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INVITED PAPERS

DEVELOPMENT AND USE OF GEOINFORMATION IN JAPAN

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Development and Use of Geoinformation in Japan

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SUMMARY

In Japan, geo-information is used in various domestic fields including disaster management and development of national land. Use of geo-information is recently progressed very much due to the rapid development of GIS and Internet technology. Japan is also conducting various international activities in geo-information field such as those of PCGIAP and Global Mapping by ISCGM, which are expected to contribute to disaster management of large scale disaster and sustainable development of the region and the globe. After taking several examples on this theme rather than reviewing the situation totally, this paper describes what should be done to enhance the use of geo-information especially in disaster mitigation and sustainable development in the region mostly based on activities in which the author is involved.

1. INTRODUCTION

Geo-information is very useful for various fields including disaster management and national, regional and global development. First, use of geo-information in disaster management of Japan is summarized focusing on activities taken by *Geographical Survey Institute of Japan* (GSI) for recent disasters in Japan. Second actions taken by GSI for recent major disasters hit in the Asian region are introduced followed by collaboration with user community of geo-information by GSI as the secretariat of *International Steering Committee for Global Mapping* (ISCGM), taking global earth observation as an example. Finally, way forward to enhancing the use of geo-information in the areas of disaster management and sustainable development are discussed.

2. DOMESTIC PERSPECTIVE

In this section, only issues on disaster management are dealt with because the concept of “sustainable development” is now built in the word “development” which covers too vast areas.

(1) Stages recovering from disasters

Regarding disaster management, we can divide it into the following four stages.

- Usual stage

Preparation for disaster is important for both administration and people living in the area. Geo-information showing the potential risk of natural disasters (hazard maps) should be developed as

well as basic geo-information.

- Just after the disaster:

In this stage, the rescue of human lives is prioritized over any other things. Geo-information on where are most severely damaged and people are waiting for rescue.

- Temporary restoration stage

People living in the damaged areas have to live daily lives anyway. Geo-information such as availabilities of evacuation centers, lifelines, and public transportation is indispensable where use of *Geographic Information System (GIS)* is promising.

- Permanent restoration stage

Areas damaged by disasters are to be reconstructed permanently unless people living there abandon their areas. In this stage, very precise and detailed geo-information is indispensable.

(2) Role of NMO

GSI, which is a *National Mapping Organization (NMO)* of Japan, is conducting various activities as a designated administrative organ. The following are typical examples.

- Monitoring of crustal movement by GPS continuous observation (based on about 1200 fixed GPS stations, FIGURE 1)
- Preparation of geo-information (e.g. land condition maps, detailed digital elevation model in 5 m spacing) used for preparation of hazard maps (FIGURE 2)
- Distribution of various topographic maps to the organ concerned immediately after disasters
- Taking aerial photo after disasters
- Disaster mapping based on aerial photo and field survey, etc
- Setting up Web-GIS (*Densi Kokudo (Digital Japan)*) for sharing disaster related information and dissemination

These items were actually implemented at the recent disasters including the followings :

- Mid Niigata pref. Earthquake in October 2004 (FIGURE 3)
- Earthquake westward offshore of Fukuoka pref. in March 2005

3. REGIONAL AND GLOBAL PERSPECTIVE

Based on domestic experiences in disaster management, GSI is expanding its activities in the Asia and the Pacific region taking full advantage of various international schemes such as *Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP)* and Global

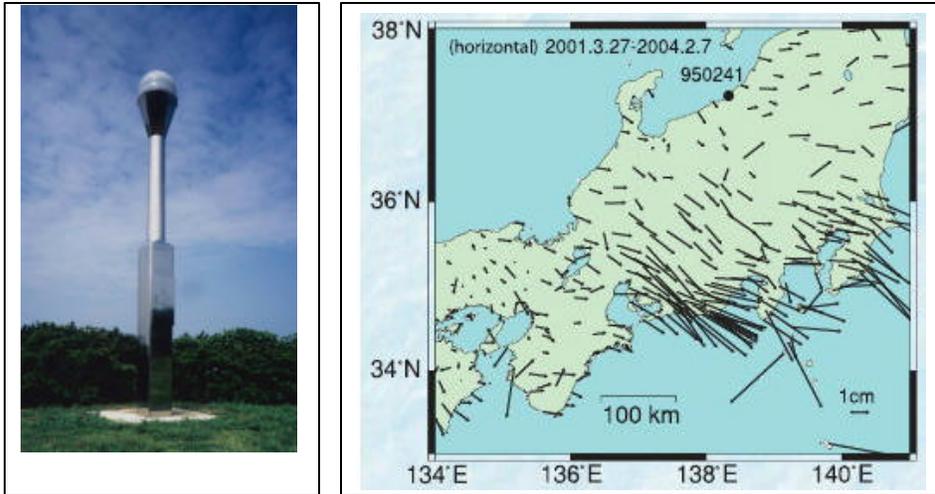


FIGURE 1 GPS based control station (left)
Horizontal displacement observed by GPS station network (right)

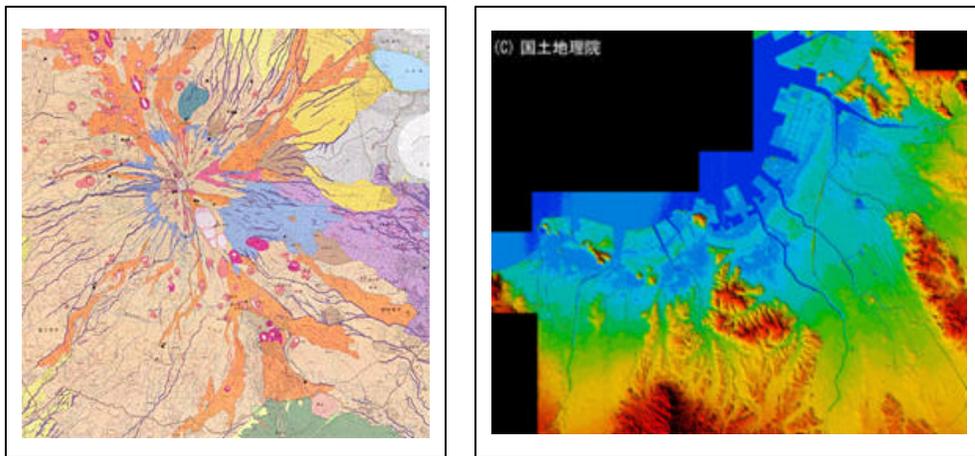


FIGURE 2 Volcanic Land Condition Map (left)
Detailed digital elevation model in 5 m spacing (right)



FIGURE 3 Disaster mapping for Mid Niigata pref. Earthquake (Denshi Kokudo)

Mapping by ISCGM. The followings are the actions taken by GSI for recent large scale disasters in the region.

- The Sumatra Earthquake and Indian Ocean Tsunami (December 2004)
(Change detection of coastal line from satellite radar images, Map of affected area by Global Map, Collaboration with PCGISAP on geodetic survey and fundamental dataset, etc)
- Northern Pakistan Earthquake (October 2005)
(Detection of crustal movement from satellite radar image, Interpretation of damages and topographic features from satellite image)
- Landslide in the southern Leyte island (February 2006)
(Map of the area by Global Map, Estimation of accurate location of the landslide from SRTM-DEM, Topographic features of the landslide, etc)
- Mid Java Earthquake (May 2006)
(Map of the area by Global Map, Satellite image “Daichi” with major map features)
- Earthquake southward offshore of West Java (July 2006, FIGURE 4)

Regarding sustainable development, several research results on various themes such as sustainable shrimp farming, water resource management and forest monitoring using Global Map have been reported in the past Global Mapping Forum. Direct use of Global Map will rapidly increase as coverage of original Global Map data increases. Larger scale geo-information, which comes from established NSDI of respective countries, is needed in actual development stages. It is recognized in several countries that Global Map triggered the establishment of NSDI. Thus Global Map is used for this area directly and indirectly.

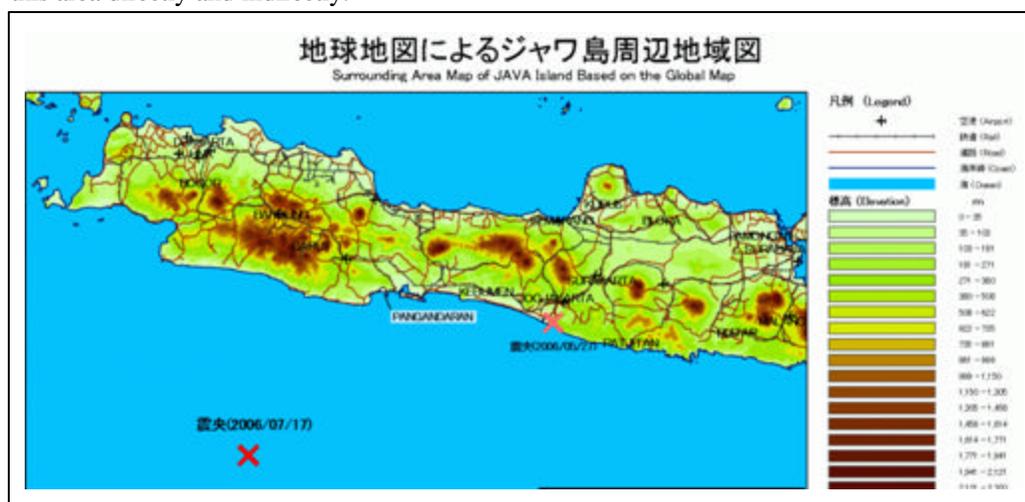


FIGURE 4 Map of West Java by Global Map where is damaged by the Earthquake in July 2006

4. COLLABORATION WITH USER COMMUNITY

To enhance the use of geo-information, it is important to provide users of geo-information with

products they need. One example of contacts with user community can be seen in Global Earth Observation area where fundamental geo-information can be indispensable as a base for integrating earth observation data and other socio-economic data.

(1) Summary of GEO activities

Recent international movement on Global Earth Observation comes from adopted documents in Johannesburg Summit in 2002 and resolutions of G8 Evian Summits in 2003. Based on these two summits, The First Earth Observation Summit (EOS-I) was held in July 2003 in Washington, USA. It was agreed in the EOS-I that an ad hoc Group on Earth Observations (GEO) was established to prepare a 10-year implementation plan for a coordinated, comprehensive, and sustained Earth observation system of systems. And the first meeting of GEO (GEO-1) was held for two days after EOS-I. Including EOS-I and GEO-1, 3 summits and 6 GEO meetings were held, and finally in EOS-III which was held in Brussels, Belgium in February, 2005, 10-year plan was endorsed, and its reference document was noted as living document.

Ten year plan clearly describes 9 societal benefit areas as targets of applications of global earth observation data. Those areas are “Disasters”, “Health”, “Energy”, “Climate”, “Water”, “Weather”, “Ecosystems”, “Agriculture”, “Biodiversity”. Basic geo-information is expected to be used commonly for these 9 areas.

GEO is now in implementing stage. At present, 96 tasks set in the 2006 Work Plan are being implemented led by (a) leading organization(s) with the help of contributing organizations while 2007-2009 Work Plan is discussed.

(2) Involvement of GSI, as a secretariat of ISCGM, in GEO

GSI jointly with ISCGM held the meeting titled "Contribution of Global Map to Earth Observation" in April 2004 when GEO-4 and EOS-II was held in Tokyo. Since then ISCGM is involved in GEO activities as a participating organization while Japan in which GSI is included as a part is a member of GEO since its establishment in 2003.

In the work plan 2006, ISCGM is leading one task on “developing guidance document for basic geographic data (including format, precision, accuracy, etc.), taking into account relevant national, regional and global initiatives” while helping the implementation of four tasks on geographic data, DEM, and land cover.

5. WAY FORWARD TO IMPROVING USE OF GEOINFORMATION

To enhance the use of geo-information in issues on disaster management and sustainable development, NMOs have to take measures in the following areas.

- More involvement in application areas of maps both domestically and internationally is required. In international stage, especially, it is desirable to take full advantage of existing international schemes such as PCGIAP and Global Mapping by ISCGM.
- Sharing information among NMOs is required. It is good to learn good examples in other countries because NMOs do not know much about users and how geo-information is used.

As concrete steps in these areas, the following action should be taken.

- Cooperation on the survey of geo-information made by NMOs
- More active participation in both PCGIAP and Global Map by ISCGM
- To make geo-information available as much as possible, especially, in the case of large scale disasters using recent IT technology such as Internet.
- To start considering the establishment of permanent body with permanent staff dealing with issues on geo-information in the region, recognizing the existence of PCGIAP

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