

# VNREDSat-1 and VIETNAM DATA PROVIDER NODE (DPN)



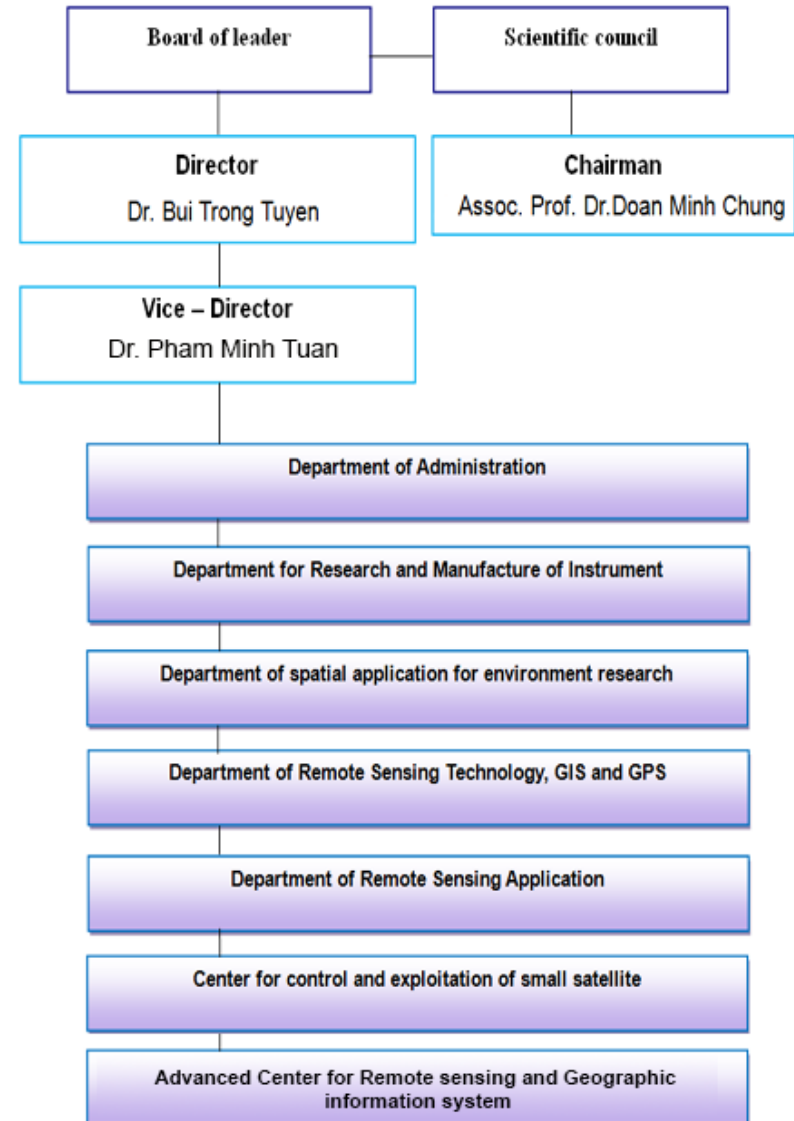
Ngo Duy Tan, Deputy Director, Center for small satellite control and exploitation,  
Space Technology Institute, VAST  
[www.sti.vast.ac.vn](http://www.sti.vast.ac.vn)

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- 1. Overview of Space Technology Institute (STI)**
- 2. VNREDSat-1: applications**
- 3. VNREDSat-1: DPN**



- STI established in 20/11/2006



Staff: ~60 members

# Mandates

- **Basic study, comprehensive research in space science and technology: satellite technology, ground station, RS, GPS, GIS**
- **Application and transfer of Space technology for national socio-economic development**
- **Building satellite database and facilities**
- **International cooperation in ST**
- **VNREDSat-1 system**

# VNREDSat-1

(1<sup>st</sup> VietNam Natural Resource, Environment & Disaster monitoring system)

**Owner: VAST**

**Launch date: 07/5/2013 from Kourou, France**

Resolution: PAN (2.5m) and 4 MS (10m)

Revisit: **3 days**

Orbit: **SSO, 680 km altitude**

LTAN : **10:42 PM**

Mass: **~130 kgs**

Design lifetime: **5 years**

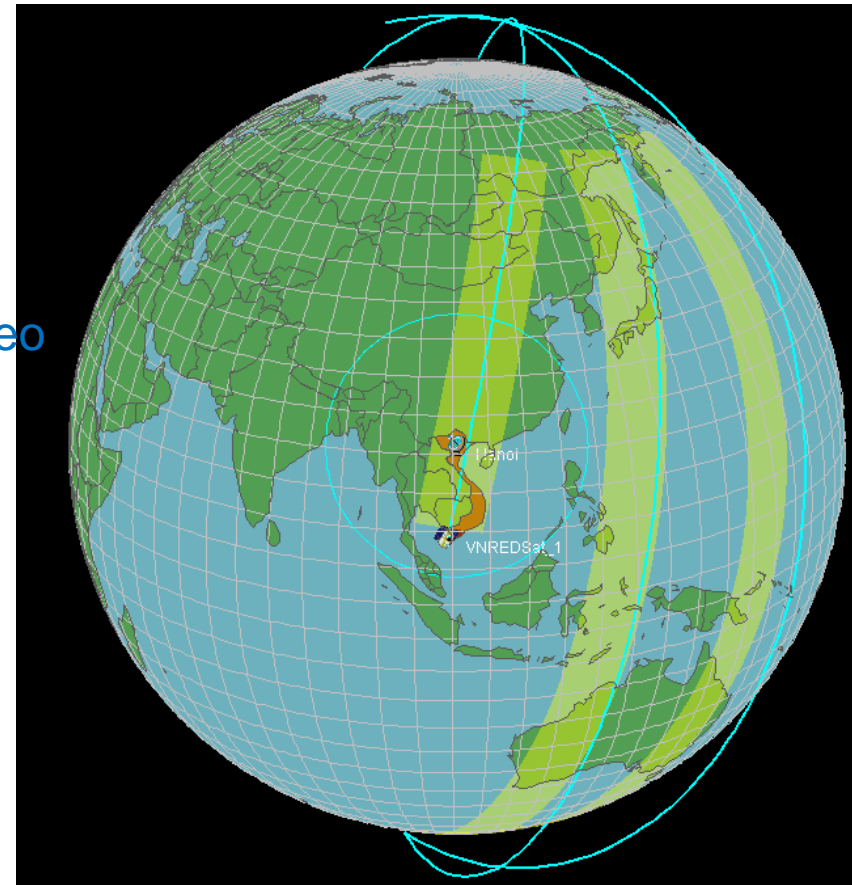
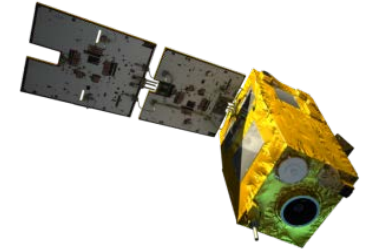
Imaging mode: single shot, scanning, stereo

Swath: **17.5 km**

Length: **823 km (PAN + MS)**

Scenes/day: **100**

Agility : +/- 35 degrees



# Spectral bands



Band	Name	Lower Band Edge ( $\mu\text{m}$ )	Upper Band Edge ( $\mu\text{m}$ )
Panchromatic	PAN	0.45 +/- 0.02	0.75 +/- 0.02
Blue	B1	0.45 +/- 0.02	0.52 +/- 0.02
Green	B2	0.53 +/- 0.02	0.59 +/- 0.02
Red	B3	0.625 +/- 0.02	0.695 +/- 0.02
Near-Infrared	B4	0.76 +/- 0.02	0.89 +/- 0.02



# **STI and Disaster Management Activities in Vietnam**

# VAST and MONRE

- Agreement between VAST and MONRE in VNREDSat-1 system operation and utilization (1/8/2013)





# VAST+( WRD – MARD) + JAXA

## Memorandum of Understanding signing ceremony – 9/2015

The Parties cooperate and make efforts on the following activities;

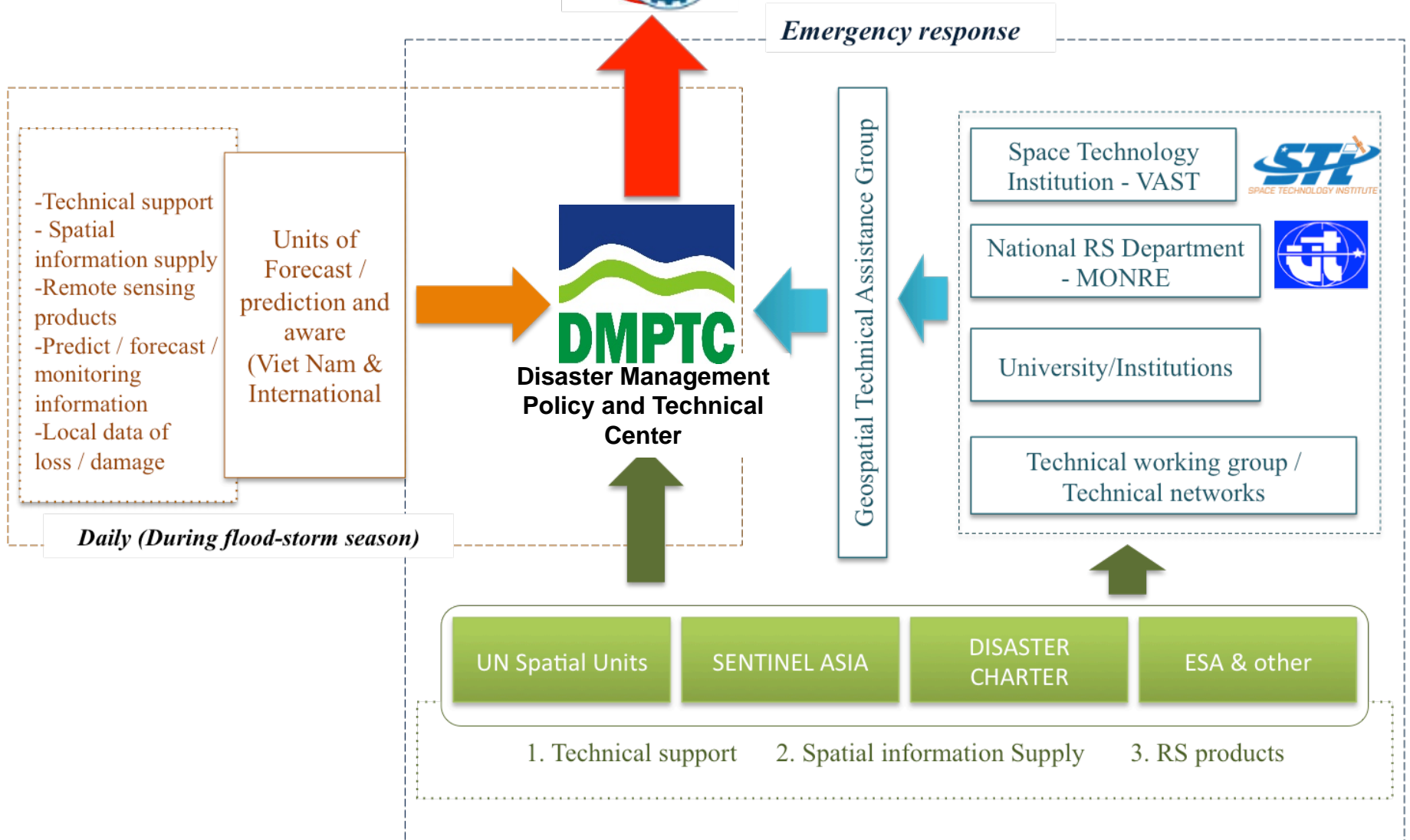
- ❑ Development of a database system by past satellite imageries of Vietnam for disaster prevention.
- ❑ Exchange of satellite data when disaster happens. (*JAXA will provide satellite data owned by JAXA, such as, including but not limited to, ALOS-2 data for WRD and/or VAST upon request of WRD and/or VAST through Sentinel Asia. VAST will provide satellite data owned by VAST, such as, including but not limited to, VNREDSat, for Sentinel Asia Step 3 Activities..*)
- ❑ Strengthening the capacity of application of remote sensing and GIS technology for disaster prevention in Vietnam.
- ❑ Development of programs and projects on application of remote sensing and GIS technologies for disaster prevention.



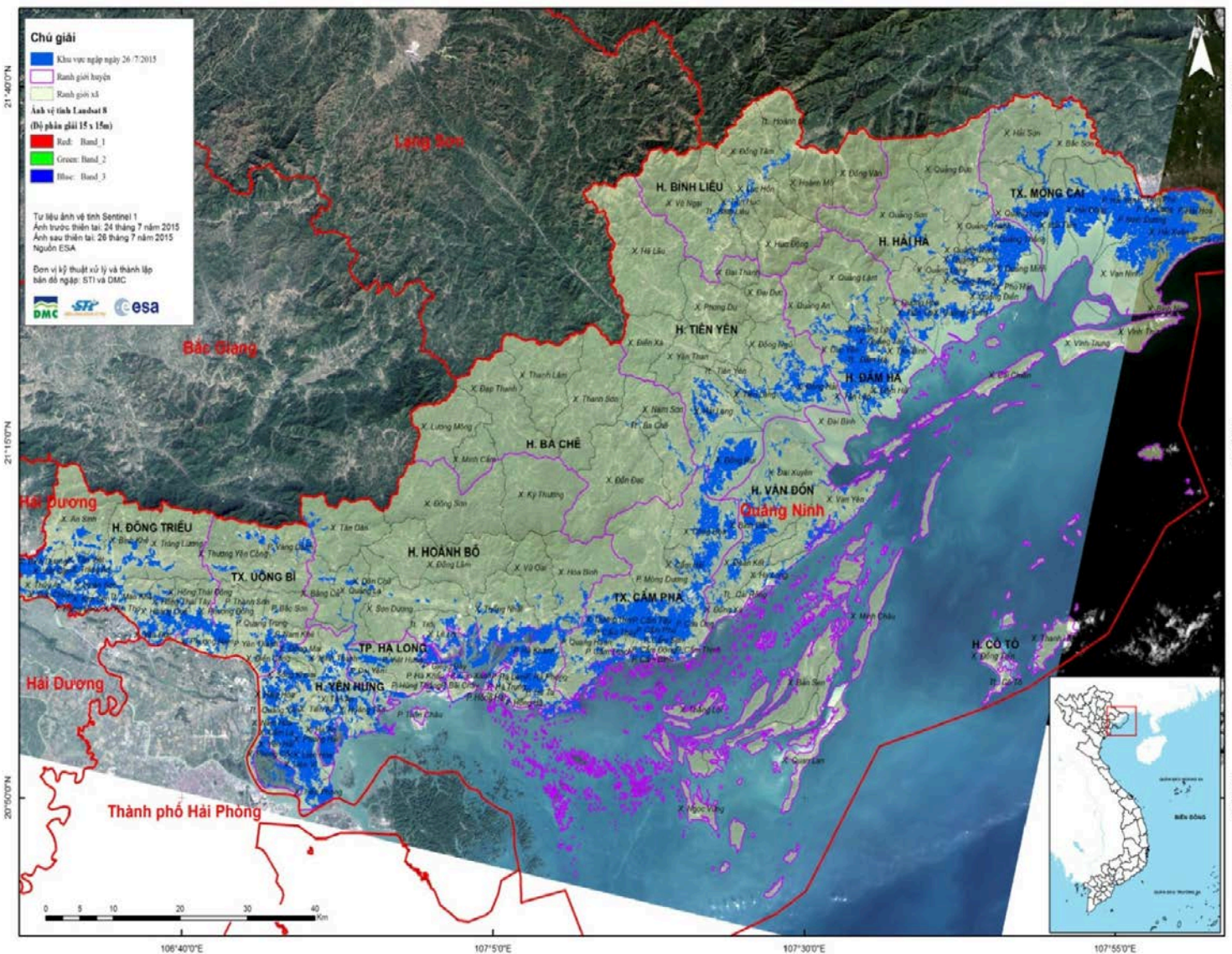
*According to the MoU, DMPTC is the focal point of WRD in this activities and STI is the focal point of VAST.*



# Standing Office of National Committee for Disaster prevention and Control

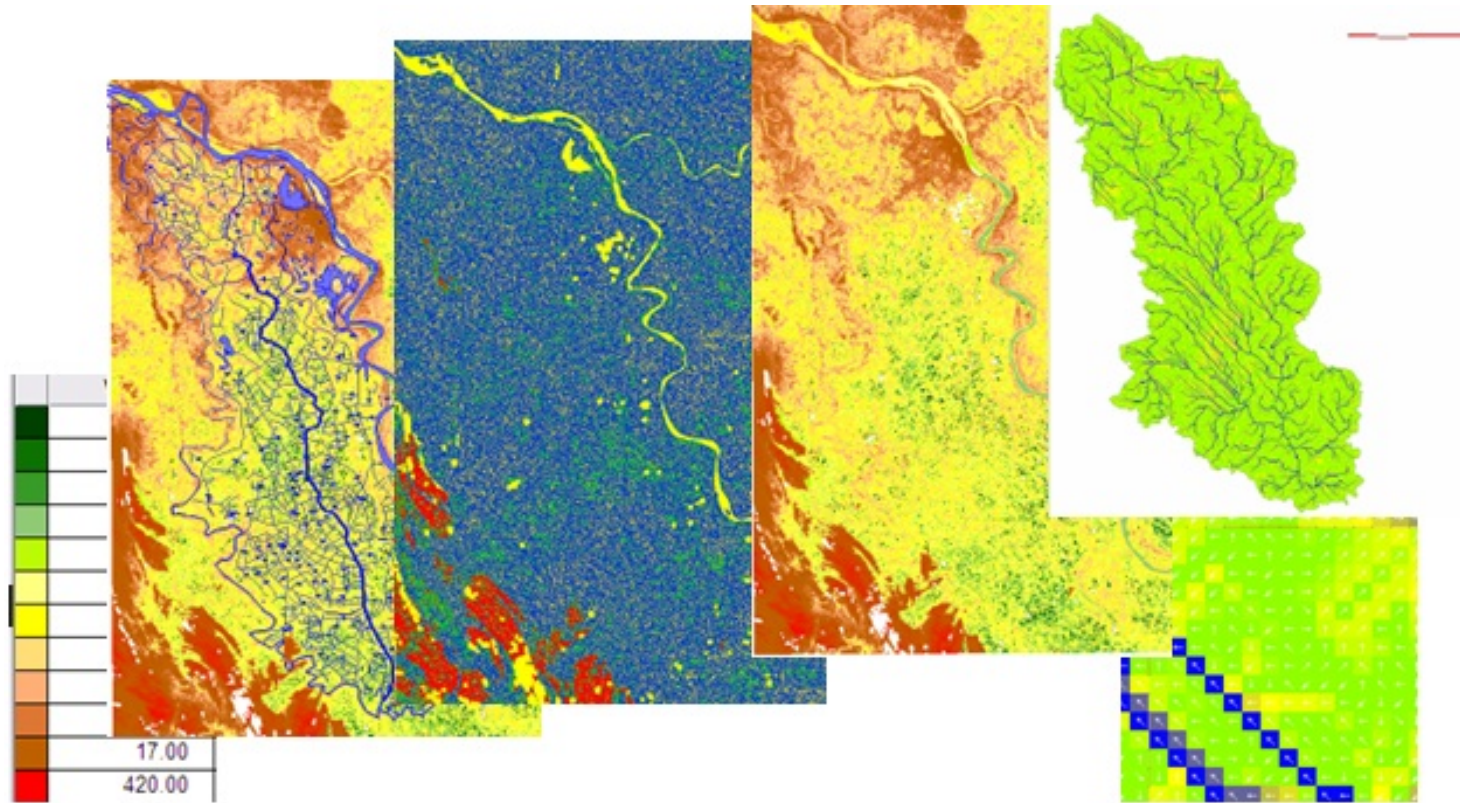


# Inundation map in Quang Ninh province, 26/7/2015

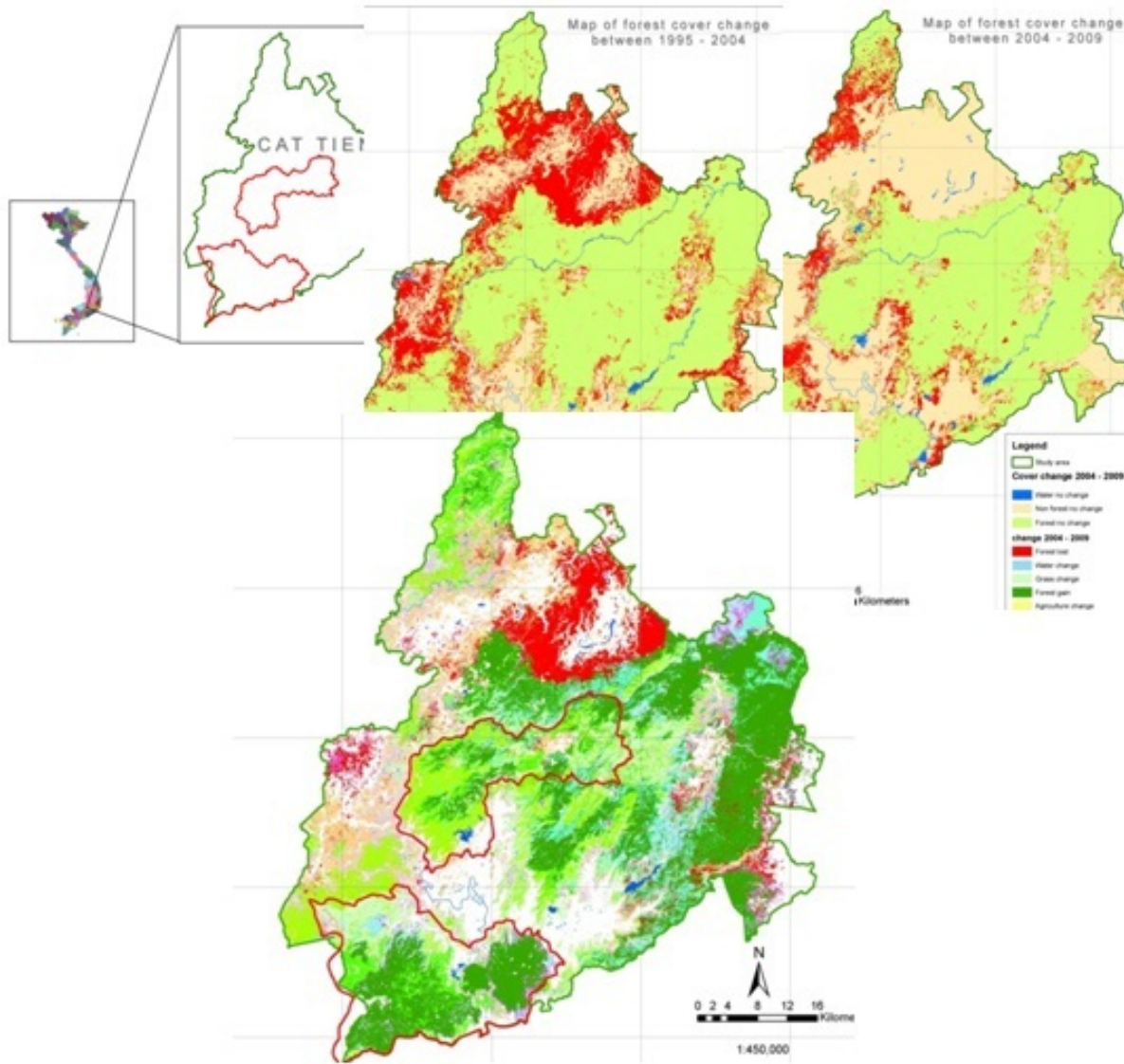


DMPTC and Space Technology Institution (STI) had cooperated in developing inundation map by heavy rain in Quang Ninh province (26/7/2015) using satellite image of Sentinel 1 (SAR)

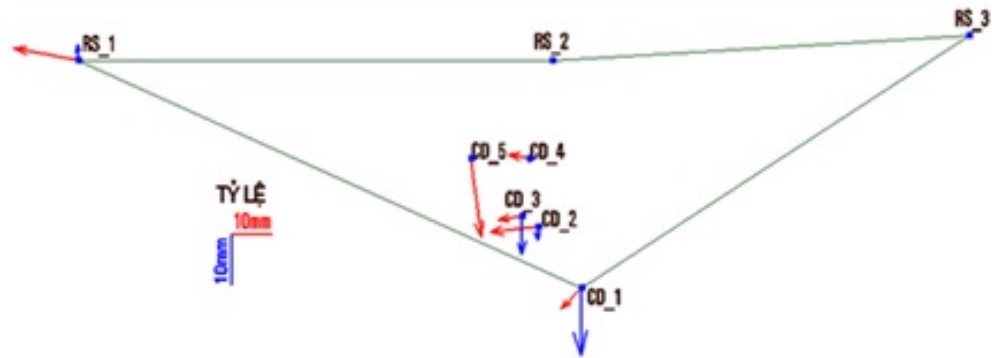
# Applications of remote sensing GPS and GIS



*Integration and modeling of remote sensing information in GIS for Cau River basin, disaster management*



*Assessment on change of forest cover, REDD (Reducing Emissions from Deforestation and Degradation) project Viet Nam*

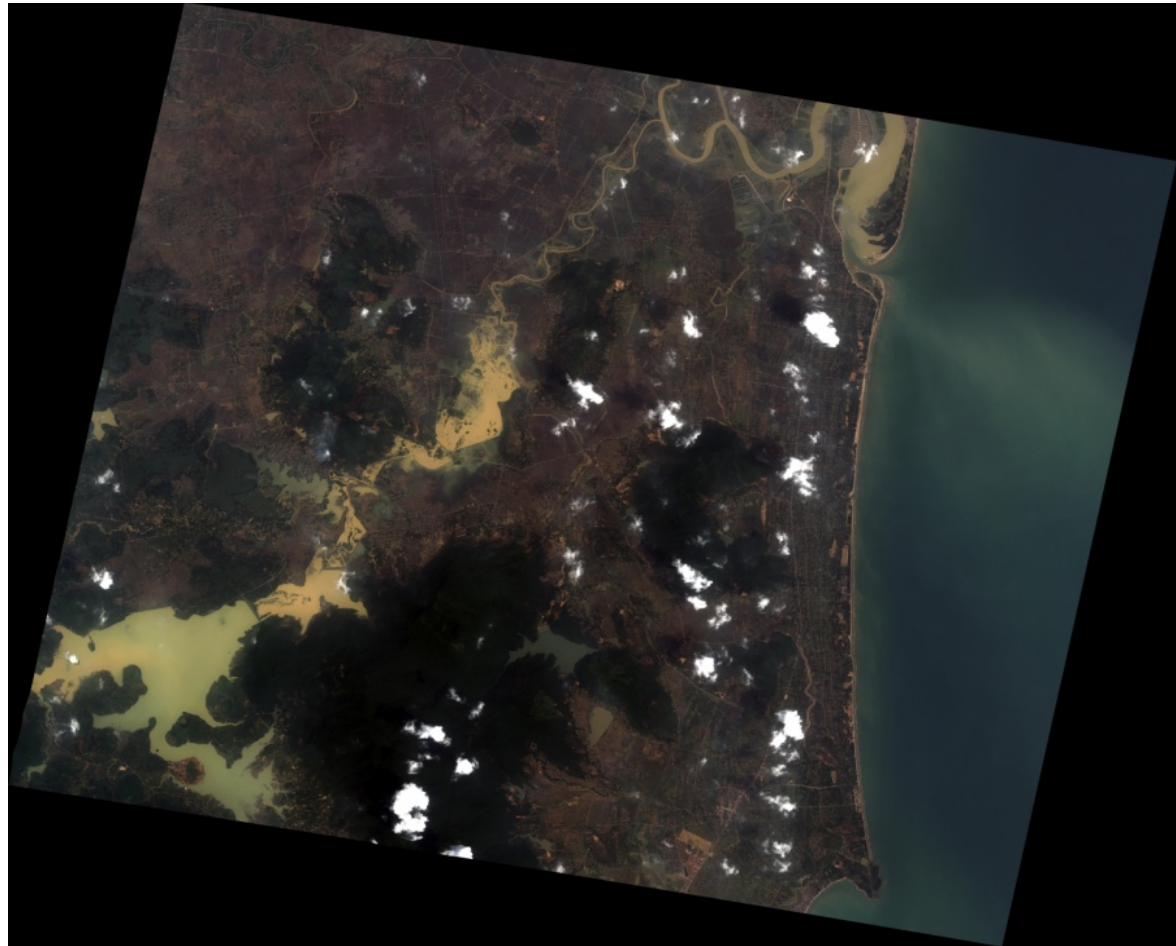


*Application of high-precision GPS for monitoring of costal building displacement*

**VNREDSat-1 system  
and its contribution as  
SA-DPN**

# Typical applications of VNREDSat-1

- Land use mapping
- Agriculture
- Forest management
- Environment and territory (oil spill, water, atmospheric pollution)
- Island and costal management
- Disaster management: monitoring, early-warning, assessment, ...



*VNREDSat-1 image dated 4/10/2013  
over Nghe An Province.  
Flood caused by hydro-power plant*



# VNREDSat-1: Good practice

1. Implementation organizations: STI and Dong Nai Province

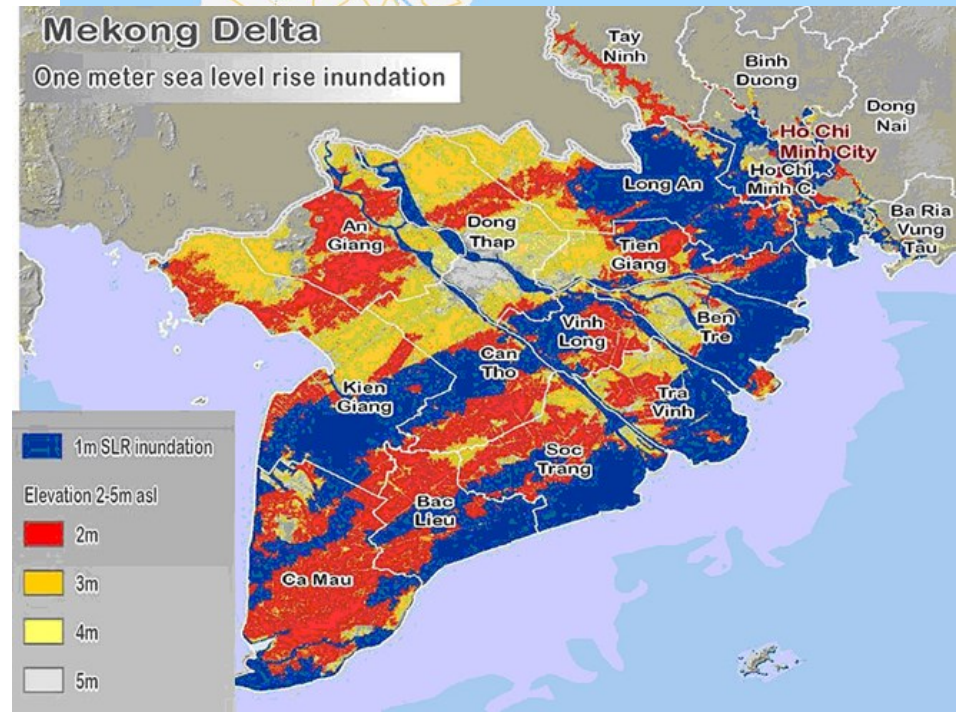
2. Objectives:

- River monitoring
- Urban planning

3. Period: 2013 – 2015, 2015 – 2018

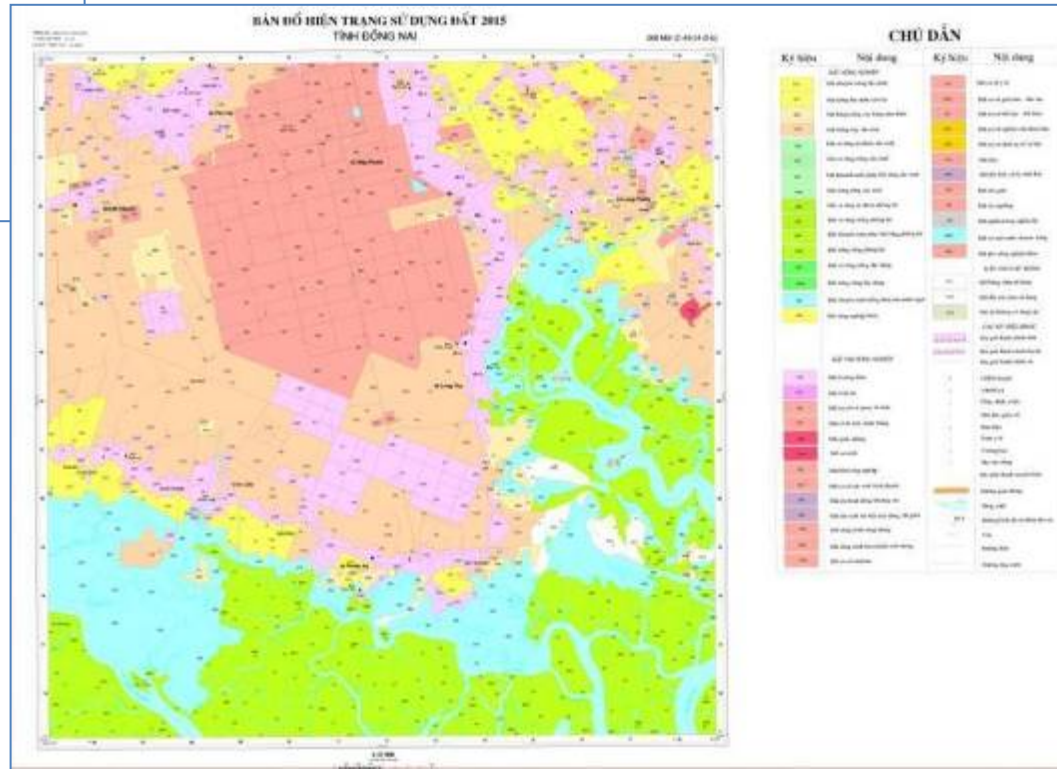
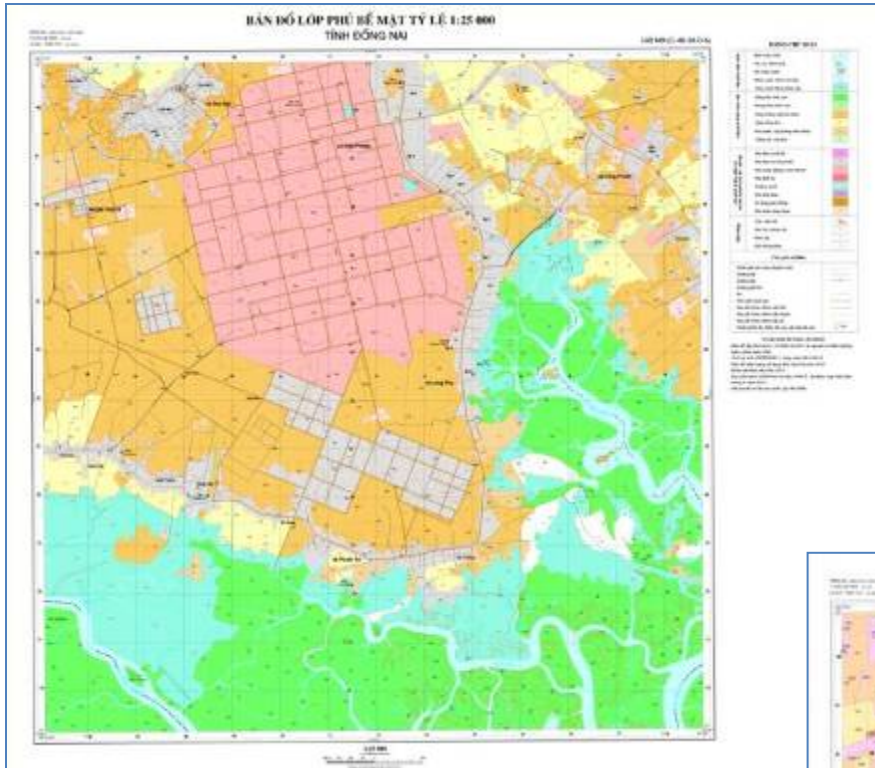
4. Items:

- Local data collection and analysis
- Mapping: VNREDSat-1 images used
- Training and technology transfer





Dong Nai Province (by VNREDSat-1 images)



Maps provided to local users  
(Dong Nai Province)

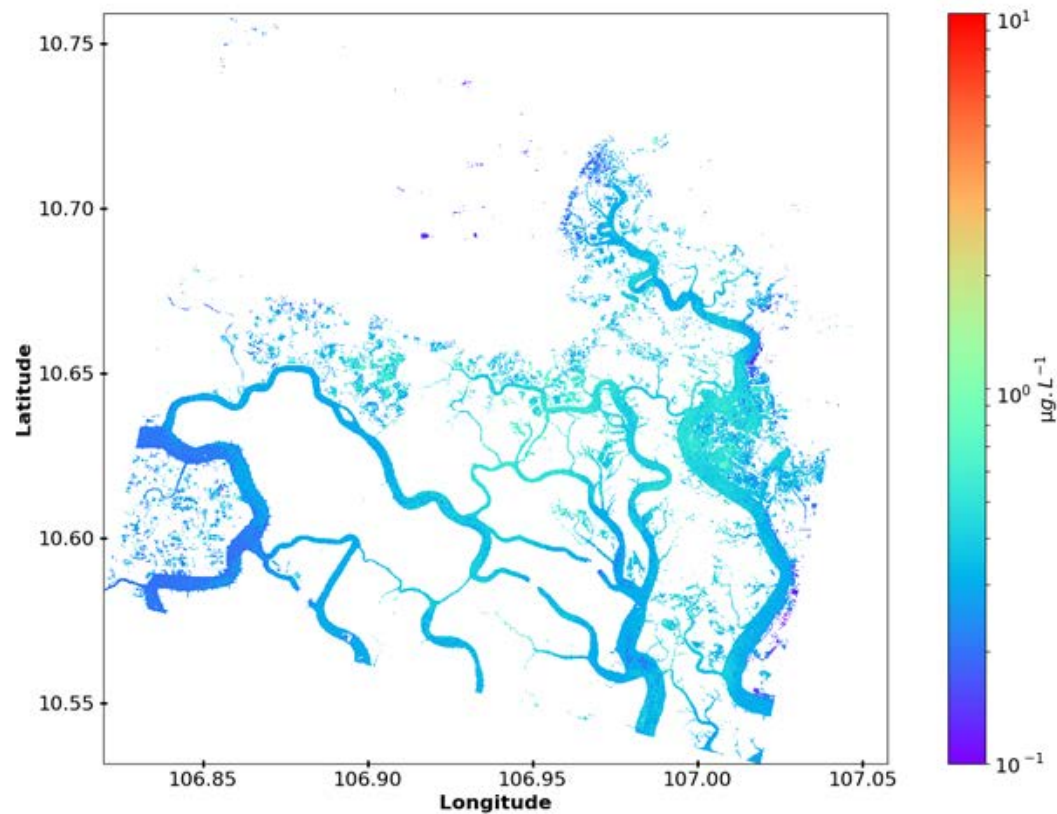
## Training and technology transfer activities





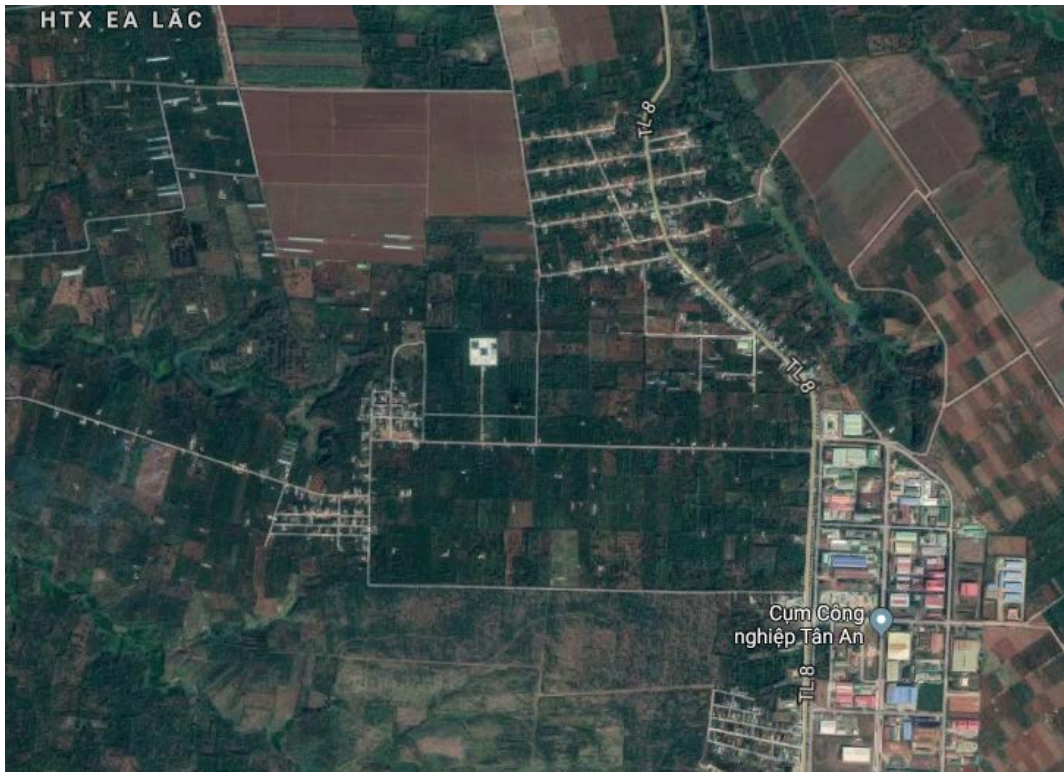
Water mapping of Dong Nai Province

Chl-a map of Dong Nai Province



# STI: Test site for VNREDSat-1 and other calibration

- Purpose: test site
- Owner: VAST
- Location: Buon Ma Thuot, Central Hi-land of Vietnam

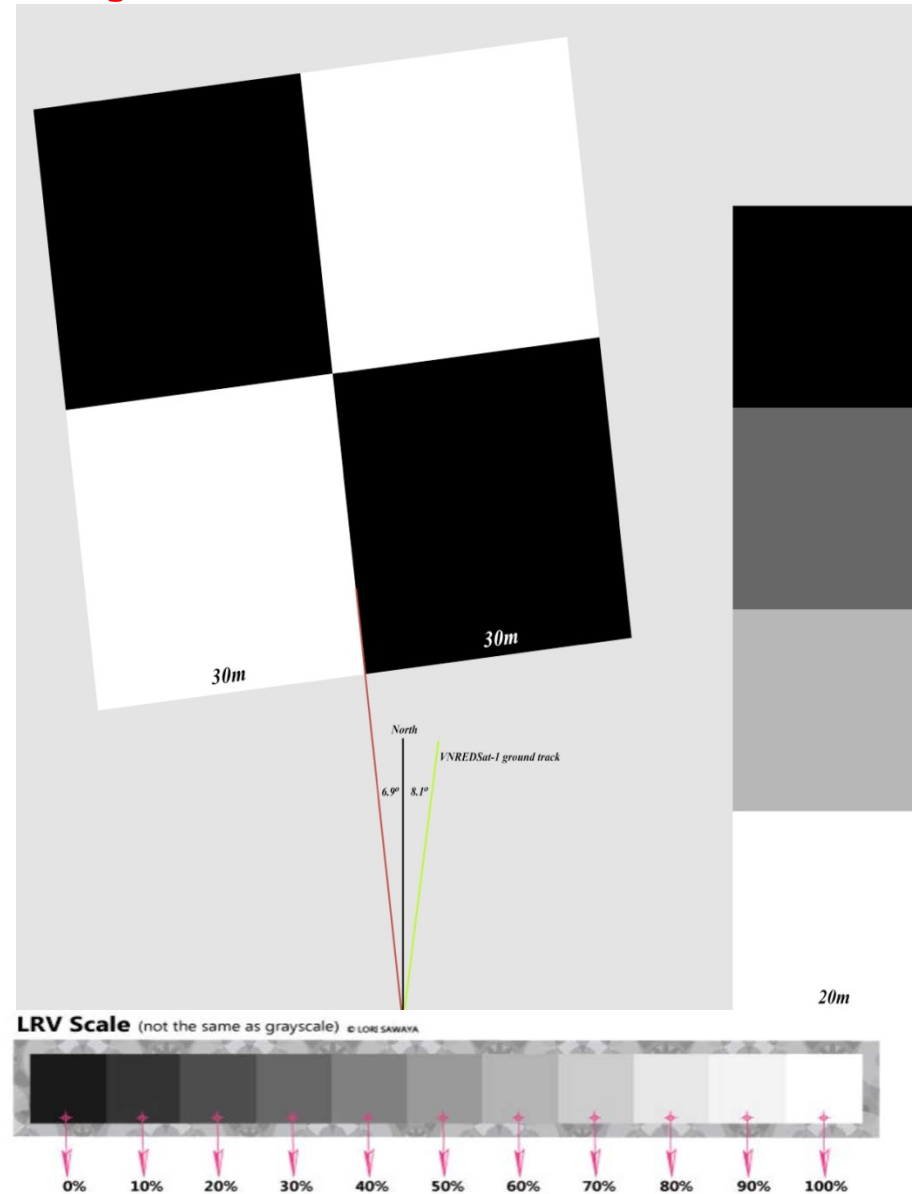


Test site imaged by VNREDSat-1



# Design and pattern

Size: 100mx100m (1ha)





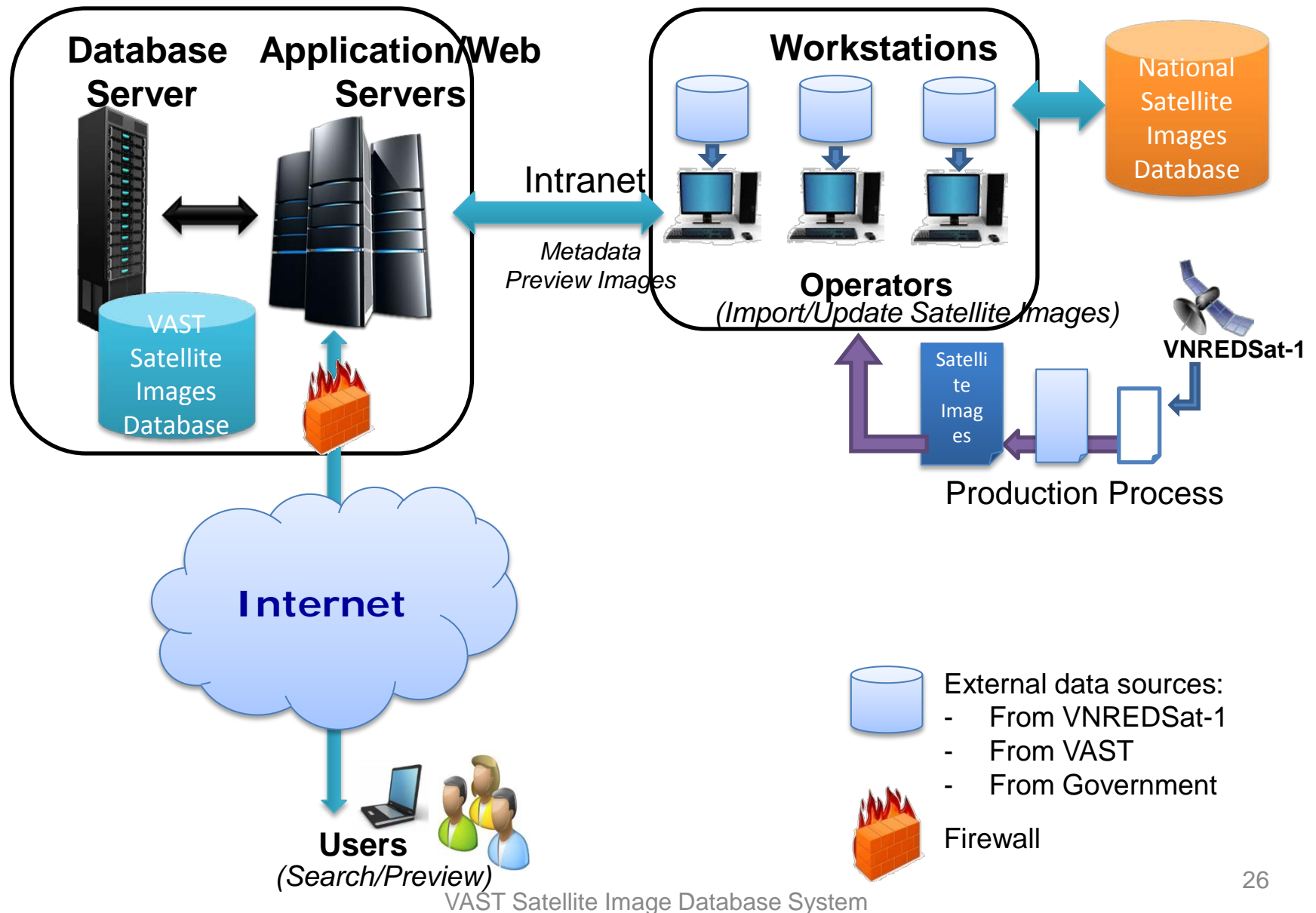
# STI: VNREDSat-1 database

- 2000 (images/month) x 60 (months) = **120.000** (images)

Product	No of scenes	Volume (GBytes)	Attached metadata (GBytes)
1A (PAN)	400	62	0,92
1A (MS)	400	62	0,92
2A (PAN)	400	80	0,92
2A (MS)	400	80	0,92
2A_PS	400	120	0,92
SUM	2000	404	4,6
TOTAL		408,6	

- ***The storages for 5 years: ~ 25 TBytes***

# System Architecture



## VNREDSat-1 as a SA-DPN

- 18/11/2015: VNREDSat-1/STI accepted as a SA-DPN/DAN
- VNREDSat-1 responses to SA

### ***EORs VNREDSat-1 in 2018***

STT	Date	Type of disasters	Location
1	16/01/2018	Volcano Eruption	Philippines
2	22/01/2018	Volcano Eruption	Papue New Guinea
3	13/02/2018	Tropical Cyclone	Tonga
4	25/6/2018	Flood	VietNam
5	09/07/2018	Flood	Japan
6	10/07/2018	Oil Spill	Thailand
7	25/7/2018	Flood	Laos
8	31/7/2018	Flood	Myanmar
9	06/08/2018	Earthquake	Indonesia
10	11/08/2018	Flood	India
11	27/8/2018	Flood	Taiwan
12	05/09/2018	Flood	Myanmar
13	06/09/2018	Earthquake	Japan
14	01/10/2018	Earthquake	Indonesia
15	10/10/2018	Tropical Cyclone	Oman, UAE

➤ Received requests for disaster: **59** (**15** in 2018)

➤ Total captured image: **779** Scenes

Where

From 2014: **6** Scenes

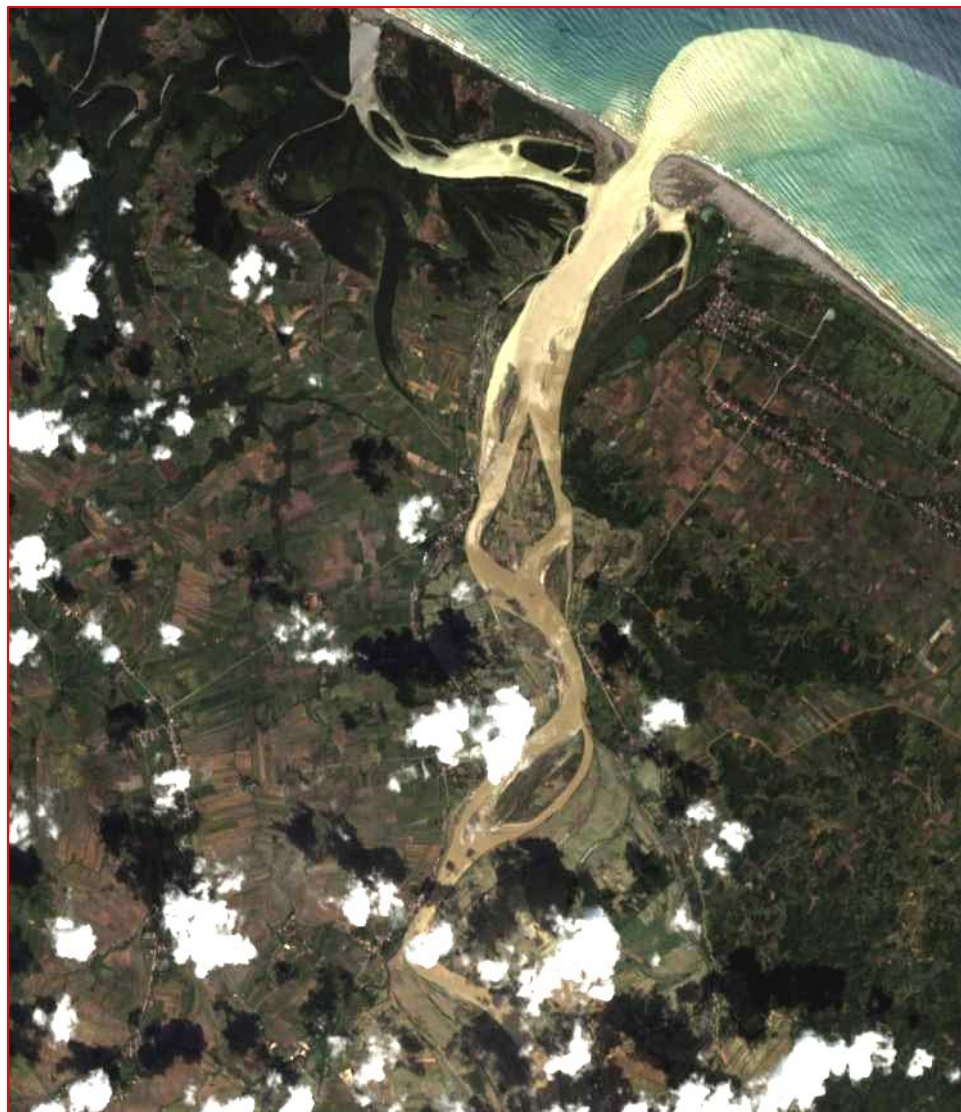
2015: **15** Scenes

2016: **300** Scenes

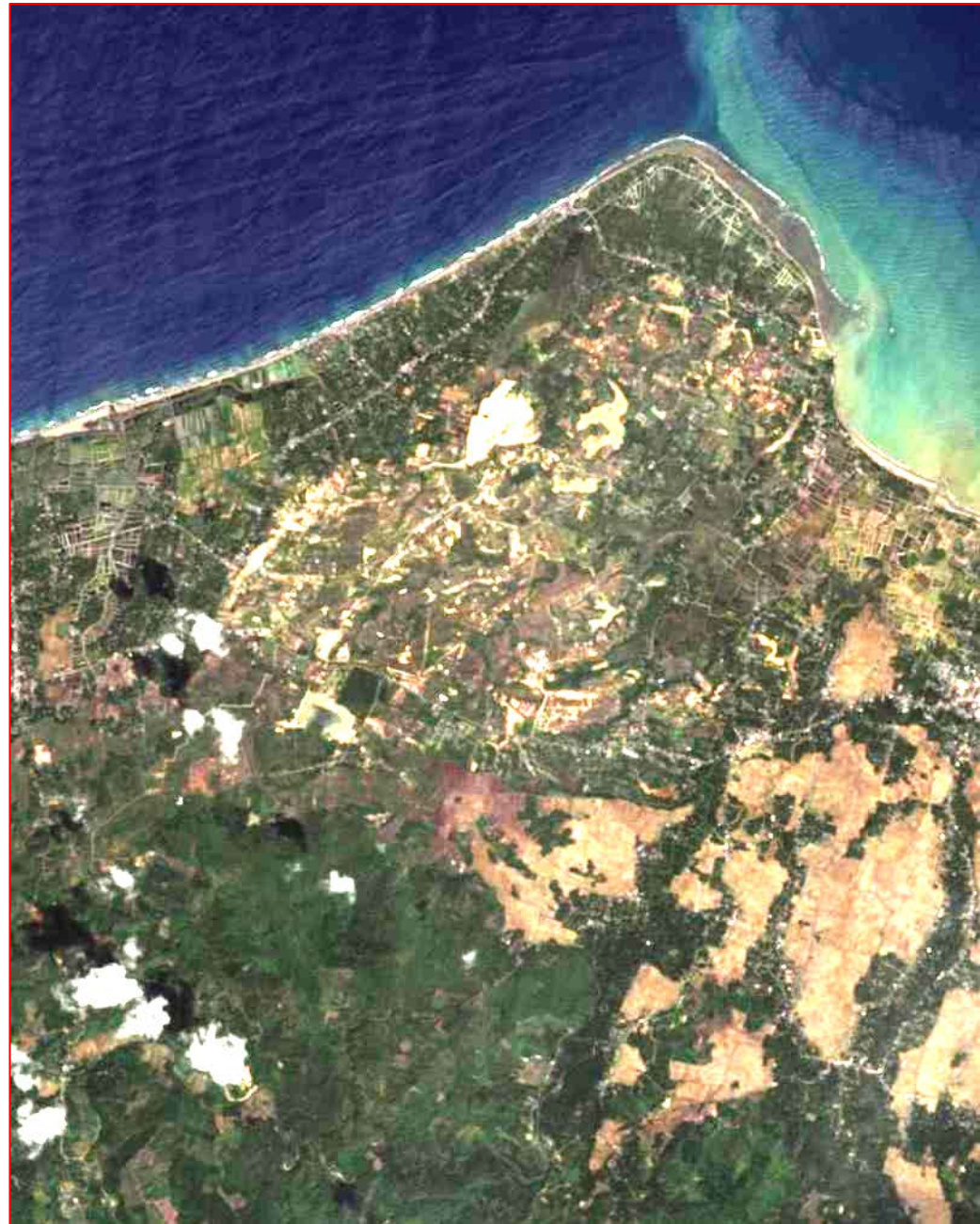
2017: **325** Scenes

2018: **143** Scenes

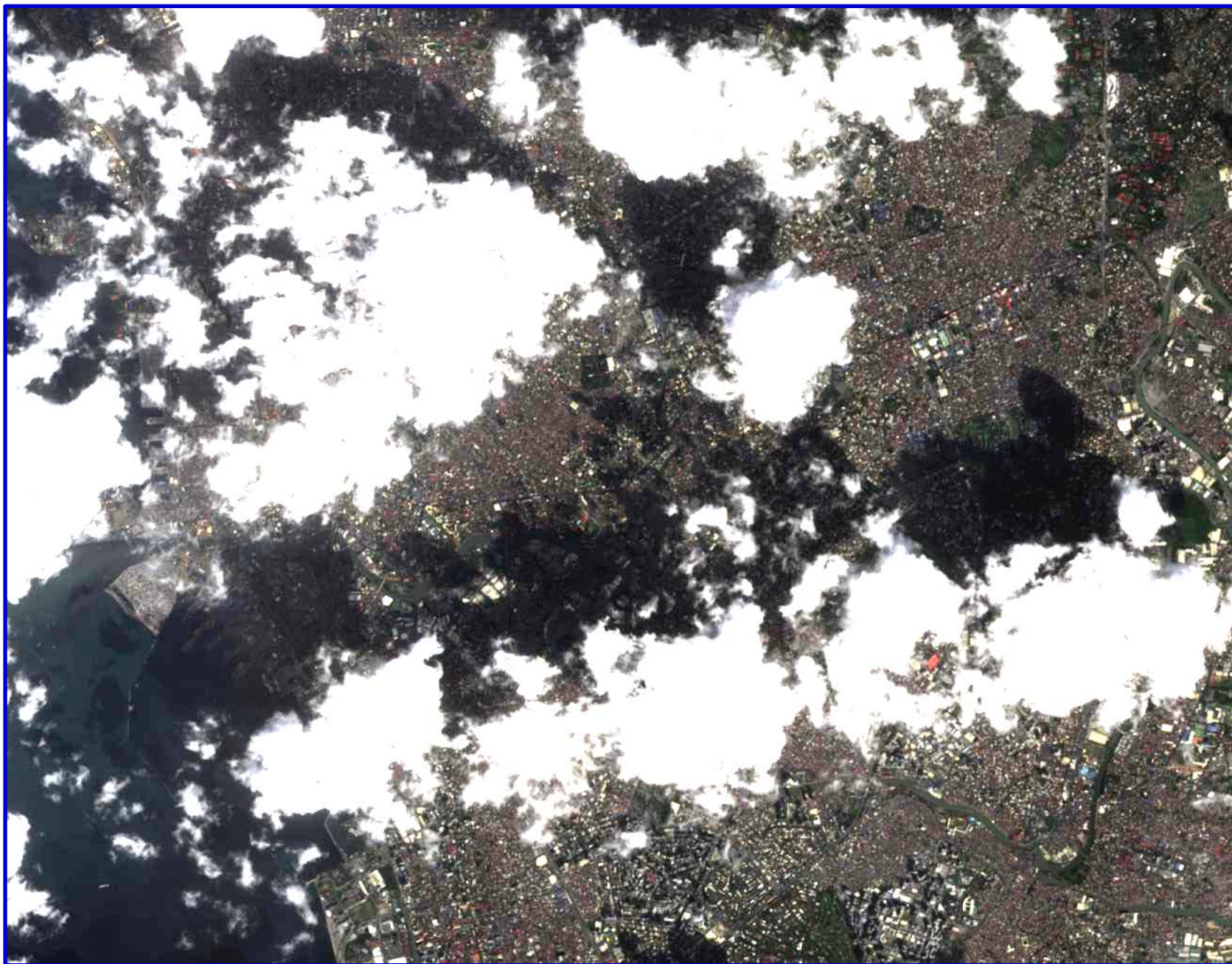
VNREDSat-1 image Philippine 24/10/2016 –  
EOR dated 21/10/2016



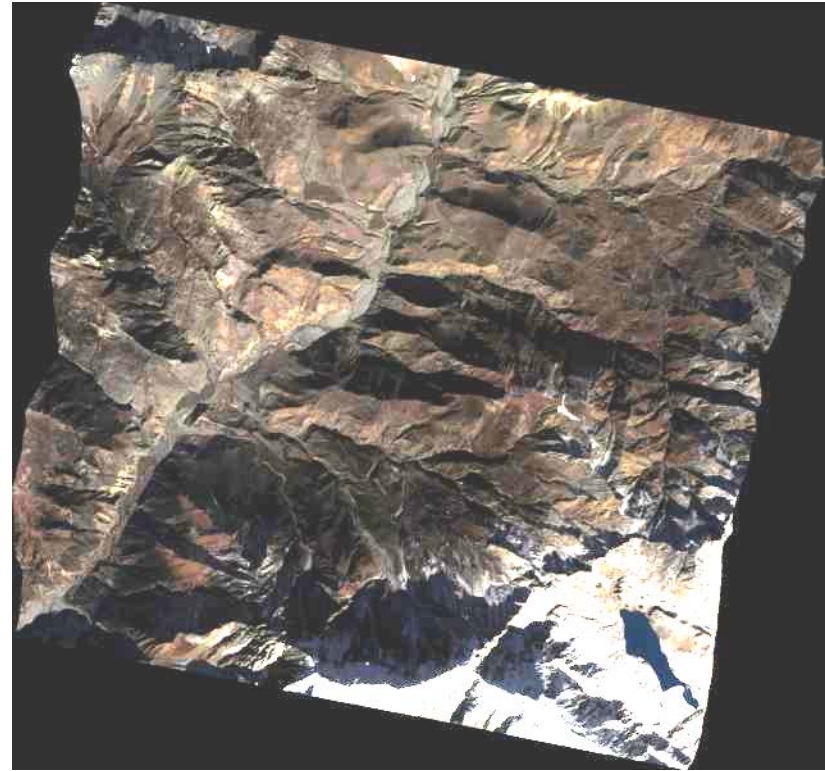
VNREDSat-1 image Indonesia 10/12/2016 – EOR dated 07/12/2016



VNREDSat-1 image Philippine 03/01/2017 – EOR dated 28/12/2016

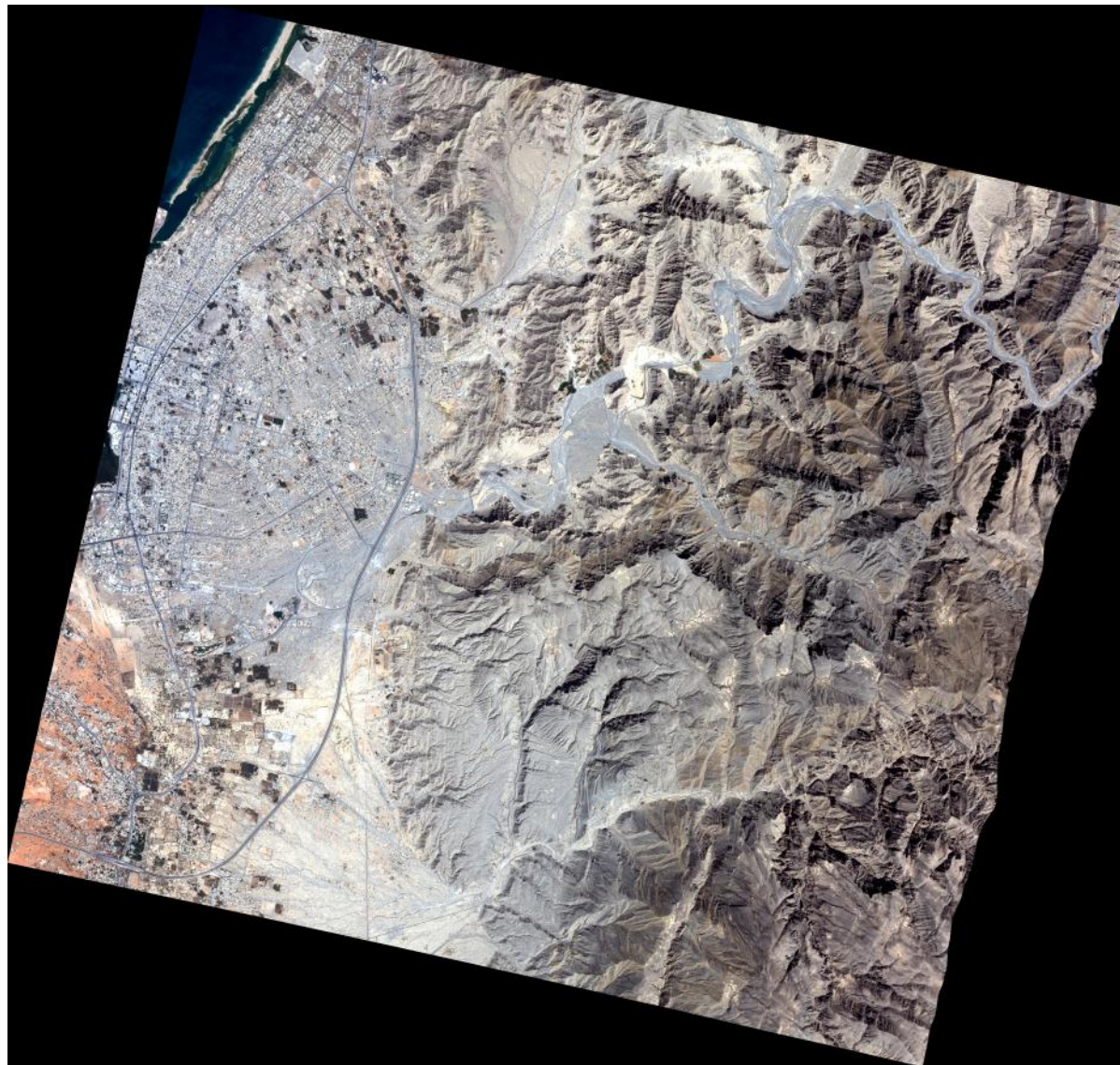


VNREDSat-1 image Ghami, Nepal 28/12/2016  
EOR dated 25/12/2016





VNREDSat-1 image over Oman-UAE (13/10/2018) –  
Emergency Observation request by SA dated 10/10/2018



# Limitations and suggested solution

## **VNREDSat-1 images:**

- VNREDSat-1: 3 day revisit and most EORs are outside Vietnam so response in timely manner (less than 3 days to acquire the image over the area of interest).
- VNREDSat-1: an optical system, 17.5km swath-> image quality influenced by cloud. Suggestion: optical image before and after the disaster (for disaster assessment activities).

## **Forecasting data:**

- Pre-disaster satellite images are needed for assessment and monitoring activities.
  - Forecasting should be used for pre-disaster imaging.
- > good source of forecasting data and pre-disaster requests are needed.

## **Coordination:**

- Joint mission planning with other satellite-> to avoid huge but not-efficient data pile
- Virtual constellation for disaster management should be established.



VIỆN CÔNG NGHỆ VŨ TRỤ  
Space Technology Institute

**THANK YOU VERY MUCH**

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