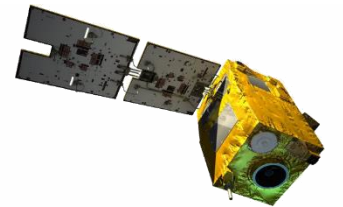




Ministry of Agriculture and Rural Development
VIETNAM DISASTER MANAGEMENT AUTHORITY

**APPLICATION OF REMOTE SENSING
AND SPACE TECHNOLOGY FOR
DISASTER MANAGEMENT IN VIETNAM**



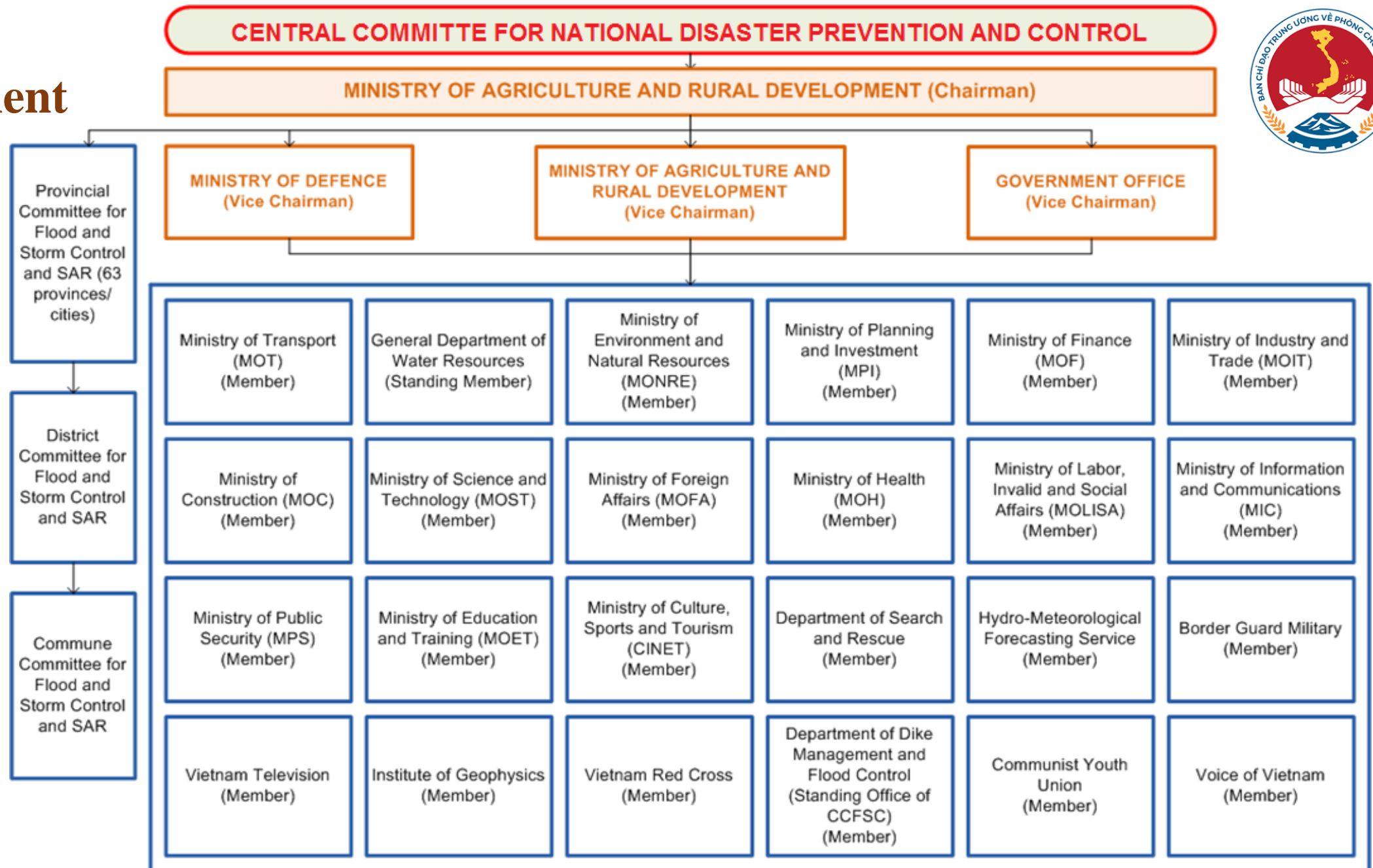
Thailand, Nov 2019

INTRODUCTION

- Vietnam is one of the countries most affected by natural disasters and climate change (in 2016, 20/21 type of disaster has appeared, excluding tsunami)
- Natural disasters, especially storms, floods and droughts, are increasing in intensity, frequency, causing great loss of life and damage to the economy. In the last 20 years, about 10,800 people were killed/missing by natural disasters; Average annual loss is about 20,000 billion VND (1-1.5% of GDP)
- Impacts from the adverse effects of socio-economic development:



Disaster management structure



Activities in applying space technology in Vietnam

- **UN-SPIDER** Technical Advisory Mission to Vietnam (March 2013)
- **UNSPIDER** and **GITA**' technical Advisory Group to Vietnam (September 2014)
- **JAXA & Disaster Charter: 1st Request / activation:** Collected Data, products from Sentinel Asia, Disaster Charter, Vietnamese DANs, AIT, Tokyo University
- **DMPTC** Collaborated **STI (Spatial Technology Institute)** for processing, mapping, survey and report (BIG Flooding 2014, Quang Ninh province)
- **Sign MOU between JAXA, WRD, VAST** (September 2015); Building Implementation plans for 3 years of MOU
- **Request activation SA for big disaster: DMPTC** Collaborated **STI** for processing, mapping, survey and report for big drought (2015-2016) in Central Highland of Viet Nam, flood event (2016- 2018) in the central area of Vietnam...
- Cooperation to organization the 10 years anniversary workshop and the 4th JPTM meeting in Hanoi (2017).
- **Request activation SA for big disaster: DMPTC** Collaborated **Remote Sensing Center (National Department of Remote Sensing)**, **STI** for processing, mapping, survey and report disaster event (2016- 2018)

THE INNITIAL RESULT

(WRD) – (MARD) & (VAST) & (JAXA)

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 RS and GIS technology for disaster prevention in Vietnam.
- ❑ Development of programs and projects on application of RS and GIS technologies for disaster prevention.

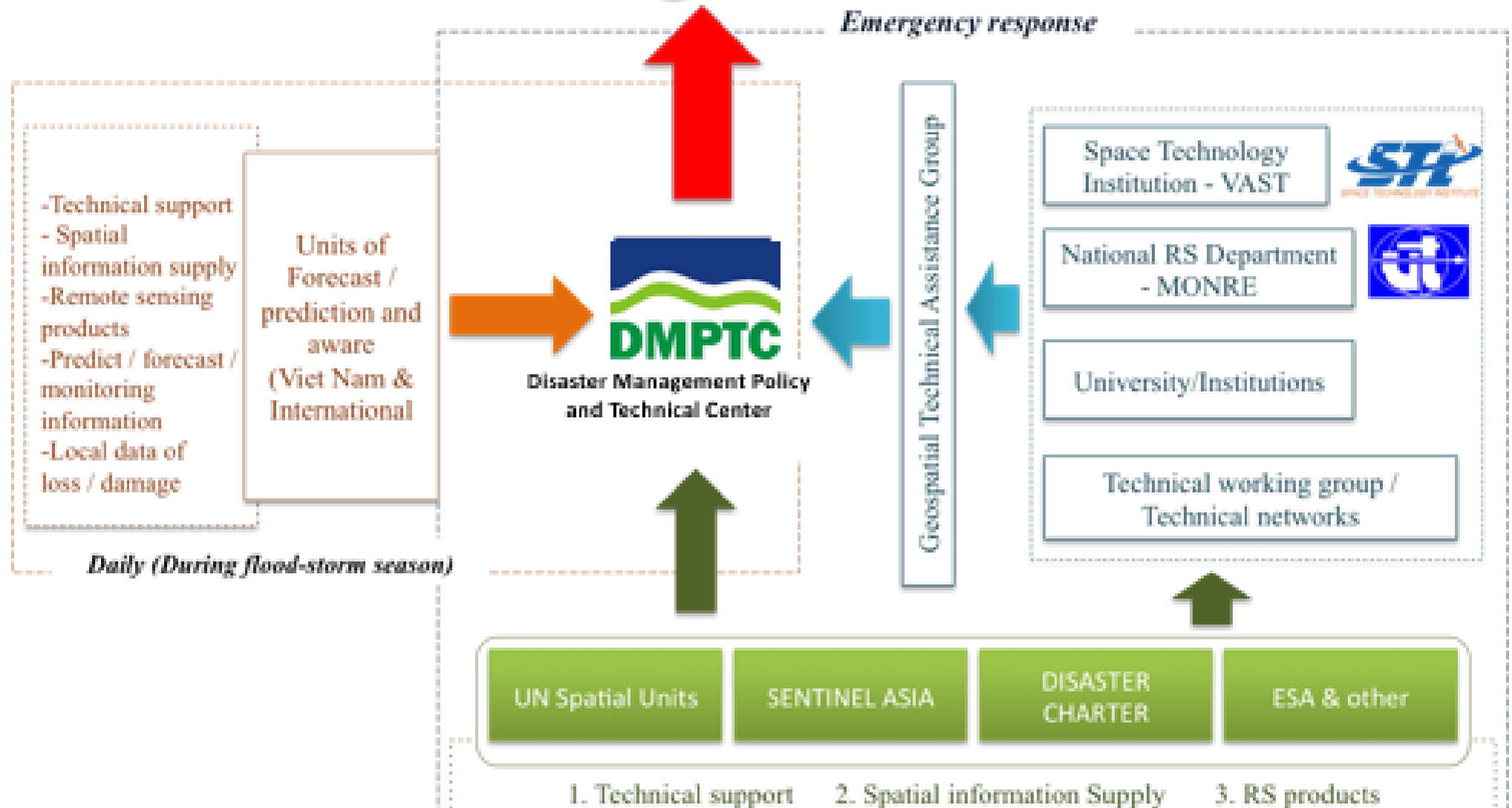
Memorandum of Understanding signing ceremony – Sep 2015



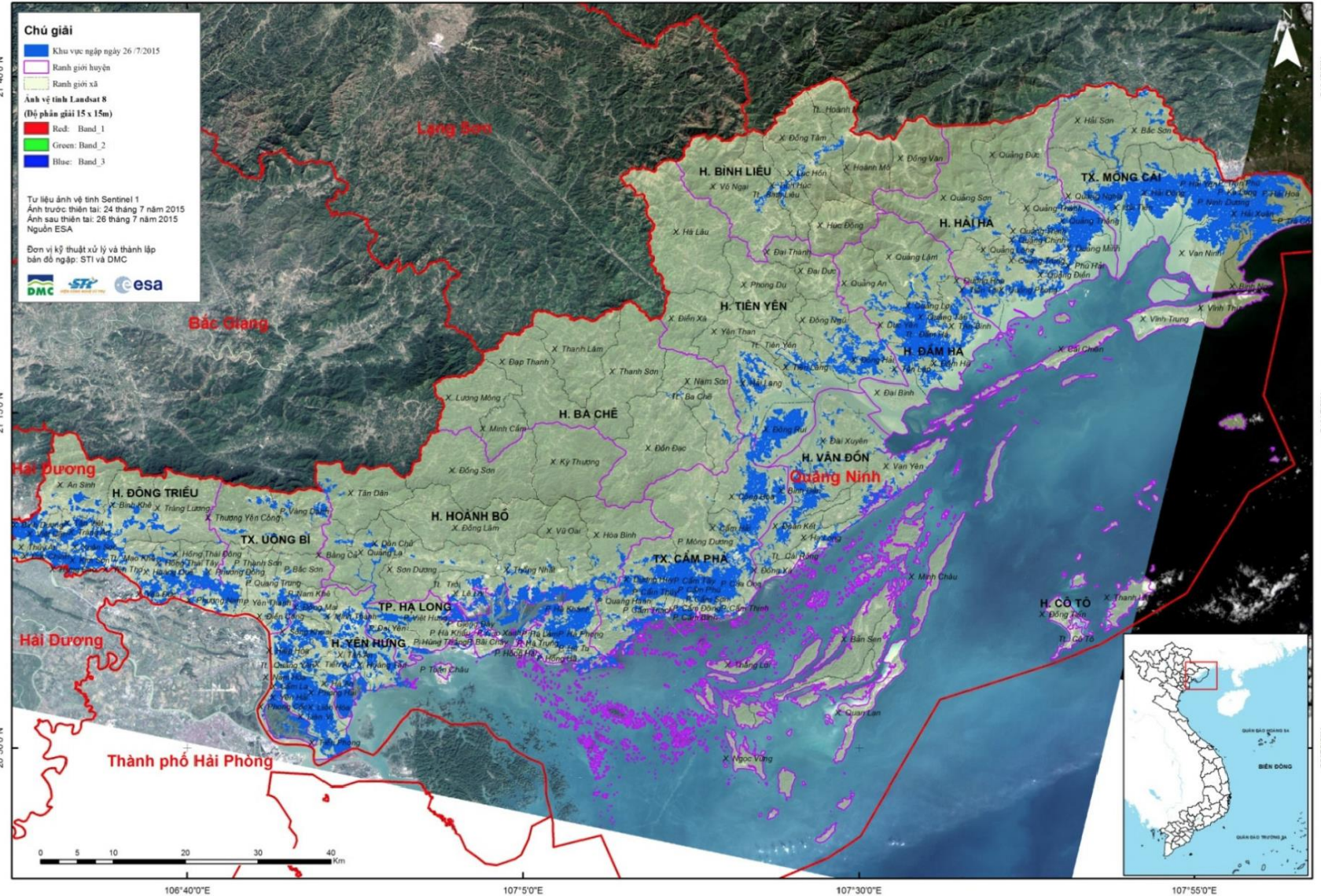
The structure for receipt RS and GIS to serve for disaster prevention and control



Standing Office of National Committee for Disaster prevention and Control



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



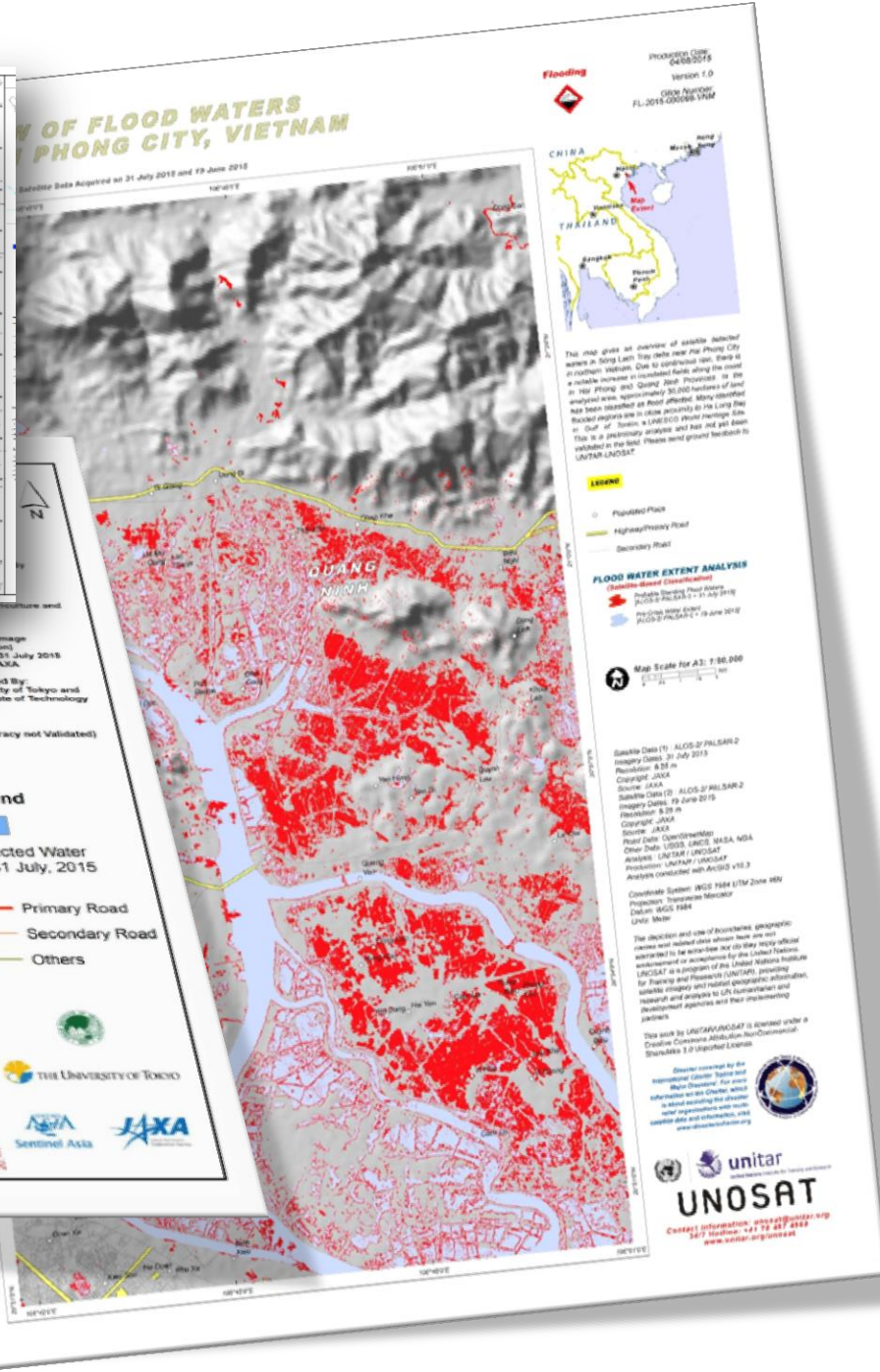
DMPTC and Spatial Technology Institution (STI) had cooperated in developing inundation map by heavy rain in Quang Ninh province (26/7/2015) using satellite image of Sentinel 1 (SAR)

Inundation Map had been produced by National RS Department of Ministry of Natural Resources and Environment (MONRE), AIT, UNOSAT for reporting to National Committee for Disaster Prevention and Control



Legend
Detected Water on 31 July, 2015

- Primary Road
- Secondary Road
- Others



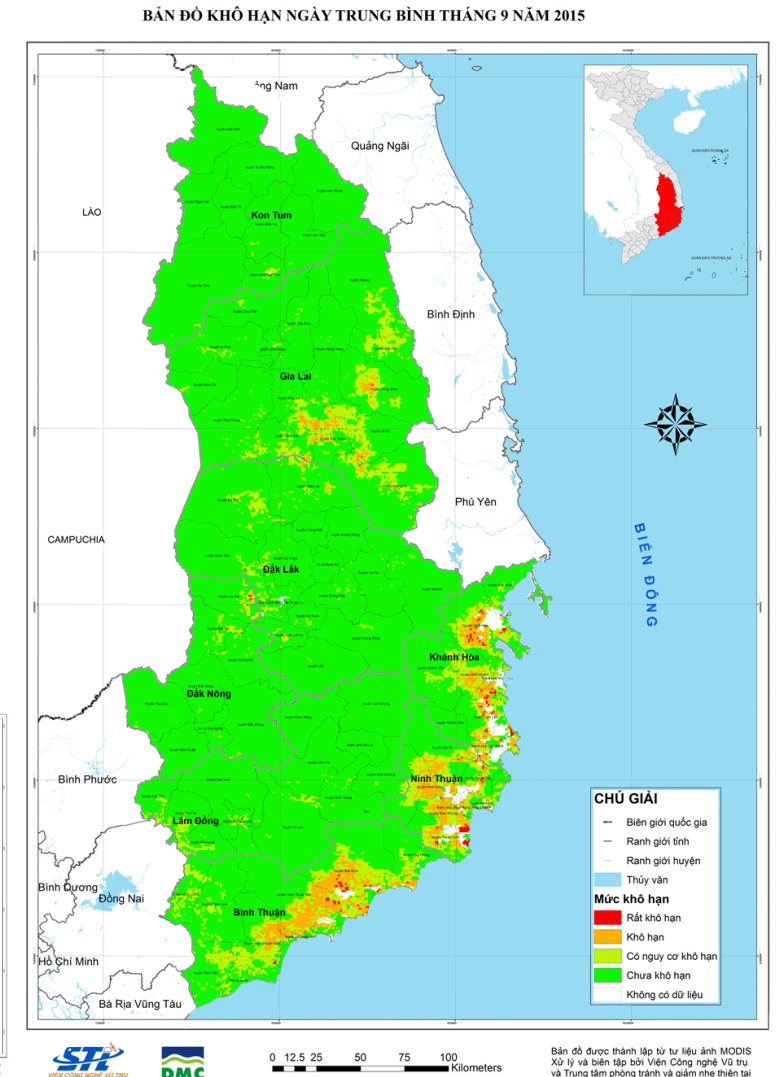
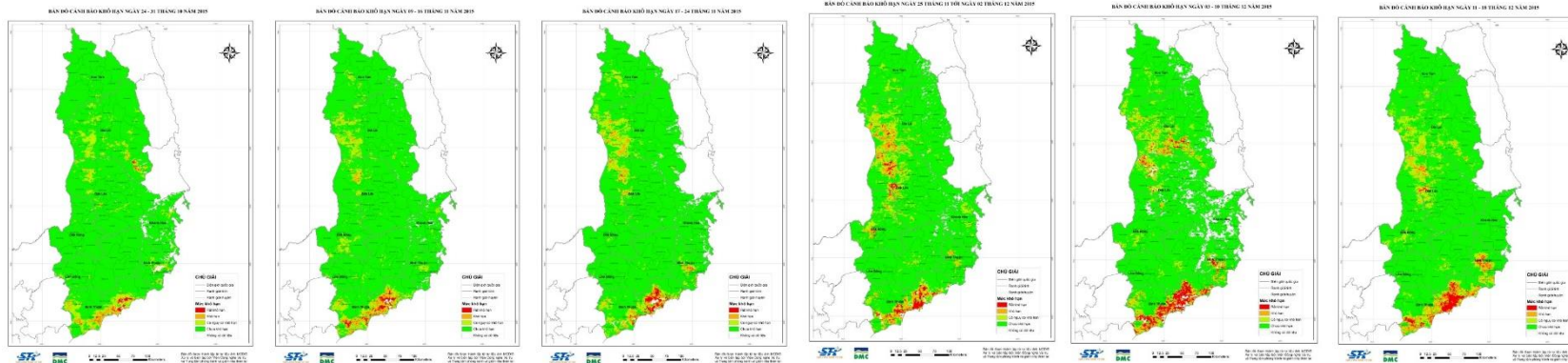
Drought map of Highland area and South Central area on 2015.

STI and DMPTC cooperation to produced the drought map for 5 provinces in Highland area and Ninh Thuan, Binh Thuan, Binh Dinh provinces.



(adapted from Mauro E. Holzman và Raúl E. Rivas, 2015)

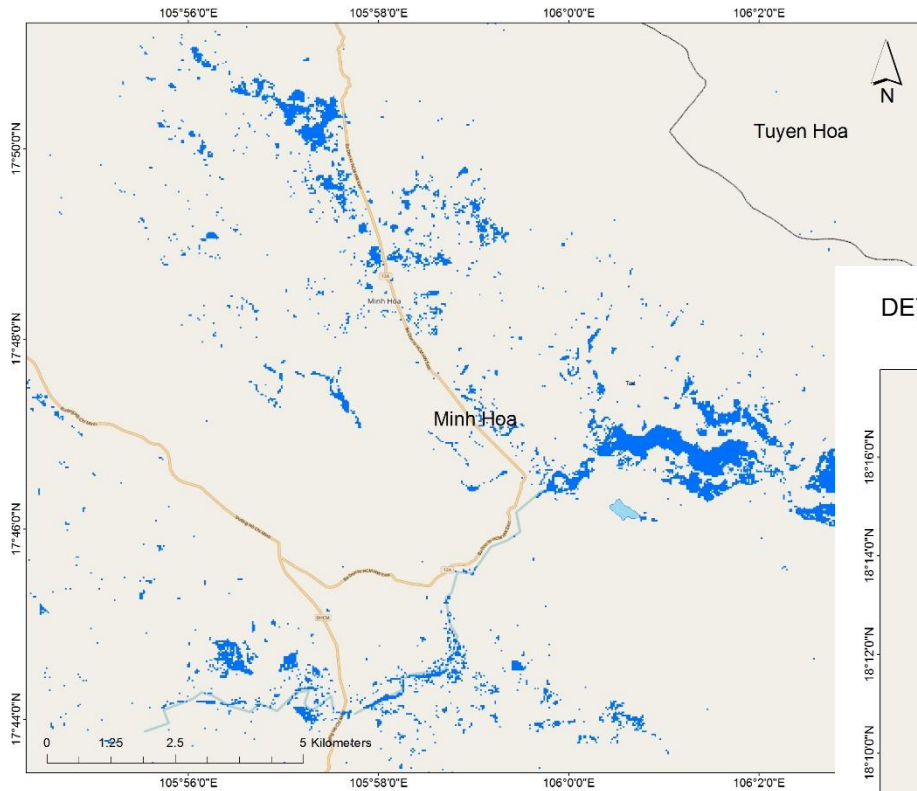
Mức độ cảnh báo khô hạn	Ngưỡng giá trị TVDI	Thang màu cảnh báo
Rất khô hạn	0,7 – 1	
Khô hạn	0,55 – 0,7	
Có nguy cơ khô hạn	0,4 – 0,55	
Chưa khô hạn	< 0,4	



MODIS satellite

October 2016 DMPTC & STI requested Sentinel Asia AIT processed

DETECTED WATER IN MINH HOA DISTRICT, QUAN BINH PROVINCE, VIETNAM (16 OCT 2016)



Date: 10/19/2016

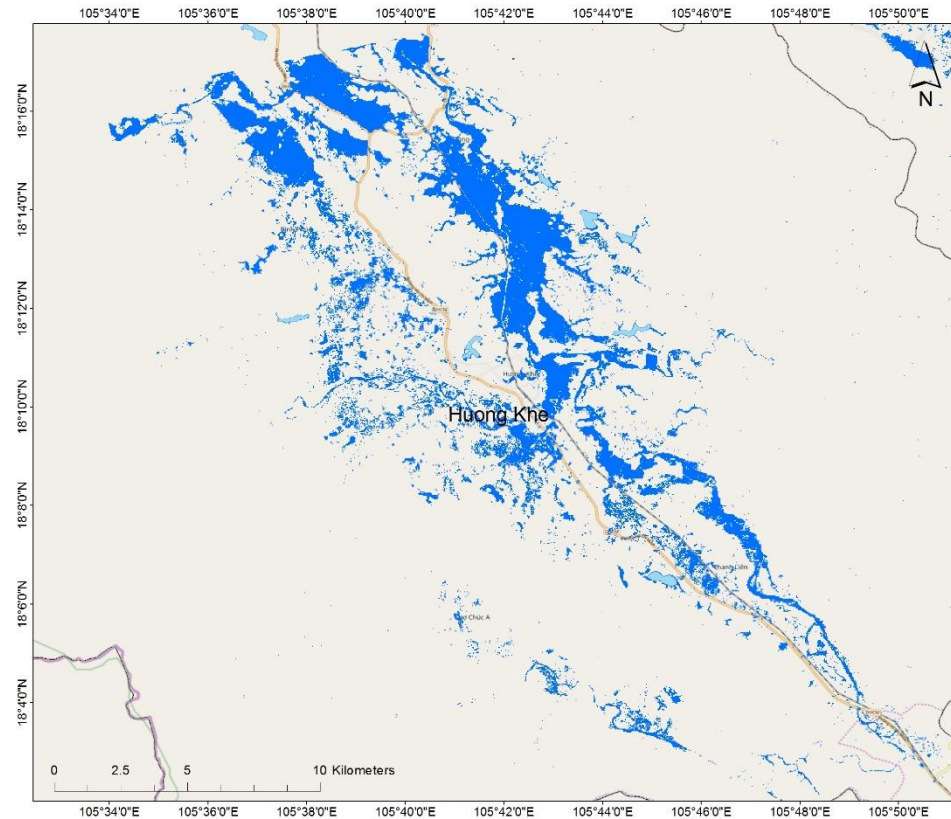
Service Layer Credits: © OpenStreetMap (and) contribut



Legend



DETECTED WATER IN HUONG KHE DISTRICT, HA TINH PROVINCE, VIETNAM (16 OCT 2016)



Date: 10/19/2016

Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA



Legend



MAP SCALE 1:60,000

POST-DISASTER IMAGE

Satellite/ Sensor: ALOS-2/ PALSAR-2
Date: 16 Oct 2016
© JAXA

Coordinate System: GCS_WGS_84
Datum: D_WGS_84
Unit: Degree

This map shows detected water area in Huong Khe district, Quan Binh province, Vietnam as observed from ALOS-2 data on 16 October 2014. Image processing using thresholding technique was applied to extract the water area.

Disclaimer: The accuracy of this product is not validated.

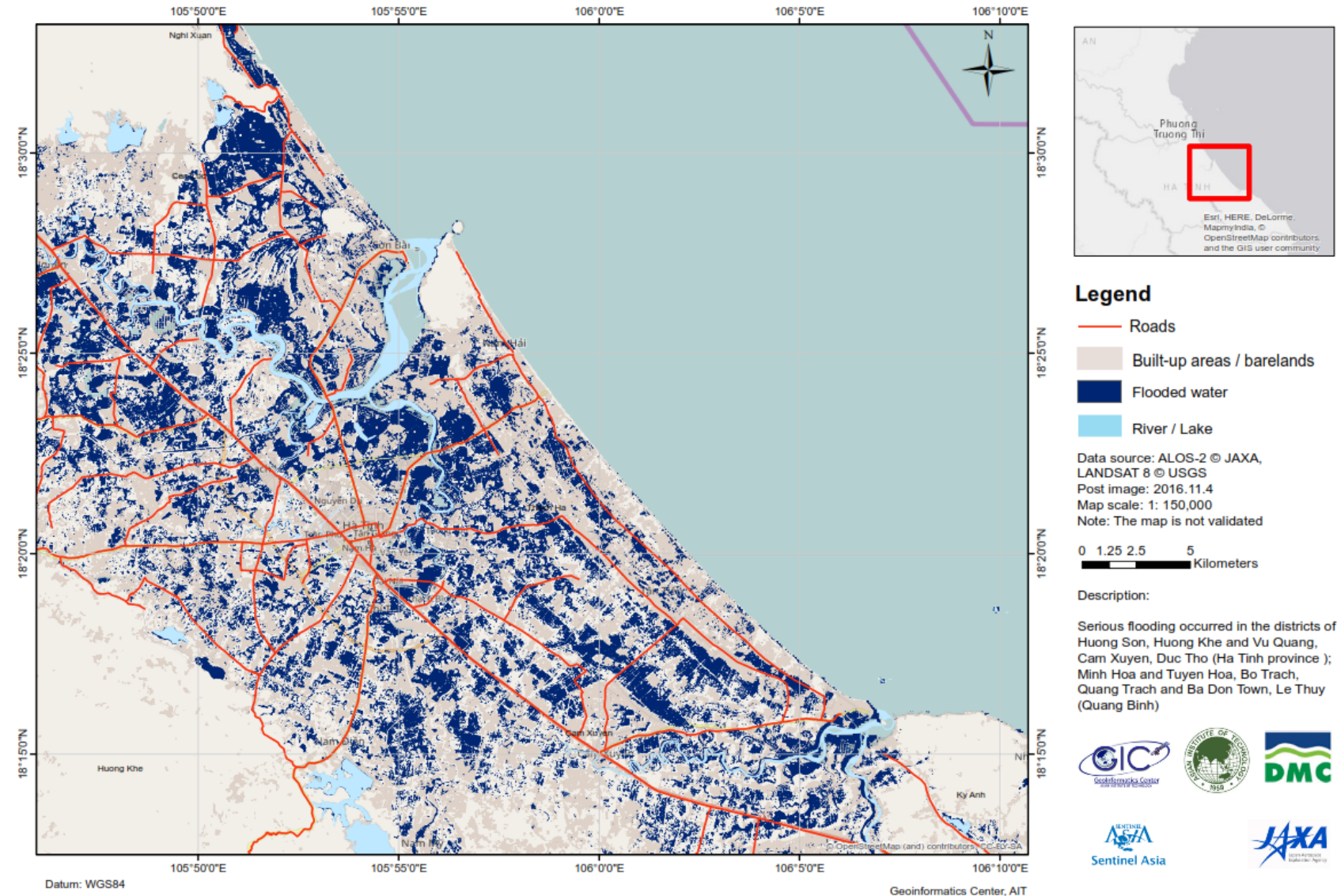
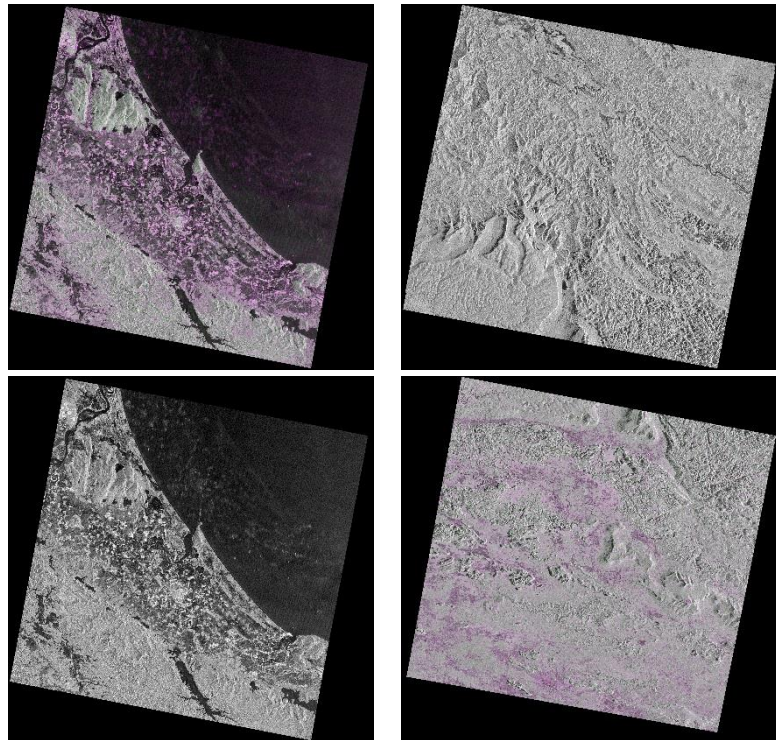


November 2016

















DMPTC & STI requested Sentinel Asia

AIT processed

Map 1.1 : Existing Water Detected by ALOS-2/PALSAR-2 Images observed on 04/11/16 in Central of Vietnam

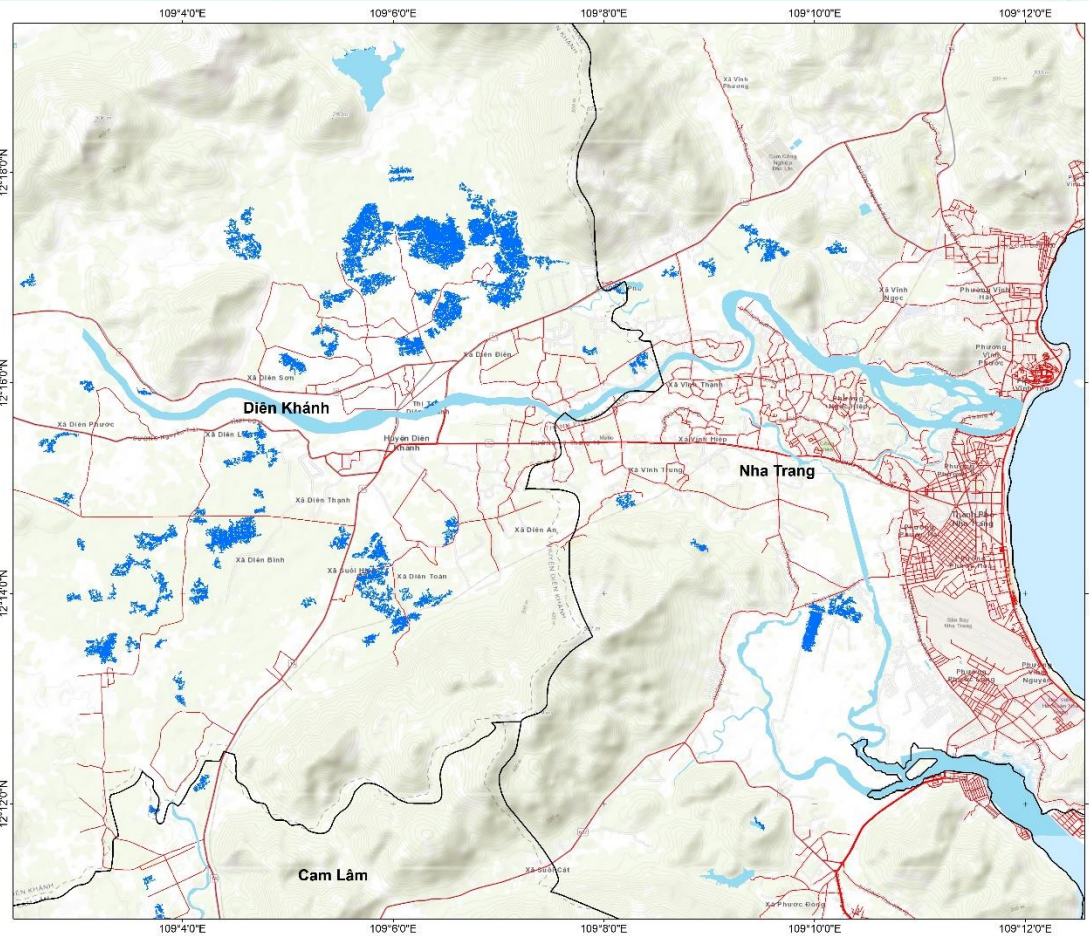


Activated disaster in Sentinel Asia 06 event in 2018 and 02 event in 2019:

Emergency Obs. ID	Occurrence Date	Country	Disaster Type	Product	WEB-GIS	Detail	Disaster Inf.	Status
ERVNMN000057	05/Sep/2019	Vietnam	Flood			link	ADRC	Active
ERVNMN000054	24/Jun/2019	Vietnam	Flash flood			link	ADRC	Active
ERVNMN000053	24/Nov/2018	Vietnam	Typhoon			link	ADRC	Active
ERVNMN000052	18/Nov/2018	Vietnam	Typhoon			link	ADRC	Active
ERVNMN000051	17/Sep/2018	Vietnam	Typhoon			link	ADRC	Active
ERVNMN000050	27/Aug/2018	Vietnam	Flood			link	ADRC	Active
ERVNMN000049	18/Jul/2018	Vietnam	Flood			link	ADRC	Active
ERVNMN000048	23/Jun/2018	Vietnam	Flood			link	ADRC	Active

Flood in Khanh Hoa province (20/Nov/2018)

FLOODING IN DIEN KHANH DISTRICT, KHANH HOA PROVINCE, VIETNAM As observed by ALOS-2 image on 20 November 2018



Map Information

0 0.8 1.6 2.4 3.2 Kilometers

MAP SCALE 1:30,000 at A1 PRINT
Coordinate System: GCS WGS 84
Datum: D WGS 84
Unit: Degree

Legend

- Roads
- District boundary
- Water bodies
- Detected flood area

Data Sources

Satellite image:
Pre-disaster: ALOS-2, 27 February 2018
Post-disaster: ALOS-2, 20 November 2018
Copyright: © JAXA (2018) - All rights reserved.

GIS data:
Roads, Water bodies © OSM 2018
Administrative boundary © GADM

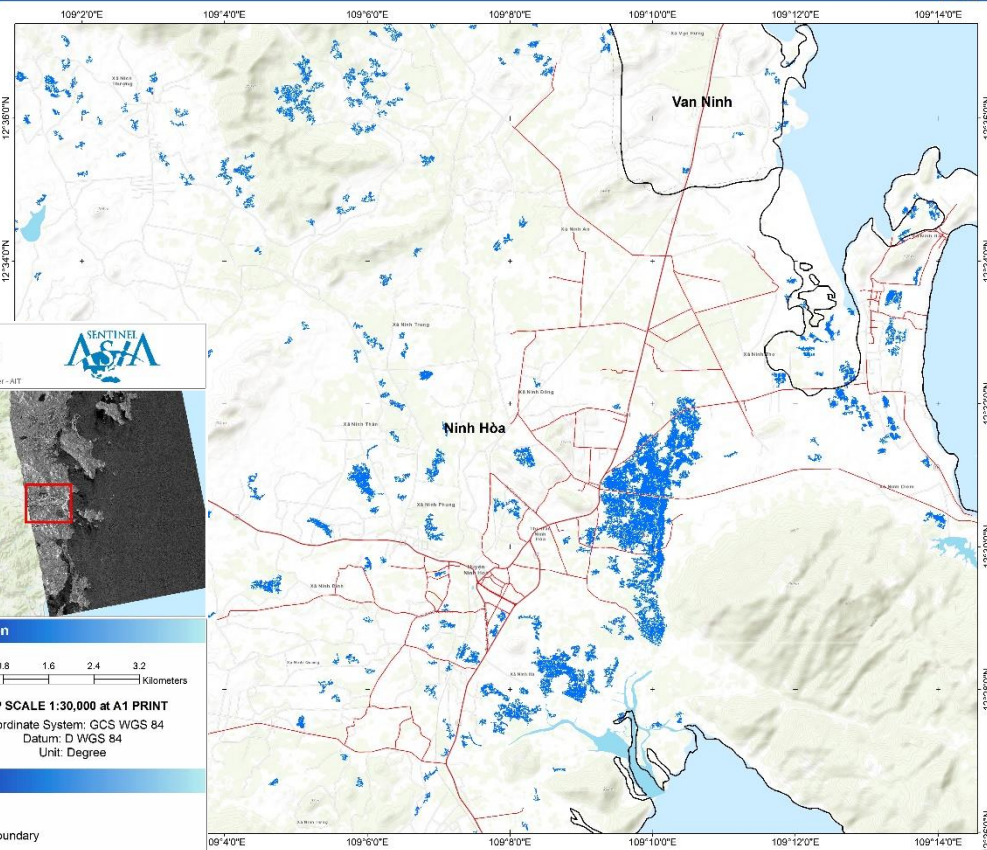
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO,

Description

This map shows possible flooding areas from typhoon occurred on 18 November 2018, which has affected Diên Khánh district in Khanh Hoa province in Vietnam.
Note that the detected-water may also include water in paddy area.
Map product made by GIC-AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.

Data provider:

FLOODING IN NINH HOA DISTRICT, KHANH HOA PROVINCE, VIETNAM As observed by ALOS-2 image on 20 November 2018



Map Information

0 0.5 1 2 3 4 Kilometers

MAP SCALE 1:40,000 at A1 PRINT
Coordinate System: GCS WGS 84
Datum: D WGS 84
Unit: Degree

Legend

- Roads
- District boundary
- Water bodies
- Detected flood area

Data Sources

Satellite image:
Pre-disaster: ALOS-2, 27 February 2018
Post-disaster: ALOS-2, 20 November 2018
Copyright: © JAXA (2018) - All rights reserved.

GIS data:
Roads, Water bodies © OSM 2018
Administrative boundary © GADM

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO,

Description

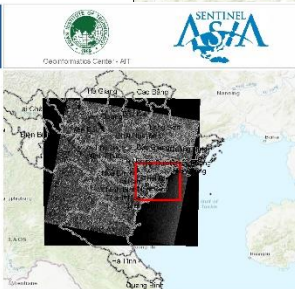
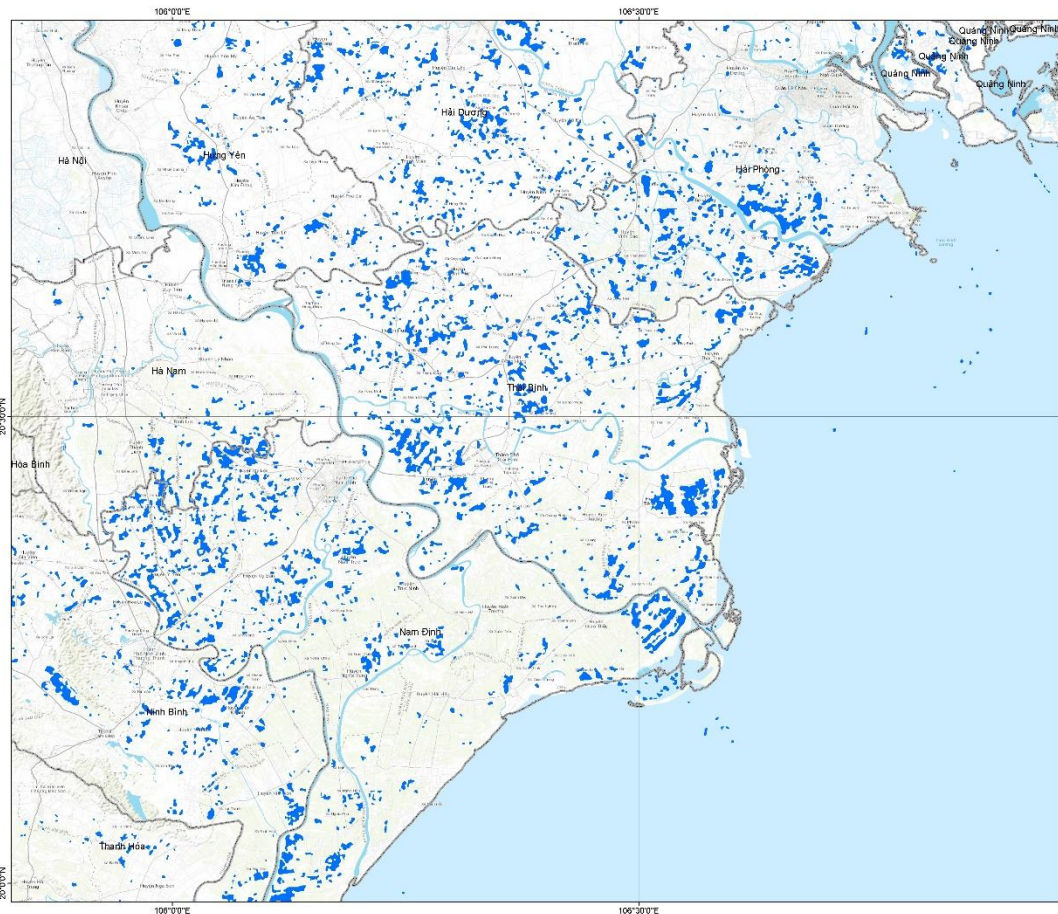
This map shows possible flooding areas from typhoon occurred on 18 November 2018, which has affected Ninh Hòa district in Khanh Hoa province in Vietnam.
Note that the detected-water may also include water in paddy area.
Map product made by GIC-AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.

Data provider:

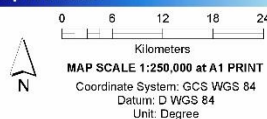
Flood in Nghe An, Thai Binh province and , Hai Phong city (18/Jul/2018)

FLOODING IN RED RIVER DELTA AND NORTH CENTRAL COAST OF VIETNAM

As observed by ALOS-2 image on 18 July 2018



Map Information



Legend

- Province Boundary
- Waterbody
- Floodwater

Data Sources

Satellite image:
 Pre-disaster : ALOS-2, 20 June 2018
 Post-disaster : ALOS-2, 18 July 2018
 Copyright : © JAXA (2018) - All rights reserved.

GIS data:
 River, Water bodies © OSM 2018
 Administrative boundary © GADM

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, Increment P Corp., GEBCO, USGS, FAO,

Description

This map shows possible flooding areas from heavy rain, which has affected Red River Delta and North Central Coast of Vietnam.
 Note that the detected-water may also include water in paddy area.

Map product made by GIC-AIT (v1.0).

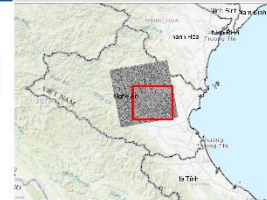
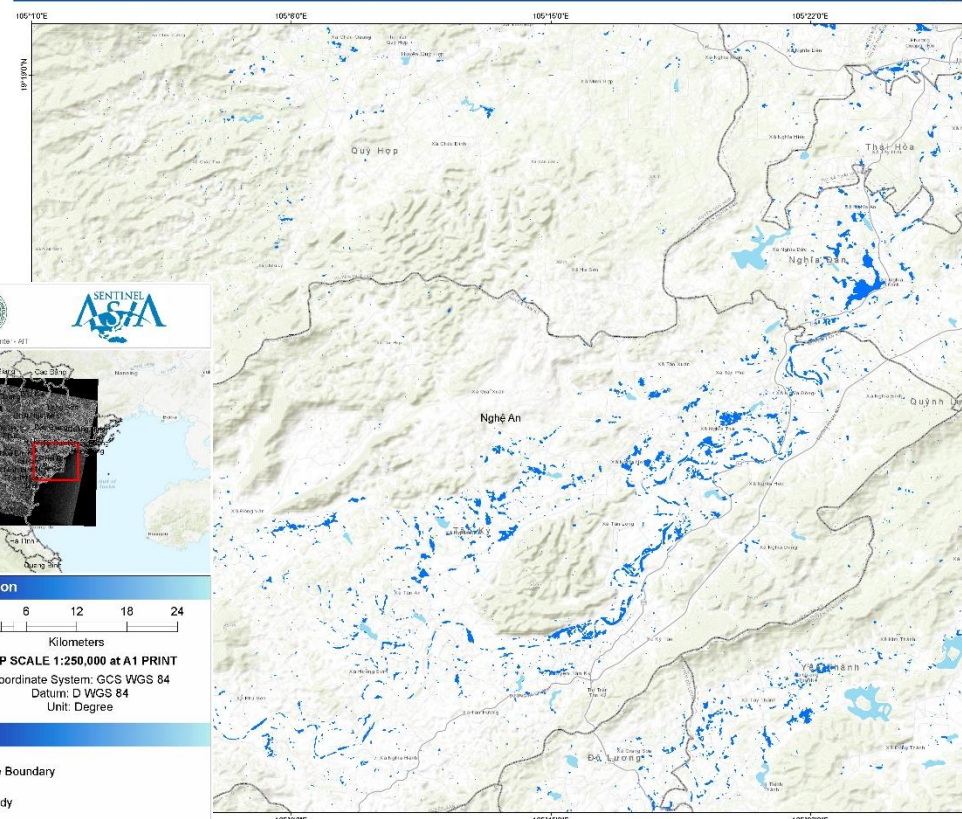
Disclaimer: The accuracy of this product is not validated.

Data provider:

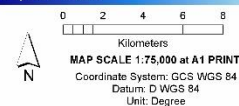


FLOODING IN HUYEN DISTRICT, NGHE AN, VIETNAM

As observed by ALOS-2 image on 28 July 2018



Map Information



Legend

- Province Boundary
- District Boundary
- Waterbody
- Flood Proxy Map

Data Sources

Satellite image:
 Pre-disaster : ALOS-2, 23 March 2018
 Post-disaster : ALOS-2, 28 July 2018
 Copyright : © JAXA (2018) - All rights reserved.

GIS data:
 River, Water bodies © OSM 2018
 Administrative boundary © GADM

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, Increment P Corp., GEBCO, USGS, FAO,

Description

This map shows possible flooding areas from heavy rain, which has affected Huyen District and surrounding, Nghe An Province. Note that the detected-water may also include water in paddy area.

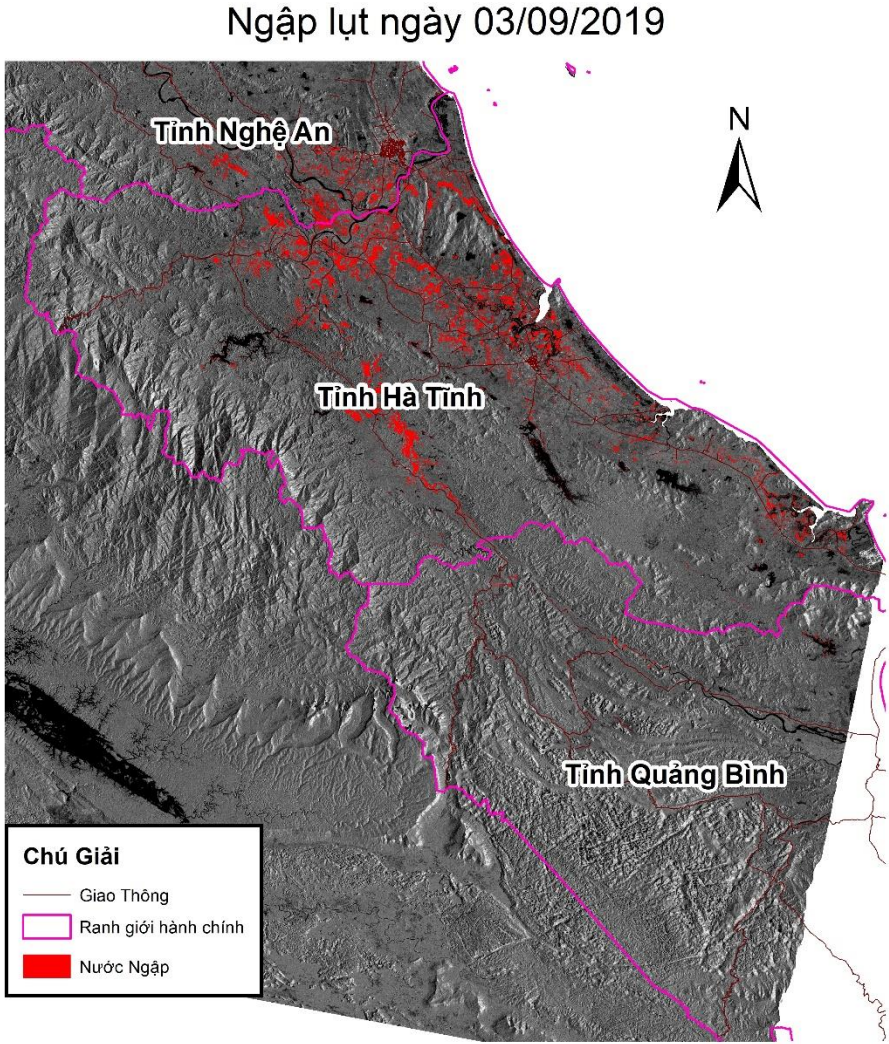
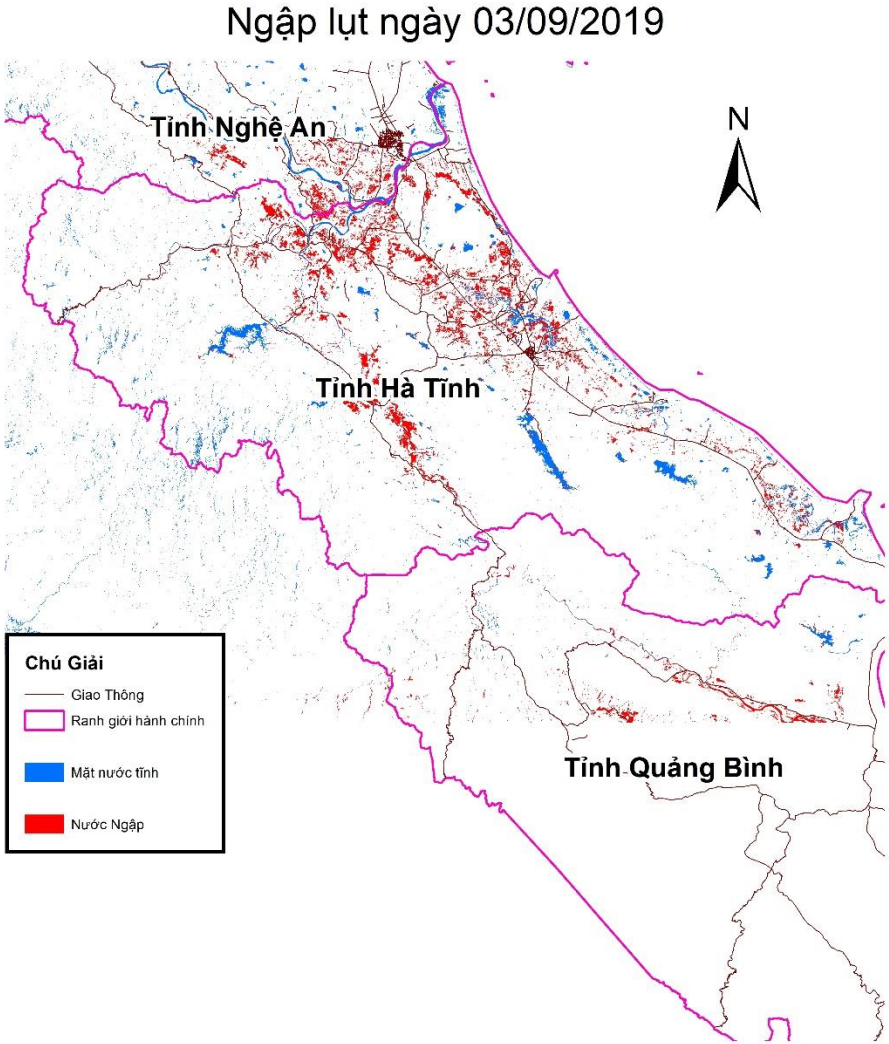
Map product made by GIC-AIT (v1.0).

Disclaimer: The accuracy of this product is not validated.

Data provider:



Heavy rain in Nghe An to Ha Tinh province (3/Sep/2019)

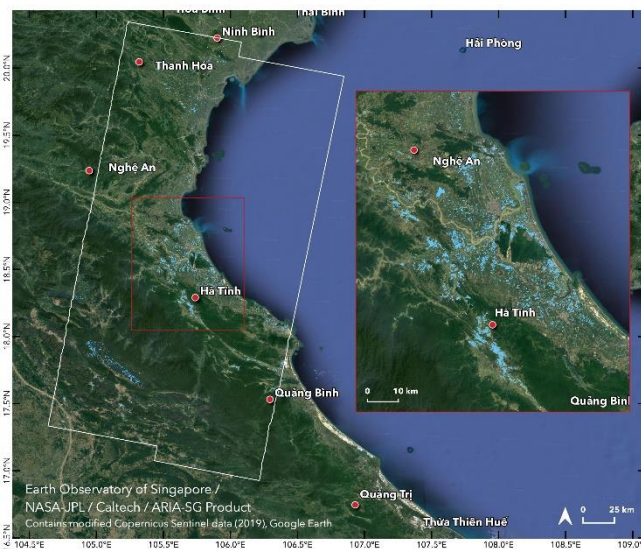
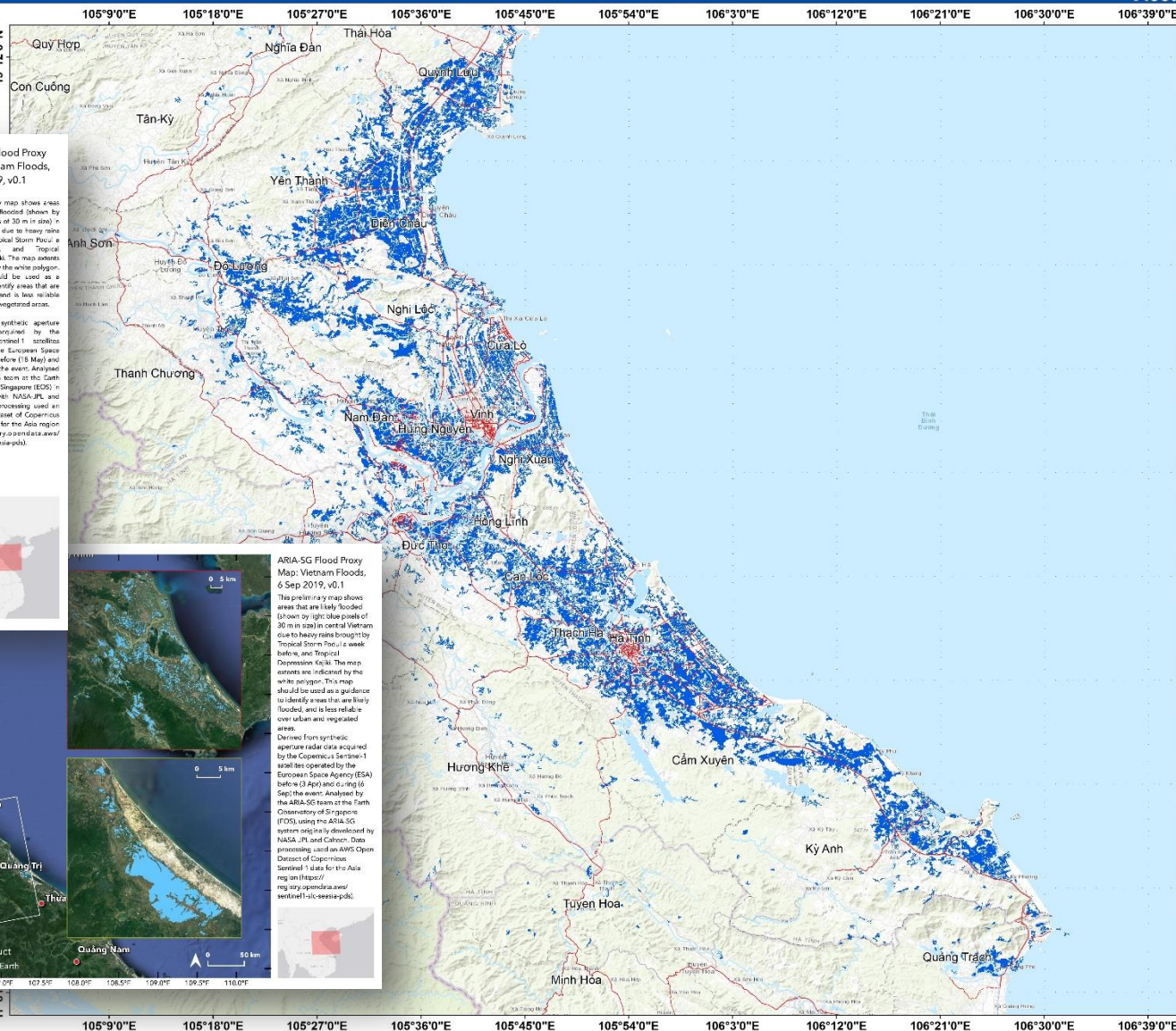


*Space Technology Institute
(HoChiMinh city processing)*

Heavy rain in Thanh Hoa to Quang Binh province (10/Sep/2019)

DETECTED WATER IN HA TINH AND NGHE AN, VIETNAM

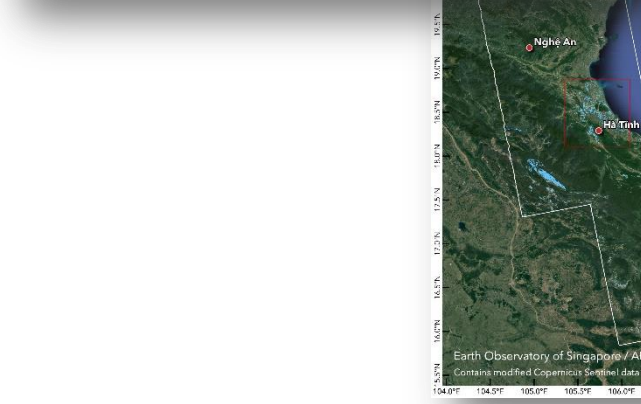
As observed by Resourcesat-2A AWiFS image on 07 September 2019



ARIA-SG Flood Proxy Map: Vietnam Floods, 3 Sep 2019, v0.1

This preliminary map shows areas that are likely flooded (shown by light blue pixels of 30 m in size) in central Vietnam due to heavy rains brought by Tropical Storm Poca a week before, and Tropical Depression Kajiki. The map extents are indicated by the white polygon. This map should be used as a guidance to identify areas that are likely flooded, and is less reliable over urban and vegetated areas.

Derived from synthetic aperture radar data acquired by the Copernicus Sentinel-1 satellites operated by the European Space Agency (ESA) before (18 May) and during (3 Sep) the event. Analyzed by the ARIA-SG team at the Earth Observatory of Singapore (EOS) in collaboration with NASA JPL and Caltech. Data processing used an AWS Open Dataset of Copernicus Sentinel-1 data for the Asia region (<https://registry.opendata.aws/sentinel-1-cosmos-pds/>).



ARIA-SG Flood Proxy Map: Vietnam Floods, 6 Sep 2019, v0.1

This preliminary map shows areas that are likely flooded (shown by light blue pixels of 30 m in size) in central Vietnam due to heavy rains brought by Tropical Storm Poca, a week before, and Tropical Depression Kajiki. The map extents are indicated by the white polygon. This map should be used as a guidance to identify areas that are likely flooded, and is less reliable over urban and vegetated areas.

Derived from synthetic aperture radar data acquired by the Copernicus Sentinel-1 satellites operated by the European Space Agency (ESA) before (3 Sep) and during (6 Sep) the event. Analyzed by the ARIA-SG team at the Earth Observatory of Singapore (EOS) using the ARIA-SG system originally developed by NASA JPL and Caltech. Data processing used an AWS Open Dataset of Copernicus Sentinel-1 data for the Asia region (<https://registry.opendata.aws/sentinel-1-cosmos-pds/>).



Map Information

0 185 370 740 1110 1480 Kilometers

MAP SCALE 1:300,000
 Coordinate System: GCS WGS 84
 Datum: D WGS 84
 Unit: Degree

- Legend**
- District Boundary
 - Detected Water Area
 - Waterbody
 - Waterway
 - Building
 - Road

Data Sources

Satellite image : Resourcesat-2A AWiFS, 07 Sep 2019
 Post-disaster : Resourcesat-2A AWiFS, 07 Sep 2019
 Copyright : © ISRO (2019) - All rights reserved.

GIS data:
 River, Water bodies © OSM 2019
 Administrative boundary © GADM

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO,


This map shows detected water areas from heavy rain from 01 to 05 September, which has affected in Ha Tinh and Nghe An provinces, Vietnam. Note that detected water may also include water in paddy field areas.

Map product made by GIC-AIT (v1.0).

Disclaimer: The accuracy of this product is not validated.

Data provider:

Landslide risk zoning map for Dien Bien province in 2018 (scale 1:50.000)

 **HỆ THỐNG GIÁM SÁT THIÊN TAI VIỆT NAM**
VIETNAM DISASTERS MONITORING SYSTEM (VNDMS)

Các nhóm bản đồ

Các lớp thông tin, dữ liệu

Các lớp bản đồ

- Bản đồ rủi ro đa thiên tai
- Bản đồ dựa vào cộng đồng
- Bản đồ ngập lụt
- Bản đồ nước dâng do siêu bão
- Bản đồ nguy cơ lũ quét và sạt lở đất**

Tỉnh:

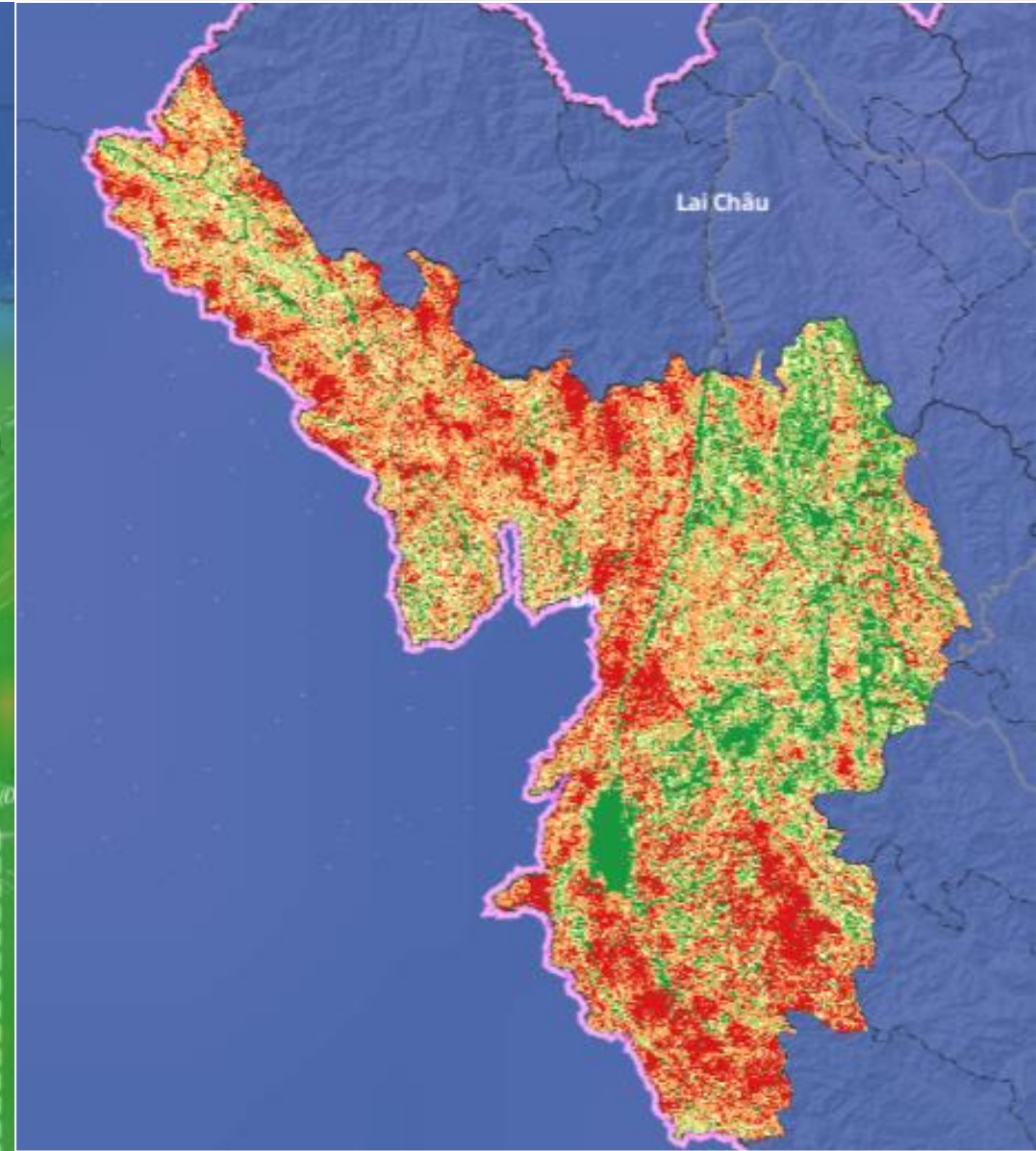
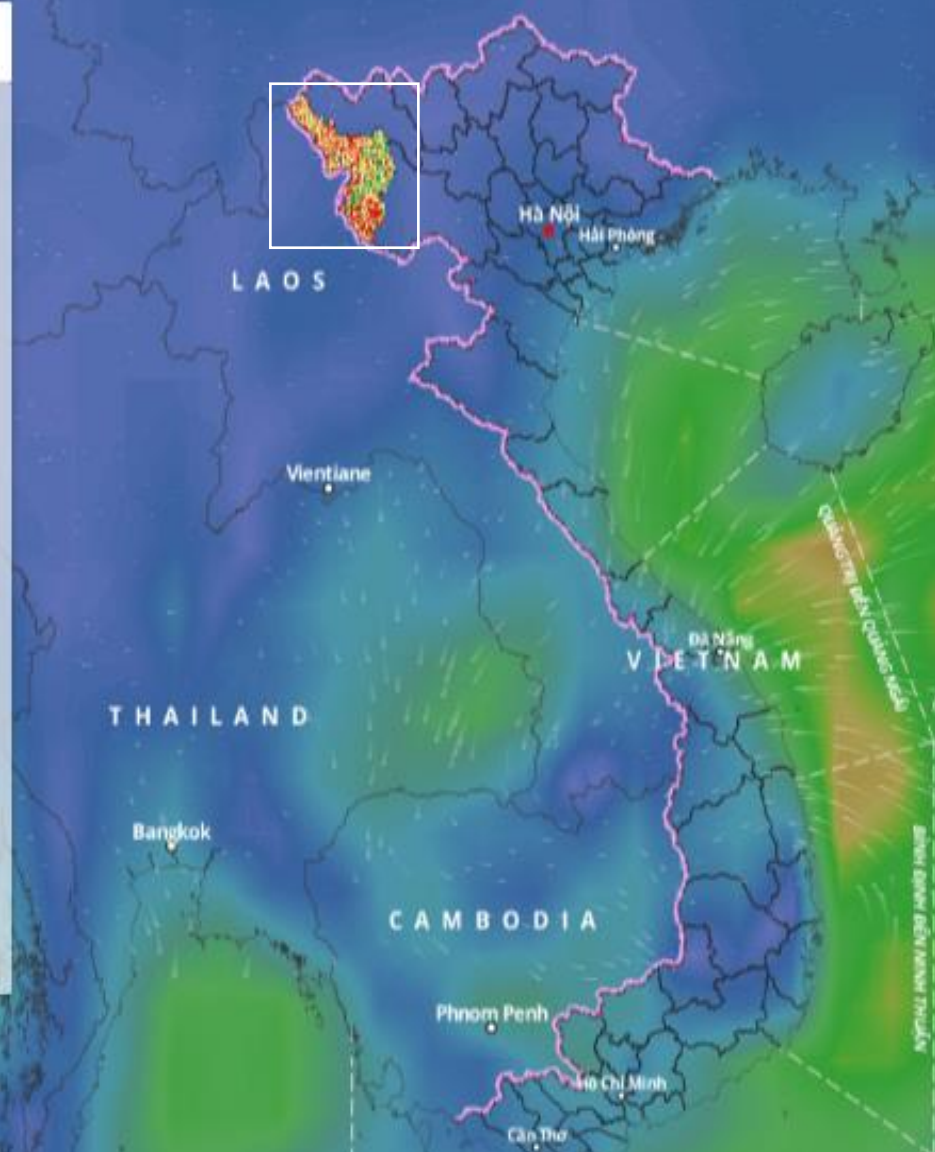
Huyện:

Xã:

Kịch bản:

- Bản đồ sơ tán
- Bản đồ sạt lở sông, bờ biển

Bản đồ đánh giá thiên tai (từ ảnh vệ tinh)



TỐC ĐỘ GIÓ

Inundation map cause by super tropical storm/ typhoon for Ba Ria- Vung Tau city



Các nhóm bản đồ

Các lớp thông tin, dữ liệu

Các lớp bản đồ

▶ Bản đồ ngập lụt

▼ Bản đồ nước dâng do siêu bão

Năm

Tỉnh

Huyện

Xã

Kịch bản

[Xem bản đồ](#)

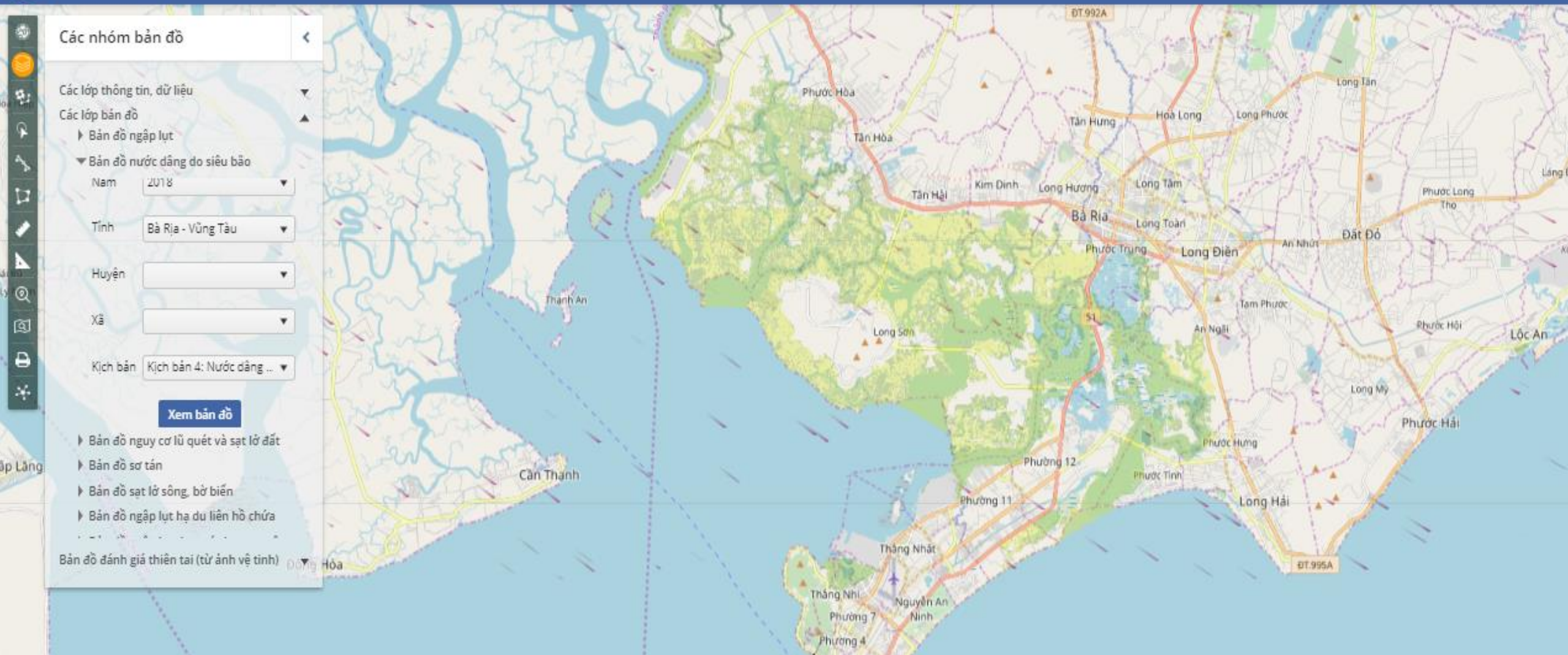
▶ Bản đồ nguy cơ lũ quét và sạt lở đất

▶ Bản đồ sơ tán

▶ Bản đồ sạt lở sông, bờ biển

▶ Bản đồ ngập lụt hạ du liên hồ chứa

Bản đồ đánh giá thiên tai (từ ảnh vệ tinh)



DISCUSSION AND RECOMMENDATIONS

1. Cooperation to national and international system, private organization to improve the applying of space technology in DDR.
2. Support for monitoring and provide satellite images in case of disaster occurred.
3. The officer need more technical training for space technology, advanced technique.

THE END

**THANK YOU
FOR
LISTENING**