MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT
NATIONAL REMOTE SENSING DEPARTMENT (NRSD)

Satellite-based applications for disaster monitoring in Vietnam

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National Remote sensing Department – Ministry of Natural resources and Environment

Awaji-island, Nov 2018

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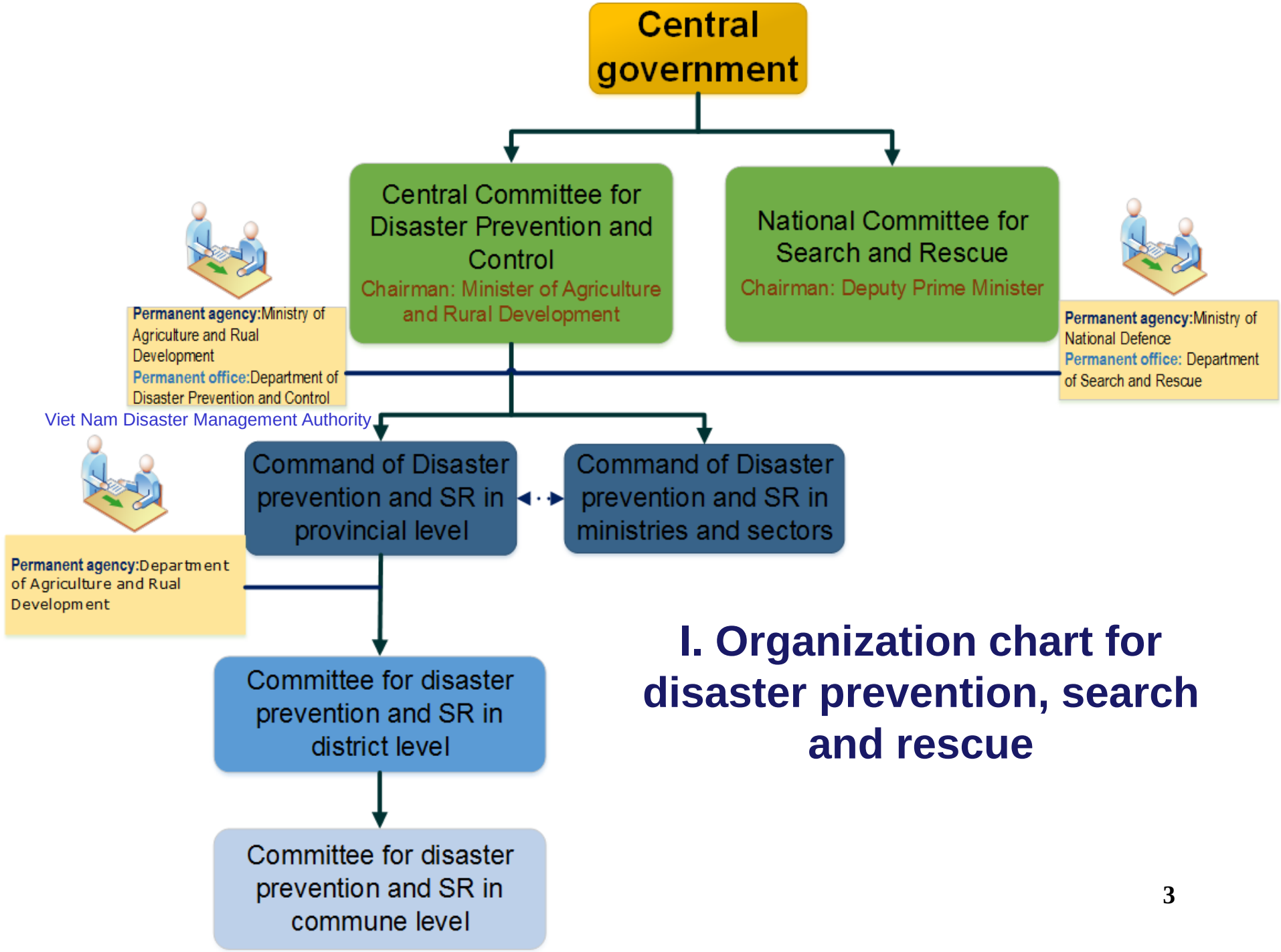


I. Organization chart for disaster prevention, search and rescue

I.1. Natural disaster in Vietnam

- Vietnam is prone to natural disasters, including typhoons, storms, floods, droughts, landslides, and.... The poorest people in society are the most vulnerable.
- More than one million people require emergency relief each year
- Climate change and natural disasters are big challenges to the development and poverty reduction in Vietnam
- It is estimated the damages cause by disasters such as hurricanes, floods, and cyclones were about 1-2% of the annual GDP.

I. 2. Natural disasters typical in Vietnam

- Storms: the annual number of storms is quite large (8-9) and intensity with an increasing trend, especially in the last three decades. 80 - 90% of the Vietnamese population affected by the storm.

- Flooding: River flooding occurs annually in all areas. Flooding is most serious in the Mekong Delta - primarily from the upstream of the Mekong River and is directly affected by the tide. Flood season lasts for long time from 4 to 5 months of the year, flooding almost the entire Mekong River Delta.

- Flash floods, mudflows: Flash floods occur within the limited geographical areas, but very intense and often cause serious loss of life and property. For the last 10 years (2005-2014) there have been 96 flash floods causing more than 880 dead and almost 1,500 injured people; more than 6000 houses destroyed; 120,000 houses were flooded; 132 thousand hectares of rice and crops were flooded.

- Drought and desertification: Droughts occur in all parts of the country. Drought has reduced from 20 to 30% yields, reduced food production, causing serious effects on livestock and subsistence of the people. Prolonged drought will lead to the risk of desertification in some regions, especially the South Central region, coastal sand and slopes of the midland and mountainous areas.

- Salinity: salinity occurs along the coast with different levels. The South West coastal provinces are those of most affected area of serious salinization with 1.77 million hectares, accounting for 45% of the land area..
- Whirlwind: usually occurs suddenly, often occur every year in Vietnam. In recent years the number of whirlwind increases.
- Erosion: loss of riverbanks, beaches, steep slopes, cracked earth. Erosion occurs often causes: exogenous causes (by water), endogenous (due to geological changes) and livelihoods (due to unorganized mining or construction works)…
- Earthquakes have occurred in Vietnam, but only at low levels. The tsunami has not yet appeared in Vietnam, many Vietnamese coasts are still at risk of tsunami affected by potential earthquake risk in the region.

Disaster relative frequency in Vietnam

Table: Disaster relative frequency in Vietnam

High	Medium	Low
Flood,	Landslide	Earthquake
Storm, Tropical depression	salinity intrusion	
Flash flood		
Drought		

(Source: National report on natural disaster reduction in Vietnam)

I.3. National policies related to disaster management

In recent years, Vietnam has developed and issued a number of related legal documents such as: Law on Dykes, Forest Protection and Development Law, Environmental Protection Law, the Ordinance on the Prevention, floods Control. The government also issued the various decrees guiding the implementation of laws and ordinances.

- A number of strategies and action plans developed as: the national program strategies: a national strategy for prevention and mitigation of natural disasters to 2020 (2007); national target program to respond to climate change (2008); ...

National policies …

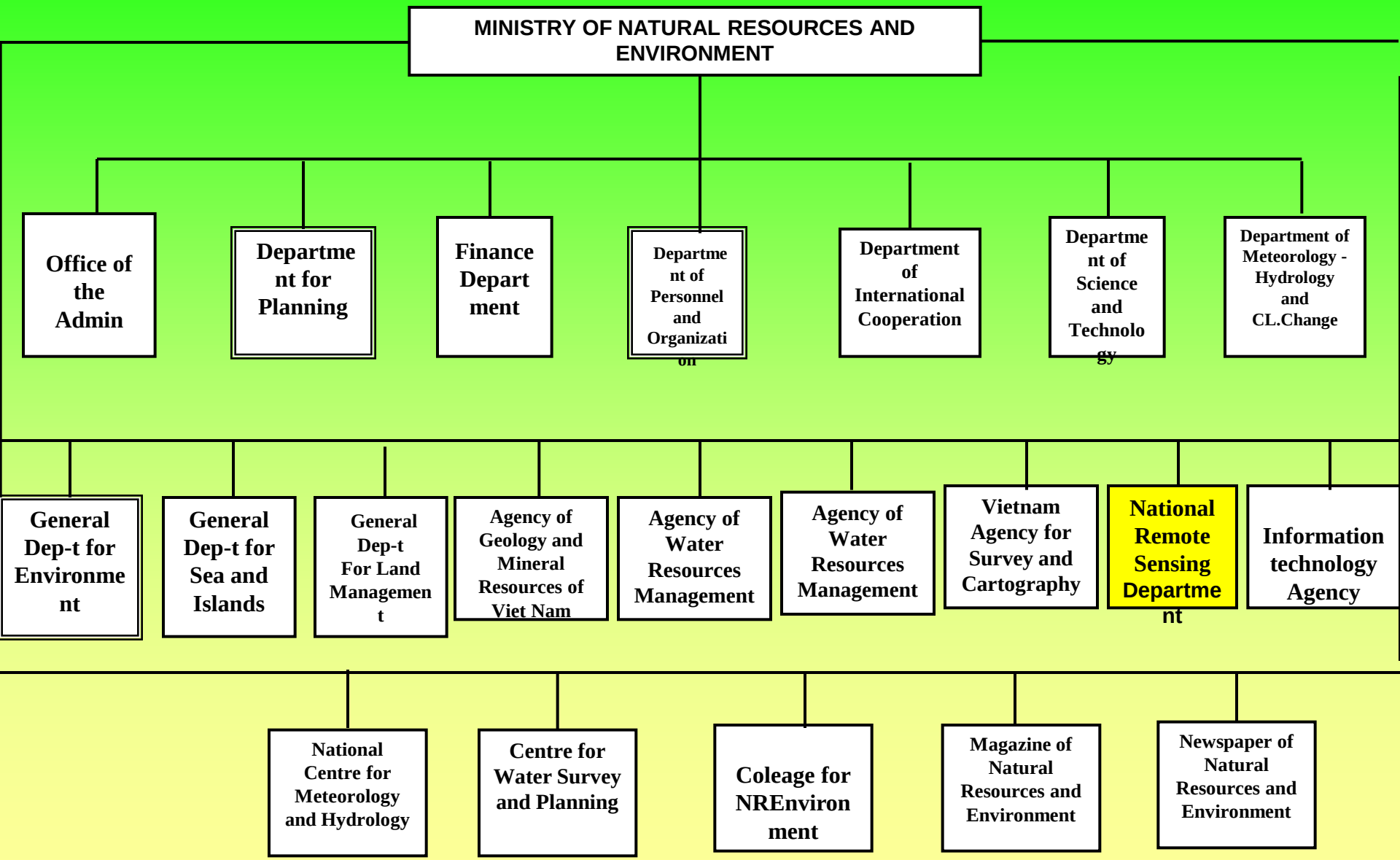
- Develop and implement programs of social and economic development related to flood, storm mitigation as: Watershed Forest planting program, mangroves forest, protection forest program, building reservoirs for regulating floods, safety program for fishing vessels, strengthening and upgrade dyke system
- Rescue work: establishment of the National Committee for Search and Rescue, completing the apparatus from the central to local levels, strengthening equipment and facilities for search and rescue work, preparedness planning for the work of search and rescue by 2015

II. Introduction of National Remote Sensing Department - MONRE

I.1. Establishment of NRSD

- 1980 – The Remote Sensing Center belong to State Depart. of Geodesy and Cartography
- 1994 – RSC belong to General Depart. Of Land Administration (GDLA);
- 2002 – RSC of Ministry of Natural Resources and Environment (MONRE);
- 2008 - National RSC of MONRE
- 2013 - National Remote Sensing Department

NRSD IN MONRE

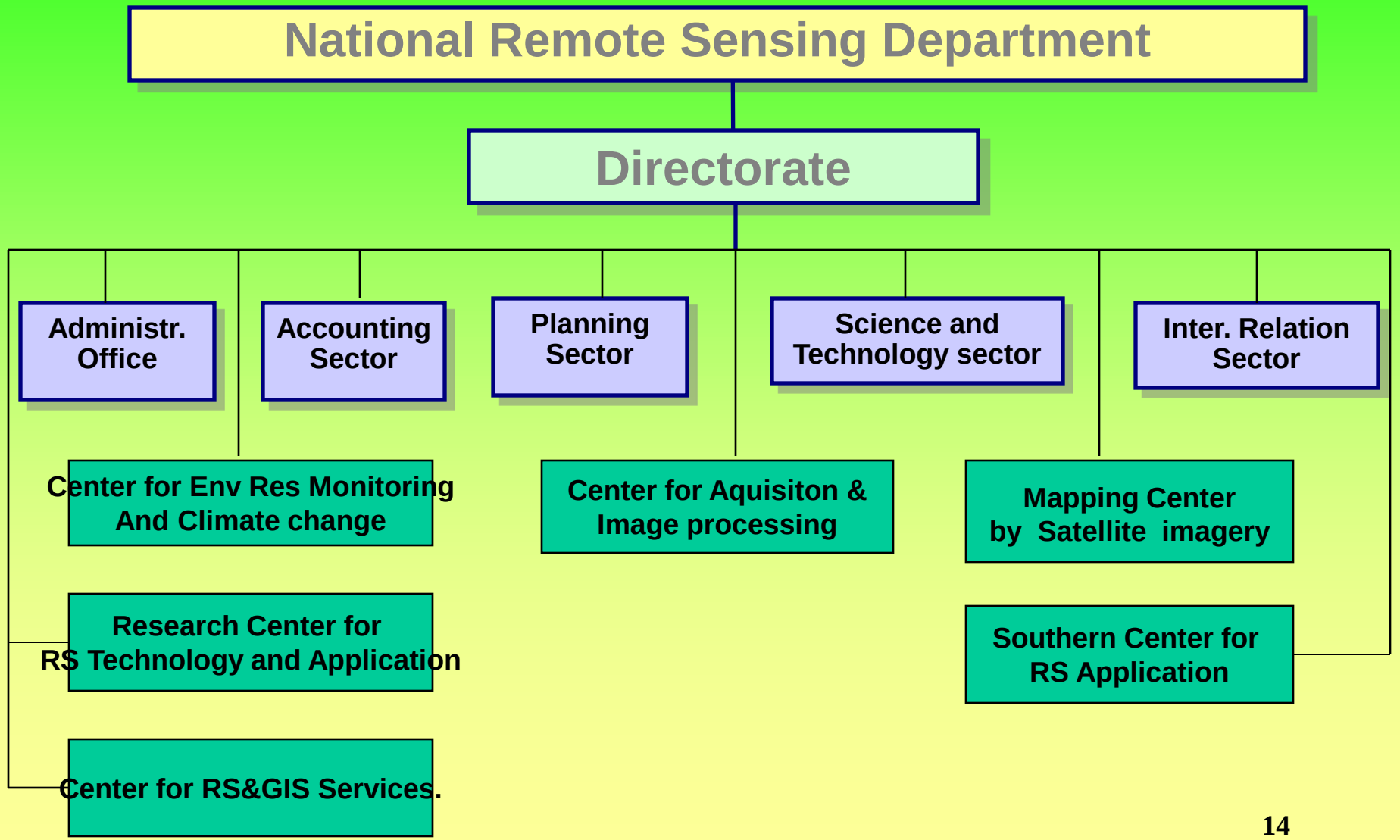


The staft

280 per.

- Doctors : 6
- M.Sc : 55
- Engineers : 200
- Others : 19

Organization flowchart of NRSD



I.2. Main functions and Duties

- To submit to the Minister of Natural Resources and Environment draft laws, ordinances and legal documents on remote sensing; Disseminate, guide sectors, localities, organizations, citizens and control them to keep remote sensing activities in accordance with the law;
- To build and update the remote sensing database and publish the national remote sensing metadata; Application of remote sensing for monitoring natural resources, environmental protection, natural disaster prevention and response to climate change.
- To uniformly manage the planning on the network of remote sensing stations, remote sensing data bases, exploitation and use of national remote sensing data;
- To provide RS data to agencies, organizations and individuals as prescribed by law

- Organizing the observation and supervision by remote sensing; To assume the prime responsibility for elaborating and publishing annual and unscheduled reports on the exploitation and use of natural resources, environmental pollution, natural disasters and climate change with RS technologies;
- To build, manage, exploit and develop remote sensing infrastructure, including: remote sensing satellite systems, remote sensing stations, storage and processing systems, remote sensing databases; Remote sensing data transmission network; To guide and inspect the protection of the technical safety corridors of remote sensing stations

Vietnam Ground Station

- Located at Hanoi, the Capital city of Vietnam;
- Become to operation since November 2008;
- Receiving data from SPOT2, SPOT4, SPOT5, ENVISAT ASAR, ENVISAT MERIS and VnredSat 1

WINDS Ground Station

Completed installation on Nov 26, 2010

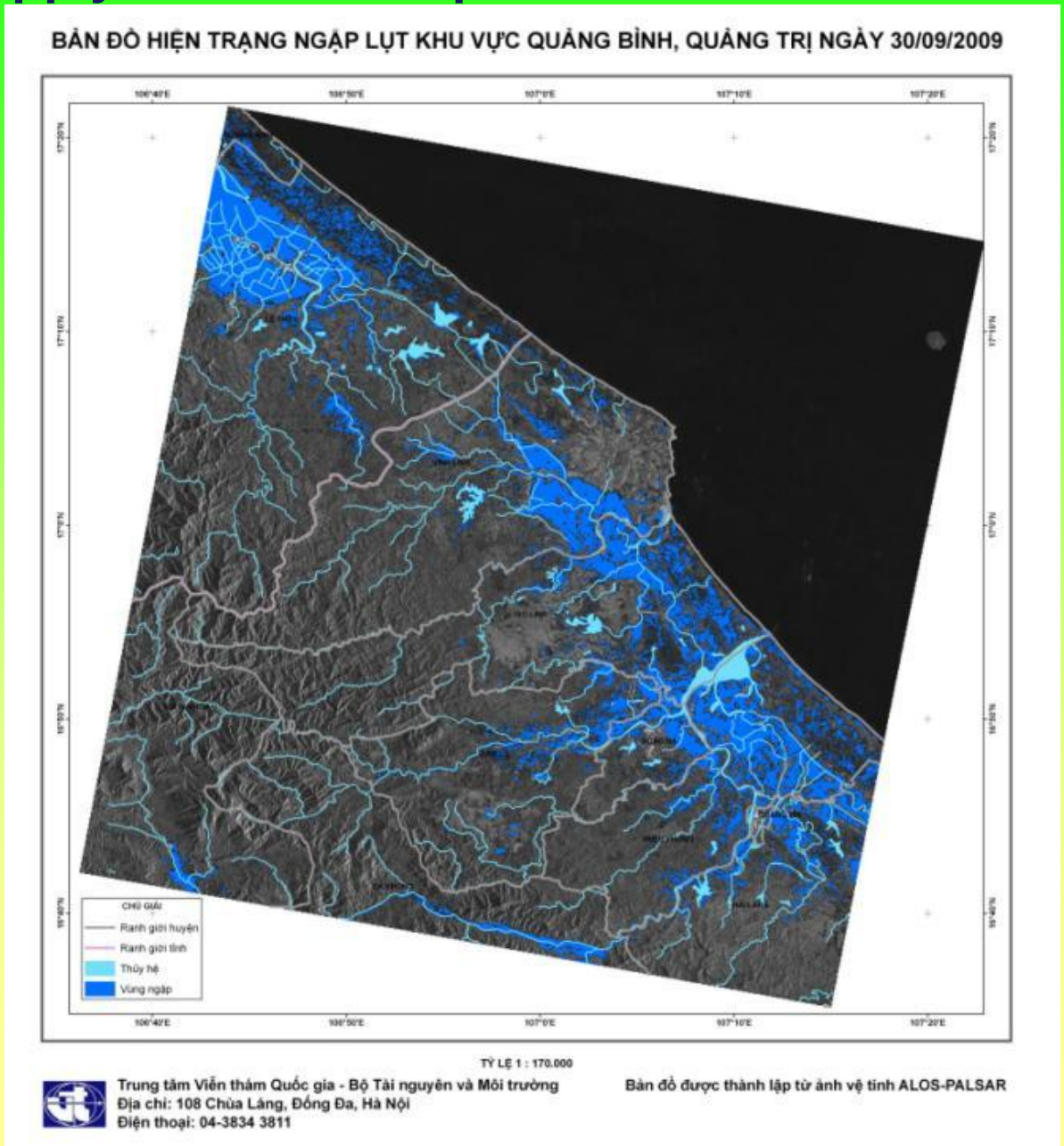
III. APPLYING REMOTE SENSING AND WEB-GIS TECHNOLOGIES TO ASSIST DISASTER MANAGEMENT

III.1. Receive and provide satellite imagery data

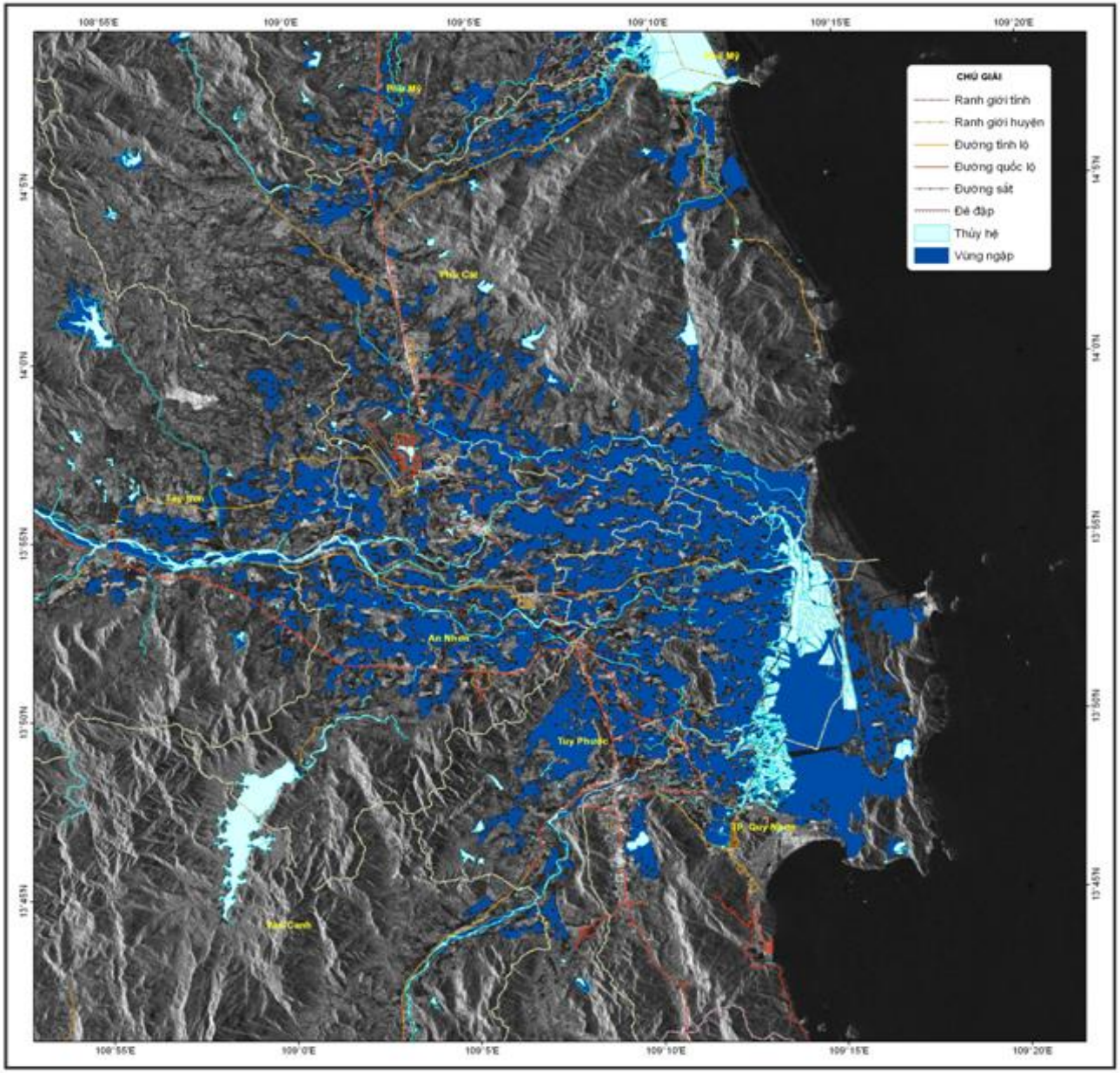
- Emergency response for Flood disaster, Flash floods, mudflows, drought, landslide, oil spill
- Monitoring of land resources (Changes in land cover and land use)
- Forest resource monitoring (Assessment on change of forest cover, Reducing Emissions from Deforestation and Degradation)
- Environmental monitoring
- Sea surface and coastal surveillance
- Update geographic information

III.2. Process and supply value added products

- Flood Rapid map



BẢN ĐỒ HIỆN TRẠNG NGẬP LỤT KHU VỰC TỈNH BÌNH ĐỊNH NGÀY 05/11/2009

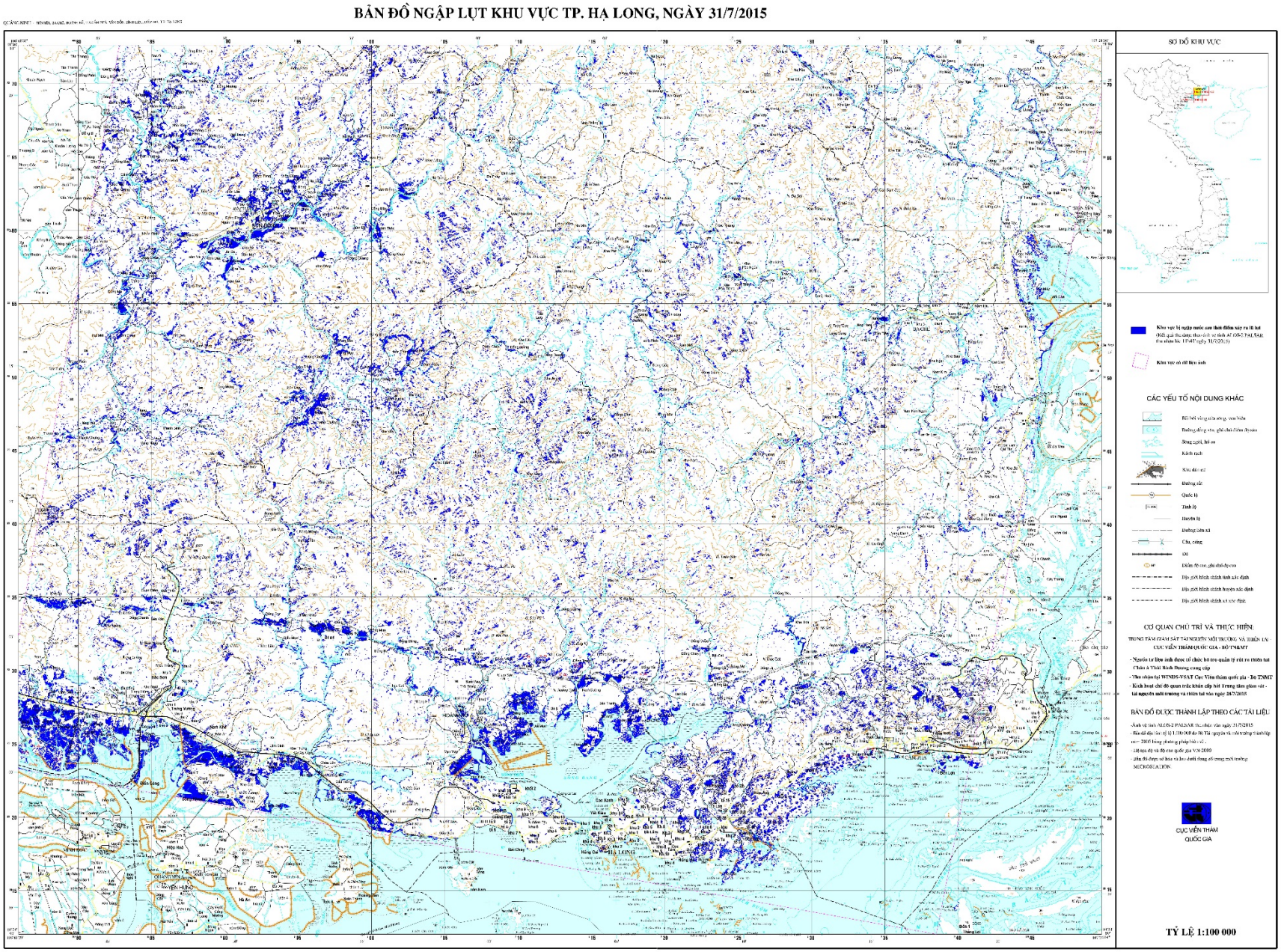


Bản đồ được thành lập từ ảnh vệ tinh ALOS-PALSAR thu ngày 05/11/2009

TỶ LỆ 1 : 100.000

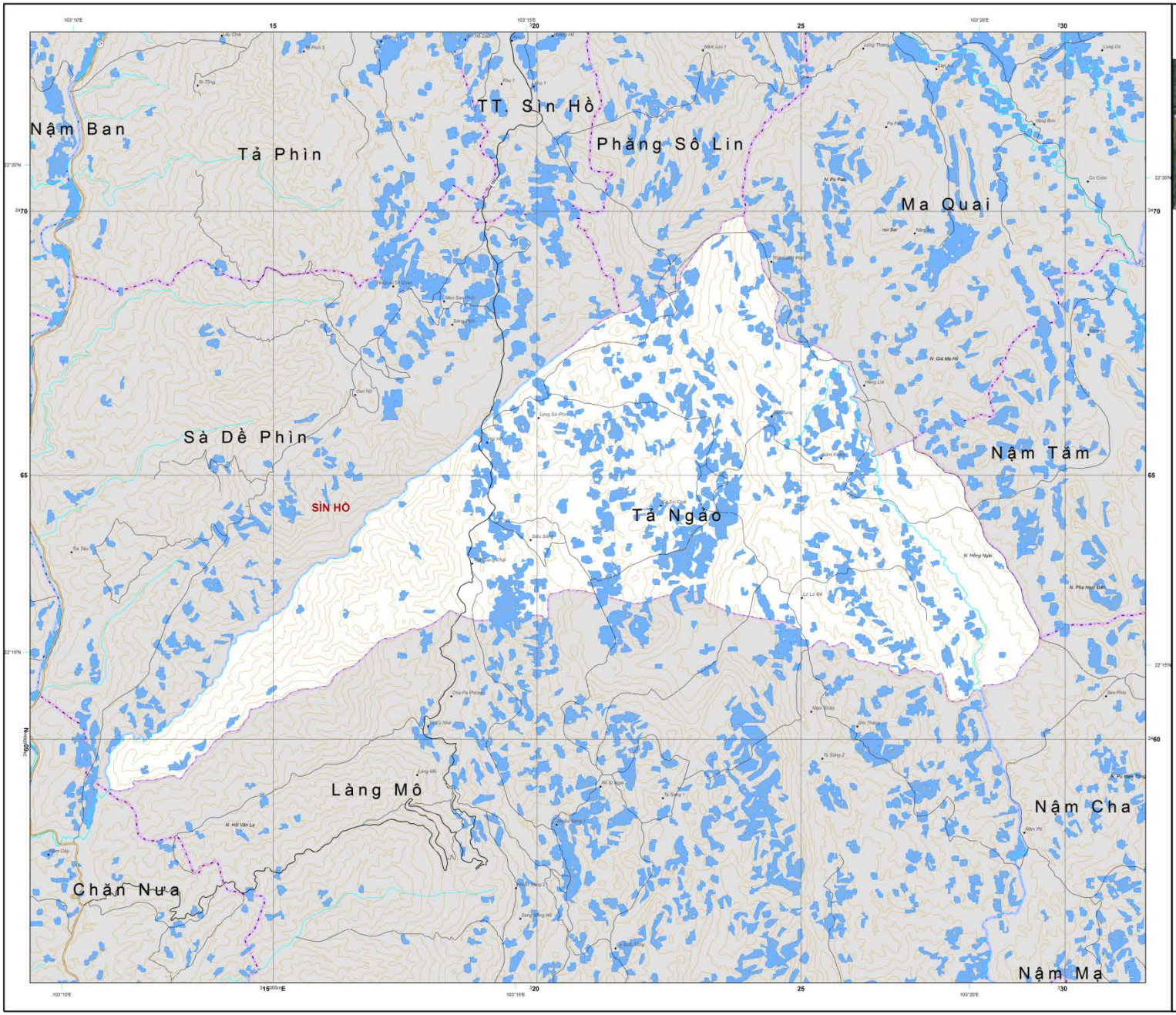
Trung tâm Viễn thám Quốc gia - Bộ Tài nguyên và Môi trường
Địa chỉ: 108 Chùa Láng, Đống Đa, Hà Nội
Điện thoại: 04-3834 3811

Flood map over Quang Ninh Province 2015



BẢN ĐỒ GIÁM SÁT NHANH HIỆN TRẠNG NGẬP LỤT

KHU VỰC XÃ TẢ NGÀO, HUYỆN SÌN HỒ, LAI CHAU NGÀY 27/6/2018



SƠ ĐỒ KHU VỰC

MẢNH 4

Khu vực bị ngập nước thêm khi xảy ra lũ lụt

(Kết quả thu được theo ảnh vệ tinh ALOS-2 PALSAR thu nhận ngày 27/6/2018)

CÁC YẾU TỐ NỘI DUNG KHÁC

- Bãi cát ven biển
- Ao hồ, sông ngòi
- Khu dân cư
- Đường sắt
- Quốc lộ và số đường
- Tỉnh lộ và số đường
- Cầu
- Đường bình độ
- Biên giới Quốc gia
- Địa giới Tỉnh

CƠ QUAN CHỦ TRÌ VÀ THỰC HIỆN:

TRUNG TÂM GIÁM SÁT TÀI NGUYÊN MÔI TRƯỜNG VÀ THIÊN TAI

CỤC VIỄN THÁM QUỐC GIA - BỘ TN & MT

- Nguồn tư liệu ảnh được tổ chức hỗ trợ quản lý rủi ro thiên tai Châu Á Thái Bình Dương cung cấp
- Kích hoạt chế độ quan trắc khẩn cấp bởi TT Giám sát - Tài nguyên Môi trường và Thiên tai vào ngày 10 / 10/ 2017

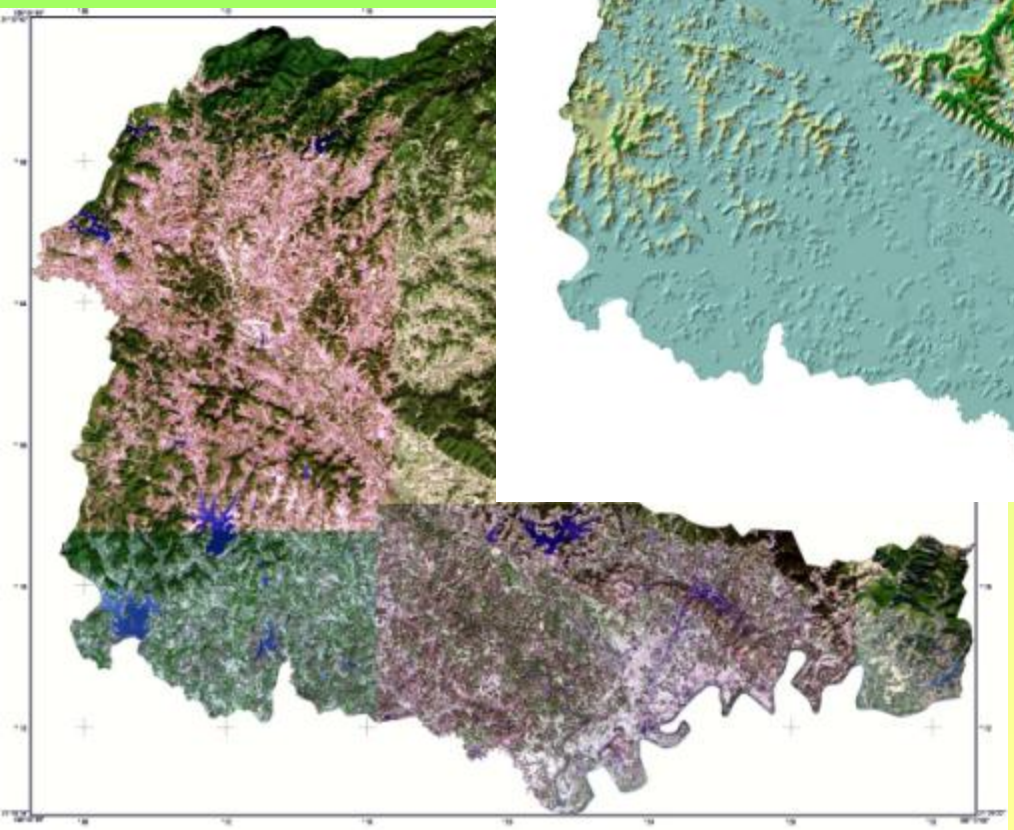
BẢN ĐỒ ĐƯỢC THÀNH LẬP THEO CÁC TÀI LIỆU

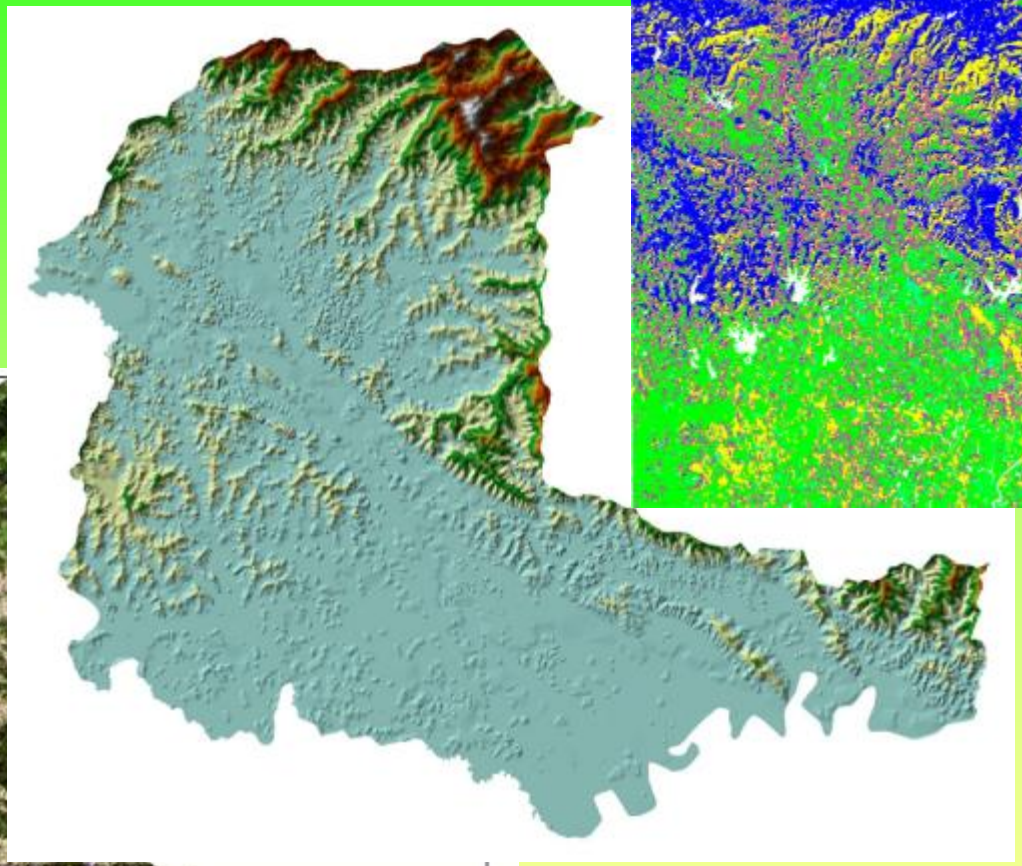
- Ảnh vệ tinh ALOS- PLASAR thu nhận vào ngày 27 /6 / 2018
- Cơ sở dữ liệu Bản đồ địa hình 1: 50.000
- Hệ tọa độ và quốc gia Việt Nam Vn-2000
- Bản đồ được thành lập dạng số trong môi trường Arcgis

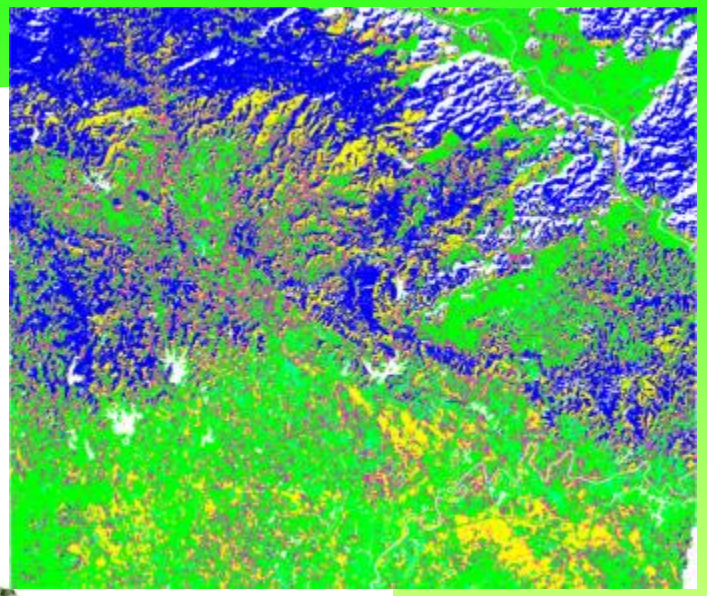
CỤC VIỄN THÁM QUỐC GIA

TỶ LỆ 1: 25 000

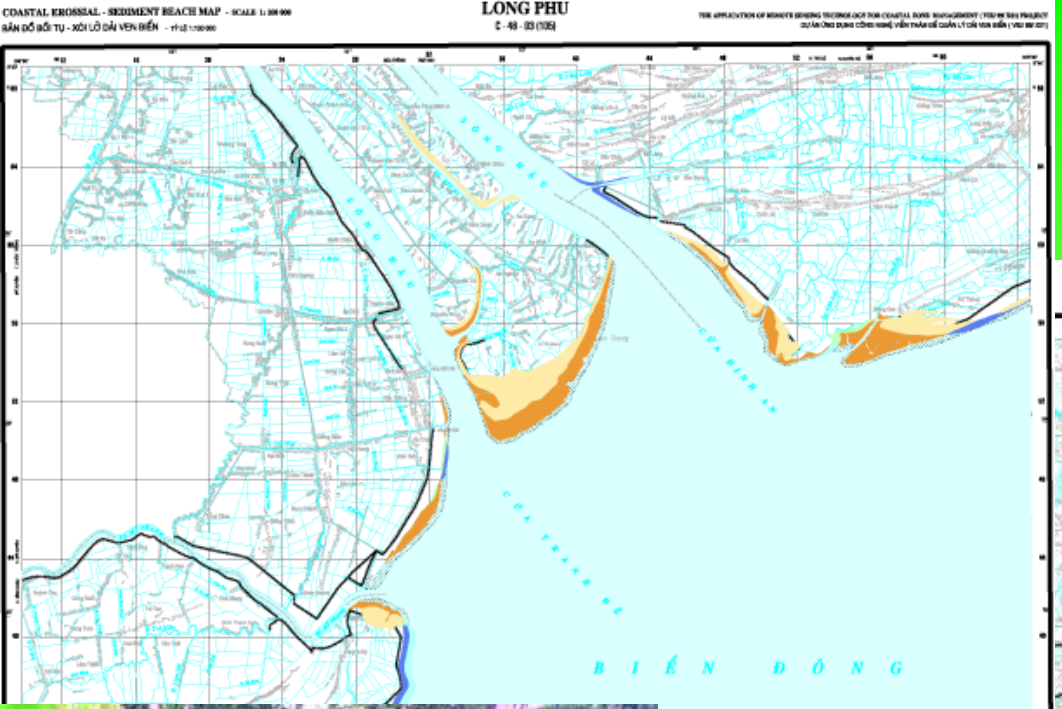
Forestry monitoring map

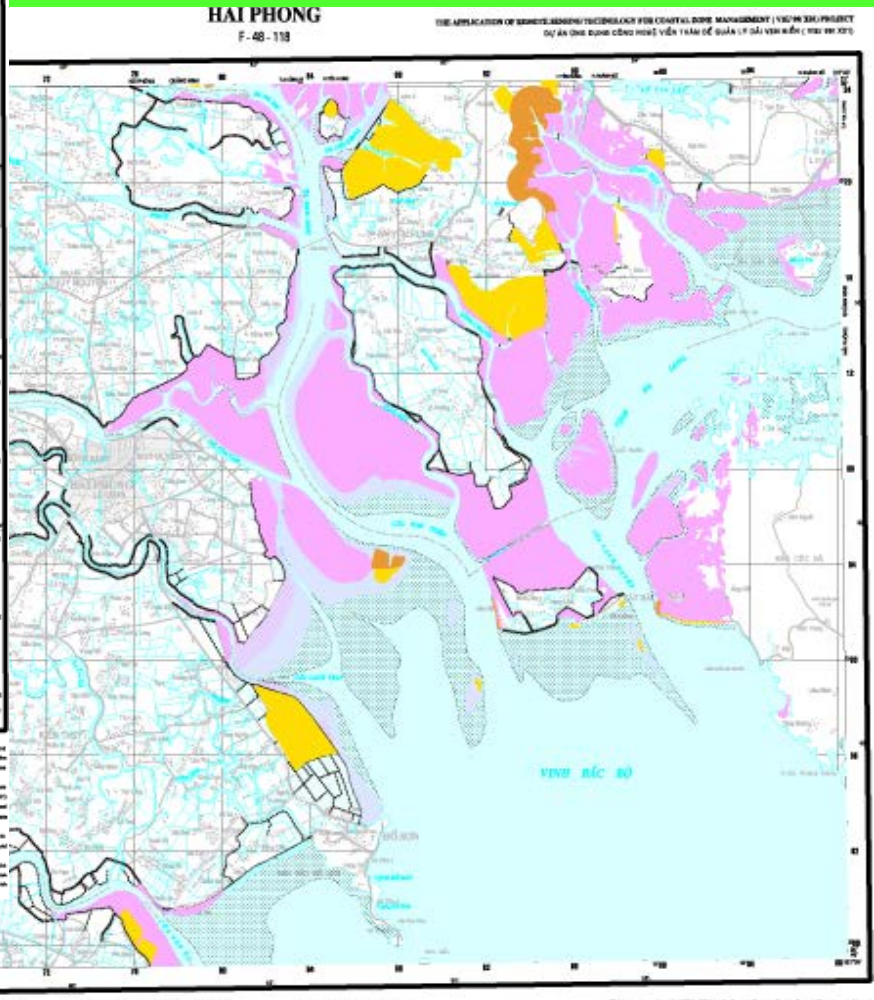


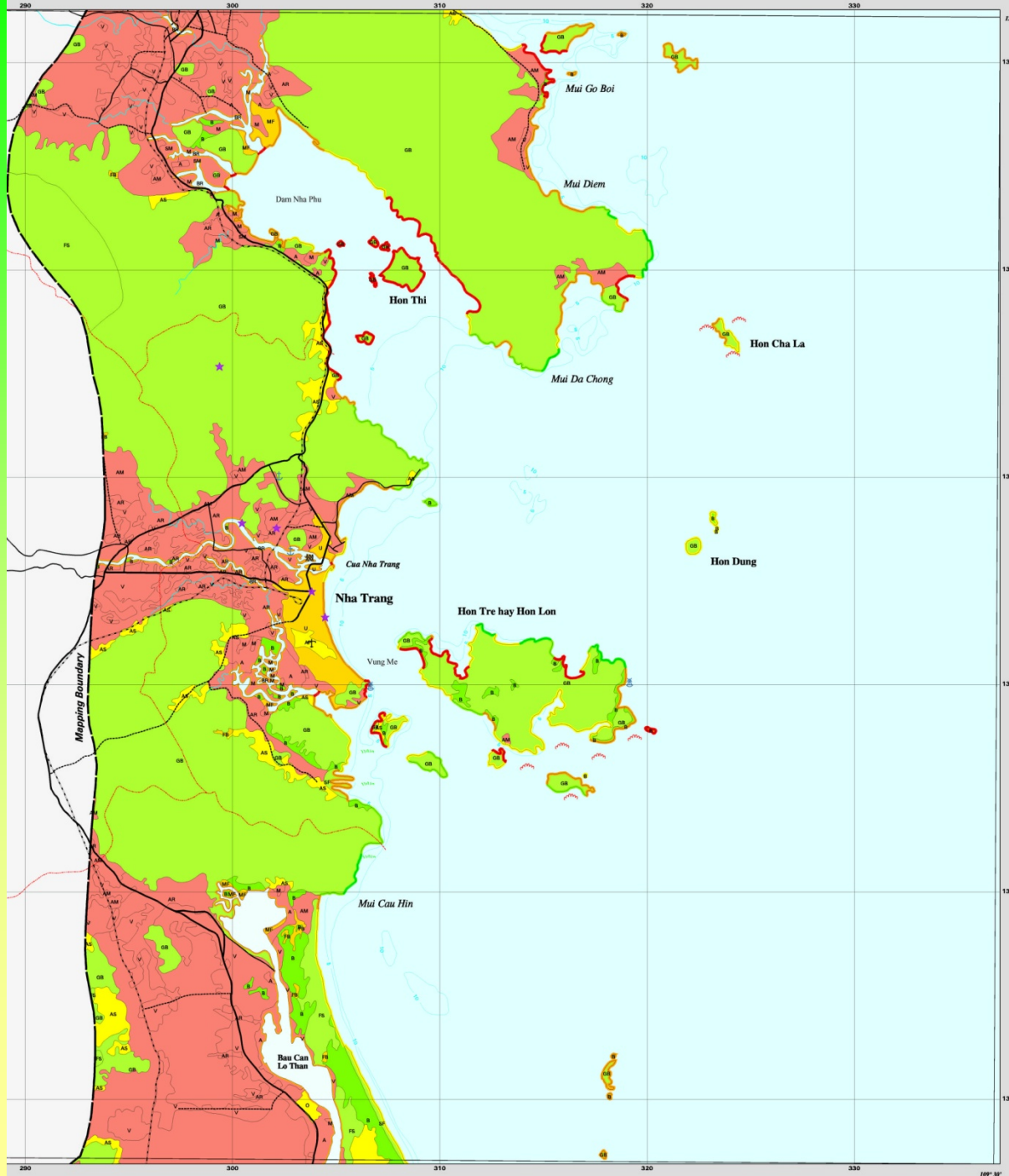




Coastal erosion map







Coastal Sensitivity Map

Coastal Sensitivity Mapping Project
Vietnam National Marine Pollution Control Programme

Vietnam - Sweden
December, 1995

Legend

Resource Sensitivity Index (CRSI)

- Low Sensitivity
  - Barren Land
- Medium-Low Sensitivity
  - Sand Flat
  - Sparse Forest
  - Grassland/Bushland
- Medium Sensitivity
  - Dense Forest
  - Sedge Plantation
  - Sparse Agriculture
  - Industrial Land
  - Harbour
  - Airport
- Medium-High Sensitivity
  - Mud Flat
  - Salt Pan
  - Lagoon
  - Broad River
  - Streams
  - Freshwater Body
  - Urban Area
- High Sensitivity
  - Mangrove
  - Freshwater Marsh
  - Saltwater Marsh
  - Dense Agriculture - Rise
  - Dense Agriculture - Mixed
  - Aquaculture
  - Canal
  - Village

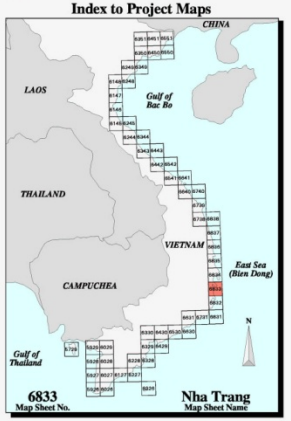
Shoreline Sensitivity Index (SSI)

- Low Sensitivity
- Medium-Low Sensitivity
- Medium Sensitivity
- Medium-High Sensitivity
- High Sensitivity

- National Boundary
- Provincial Boundary
- District Boundary
- National Road
- Provincial Road
- Access Road
- Railway
- Presence of Coral Reef
- Presence of Seagrass
- Port
- Light House
- Airport
- Tourist/Cultural Area
- Protected Area

Class definitions and sources of information are described and listed in the main project report "Coastal Sensitivity Mapping". Positioning of point information, e.g. ports and light houses, are not verified in field.

Index to Project Maps



6833
Map Sheet No.

Nha Trang
Map Sheet Name

Scale 1:100,000

Units: Kilometer Projection: UTM (zone: 49) Ellipsoid: Everest

0 1 2 3 4 5 6 7 8 9 10 km

The map has been produced from satellite imagery interpretation within the project "Coastal Sensitivity Mapping" which forms part of the Vietnam National Marine Pollution Control Programme (VNMPCP). The majority of the imageries were recorded by the SPOT-3 satellite in 1994-95, using multispectral mode. Satellite interpretation, Field work and Map preparation were conducted in Vietnam during May - September 1995. The map production was finalized in Sweden.

Trimar Sterling Group: P.O. Box 27313, 102 54 Stockholm, SWEDEN

TRIMAR

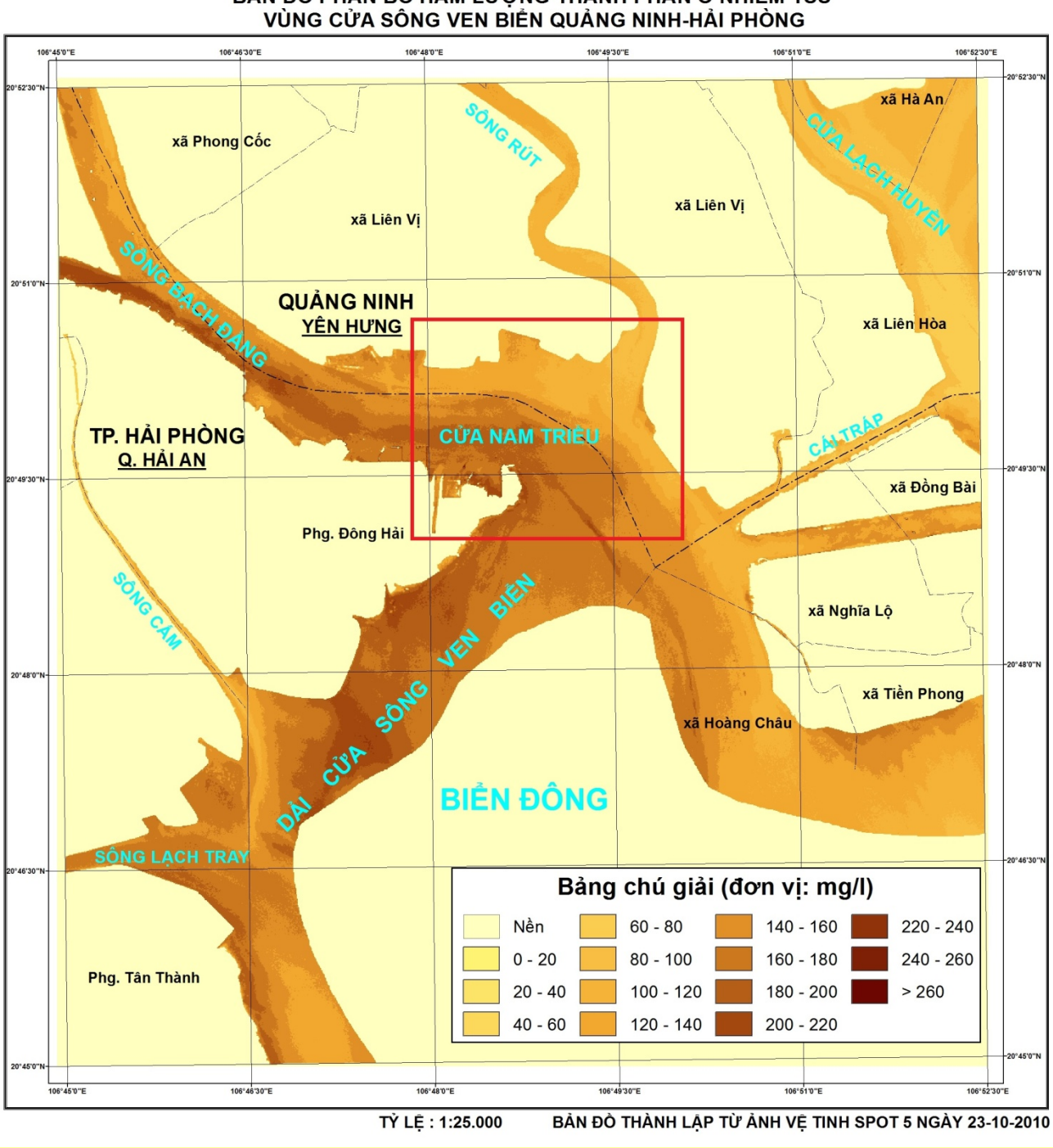
in association with

SWECO

and

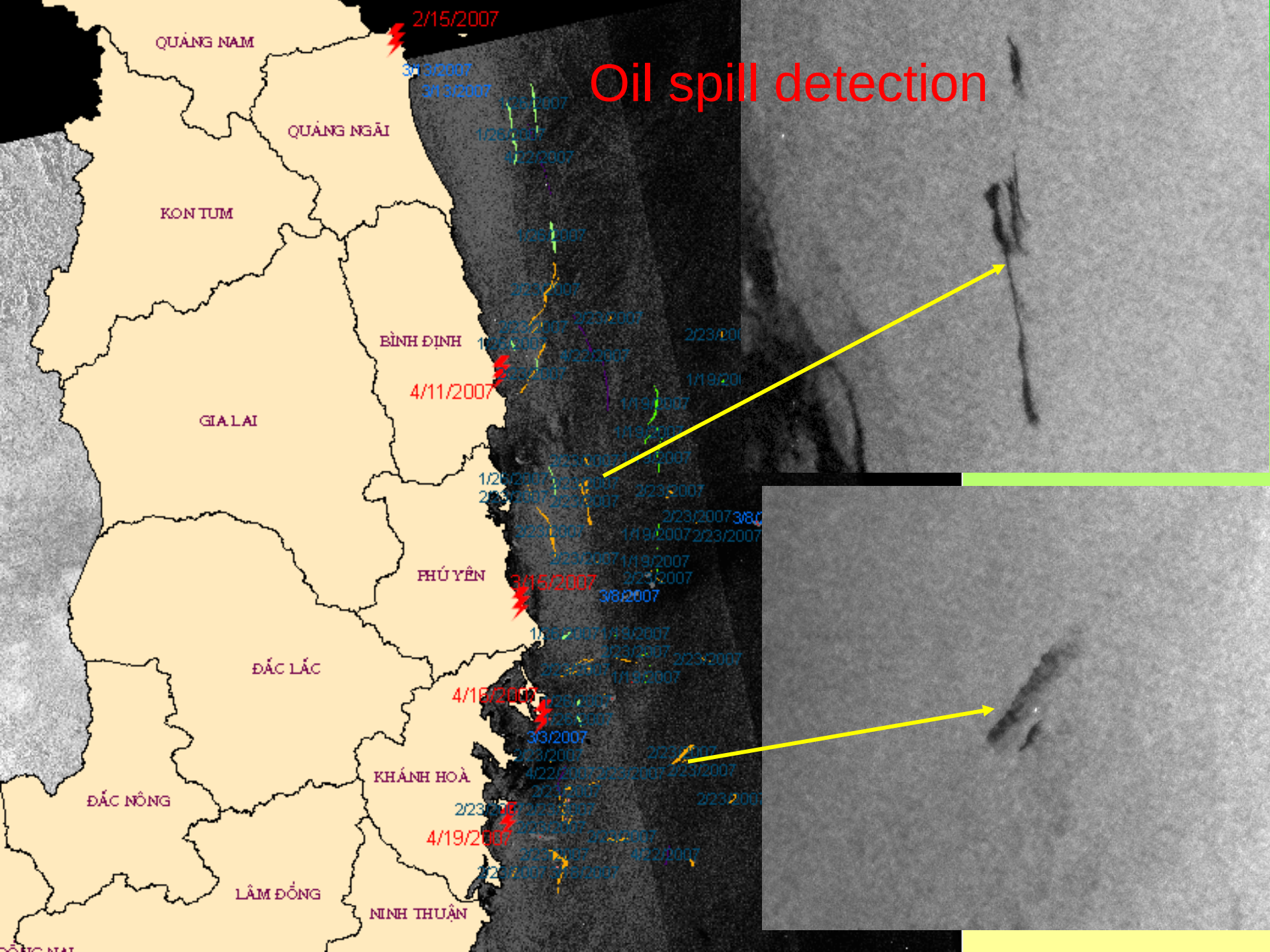
Remote Sensing Centre
General Department of Land Administration

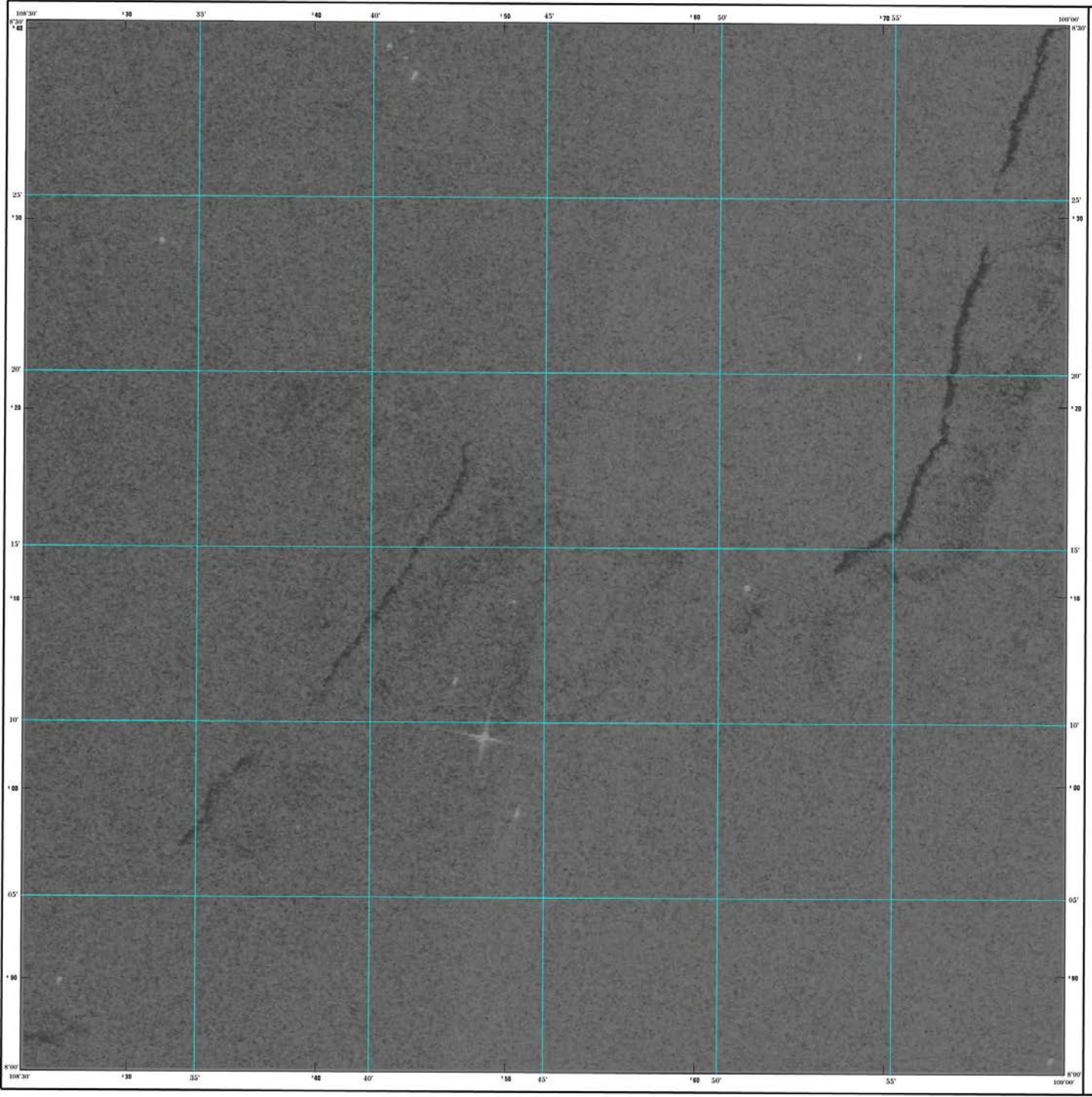
Client: Ministry of Science, Technology and Environment



Application spot 5 satellite images for mapping surface water quality in estuarine area

Oil spill detection





BÌNH ĐỒ ẢNH VỆ TINH

Dự án: "Sử dụng công nghệ viễn thám phục vụ xác định nguyên nhân sự cố ô nhiễm dầu tại các tỉnh ven biển Việt Nam"

CHỦ ĐẦU TƯ DỰ ÁN:
TRUNG TÂM VIỄN THÁM - BỘ TN&MT

THỜI GIAN THỰC HIỆN:
NĂM 2007

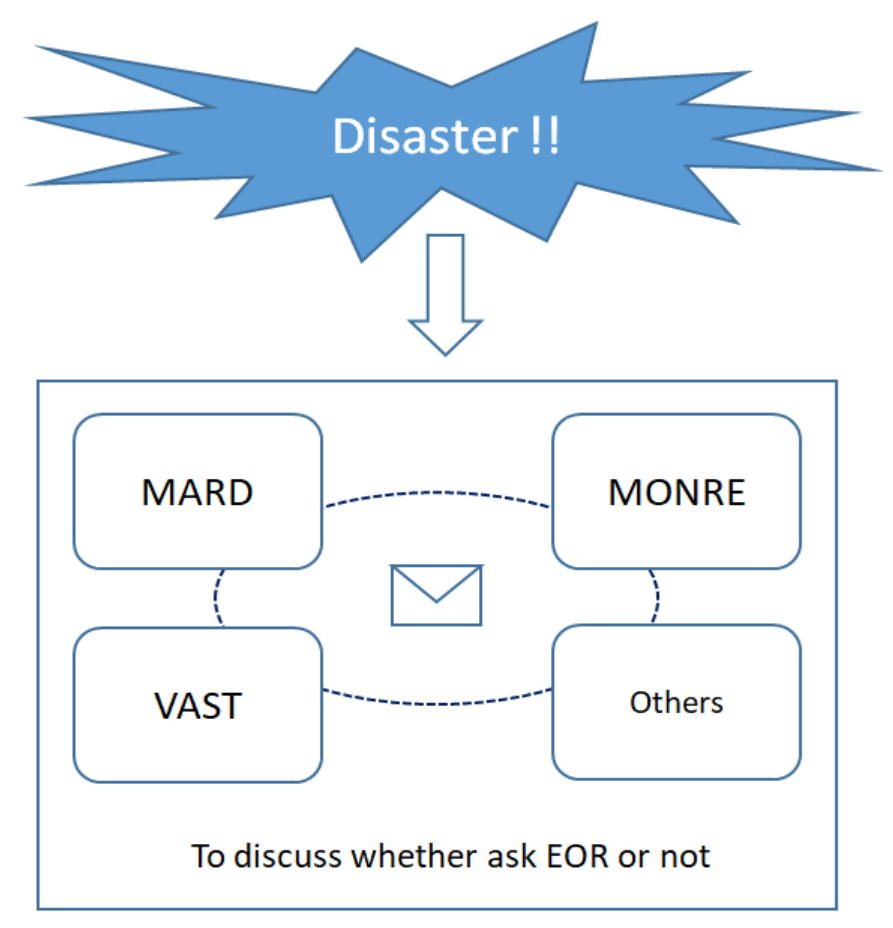
BÌNH ĐỒ ẢNH ĐƯỢC THÀNH LẬP
TẠI TT. GIÁM SÁT TN & MT
TRUNG TÂM VIỄN THÁM - BỘ TN&MT

NGUỒN TÀI LIỆU:
Ảnh vệ tinh rada ENVISAT ASA chụp ngày 15/04/2007; số hiệu ASA_WSM_1PNIPA20070415_023038_000001152057_00175_26782_1898;
Hệ VN-2000, múi 6°, kinh tuyến trục 111°

Tỷ lệ 1:100 000

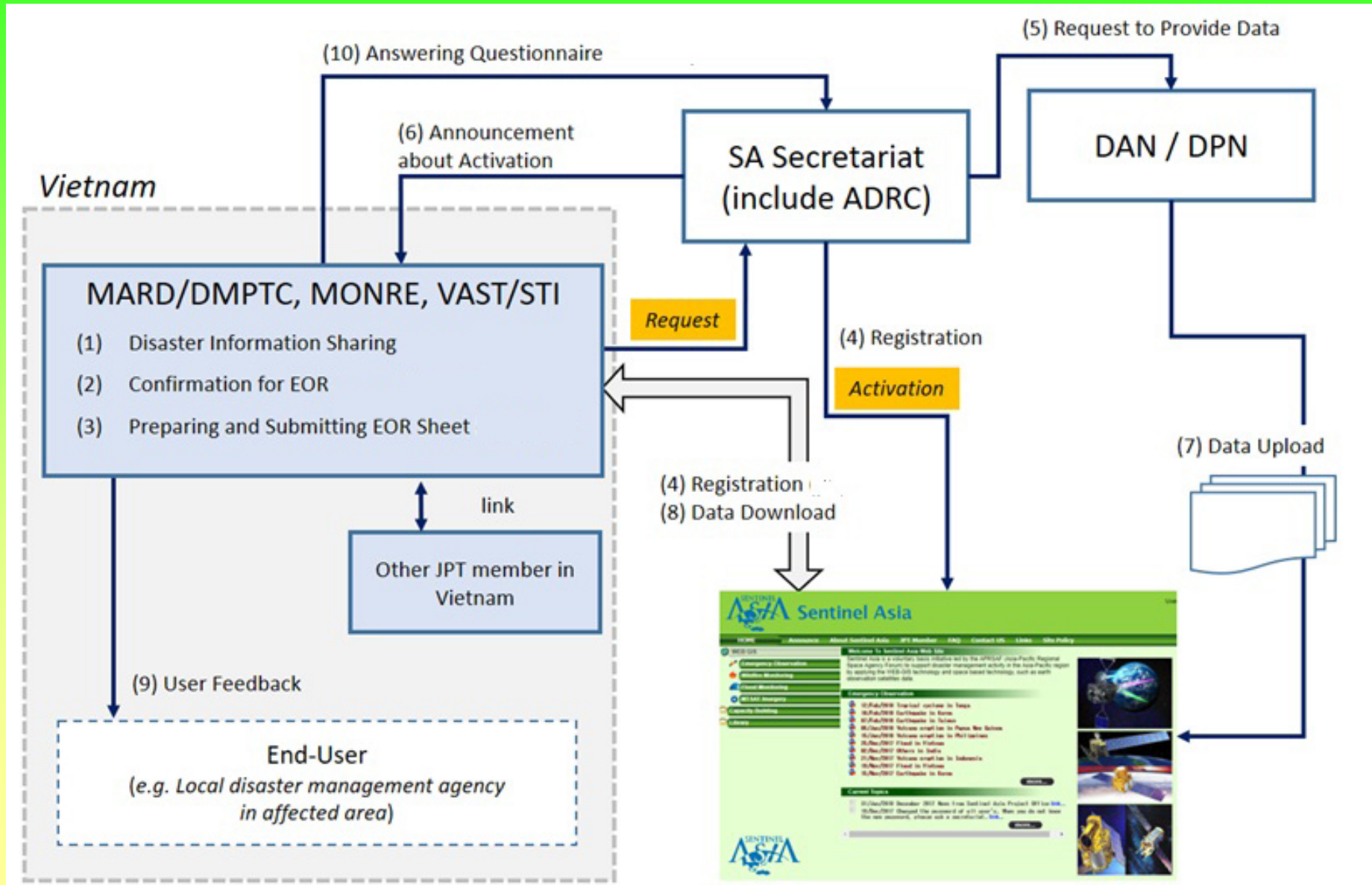
III.3. Collaborate with specialized agencies to provide disaster information and data

- The Joint Project Team members and Disaster Management Organizations in Vietnam have agreed on a Standard Operation Procedure in the event of natural disasters.



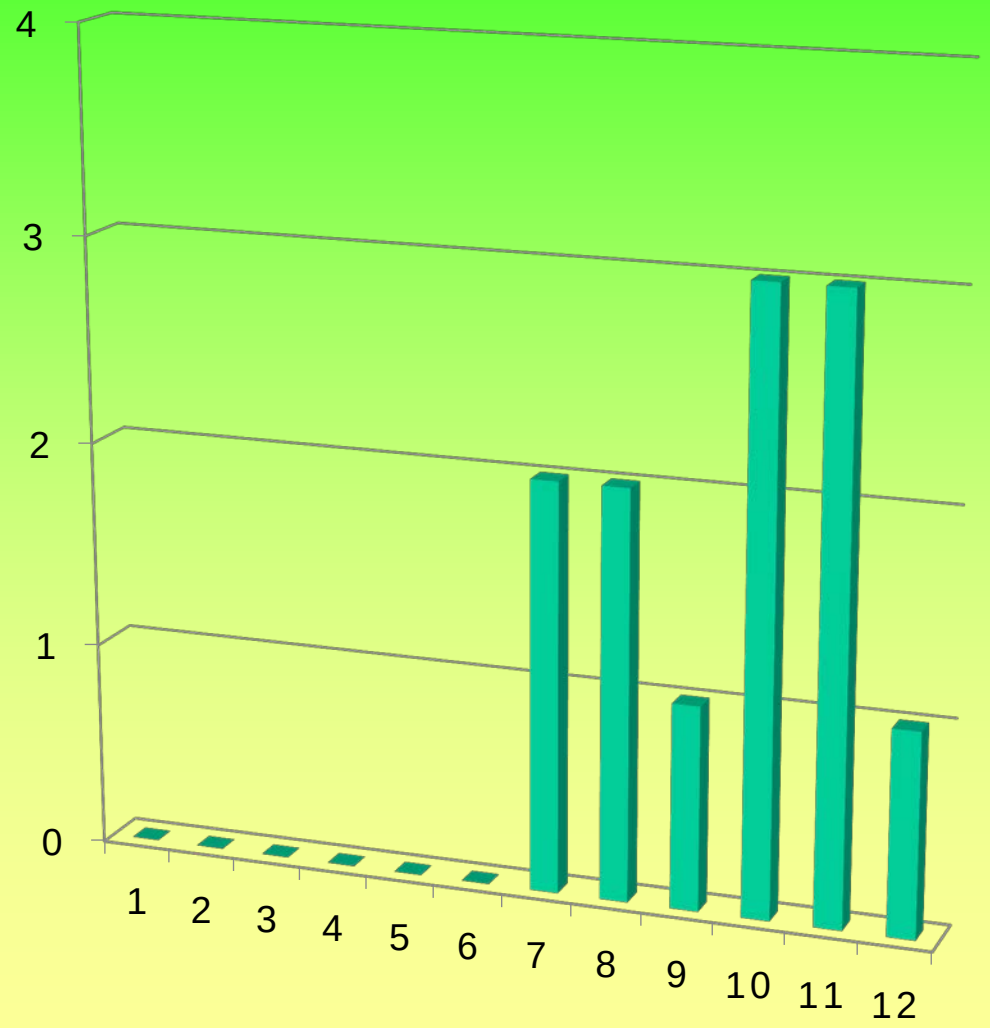
SOP for emergency observation request

(The project for sentinel asia, march 2018)



Result of the operation

Monthly number of emergency observation request in 2017



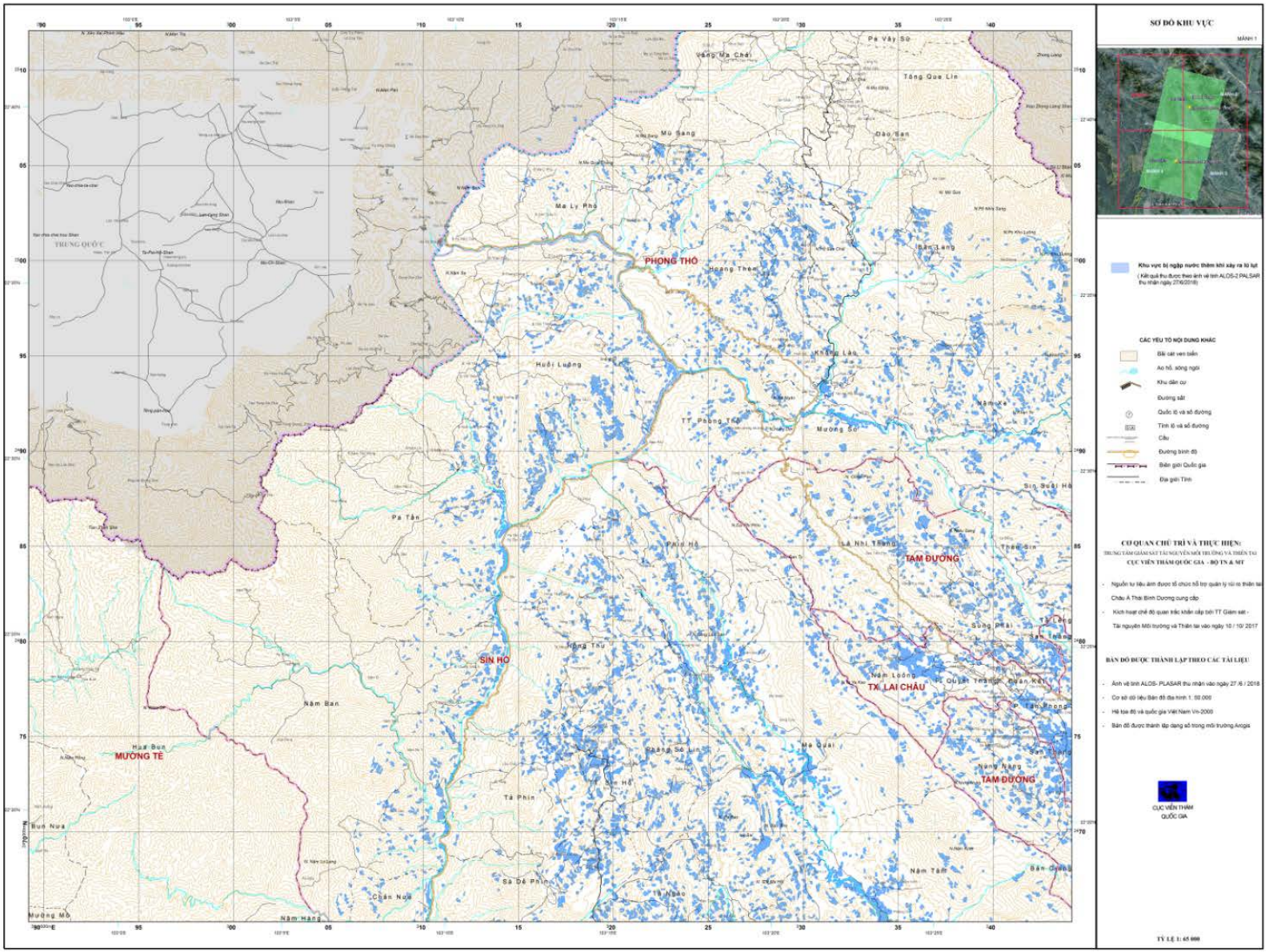
- Total number of emergency triggers: 12

+ Typhoon: 17/7/2017
+ Flood: 25/07/2017
+ Flood: 03/08/2017
+ Flood: 23/08/2017
+ Flood: 15/09/2017
+ Flood: 09/10/2017
+ Flood: 11/10/2017
+ Flood: 17/10/2017
+ Flood: 01/11/2017
+ Flood: 04/11/2017
+ Flood: 19/11/2017
+ Flood: 25/12/2017

Statistics data received via system activation in 2017

No	Activation date	Number of scenes received			Number of VAPs received		Activation agency
		ALOS-2	THEOS	RESOURCE SAT	Map	RGB image	
1	17/7/2017	6	1		5		MONRE
2	25/07/2017		7	2	1		MONRE
3	03/08/2017	3		2			MONRE
4	23/08/2017	4		1		2	MARD
5	15/09/2017	12	6	1	1	6	MARD
6	09/10/2017	6	7		3	3	MONRE
7	11/10/2017				2		MONRE
8	17/10/2017	9			3		MONRE
9	01/11/2017		4		1		MONRE
10	04/11/2017	6	16	1	4	3	MONRE
11	19/11/2017	4			2	2	MONRE
12	25/12/2017	4	10	1		4	MARD

Flood Rapid map in northwest province of Vietnam (6/2018)



International cooperation in capacity building training in disaster preparedness and mitigation support

+ Int'l Disaster Charter Project Manager Training in Vietnam (October 2, 2018)

Classes took place at NRSD, including 14 trainees from 5 agencies:

1. National Remote Sensing Department
2. Viet Nam Meteorological and Hydrological Administration
3. National Centre for Hydro - Meteorological Forecasting
4. Defense Mapping Agency of Viet Nam
5. Viet Nam Institute of Geosciences and Mineral Resources


Ngõ vào-A


Activations by Disaster Type

Comments and suggestions

Forecasting data:

- Pre-disaster satellite images are needed for assessment and monitoring activities.
- Forecasting should be taken into account for pre-disaster imaging.
- Good source of forecasting data and pre-disaster requests are needed.

Processing:

- Need building the database that include base map and other geographical maps to serve for disaster management
- Need additional optical image before and after the disaster (for disaster assessment activities).

Thank you
for
your kind attention!