VENTEN system.

3-5-3. Toward Wider Use of Disaster Management Internet GIS

ADRC will closely observe current and future developments in the relevant fields, and seize opportunities to further promote the use of its disaster management Internet GIS in Asia.

3-5-3-1. Creation, Distribution and Use of Hazard Maps

It seems that cities around the world have been increasing their vulnerability to disasters because of rapid development, urbanization, and population growth since the second half of the 20th century. As for earthquakes, capitals and major cities of countries in Asia, including Teheran, Istanbul, Kathmandu, Manila, Ulaanbaator, Tokyo, and Yokohama, have conducted damage assessments Asian countries have also been committed to creating flood hazard maps. As for forest fires, the ASEAN countries, for example, have developed an Internet GIS network to share hazard data collected using satellite imagery and observation.

It is important to study and implement the methods of integration of hazard maps into city planning (disaster preparedness), zoning, building standards, and disaster awareness raising activities targeting citizenry from various perspectives including international cooperation, central government policies, and local community activities. It is not enough that the government provides hazard maps to citizens A mechanism should be devised that can incorporate citizens' view points into data updating. Equally important are multilateral information exchange among relevant ministries and agencies, cooperation among the public, private, academic and NGO sectors, and disaster education curricula for schools. A disaster management Internet GIS that anyone can readily access is indispensable for all these purposes.

3-5-3-2. Integration of Mobile Telecommunications with Disaster Management Internet GIS

Mobile phone networks can be developed with smaller initial investment than fixed telephone networks. Therefore, mobile phone networks are rapidly expanding in Asian countries, developing countries in particular According to some estimates, the world's mobile phone user population will exceed two billion persons in 2005. There are already many successful cases of transmission of early warnings and disaster emergency information using wireless telecommunications technologies such as cell-phone short mail services. The ongoing diffusion of broadband connections will influence the way mobile phones are used. It will become more common than it is today to use mobile phones for interactive transmission of image data in addition to text and voice data.

To display GIS data on the small screen of a mobile phone, it will be necessary to develop a new data format different from existing Internet GIS data formats, as well as a whole new set of data. Therefore, it is likely that mobile phone-based GIS data will first become available for major cities and surrounding areas It is also important, in terms of cost effectiveness, to develop cell phone-based GIS networks as a useful multi-purpose urban infrastructure not only for disaster reduction, but also for daily social life and tourism

Once they become widely used, cell phones bundled with sophisticated digital camera and GPS functions will provide a powerful Internet tool for near real-time GIS data sharing between affected areas and disaster management headquarters in disaster emergencies. It is also considered that cell phones will become a useful ubiquitous communications tool for raising disaster preparedness awareness among local residents and promoting " participatory disaster-resistant city planning "

3-5-3-3. Utilization of Satellite Imagery and Aerial Photography

Satellite image data and aerial photographic data are useful to enable the user to associate map data with physical geography. The problems are: that these data are expensive.

that raw data need reformatting for integration into GIS databases (data conversion and management), and that satellite image or aerial photographs data for areas or time of interest are often unavailable in the user's preferred resolutions.

Recently, there is an increasing number of satellite image and aerial photograph databases being created and released as part of international cooperation or as national policies. As of March 2004, there were 132 countries and regions participating in the "Global Mapping" project, and the number of countries releasing data reached 18. Though the Project has various limitations such as small scale maps, vector map data as well as satellite image data are already made available on the Internet. Moreover, the Geographical Survey Institute of Japan has released a chronological collection of aerial photograph data of the three Japanese metropolitan areas (Tokyo, Osaka, and Nagoya) (available in Japanese only. http://mapbrowse.gsi.go.jp/airphoto/indexmap_japan.html). National spatial data primarily created with taxpayer's money are a common property of the nation The Japanese government should continue taking the initiative in the development of this kind of databases.

3-6. Disaster Analysis Based on Satellite Information

There are tens of Earth observation satellites going around the orbit at different observation cycles. These satellites are equipped with various sensors of different wavelength band ranges and resolutions, and have different observation ranges. Some of the image data collected by these satellites are made publicly available to facilitate disaster reduction and prevention activities including analysis and forecasting of disasters (see Table.3-6-1).

Table.3-6-1 Observation satellite data open to public (by NASDA, 2001)

Japanese Satellite

Satellite Name	Sensor Name	Band Number	Wavelength Band Range	Effective Life	Observation Frequency	Resolving Power	Observation Width
MOS-1, 1b	MESSR VTIR MSR	4 4 1	Visibility・Near-infrared Visibility・Thermal infrared Microwave	87.2-96.4	Saved data Saved data Saved data	50m 900&2700m 32km	100x90km 1500kmx1Path 320kmx1Path
JER-1	VNIR SWIR SAR	4 4 1	Visibility・Near-infrared Medium infrared L Band	92.9-98.10 92.9-93.12 92.9-98.10	Saved data Saved data Saved data	18m 18m 18m	75x75km 75x75km 75x75km
ADEOS	AVNIR-Mu AVNIR-Pa OCTS	4 1 13	Visibility・Near-infrared Visibility Near-infrared Visibility～Thermal infrared	96.10-97.6	Saved data Saved data Saved data	16m 8m 700m	80x80km 80x80km 1400km
TRMM	PR VIRS TMI	2 5 5	Microwave Visibility～Thermal infrared Microwave	97.11-	0.75 days 0.33 days 0.33 days	4.3km 2km 6～50km	～215km ～720km ～760km
ADEOS-II	GLI AMSAR	36 8	Visibility～Thermal infrared Microwave	02.03-	4 days 4 days	0.25&1km 5～50km	1600km 1600km
ALOS SAR→	AVNIR-2 PRISM PALSAR	4 1 1	Visibility・Near-infrared Visibility Near-infrared L Band	04.6-	2 days 46 days 5 days	10m 2.5m 10&100m	70km 70km /35km 20 - 350km

Foreign Satellite

Satellite Name	Sensor Name	Band Number	Wavelength Band Range	Effective Life	Observation Frequency	Resolving Power	Observation Width
EOS-AM1 (Economy/Industry/Commerce→)	MODIS ASTER	36 14	Visibility～Thermal infrared Visibility・Near-infrared, Medium infrared, Thermal infrared	99.12-	1.5 days 16 days	0.25, 0.5, 1km 15, 30, 90m	2330km 60km
LANDSAT-1.2.3	MSS	4	Visibility・Near-infrared	79.1-83.3	Saved data	80m	185x170km
LANDSAT-4.5	MSS TM	4 7	Visibility・Near-infrared Visibility・Near-infrared, Medium infrared, Thermal infrared	82.10-	Saved data 16 days	80m 30&120m	185x170km 185x170km
LANDSAT-7	ETM+	8	Visibility・Near-infrared	99.4.15-	16 days	15, 30, 60m	185x172km
SPOT-1.2.3	HRV-XS HRV-P	3 1	Visibility・Near-infrared Visibility Near-infrared	88.5-	3 days 3 days	20m 10m	60x60km 60x60km
SPOT-4	HRV-Xi HRV-P	4 1	Visibility・Near-infrared Visibility Near-infrared	98.3-	3 days 3 days	20m 10m	60x60km 60x60km
IRS-1C IRS-1D	PAN LISS-3	1 5	Visibility Near-infrared Visibility Near-infrared, Medium infrared	95.12- 97.9-	5 days 5 days	5.8m 23&70m	70x70km 141x141km
ERS-1 (SAR) ERS-2 (SAR)	AMI	1	C Band	91.8-00.3 95.4-	Saved data 35 days	30m 30m	80x80km 80x80km0
RADARSAT	SAR	1	C Band	95.11-	2 days	10～100m	2.5-250,000km2

High Resolution Satellite

Satellite Name	Sensor Name	Band Number	Wavelength Band Range	Effective Life	Observation Frequency	Resolving Power	Observation Width
IKONOS	MULTI PAN	4 1	Visibility・Near-infrared Visibility Near-infrared	99.9-	3 days 3 days	4m 1m	11x11km 11x11km
EROS-A1	PAN	1	Visibility Near-infrared	00.12-	2 days	1.8m	12.5x12.5km
Quick Bird	MULTI PAN	4 1	Visibility・Near-infrared Visibility Near-infrared	01.10-	3.5 days 3.5 days	2.5m 0.61cm	17～32km 15～17km

Using satellite data used for analyses of actual disasters, the Disaster Reduction Working Group of the Satellite Remote Sensing Promotion Committee[1] compiled and published a guidebook on disaster analysis methodology, "Introduction to Satellite Data-based Disaster A nalysis," on the Web (available in Japanese only at http://www.restec.or.jp/eeoc/bousai/v11.htm) in 2000. The purpose of this web publication was to inform a wide spectrum of people from municipal government disaster management personnels to the general public how satellite remote sensing technology is used for disaster reduction, so that satellite data will have a wider range of applications.

The Web book is so designed that the reader can search and select various examples by analysis method, chronology, cause, occurrence site, region, satellite, and sensor, to suit his purposes (see Fig. 3-6-2).

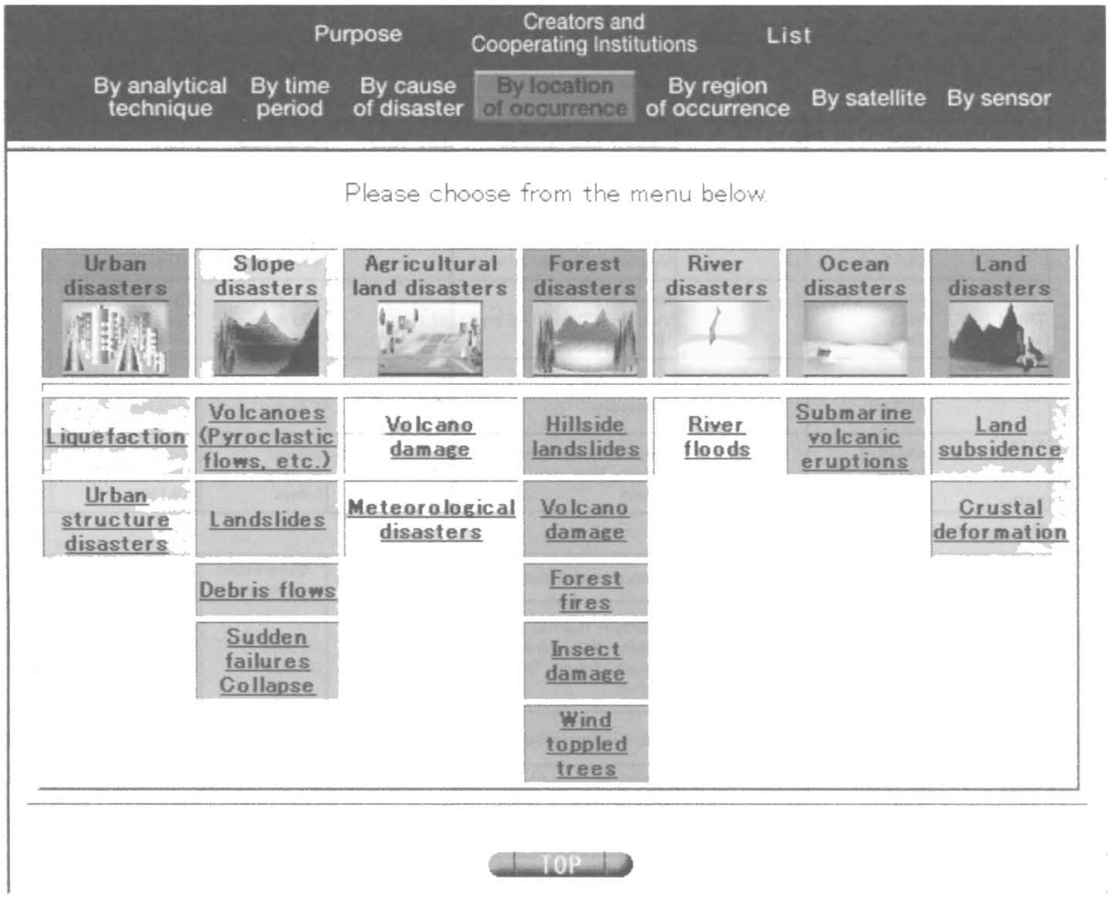

Fig.3-6-2 Typical Screen Shot of Analysis by Disaster Site

In addition to text data, the Web book contains links to analysis flowcharts, data used for analyses, and graphic images. For the ease of the user, the structure of the Web book is designed in a typical textbook style to help understand the use of satellite data (see Fig.3-6-3).

1 An organization established in the Remote Sensing Technology Center, in order to investigate the feasibilities of R & D programs on remote sensing technology and satellite systems, and to conduct specialist investigations to facilitate planning and coordination of promotion strategies for wider use of satellite data.

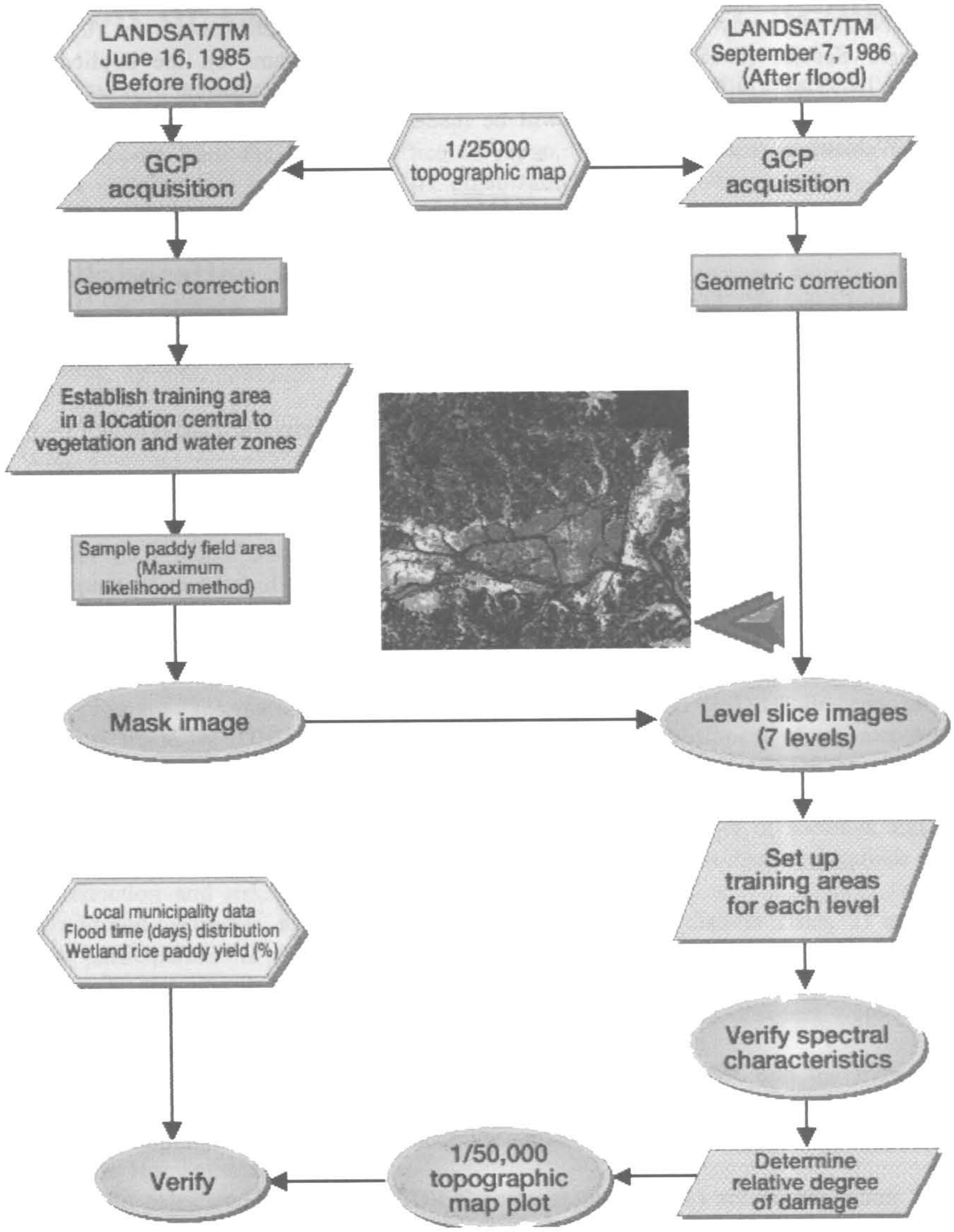

Fig.3-6-3 Typical Analysis Process Flowchart

This publication would provide a valuable source of information for disaster management agency staffs and researchers not only in Japan but also in all Asian countries. ADRC will continue its effort to collect academic case studies on disaster reduction, and to enhance and enrich databases on satellite data-based disaster analysis methods. ADRC has acquired the right to create and release an English version of the Web book in order to contribute to the promotion of disaster reduction activities in member countries. The current version is available on the Website of ADRC
(http://www.adrc.or.jp/dmweb/index.html).

Moreover, there is a new communications satellite project being promoted by Japan Aerospace Exploration Agency (JAXA, formerly known as the National Space Development Agency of Japan (NASDA)). The satellite, named Wideband InterNetworking engineering test and Demonstration Satellite (WINDS), is scheduled for launch in 2006. Currently, ADRC, together with JAXA, National Institute of Information and Communications Technology (NICT, formerly known as the Communications Research Laboratory (CRL)), and Diamond Air Service (DAS), is promoting joint research programs on the application of data from WINDS and other satellites to early disaster warning and disaster information sharing The result reports of these programs will be made available on the Highlights section of the ADRC Website as required.