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**Limited Right of Access to Remote Sensing Data for the Prevention and Mitigation
of Disasters**

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Thesis

All national remote sensing regimes contain legal authority for governments to control and to prevent access to remote sensing data. Denial of access to remote sensing data could have serious adverse effect on disaster prevention and mitigation.

Introduction

Remote sensing satellites provide important tools for understanding the cause of disasters and for management of the risks of disasters including their prevention and mitigation. The benefit of satellites includes expediting the response to disasters and recovery after disasters. A 2007 study concludes: "Satellites offer the largest potential for improving current practices in support of one of GEO's [the Group on Earth Observation] core societal benefit areas: the reduction of loss of life and property through improved disaster management." Information from remote sensing satellites establishes improved access resulting in better preparedness for and response to disasters.¹

Principle I of The UN Principles Relating to Remote Sensing of the Earth from Outer

¹ The Group on Earth Observations (GEO), The firsts 100 Steps to GOESS, Report to Progress 2007. Cape Town Ministerial Summit, 30 November 2007).

Space² defines remote sensing as the sensing of the Earth's surface from space by making use of the properties of electromagnetic waves emitted, reflected or diffracted by the sensed objects, for the purpose of improving natural resources management, land use and the protection of the environment.

The National Aeronautics and Space Administration (NASA) defines remote sensing as follows:³

Remote sensing is a technology for sampling electromagnetic radiation to acquire and interpret non-continuous geospatial data from which to extract information about features, objects, and classes on the Earth's land surface, oceans, and atmosphere.

I. Important Distinction Between Raw Data and Analyzed Remote Sensing Data

The Distinction between raw and analyzed remote sensing data is important because

² U.N. General Assembly Res. 37/92, (1986). The UN Principles are keyed to the 30 meter resolution Landsat satellites. Therefore, the UN Principle I definition does not adequately consider the high resolution issue raised by later satellites technology.

³ http://rsat.gsfc.nasa.gov/intro/Part2_1, Visited July 30, 2007.

states tend to be more protective of data they have analyzed and enhanced for their own needs than of raw data that do not indicate the operator's purposes in sensing the Earth's surface.

UN Principle I establishes three data categories: (1) Primary data are the raw data transmitted from the satellite to the ground station. (2) Processed data are the raw data made ready for use. (3) Analyzed data are the data to which further information from other sources and further interpretation have been added.

Greater distinction between enhanced and raw, unenhanced data exists under US national regulation⁴ than under the UN Principles. The US regulations were adopted pursuant to the US Land Remote Sensing Policy Act of 1992.⁵ They define unenhanced data as "remote sensing signals or imagery products that are unprocessed or subject only to data preprocessing. Data preprocessing may include rectification of systems and sensor distortions in remote sensing data as it is received directly from the satellite, registration of such data with respect to features of the Earth, and calibration of spectral response with respect to such data. However, conclusions, manipulations or calculations derived from remote sensing data do not qualify as unenhanced data."⁶

II. Distinction Between High Resolution and Low Resolution

⁴ 15 CFR Part 360, 71 Fed. Reg. 24474, 25 April, 2006

⁵ 15 U.S.C. 5601 et seq. These definitions may be traced back to the 1984 Land Remote Sensing Commercialization Act, 15 U.S.C. 4201 et seq.

⁶ For discussion of non-discriminatory access to data see discussion *infra* at V(A)(1).

Remote sensing operators vary greatly in image resolution. Some provide low detailed resolution and some highly detailed resolution. Highest resolution can show individual cars on a road; intermediate resolution is used to map resources and for assessment of natural disasters; low resolution remote sensing is used to observe vegetation, cloud patterns and broad views of the weather. U.S. Landsat 5 satellite provides images at 30 meter resolution. Thus Landsat 5 provides a view over a large territory that advantageously shows vegetation. Land surveying and land use planning may require much more detailed images enabling the user to distinguish different materials. Orbview, Quick Bird and IKONOS provide images of 1 meter resolution or even lower (one meter resolution means that one square meter is recorded on each unit of the image). The French operator Spot Image provides 2.5 meter resolution. The capacity of the remote sensing satellites for very detailed high resolution accuracy is constantly improving. The images are sent from the satellite to a ground station for processing.

As the remote sensing images approximate the detailed clarity of reconnaissance almost no privacy is left to the sensed state and persons in that state. Some authors argue that a redefinition of sovereignty is taking place.⁷ High resolution images may have national security significance. Many countries, concerned that remote sensing can be used to military advantage for identification of military installations such as airfields, now restrict the degree of image resolution permitted by licensees.⁸

III. Remote Sensing Providers and Users

⁷ Jackson, *Cultural Lag and the International Law of Remote Sensing*, 23 *Brook. J. Int'l L.* 854.

⁸ See discussion *infra* at V.

China, The European Space Agency (ESA), India, Japan Thailand, France, Canada, Israel, Germany, Russia and the United States provide satellite remote sensing. Small nations like Zambia are becoming increasingly able to participate in joint ventures on high performance imaging systems. A consortium of Algeria, Kenya, Nigeria, and South Africa have formed the African Resource Management (ARM) to pool their remote sensing resources in order to orbit satellites and use them to study uses of land and water, agriculture, forests and general use of resources. Remote Sensing Operators range from Landsat, SPOTIMAGE, IRS, Quick Bird, Envisat, OrbView, and IKONOS to Eros, Cosmo, Image Sat International (ISI), and Radarsat.⁹ The Indian Space Research Organization (ISRO) provides 20% of the global market for remote sensing data.¹⁰

Some of the providers, such as the Thai THEOS satellite are government-owned and operated. The Thai government dispenses remote sensing services. Other providers, such as the Indian provider Anthrix, are owned by government, but engages in private commerce. Thus Anthrix, in the IRS series, has supplied remote sensing data to the private US company Space Imaging. Other remote sensing providers, such as IKONOS and ISI are owned by private companies. These companies not only own the satellites, but operate them and sell remote sensing services. Initially the United States began remote sensing with the

⁹ Taverna, Arming for Imint, African Constellation plans reflect Rapid Spread of Cheap, high-performance Imaging, *Aviation Week and Space Tech.*, Oct. 8, 2007, at 36. See NASA chart of existing and prospective operators at <http://rst.gsfc.nasa.gov/Front/overview2.html>

¹⁰ See Subramin, ISRO Entrenched in Remote Sensing Images Market, *The Hindu*, Sept. 23, 2007, at 10.

Landsat satellites. The satellites were at first government-operated and the data were free; but in a change of government policy, effected by the 1984 Land Remote Sensing Commercialization Act, 15 USC 4201 et seq., marketing of US remote sensing data was turned over to private commercial companies for sale

Sensed data are stored not only in satellite operator's state, but also at earth stations receiving remote sensing data whenever the particular remote sensing satellite passes over the receiving station. That places the country in which the receiving station is located in the legal position of being in possession and therefore subject to claims for access to the data in its possession.¹¹

IV. International Regulation of Remote Sensing Data

Remote sensing by satellite from outer space is legal but distribution of data is subject to regulation by international and domestic laws. Many countries have only the international rules as guides for operating and receiving remote sensing data. A recent study shows that states which adopt domestic regulations restrict access to data for reasons of national security.¹² For the most part the system of national regimes that implement and supplement the international regimes works well. Inevitably, however, there are tensions. Interaction between the international and national legal regimes will be described below.

A. Outer Space Treaty

¹¹ See discussion of UN Principles at IV(B) *infra*.

¹² See the Land Remote Sensing Laws and Policies of the National Government, a global survey for the National Oceanic and Atmospheric Administration (NOAA) by the Univ. of Mississippi National Center for Remote Sensing, Air, and Space Law, at 12 (2007), available at www.spacelaw.olemiss.edu (hereinafter referred to as NOAA Survey).

The Outer Space Treaty, Art. V,¹³ states that the UN Secretary General must be kept informed of unusual phenomena discovered from and in outer space. Art. VI requires States to supervise the remote sensing satellites that they authorize to be deployed. National oversight is through the licensing process. This oversight obligation continues after a satellite has been licensed and placed in orbit. Remote sensing satellites may be deployed by an international organization, in which case the oversight responsibility rests on both the organization and on the individual members of the organization.¹⁴ Article IX requires states to cooperate in their uses of outer space and to keep the United Nations and the public informed about their activities.¹⁵

B. United Nations General Assembly Resolution 41/65 on Principles Relating to Remote Sensing of the Earth from Outer Space

Remote sensing is increasingly used to monitor and mitigate floods and many other disasters. For example, a series of satellite images can show if a flood is increasing or decreasing and can alert authorities about threats of floods.

UN Principle XI specifically requires sensing States to transmit processed and analyzed data concerning environmental harm and natural disasters to states that may be affected.

Principle XII is the most important of the UN Principles. It reflects the basic standard that remote sensing data shall be openly

¹³ Outer Space Treaty, 610 UNTS 205

¹⁴ Id. Art VI "Supervision by the appropriate State Party to the Treaty" may entail ambiguity about which state has duty to supervise because the authority to operate may be issued by a state other than the launching state.

¹⁵ Id. Art. IX.

available. It expresses the basic compromise of the UN Principles: the right of states to sense other states but the right of the sensed states to information in possession of sensing states. The compromise does not require prior consent by the sensed states. Neither is the sensed information free. However, "the sensed state shall have access to [primary and processed data] on a non-discriminatory basis and on reasonable cost terms." Likewise, the sensed state shall have access to analyzed data concerning its territory in possession of the sensing state. The developing countries shall received special consideration. While this language appears to guarantee all concerned States access to remote sensing of their States' territory, in practice States are withholding remote sensing data on national security grounds.¹⁶ Such denials may be based on the legal argument that the UN Principles are a General Assembly Resolution and not a treaty obligation. The justification may also be later United Nations' resolutions superseding UNGA Resolution 41/65, or the data may simply not be available because some other organization has bought up all available data.¹⁷

Principle XII also raises the logical question of whether an endangered state can be refused remote sensing data in disaster situations involving its own territory simply, because it cannot pay for the cost.¹⁸ The general tendency is toward reduction or even total elimination of charges for remote

¹⁶ See discussion in section V, *infra*. For example, the United States, Canada, India, France, Italy and Israel have all adopted regulation regarding denial of data, see NOAA Survey, *supra* n. 12.

¹⁷ See UNISPACE III discussion paper, Gabrynowicz, Expanding Global Remote Sensing Services, UNISPACE III, Proceedings of the Workshop, July 1999, at 97.

¹⁸ DeSaussure, Remote Sensing Regulation by National and International Law, 15 Rutgers Computer & Tech. L. J. 351 (1989).

sensing data. The United States originally provided free Landsat data although now there is a low charge.¹⁹ Google Earth data are free. Australia also provides sensed data free on the Internet. Japan's policy is to charge very little. Thailand provides free data for educational purposes and for disasters. ESA's policy is the same.²⁰

C. Two Special Legal Regimes for Disaster Management

Two international legal regimes have been established specially for the special management, mitigation and avoidance of natural disasters: The International charter on Space and Major Disasters, and the Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations.

1. The International Charter on Space and Major Disasters

The International Charter on Space and Major Disasters²¹ coordinates a specialized unified system of space data collection for the purpose of urgent information delivery to countries that have experienced disasters like the 2004 Indian Ocean tsunami. The Charter organizes, coordinates and unifies disaster

¹⁹ The US nondiscrimination policy may be viewed as implementation of UN Principle XXII which makes available remote sensing data on a nondiscriminatory basis. Wide availability of data is the intended meaning of both the UN Principle XII and of the US law. Gabrynowicz interprets the meaning of "make available" to be nondiscriminatory access, but subject to restrictions imposed by the national laws and regulations, Gabrynowicz, *Expanding Global Remote Sensing Services*, UNISPACE III Proceedings of the Workshop, July 1999, at 109. She also states that "[R]easonable terms and conditions" refers to market prices, not uniform prices.

²⁰ See NOAA Survey, *supra* n. 13, at 17 -18.

²¹ www.disasterscharter.org

management. Among participants in the Charter's coordinated management are the Argentine Space Agency (CONAE), the Canadian Space Agency (CSA), the Chinese National Space Administration (CNSA), the Indian Space Research Organization (ISRO), the Japanese Aerospace Exploration Agency (JAXA), and the US National Oceanic Research Administration (NOAA). These agencies coordinate and collect resources that may be activated by authorized users. The Charter came into force in 2000. An authorized user need only make one contact in order to receive space based information from the entire battery of member agencies. The charter may be activated in a crisis. Duration of the coordinated emergency response includes the time period immediately before and after the emergency. Participation in the Charter is voluntary and no funds are exchanged among the parties. The parties coordinate access to data, pooling of data for study of potential crises, receipt of data during crises, delivery of data to the authorized users, and access to telecommunications, data collection and global navigation satellite systems (GNSS). The relief activities are coordinated with associated organizations as well as the beneficiaries of the relief. These activities are intended to assist in the crisis caused by a disaster. The crisis and thus the application of the Charter is for a brief period "immediately before, during or immediately after a natural or technological disaster."²² The definition of the 'crisis' period normally does not include the period of reconstruction after a crisis.²³

Countries affected by disasters need immediate access to remote sensing information. The US will make space-based

²² *Id.* Art I.

²³ Ito, *Indian Ocean Tsunami: Highlighting Issues Relating to the Use of Space Technology for Disaster Management*, Proceedings of the ISRO-ISL Space Law Conference 2005, at 3/9.

capabilities available for disaster warning, monitoring and response activities. It will facilitate “open access to government environmental data on equitable terms.” Therefore, the US Government waived its 24 hour waiting period for access to remote sensing data during the Indian Ocean tsunami.²⁴

In conclusion, the Charter is not a treaty. It does not override national remote sensing regulation of data.

2. The Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief operations

The Tampere Convention’s²⁵ purpose is to improve and coordinate communications services for the purpose of mitigating and relieving disasters. The Convention is evidence of the International Telecommunication Union’s policy that effective communication is essential for disaster warnings and relief. The policy is expressed in Article 46 of the ITU Constitution stating that radio stations shall be required to receive and communicate distress messages and to take necessary action.²⁶ This policy is further implemented by the Tampere Convention. The Convention establishes an international coordinator, the Emergency Relief Coordinator (Art. 2). In Art 3, the participating states undertake to make

telecommunication resources available for disaster mitigation and relief. The Article obligates states to make satellite telecommunication technology available to monitor, predict and distribute information about natural disasters. Article 4 organizes the provision of telecommunication assistance from the time of request for telecommunication services to their delivery. Art. 7 provides that the cost, if any, of the telecommunication services provided in accordance with equitable principles shall take into consideration the nature of the disaster, its place, area affected, capacity of the state affected and also take into consideration the special needs of developing countries. The Convention reduces or waives regulatory barriers to international uses of telecommunications for disaster relief (Art 9).

The Tampere Convention came into force in 2005 after receiving 30 ratifications. The Convention is thus legally binding. Satellite telecommunication is one important resource towards mitigation and relief of disasters. However, the Convention does not obligate the member states to provide remote sensing data.

D. Global Earth Observation System of Systems (GEOSS)

The intergovernmental Group on Earth Observation (GEO) is a voluntary group coordinating management of data bearing on disaster management and mitigation. The over-all mandate of GEO is intense monitoring of Earth in order to better understand and influence what is happening on Earth. For that purpose GEO has formed the Global Earth Observation System of Systems (GEOSS) to support better decision making and actions for the benefit of humankind. GEOSS involves not only Earth’s disasters but also events and situations affecting the Earth’s weather,

²⁴ U.S. Space Policy Statement, www.spaceref.com/news/views. See also www.rshgs.sc.edu. The U.S. government imposes a 24 hour delay on distribution of high resolution images in order to give the government time to decide whether to permit distribution. 71 Fed. Reg. at 24475 (2006).

²⁵ <http://www.reliefweb.int/telecoms/tampere/icet98-e.htm>

²⁶ ITU Constitution, Art. 46, Project 2001, Working Group on Telecommunications, at 325.

climate, water, health, energy, ecosystems, and water sources. GEO has adopted a 10 year plan to coordinate, build and operate a global Earth observation system over the existing national and international observation systems (it is an over-all system linking disparate systems). For example, the GOESS links satellite systems, widely scattered ocean buoy systems, weather stations and many other observations systems into one seamless web. The result is better management, mitigation and prevention of disasters.²⁷ Relevant data on disasters often are not available because they are held in government offices. GOESS will make data more widely accessible

Currently 71 countries, as well as several international organizations and non-governmental organizations, contribute to GEOSS. GEO's headquarter is in Geneva, Switzerland. The 2007 Ministerial Summit in Cape Town, South Africa, considered the particular problems of the developing countries as well as the general administration, coordination and distribution of data through GEOSS.²⁸

The importance of GOESS is mainly to coordinate data and make them more widely available. However, GOESS does not and cannot require participants to make data available.

E. Rio Declaration of 1992

Principle 18 of the Rio Declaration²⁹ requires States immediately to notify other States of natural disasters and other events that are likely to cause harm to the environment. States shall assist other states

²⁷ See the Group on Earth Observations, *The firsts 100 Steps to GOESS*, Report, supra n. 1.

²⁸ Id.

²⁹ 1992 Rio Declaration on Environment and Development, U.N. Doc. A/CONF.151/26. The Rio Declaration is not a treaty instrument.

harmed by natural disasters. Sgrosso characterizes this principle as a law-developing resolution leading to customary international law.³⁰ Rio Principle 19 pronounces a duty of states to notify states of impending disasters. This principle relates particularly to the duties of states to use remote sensing technology and information relating to possible impending disasters in other countries, which do not have such information.

V. National Laws on and Regulations of Remote Sensing

All national remote sensing regimes contain legal authority for governments to control and to limit access to remote sensing data.³¹ The 2007 University of Mississippi global survey commissioned by the US National Oceanic and Atmospheric Administration (NOAA)³² concluded that the most extensive national regulation is by the US Government. Canada³³ and China³⁴ also have national regulation. India has begun to control access to remote sensing data affecting India. The NOAA Survey concludes that a number of additional countries have begun to develop national regulations. They use a variety of methods to control and limit access to remote sensing data. Mostly the states use their mandate under Art. VI of the Outer Space Treaty to license the activities of remote sensing operators by attaching conditions to issuance of those licenses and continuing to supervise those licenses after issuance. The

³⁰ Sgrosso, *Natural Disaster Management*, Proceedings of the ISRO-IISL Space Law Conference 2005, at 3-34.

³¹ NOAA Survey, supra n. 12.

³² Id.

³³ See lois.justice.qc.ca/en.R-5.4/259133

³⁴ Yun Zhao, *National Space Legislation*, with Reference to China's Practice, Proceedings of the Space Law Conference, Bangkok, 2006, at footnote 21.

national control methods include limiting data availability to raw data, strict exercise of oversight of who gets an operating license, elimination of foreign control over domestic operators, restrictions on foreign financing of operators, maintaining operational control within the borders of the licensing state, maintenance of government approved data management plan, direct control over release of data to foreign buyers (shutter control), and prohibitions on collection of remote sensing data over certain countries and areas.

A. U.S. Laws on Denial of Access to Remote Sensing

U.S. regulation of remote sensing by satellite is a compromise between the US government's need for remote sensing for national security purposes and the wish to promote US commercial remote sensing. Ultimately, the government's concern with national security has become a trade barrier to international commerce in remote sensing data.³⁵ The U.S. President has considerable discretion to waive national constraints on the flow of remote sensing data in disaster situations.

The Land Remote Sensing Act was implemented by Department of Commerce regulation in 2006.³⁶ The US national security interest pervades US regulation. Whenever national security interests are in issue, they are always more important than the commercial interests.³⁷ Stated purposes

³⁵ Jackson, *supra* n. 7, at 861

³⁶ Fed. Register, Vol. 71, April 25, 2006 at 24474, 15 CFR, Part 960.

³⁷ US Commercial Remote Sensing Policy, April 25, 2003 states that "because of the potential value of its products to an adversary the operation of a U.S. commercial remote sensing space system requires appropriate security measures to address U.S. national security and foreign policy concerns." See also Licensing of Private Land Remote-Sensing

of the U.S. Remote Sensing Act are to preserve U.S. national security, and to implement treaty obligations such as the Outer Space Treaty and foreign policies such as the U.N. Principles.³⁸

1. Nondiscriminatory Availability of Data

The US Land Remote Sensing Act, Section 5622 (b)(2) of the Act requires the licensed private operator to:

make available to the government of any country (including the United States) unenhanced data collected by the system concerning the territory under the jurisdiction of such government as soon as such data are available and on reasonable terms and conditions;

The US policy is further elucidated in the US remote sensing regulations³⁹ which distinguish between enhanced data and unenhanced data. Only unenhanced data are required to be made available to the public. The regulations⁴⁰ establish three different unenhanced data groups: (1) US government funded (in whole or in part) unenhanced data are made available on a nondiscriminatory basis subject to national security restrictions. (2) Privately funded remote sensing data shall be made available "in accordance with reasonable commercial terms," subject to an obligation to supply data to the sensed state. (3) If the data are funded by a combination of the US government and non-government agencies, the government will decide which data are made available on a non-discriminatory basis subject to considerations of the nature of private financing, the commercial demand for the data and public benefit

Space System: Final Rule, 15 CFR 960.1 .

³⁸ Id. 15 CFR 960.1.

³⁹ 15 CFR 960.12

⁴⁰ Id.

purposes.

2. Operating License

The requirement to provide unenhanced data is mandated by the Land Remote Sensing Policy Act, and is a condition for obtaining a government operating license.⁴¹ All operators are required to obtain a license in accordance with U.S. regulations before engaging in remote sensing.⁴² The license is subject to a number of conditions and restrictions. The license application must contain a detailed description of the applicant's planned remote sensing business, including data distribution. The government annually audits the license to assure the operator's compliance with all government rules, regulations, conditions and restrictions. Noncompliance may result in termination of the operating license.

The 2003 U. S. Commercial Remote Sensing Policy statement provides: "The United States Government may condition the operation of U.S. commercial remote sensing space systems to ensure that appropriate measures are implemented to protect U.S. national security and foreign policy interests." The US Land Remote Sensing Policy Act requires the Department of Commerce licensing office to coordinate extensively with the Departments of Defense and State.⁴³ These Departments are very concerned that US national defense and international relations interests not be endangered by US licensing of remote sensing providers. This is a continuing concern which attaches to licenses even after they are issued. These national security interests are the same as are found in the 2006 US National Space Policy and the

⁴¹ 15 U.S.C. 201

⁴² 15 CFR. 9604. See also NOAA Survey supra n. 12.

⁴³ 15 U.S.C. 5621 *et seq.* Also see 5 U.S.C. 552 which gives agency heads the authority to withhold disclosure of remote sensing data.

Presidential Decision Directive 23.⁴⁴ Finally, an applicant for a license is required to submit a plan showing that the applicant can control collection and distribution of imagery in order to satisfy the laws and regulations.

3. Restriction on foreign control of domestic operators

Licenses are required to apply for an amended license if the foreign purchaser of a financial interest in the company acquires in excess of 10% of the remote sensing company. An amended license is also required if a foreigner acquires assets of a US remote sensing company on default. NOAA will prescribe appropriate conditions to protect US national security.⁴⁵ Furthermore, the licensee shall inform NOAA if the licensee intends to conclude an agreement with a foreigner. In such case NOAA shall consult with the U.S. Departments of State and Defense in order to provide appropriate restrictions on foreign control of remote sensing data, to ensure licensee's obligation to submit data to the National Satellite Land Remote Sensing Data Archive,⁴⁶ and to comply with the required reporting and keeping of records.

Financing of remote sensing satellite companies is also restricted. The US government firmly provides that⁴⁷ "[a] license is not an asset of the licensee and shall not be mortgaged, sold or pledged as collateral."

The government does not want the operating license to be used as collateral in a loan agreement. The reasoning is that the

⁴⁴ See the 2006 US National Space Policy statement, <http://www.spaceref.com/news/views> also Presidential Decision Directive 23 (1994).

⁴⁵ 15 CFR 960.7.

⁴⁶ See 15 CFR 960.11(9) regarding Archive of Remote Sensing Data.

⁴⁷ 15 CFR 960.11(14.)

Government wants assurance that the operator will comply with national security and foreign policy considerations. If the licensee were able to use the license as collateral for a loan from a financier, the financier would obtain leverage over the licensee. The inability to use the license as an asset in secured transactions may conflict with the definition of space asset in the draft Space Protocol to the 2001 Cape Town Convention⁴⁸. While such a restriction would be an impediment to financing, it is a narrow restriction dictated by national security.

4. Required Operational Control from Within US Territory

An operator licensed by the United States must exercise operational control from within the United States,⁴⁹ where the operator must always be able to override commands issued at foreign collection centers. The operator must maintain records so that the US government can monitor compliance with existing laws and regulations. Upon governmental request, the operator shall also make unenhanced data available to the US government during emergencies on an exclusive basis. Furthermore, the operator shall inform the government of plans to enter into agreements with foreign users.⁵⁰ The operator may be required to delay data transmission to foreign users for 24 hours in order to give the government opportunity to review the data in question. Upon request, the operator shall also make unenhanced

⁴⁸ Convention on International Interests in Mobile Equipment UN Doc. No. A/AC.105/C.2?2002/CRP.3 (Nov. 16, 2001); Preliminary Draft Protocol on Matters Specific to Space Assets, Unidroit 2002, Study LXIII, Doc. 10.

⁴⁹ 15 CFR 960.11.

⁵⁰ Id. Such notification does not free the operator from additionally having to receive export licenses and to comply with the ITARS.

remote sensing data available to the sensed state at a reasonable charge; that is, unless ordered otherwise by the US government in accordance with existing laws and regulations. The operator may be required to archive data.

5. Approved Data Protection Plan

Government regulations require the operator to protect the remote sensing data from unwarranted disclosure in accordance with a government approved data protection plan. All proprietary information contained in the license application is kept confidential. Furthermore, business information must also be kept confidential.⁵¹

6. National Archive of Remote Sensing Data

Section 502 of the US Land Remote Sensing Policy Act⁵² requires the U.S. Secretary of Interior to maintain a long-term archive of basic global land remote sensing data. The archive serves "historical, scientific and technical purposes, including long-term global environmental monitoring." The Department of Interior consults with the users of remote sensing data to obtain their advice and guidance about their future data needs. In the remote sensing archive are Landsat data as well as data collected by foreign remote sensing systems. After expiration of the exclusive rights, the data enter into the public domain and are accessible subject to the cost of making them available. Unenhanced data in the archive may be distributed by any licensee on the condition that the data not be reproduced or sold by the purchaser.

7. Shutter Control

⁵¹ 15 CFR 960.5.

⁵² US Land Remote Sensing Policy Act, supra n. 5.

Remote sensing technology is developing rapidly and the US shutter control policy has developed along with the technology. This pertains in particular to the higher resolution that is now available and even higher resolutions that will become available. Gabrynowicz states that:⁵³

The approach has been to issue licenses allowing a system to gather data anywhere, imposing temporal and geographic limits only when necessary. National security institutions are less comfortable with this approach for commercial systems using newer technologies, like hyper-spectral and radar instruments, and have begun to apply new ones. New approaches are attempting to control individual products more than operations.

The US Government now imposes a 24 hour delay on distribution of high resolution images in order to give the Government time to decide whether to permit distribution.⁵⁴

These kinds of shutter control reduce the private remote sensing operator's market for data services. The operator is denied access to certain markets. US law therefore allows US licensed private operators to recover for lost market opportunities:⁵⁵

If, as a result of technical modifications imposed on a licensee...on the basis of national security concerns, the Secretary [of Commerce] in consultation with the

Secretary of Defense or with other Federal agencies, determines that additional cost will be incurred by the licensee, the Secretary may require the agency or agencies requesting such technical modifications to reimburse the licensee for such costs, but not for anticipated profits.”

8. Specific Prohibitions on Collection and Sale of Detailed Satellite Imagery of Israel and Certain Other Countries and Areas

U.S. law⁵⁶ prohibits a US government agency from issuance of any license that would permit a private operator to collect or disseminate satellite images of Israel, unless the resolution of such images is less than the resolution of images regularly available for sale in the commercial market. This restriction places statutory limits on nondiscriminatory access to remote sensing. Remote sensing operators and providers are disadvantaged *vis-a-vis* foreign competitors who can produce high resolution images of Israel for sale on the international market. The statute also establishes a precedent for discriminatory access to remote sensing data.⁵⁷ The statute permits the US President to prohibit remote sensing of other designated areas and localities. This provision may conflict with Principle XII of the UN Remote Sensing Resolution which provides nondiscriminatory access to all remote sensing data at reasonable cost

B. India

India is a major provider of remote sensing data. India remote sensing satellites provide about 20% of the world's remote sensing data. As a major purveyor of data, India is

⁵³ Supra n. 19.

⁵⁴ 71 Fed. Reg. at 24475 (2006). Note that the US government agreed to waive its 24 hour waiting period for access to remote sensing data during the 2004 Indian Ocean tsunami. Furthermore, the U.S. National Geospatial-Intelligence Agency (NGA) assumed responsibility for providing remote sensing information for natural disasters such as the Hurricane Katrina disaster in New Orleans, See Space News, Oct 22, 2007, at 22.

⁵⁵ 15 U.S.C. 5621.

⁵⁶ 15 U.S.C. 5621.

⁵⁷ Gabrynowicz, supra n. 19, at 110

interested in selling as many remote sensing data as possible. However India is also a major user of remote sensing data. Furthermore, India is concerned that high resolution data may lead to damage to its military installations and be of assistance to countries that are not friendly to India.

National security is a very important issue in India; primarily it is high resolution images that are of concern. The low resolution images over 6.8 meter resolution are generally available, whereas images of higher resolution are only available on a case-by-case basis⁵⁸

The Indian Government reserves the right to impose control over imaging tasks and distribution of data from IRS or any other Indian remote sensing satellite when it is of the opinion that national security and/or international obligations and/or foreign policies of the government so require.

Furthermore:

With a view to protect national security interests, all data of 5.8 meter and better than 5.8 meter resolution images will be screened by the appropriate agency before distribution so that images of sensitive areas can be excluded.

The Indian Government does not rule foreign remote sensing providers. They are controlled by contracts. In fact, India is troubled that Google Earth, Microsoft Virtual Earth and other foreign image providers are making images of India freely available. The thinking is that the foreign providers should be subject to restrictions similar to those on display of Indian images by Indian providers⁵⁹

⁵⁸ ISRO Remote Sensing Data Policy, see WWW.ISRO.org/announcement-opportunity/rdsp.pdf

⁵⁹ NOAA Survey, supra n. 12

C. Malaysia

Malaysian remote sensing policy is somewhat like India's. There is no restriction on sale of remote sensing data which is above 5 meter resolution. When the resolution is less than 5 meters, the Malaysian government will inquire into who is buying the data and the reasons for buying the data. Malaysia will make data available in a disaster situation with "utmost priority." Malaysian Disaster Response Instruction # 20 provides that "routine data distribution decisions are made according to Malaysian regulations for disaster response."

D. Thailand

Thai THEOS remote sensing satellites are government operated; the data belong to the purchaser only. The Government sells remote sensing data. Thailand has formed the Geo-Informatics and Space Technology Development Agency (GITSDA) as a new public organization for remote sensing. It is Government funded but is authorized to compete with both government and private organizations. Thai policy on availability of remote sensing data is that data is made available on a case by case basis. However, data for disasters are freely available.

E. Japan

Japan is a major user of remote sensing data. The Japan Aerospace Exploration Agency (JAXA) establishes guidelines for use of remote sensing in Japan.⁶⁰ This legal authority includes both unenhanced and enhanced data. Generally there are no Japanese restrictions on availability of remote sensing data, except that Japan's policy is to limit use of remote sensing data

⁶⁰ www.jaxa.jp/about/gaiyo/law/law_e.pdf

to peaceful purposes.⁶¹ Use for military purposes would contravene the Japanese Constitution. There are three classes of data users: (1) Public users including those who contributed to the collection of the images; they may buy the images at cost. (2) Commercial users who may buy the images at prices that are not lower than those charged private companies. (3) National security users who may obtain classified data.

All data are available on a case by case basis, regardless of the level of resolution of images. In this way JAXA ascertains the identity of the user of the data and the purpose of the request. Japan has established a national archive of remote sensing data to facilitate users' access to data and to improve circulation of data.⁶² Sensed data are stored not only in the satellite operator's state, but also at earth stations receiving remote sensing data whenever the particular remote sensing satellite passes over the receiving station. That places the country in which the receiving station is located in the legal position of being in possession and therefore subject to claims for access to the data in its possession.⁶³

F. Israel

Israeli commercial remote sensing promotes itself as making data available on an exclusive basis. The images can belong to the user without any possibility of use for any other purposes. The images can be both

⁶¹ Voluntary arms control agreements such as the Wassenaar Agreement, www.wassenaar.org, the Missile Technology Control Regime, www.mtcr.info, and the Hague Code of Conduct against Missile Proliferation, www.armscontrol.org. See Japan Long Term Plan of Space Development, Space Activities Commission, 2003.

⁶² Long Term Plan of Space Development, Space Activities Commission (2003). NOAA Survey, *supra* n. 12.

⁶³ See discussion of UN Principles, IV(B) *supra*.

high and low resolutions. The images can purposely be designed for environmental purposes or for other purposes.

G. Canada

Canada works very closely with the United States on remote sensing. Canadian law⁶⁴ provides that unenhanced remote sensing data shall be made available without restriction to the governments of the states where the images originate. The data will be made available within a reasonable time after it is produced. On the other hand enhanced and value added data are not made available without restriction. The Ministry of Defense may order that remote sensing be discontinued if it is contrary to international policy or injurious to Canadian military forces.

H. Australia

Australia draws much on the U.S. regulatory experience. Similar to the U.S. Commercial Space Launch Act, the Australian Space Activities Act of 2001 provides for authorization and supervision of private space activities through issuance of licenses and permits.⁶⁵ To obtain a permit the applicant must have an approved management plan plus a plan indicating familiarity with and disposition to comply with national security restrictions as well as the means of carrying such management plans and national restrictions.

Australian regulation of space activities, includes regulation of access to remote sensing data. The government regulations function in the context of other acts and regulations relating to national security. Other government regulatory activities include required compliance with radio

⁶⁴ Canadian Remote Sensing Space Systems Act, 2005

⁶⁵ NOAA Survey, *supra* n. 12.

frequency assignments, allocation of functional orbit, and other operating rules.

VI. Conclusion

Remote sensing generally is based on the assumption that the data will be made available on a nondiscriminatory basis. However, States are increasingly restricting access to high resolution data. That is so in Canada, Europe, India, Israel, the United States and many other states. States now distinguish between military and civilian remote sensing data, making only civilian data publicly available. Ultimately all the current and pending national laws and policies may provide for government mandated interruption of data access. What are and will be the consequences of restricted access to remote sensing data for the prevention and mitigation of disasters? The answers to this question depends on whether the remote sensing data are under the control of the state requesting the data or under the control of a foreign state. It will be in the national interest of the state experiencing an emergency to release both unenhanced and enhanced data and both high resolution and low resolution data in order to mitigate and prevent disasters. However, foreign states may exercise some discretion in releasing remote sensing data, because they are required by their domestic legislation to give first priority to their own national security. The data which are most sensitive to national security are high resolution data and enhanced data. Disaster planning will have to take these facts into consideration.

How important are *high resolution* remote sensing data for the mitigation and prevention of disasters? One expert commented about the 2004 Indian Ocean tsunami that “[h]igh resolution optical data were most immediately instrumental in showing the gravity of the situation as well

as the extent of the disaster in the hours following the tsunami.”⁶⁶ High resolution data are used to detect levels of the ocean and of land. They are used to see whether people are stranded and whether houses and roads have been destroyed.

How important are *enhanced analyzed* data for disaster prevention and mitigation? They are used to detect the disaster effects on vegetation, agriculture, fisheries and other resources. Limitation or denial of access to analyzed and enhanced data will preclude the benefits that these data could provide.

Ultimately, the issue is that while individual states exercise control over their domestic remote sensing operators for national security purposes, those states lack similar control over foreign operators. Thus national control over domestic operators and providers may be undercut by foreign operators and providers who can supply the world market with high resolution data as well as data from geographical areas prohibited by national laws. Effective international controls or standards regulating access to remote sensing of sensitive areas may necessitate a new international agreement. Such agreement would have to include effective international enforcement. Further technological and political developments would dictate the nature of such agreement. International agreement could be between interested and affected states in the form of the familiar voluntary agreements on weapons control, or under the umbrella of the United Nations.

In conclusion limited right or denial of right of access to remote sensing data can have serious adverse effect on disaster prevention and mitigation. Where does that leave Thailand and other Asian states in a disaster

⁶⁶ Sgrosso, supra n. 30, at 3-34.

situation? They can rely on their own resources; however they will still need the enhanced and high resolution data possessed by those states that limit right of access to remote sensing data for reasons of national security.