2-8. Disaster Analysis Based on Satellite Information

There are dozens 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 Table2-8-1).

Table2-8-1 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 for analyzing 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 Analysis," 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 expand the range of satellite data application by informing a wide spectrum of people from municipal government disaster management personnel to the general public of how satellite remote sensing technology is used for disaster reduction.

The Web book is designed to allow the reader to search and select various examples by analysis method, chronology, cause, occurrence site, region, satellite, and sensor, to sui this/-her purposes (see Fig.2-8-1).

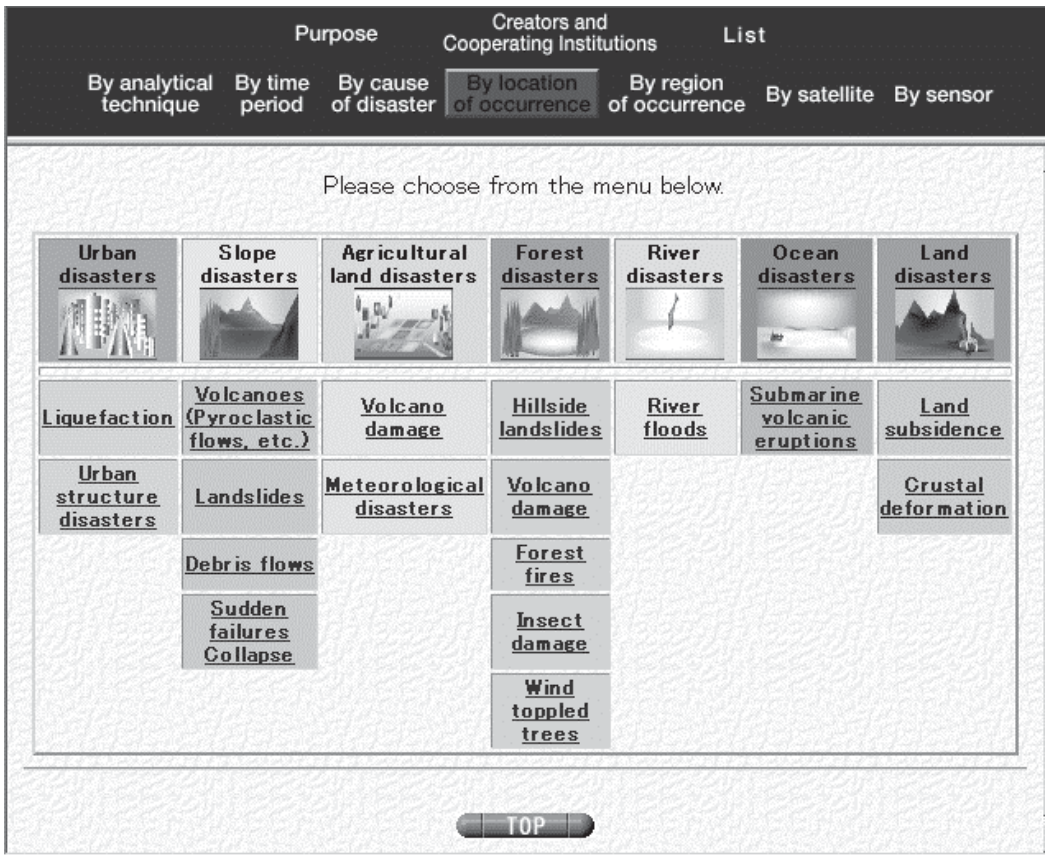

Fig.2-8-1 Typical Screen Shot of Analysis by Disaster Site

In addition to text data, the Web book contains links to analysis flowcharts, data used for analyses, and graphic images. For the convenience of the user, the Web book is structured like a textbook to help understand how satellite data are used (see Fig.2-8-2).

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.

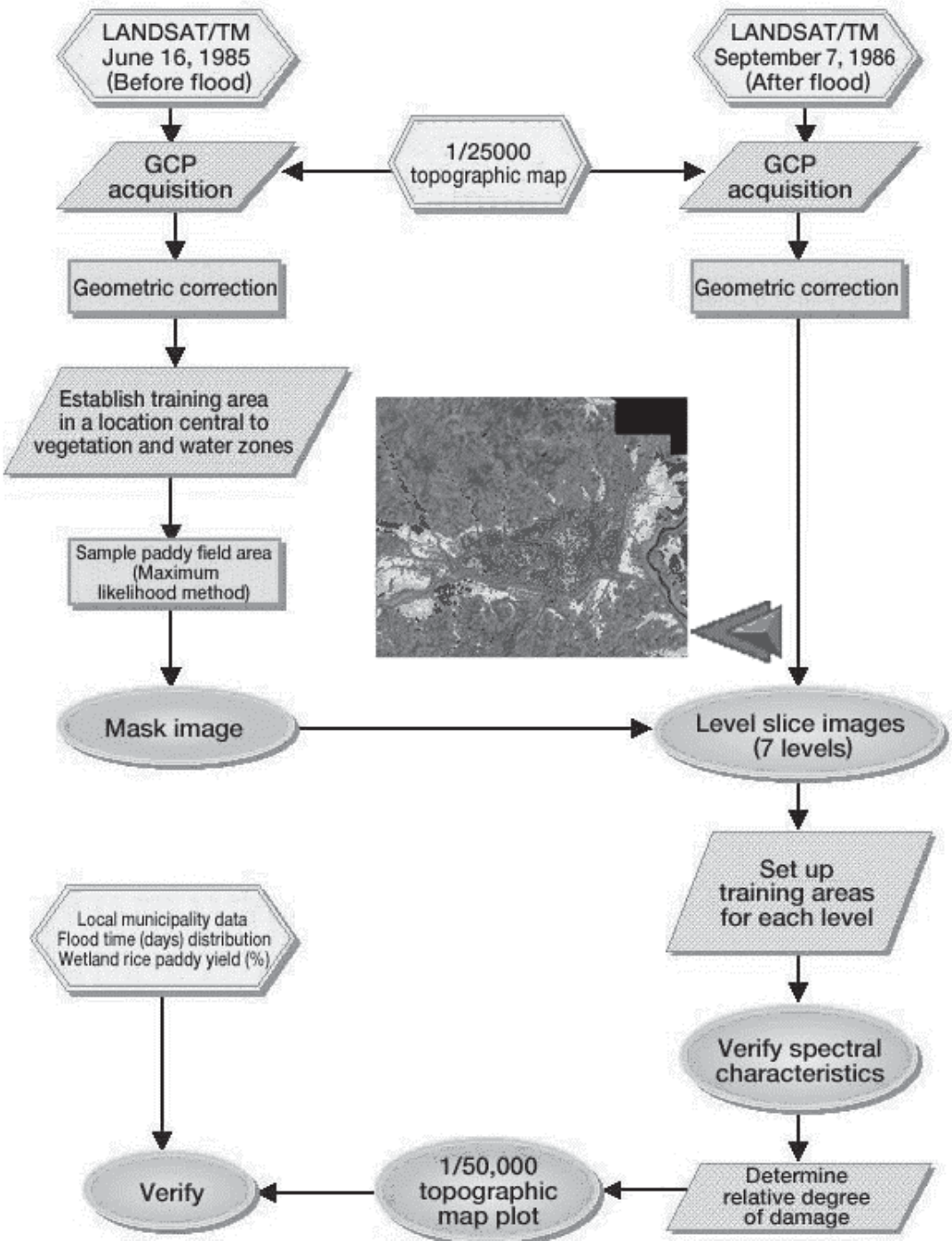

Fig.2-8-2 Typical Analysis Process Flowchart

This publication would provide a valuable source of information for disaster management agency staff and researchers not only in Japan but also in all Asian countries. ADRC will continue its effort to collect case studies on disaster reduction, and to enhance and enrich databases of 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 ADRC Website (http://www.adrc.or.jp/dmweb/index.html).

Moreover, there is a new communications satellite project being promoted by the 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 fiscal 2007. Currently, ADRC, together with JAXA, the 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 the WINDS and other satellites to early disaster warning and disaster information sharing (see Fig.2-8-3).

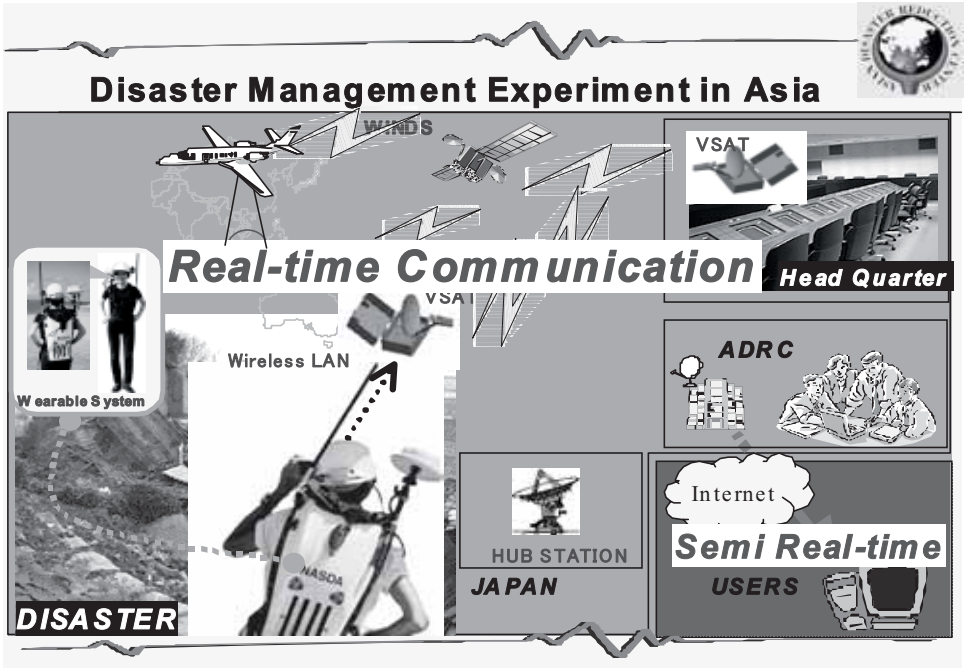

Fig.2-8-3 Realtime Disaster Information System by communications satellites

Since 2004, ADRC and JAXA have been developing a new disaster image distribution system for ADRC member countries and creating user-friendly GIS-based remote sensing database accessible via the web. JAXA has launched a new earth observation satellite "DAICHI" (ALOS) at January 2006 (see Fig.2-8-4).

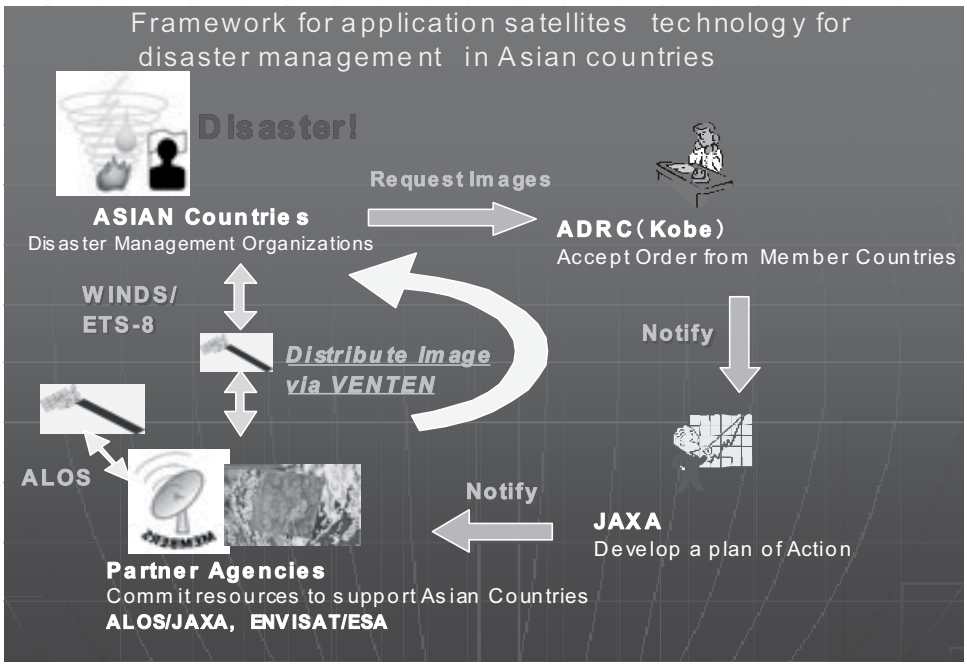

Fig.2-8-4 Satellite Image Distribution System (Plan)

Information flow in this system is as following;

- If a new disaster occurres, counterpart of ADRC member country requests to get space information to ADRC information desk.
- ADRC confirms the area of disaster, and then forwards a request to JAXA.
- JAXA makes a plan of getting images from DAICHI, and then JAXA processes intelligibly the satellite data which DAICHI photoed.
- ADRC adds the text information relevant to disaster, and releases it via VENTEN.
- Only counterparts of ADRC can perform a request, and the result information will release in public.
- ADRC will distribute via VENTEN basically, however in case of narrow internet environment, ADRC will send CD or DVD by international mail, DHL and so on.

ADRC will inform latest news of this project on our by-weekly newsletter “ADRC High Lights”.