

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 Table 2-8-1).

Table. 2-8-1 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	4	Visibility·Near-infrared	87.2-96.4	Saved data	50m	100x90km
	VTIR	4	Visibility·Thermal infrared		Saved data	900&2700m	1500kmx1Path
	MSR	1	Microwave		Saved data	32km	320kmx1Path
JER-1	VNIR	4	Visibility·Near-infrared	92.9-98.10	Saved data	18m	75x75km
	SWIR	4	Medium infrared	92.9-93.12	Saved data	18m	75x75km
	SAR	1	L Band	92.9-98.10	Saved data	18m	75x75km
ADEOS	AVNIR-Mu	4	Visibility·Near-infrared	96.10-97.6	Saved data	16m	80x80km
	AVNIR-Pa	1	Visibility Near-infrared		Saved data	8m	80x80km
	OCTS	13	Visibility~Thermal infrared		Saved data	700m	1400km
TRMM	PR	2	Microwave	97.11-	0.75 days	4.3km	~215km
	VIRS	5	Visibility~Thermal infrared		0.33 days	2km	~720km
	TMI	5	Microwave		0.33 days	6~50km	~760km
ADEOS-II	GLI	36	Visibility~Thermal infrared	02.03-	4 days	0.25&1km	1600km
AMSAR	8	Microwave	4 days		5~50km	1600km	
ALOS	AVNIR-2	4	Visibility·Near-infrared	04.6-	2 days	10m	70km
	PRISM	1	Visibility Near-infrared		46 days	2.5m	70km /35km
	PALSAR	1	L Band		5 days	10&100m	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	36	Visibility~Thermal infrared	99.12-	1.5 days	0.25, 0.5, 1km	2330km
	ASTER	14	Visibility·Near-infrared, Medium infrared, Thermal infrared		16 days	15, 30, 90m	60km
LANDSAT-1,2,3	MSS	4	Visibility·Near-infrared	79.1-83.3	Saved data	80m	185x170km
LANDSAT-4,5	MSS	4	Visibility·Near-infrared	82.10-	Saved data	80m	185x170km
	TM	7	Visibility·Near-infrared, Medium infrared, Thermal infrared		16 days	30&120m	185x170km
LANDSAT-7	ETM+	8	Visibility·Near-infrared	99.4,15-	16 days	15, 30, 60m	185x172km
SPOT-1,2,3	HRV-XS	3	Visibility·Near-infrared	88.5-	3 days	20m	60x60km
	HRV-P	1	Visibility Near-infrared		3 days	10m	60x60km
SPOT-4	HRV-Xi	4	Visibility·Near-infrared	98.3-	3 days	20m	60x60km
	HRV-P	1	Visibility Near-infrared		3 days	10m	60x60km
IRS-1C	PAN	1	Visibility Near-infrared	95.12-97.9-	5 days	5.8m	70x70km
	LISS-3	5	Visibility Near-infrared, Medium infrared		5 days	23&70m	141x141km
ERS-1 (SAR)	AMI	1	C Band	91.8-00.3	Saved data	30m	80x80km
				95.4-	35 days	30m	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	4	Visibility·Near-infrared	99.9-	3 days	4m	11x11km
	PAN	1	Visibility Near-infrared		3 days	1m	11x11km
EROS-A1	PAN	1	Visibility Near-infrared	00.12-	2 days	1.8m	12.5x12.5km
Quick Bird	MULTI	4	Visibility·Near-infrared	01.10-	3.5 days	2.5m	17~32km
	PAN	1	Visibility Near-infrared		3.5 days	0.61cm	15~17km

Using satellite data for analyzing disasters, the Disaster Reduction Working Group of the Satellite Remote Sensing Promotion Committee¹ 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 suit this/her purposes (see Fig. 2-8-2).

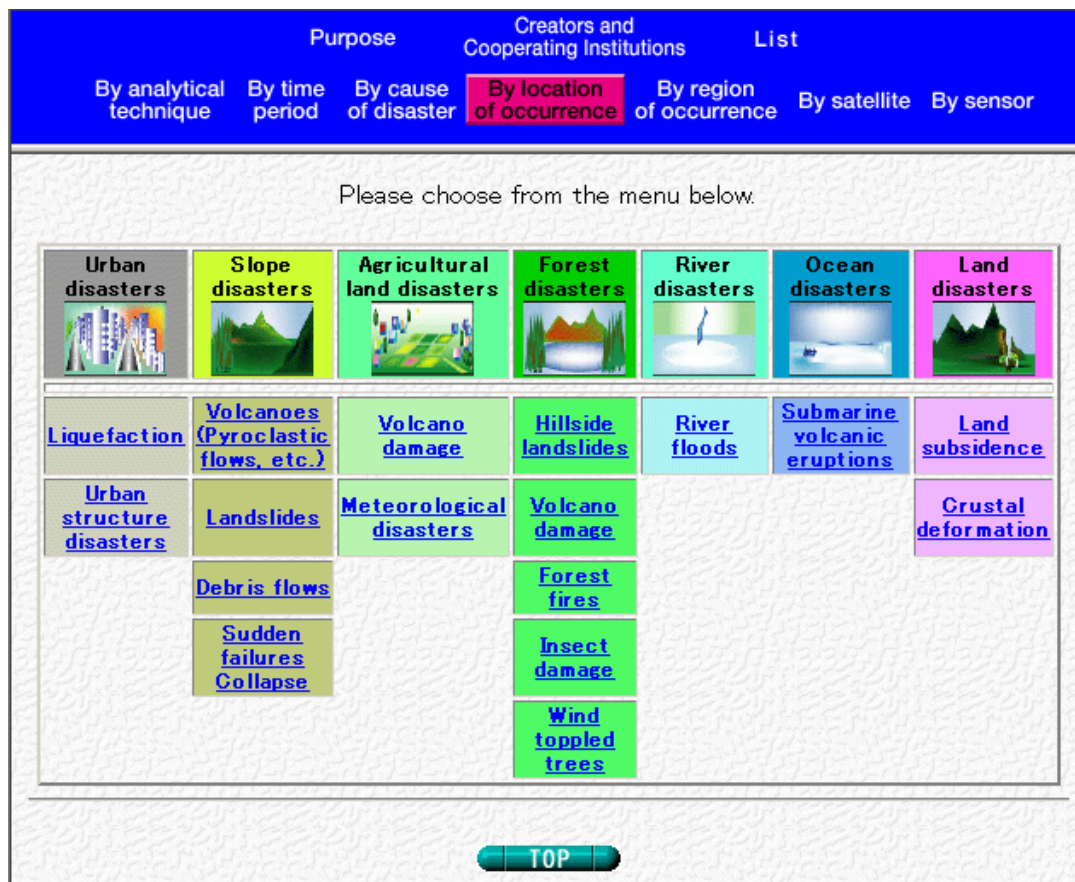


Fig. 2-8-2 Typical Screen Shot of Analysis by Disaster Site

In addition to text data, the Web book contains links to analysis flowcharts, data used for analyses, and graphic images. For the convenience of the user, the Web book is structured like a textbook to help understand how satellite data are used (see Fig. 2-8-3).

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.

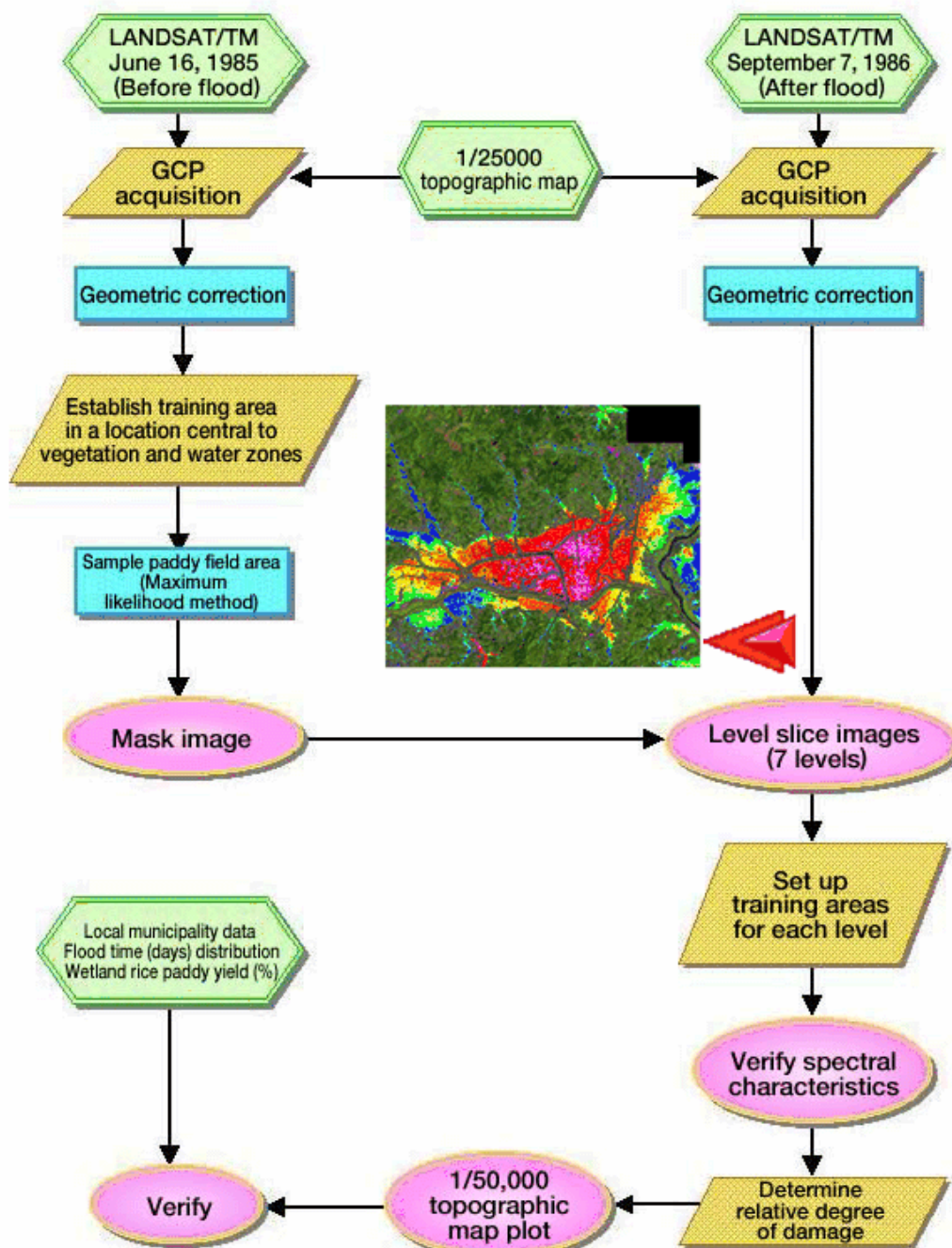


Fig. 2-8-3 Typical Analysis Process Flowchart

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. The 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. The 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 2006. Currently, the 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. 2-8-4).



Fig. 2-8-4 Realtime Disaster Information System by communications satellites

Since 2004, the 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 plans to launch an Earth observation satellite (ALOS) in autumn 2005 (see Fig. 2-8-5).

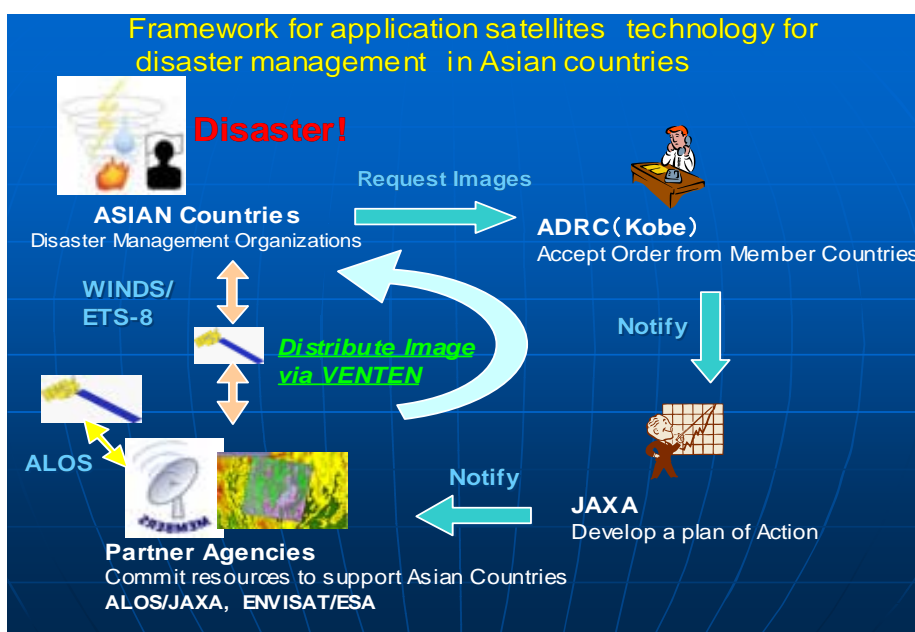


Fig. 2-8-5 Satellite Image Distribution System (Plan)