therefore, members participating in regional frameworks such as Sentinel Asia would have to establish a liability regime, and extend it to the participating local authorities as necessary. While at present the motivation to extend international cooperation seems to exceed the urgency of establishing a clear liability regime, for the future development of satellite data utilization in disaster management support, there is a need to establish an unambiguous legal basis for responsibility and liability.

4. Conclusion

In considering the utilisation of satellite data in disaster management, it is essential to recognise the characteristics of the international framework that is the backbone for data requirements and use – in other words, the implementation of the societal framework should be consistent with the technical system operations.

Compared to the global coordination efforts of the International Charter, a regional initiative

such as Sentinel Asia is more focused and perhaps manageable. Such a framework through partnership among regional organizations would facilitate and expand the use of space technology for disaster monitoring in Asian countries¹¹. However, the limited space resources at the regional level may imply less time frequency, a crucial factor for disaster monitoring. Thus, balance and combination at both the international and regional levels is essential in developing disaster management support systems in the future.

While it seems too early to discuss the role of disaster management support from space in terms of international obligations, we may also note that achieving an international interest does not always require formal or legal institutions. In the absence of a comprehensive multilateral treaty for disaster monitoring, and with the premature status of data policy issues with regard to disaster management support, there is a large gap between legal/policy instruments and space programmes and disaster initiatives utilising space resources. It should be, therefore, the role of those engaged in space law and practitioners to bridge that gap. It is necessary to balance and coordinate the many projects at global, international, and regional levels, including GEOSS, the Disasters Charter, and Sentinel Asia. We should first accumulate successful practices to constructing a truly effective framework for applying satellite data to disaster needs. It is important to identify the underlying international obligations and to clarify the procedures, in close coordination with humanitarian/disaster related agencies, and to address the policy issues in order to establish a working regional framework.

¹ This paper is an update of the speech given at the IISL/ECSL Space Law Symposium 2006. See Onoda, Masami, "Legal and Policy Aspects of Disaster Management Support from Space in Asia" in *Proceedings of the Forty-Ninth Colloquium on The Law of Outer Space*, American Institute of Aeronautics and Astronautics, 2007.

² Charter On Cooperation To Achieve The Coordinated Use Of Space Facilities In The Event Of Natural Or Technological Disasters, available at

http://www.disasterscharter.org/charter_e.html (last visited 21 Feb. 2008) [hereinafter International Charter].

³ Based on a press release by JAXA on February 10, at http://www.jaxa.jp/press/2005/02/20050210_disasterscharter_j.html (last visited Feb. 21, 2008) (only in Japanese).

⁴ See “Humanitarian Charter” Principles at www.sphereproject.org/ (last visited 21 Feb. 2008).

⁵ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, Jan. 1, 1967, 610 U.N.T.S. 2005 [hereinafter Outer Space Treaty].

⁶ Principles Relating to Remote Sensing of the Earth from Space, G.A. Res. 41/65, Annex, U.N. Doc. A/RES/41/65/Annex (Dec. 3, 1986).

⁷ See Masami Onoda, *Satellite Earth Observation As Systematic Observation in Multilateral Environmental Treaties*, 31 *Journal of Space Law* 339-411 (2005).

⁸ Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations, ICET-98, (June, 18, 1998).

⁹ See International Federation of Red Cross and Red Crescent Societies, *International Disaster Response Law: A Preliminary Overview and Analysis of Existing Treaty Law*, Jan. 2003, available at <http://www.ifrc.org/what/disasters/idrl/research.asp> (last visited Feb. 21, 2008).

¹⁰ Article 5.4.

¹¹ See JAXA press release at http://www.jaxa.jp/press/2006/03/20060301_sac_sentine1_j.html (last visited 21 Feb. 2008) (only in Japanese).