SENTINEL ASIA

ANNUAL REPORT 2023

Sentinel Asia

Annual Report 2023

Contents

1. Introduction

1.1. Purpose and Scope of this Document

This document describes the activities of Sentinel Asia (SA) in 2023 for member organizations and external relations.

1.2. Structure of this Document

This report follows the following structure:

Chapter 1 Introduction

Chapter 2 Sentinel Asia and Major Disasters: overview and target disaster events related to Sentinel Asia.

Chapter 3 Emergency Observation Operations in 2023: results of emergency observation activities in 2023.

Chapter 4 External Relations: explanation of the integration of new members, progress, external relationships, and Cooperating Bodies.

Chapter 5 Conference and Releases: reports on all communication activities undertaken throughout the reporting period.

Chapter 6 Assessment of Sentinel Asia Operations: assessment of the overall impact of Sentinel Asia as a service in supporting disaster response, and of system performance, products, and services.

Chapter 7 Conclusions: outline of significant achievements and conclusions throughout the reporting period.

1.3. List of Acronyms

ADRC	Asian Disaster Reduction Center
AFAD	Türkiye Disaster and Emergency Management Presidency
AHA Centre	ASEAN Coordinating Centre for Humanitarian Assistance on disaster management
ANDMA	Afghanistan National Disaster Management Authority
AIT	Asian Institute of Technology
ALOS	Advanced Land Observing Satellite
APRSAF	Asia-Pacific Regional Space Agency Forum
ASEAN	Association of South-East Asian Nations
BRIN	Badan Riset dan Inovasi Nasional
BWDB	Bangladesh Water Development Board
CAIAG	Central Asian Institute for Applied Geosciences
CEA	Institute of Geology, China Earthquake Administration
DAN	Data Analysis Node
DDM	Department of Disaster Management
DMS	Disaster Management Support
DPN	Data Provider Node
DRR	Disaster Risk Reduction
DRRM	Disaster Risk Reduction and Management
EOR	Emergency Observation Request
EOS	Earth Observatory of Singapore
GIC	Geoinformatics Center
GIS	Geographic Information System
GISTDA	Geo-Informatics and Space Technology Development Agency
ICIMOD	International Centre for Integrated Mountain Development
ICT	Information and Communication Technology
IDC	International Disaster Charter
ISRO	Indian Space Research Organisation
IWM	Institute of Water Modelling
JAXA	Japan Aerospace Exploration Agency
JPTM	Joint Project Team Meeting
MBRSC	Mohammed Bin Rashid Space Centre
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MO	Manila Observatory

MONRE	Ministry of Natural Resources and Environment
NDMI	National Disaster Management Research Institute
NTU	Nanyang Technological University
PhilSA	Philippine Space Agency
PHIVOLCS	Philippine Institute of Volcanology and Seismology
RSO	Regional Support Office
SA	Sentinel Asia
SAWG	Space Applications for Societal Benefit Working Group
SIG-SIU	Symbiosis Institute of Geoinformatics, Symbiosis International University
SOP	Standard Operating Procedure
SUPARCO	Pakistan Space & Upper Atmosphere Research Commission
SPARRSO	Bangladesh Space Research and Remote Sensing Organization
TASA	Taiwan Space Agency
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNOOSA	United Nations Office for Outer Space Affairs
VAP	Value Added Product
WFP	World Food Programme
WINDS	Wideband InterNetworking engineering test and Demonstration Satellite

2. Sentinel Asia and Major Disasters

2.1. Outline of Sentinel Asia

2.1.1. Background and History of Sentinel Asia

Natural hazards have been on the rise worldwide, including the Asia-Pacific region (Figure 1). The Asia-Pacific region suffers from different types of natural hazards, such as earthquakes, cyclones/typhoons, floods, landslides, droughts, tsunamis, volcanic eruptions, and forest fires. Several of them are large-scale, devastating disasters. Given the high population level (about 3 billion) as well as the high frequency and severity of natural hazards in the region, an integrated use of space technology, such as earth observation satellite data and geographic information systems, can be an effective means to reduce the magnitude of the severity, or provide timely management in the event of a large-scale natural hazard or disaster. In light of the increasing frequency of natural hazards and an elevated loss of lives and properties from these events, SA, a collaborative, regional project, was conceptualized in 2005, and began Emergency Observation Request (EOR) activity in 2007. It is engaged in activities to share and provide disaster-related information, including earth observation satellite images via the internet, in order to contribute toward disaster management in the Asia-Pacific region. Space agencies from the Asia-Pacific Region Space Agency Forum (APRSAF) community, including the Japan Aerospace Exploration Agency (JAXA), and disaster risk reduction agencies in the Asia-Pacific region, such as the Asian Disaster Reduction Center (ADRC), cooperate in forming a Joint Project Team (JPT) and promoting SA. As of December 2023, it consists of 114-member organizations, including 97 agencies from 29 countries/regions, and 17 international organizations. JAXA has been serving as a secretariat of the JPT.

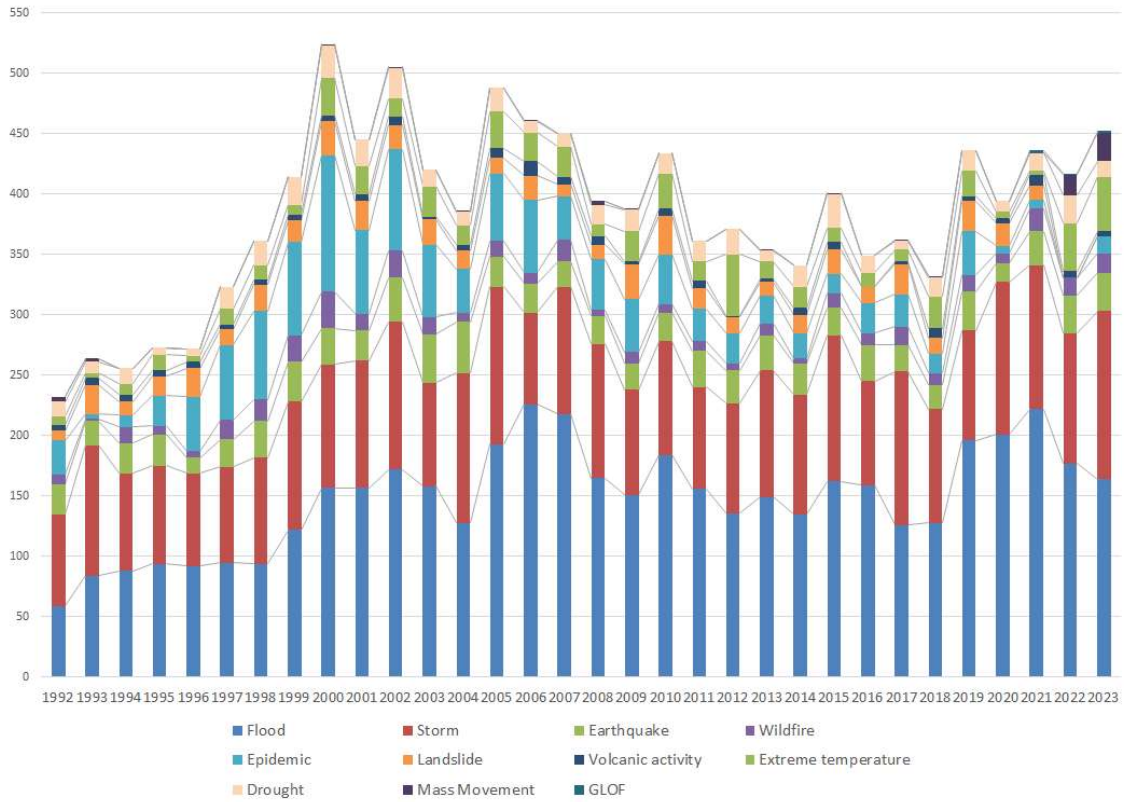

Figure 1: Incidence of Natural Hazards by Region (in and after 1990)

A stepwise approach for the implementation of data and information dissemination systems through SA as proposed by the APRSAF was as follows:

Step 1: Implementation of the backbone 'Sentinel Asia' data dissemination system and associated Nodes (Feb. 2006–Dec. 2007)

Step 2: Expansion of the dissemination backbone with new Satellite Communication Systems (2008–2012)

Step 3: Establishment of a comprehensive 'Disaster Management Support System' in the region (2013 onwards)

Sentinel Asia initiated an emergency observation request system in 2007 to provide image data (and analysed images) acquired through the satellites operated by participating space agencies on the internet and via JAXA's Wideband InterNetworking engineering test and Demonstration Satellite (WINDS), also known as Kizuna, in the event of a disaster in the Asia-Pacific region.

During that time, Sentinel Asia participated in the International Disaster Charter (IDC) in 2010 to expand its activities and cooperation on a global scale. Sentinel Asia also established the Regional Support Office (RSO) for the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) at ADRC in June 2009, which serves as a contact (liaison) office for emergency observation requests, to expand the range of its activities and increase international interest.

2.1.2. Aims and Activities of Sentinel Asia in a Nutshell

The SA aims to: (i) improve safety in society with the use of modern Information and Communication Technology (ICT) and space-based technology; (ii) improve the speed and accuracy of disaster preparedness and early warnings; and (iii) minimize the number of victims, as well as social and economic losses. To achieve these goals, various activities have been undertaken.

The main activities of the SA are summarized as follows:

- Emergency observation by earth observation satellites (e.g. ALOS-2, FORMOSAT-5, RESOURCESAT-2/2A, CARTOSAT-2S/3, EOS-4, Thaichote, VNREDSat-1A, TeLEOS-1, KhalifaSat, DIWATA-2, and NovaSAR-1) in the event of major disasters
- Acceptance of observation requests for major disasters in the Asia-Pacific region from ADRC member organizations and the representative organizations of JPT members to support disaster management in the region
- Working Groups (WGs) for early warning and disaster monitoring: WGs on wildfires, floods, glacial lake outburst floods, and tsunamis are formed and in operation
- Capacity building of member organizations (e.g., through training) for the utilization of satellite images for disaster management

The following is an overview of the main data and products provided by SA to its members: (i) satellite imagery (and data permitted by data providers) and value-added images with an extraction of the affected area, etc.; (ii) on-site digital camera images; (iii) wildfire hotspot information and data; (iv) rainfall (short-term and long-term)

information and data; and (v) meteorological satellite imagery and data.

2.1.3. Framework and Emergency Observation Mechanisms of Sentinel Asia

SA is promoted under cooperation among the following three communities: (i) the Space Community (APRSAF); (ii) the International Community (e.g., UNESCAP, UNOOSA, ASEAN, AIT); and (iii) the Disaster Reduction Community (ADRC and its member countries), as illustrated in Figure 2. The JPT was established to promote the activities of SA, and it is open to all APRSAF member countries, disaster prevention organizations and regional/international organizations who wish to participate in disaster information sharing activities.

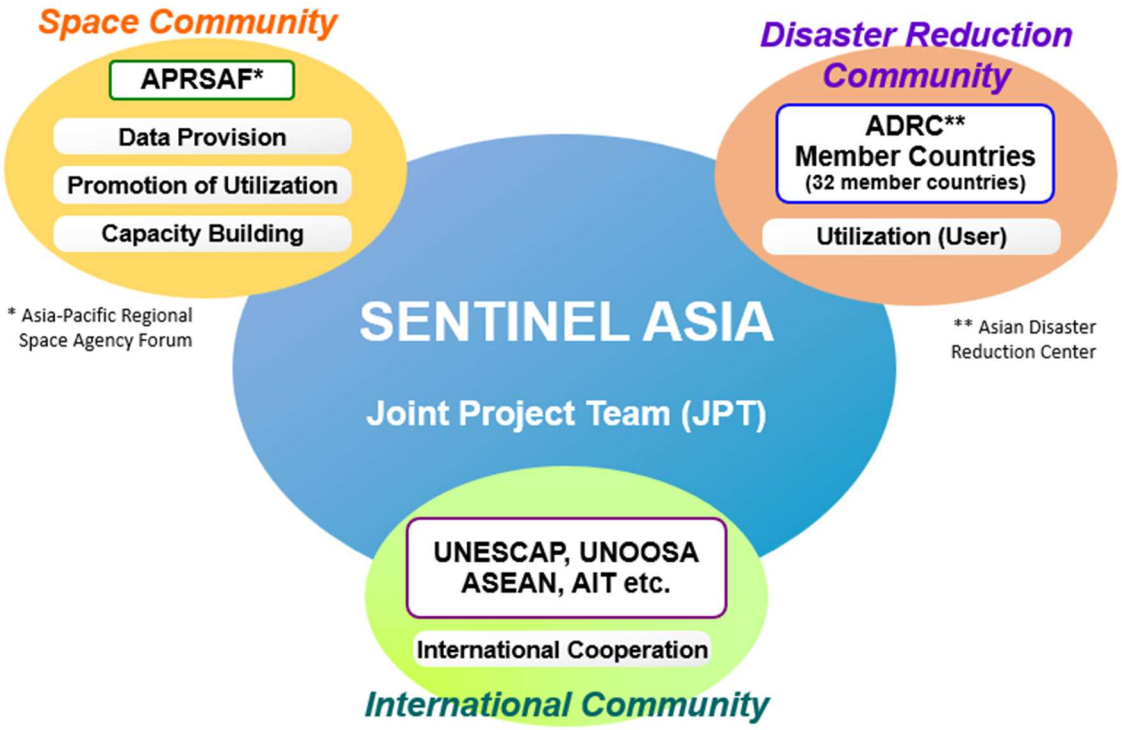

Figure 2: Framework of Sentinel Asia

SA is composed of two Nodes (Data Provider, and Data Analysis) and four Working Groups (Wildfire, Flood, Water related disaster and Tsunami). The Data Provider Node (DPN) provides their own satellite imagery and other relevant data to JPT members upon an EOR from a JPT member, to the extent permitted by the data policy of each

DPN when a disaster occurs; while the Data Analysis Node (DAN) analyses the satellite data provided by DPN, makes a Value Added Product (VAP) and uploads and shares the result through the Sentinel Asia EOR system "OPTEMIS", which started operation in 2019 (Figure 3). Between 2007 and 2023, 478 EORs have been made or accepted, providing data and products to its members to support disaster management. The four WGs work toward the establishment and improvement of early warning/forecasting systems, as well as monitoring and planning for disaster management in their respective fields.

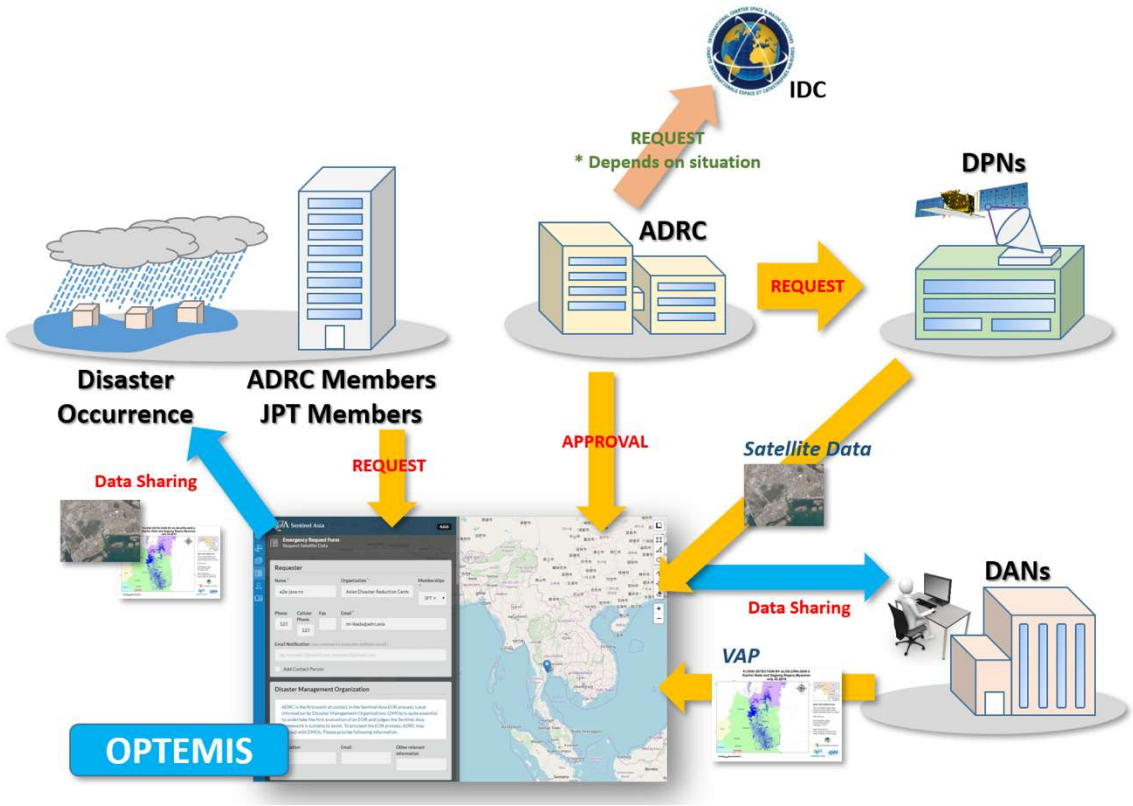

Figure 3: Flow of Sentinel Asia emergency observation

2.1.4. Current Phase (Step 3) and Ongoing Actions of Sentinel Asia

Out of the 3 Steps employed by Sentinel Asia, Steps 1 and 2 has so far been declared successfully completed. Step 3 began in 2013, defining its priority areas based on experiences in the earlier Steps and user requests leading to necessary actions as shown in Figure 4.

The key features of Step 3 are:

- Covering all phases in a disaster management cycle
- Employing a wide variety of satellites, including earth observation satellites, communication satellites and navigation satellites
- Being managed as a joint project by participating agencies, through the planned construction of a joint management system
- Promoting the use of services by expanding human networks through capacity development and outreach activities

Figure 4: Current Phase (Step 3) and Actions of Sentinel Asia

2.2. Major Disasters with Emergency Observation (2007-2023)

Table 1 shows the number of requests, activations, and rejections for each type of disaster. Requests related to floods, earthquakes, typhoon/storm, landslides, volcano, and cyclone are activated for more than 80% of all requests.

Table 1: Number of Requests, Activations, and Rejections for Emergency Observations by Disaster (2007-2023)

	Number of Requests	Number of Activations	Number of Rejections	Activations/Requests (%)
Flood	238	226	12	95.0%
Earthquake	65	60	5	92.3%
Typhoon / Storm	42	40	2	95.2%
Landslide	32	27	5	84.4%
Volcano	26	23	3	88.5%
Cyclone	26	22	4	84.6%
Forest Fire	19	9	10	47.4%
Oil Spill	8	6	2	75.0%
Others	22	18	4	81.8%
Total	**478**	**431**	**47**	

Figures 5 and 6 show a breakdown of emergency observations with requests and emergency observations with activation by disaster. Floods represent the largest number of disasters with 238 requests (49.8%), followed by earthquakes at 65 (13.6%), typhoons at 42 (8.8%), landslides at 32 (6.7%), volcanic eruptions at 26 (5.4%), cyclones at 26 (5.4%), forest fires at 19 (4.0%) and oil spill at 8 (1.7%). Generally, around 90.2% of requests for most disasters are activated.

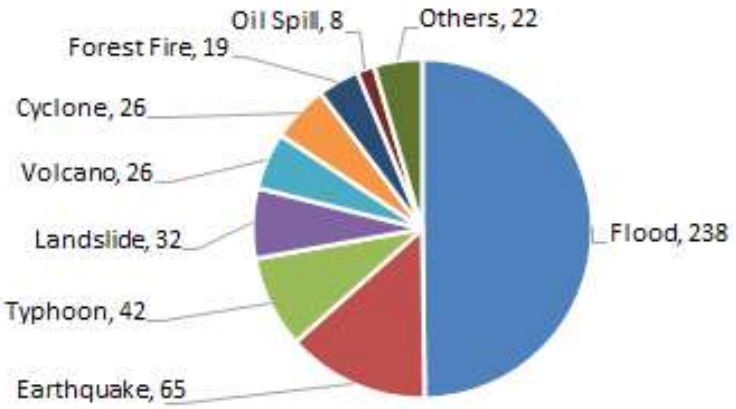

Figure 5: Breakdown of Emergency Observations by Disaster (2007–2023)

***Requests (N=478)**

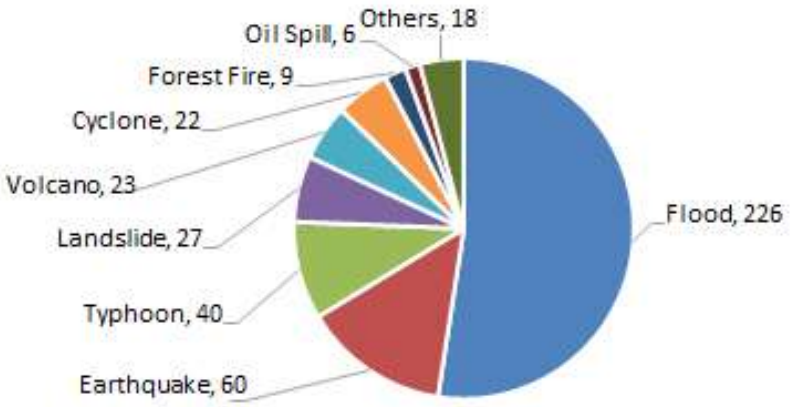

Figure 6: Breakdown of Emergency Observations by Disaster (2007–2023)

***Activations (N=431)**

3. Emergency Observation Operations in 2023

3.1. Emergency Observation Requests

Figure 7 shows the number of requests, activations and rejections involving emergency observations from 2007 to 2023. The number of requests and activations peaked in 2010 and 2012, with the number declining subsequently thereafter, but the number increased once again from 2015 to 2016. The number has begun decreasing gradually once more since 2016. And 27 requests were submitted and activated in 2023. No requests were rejected after 2020.

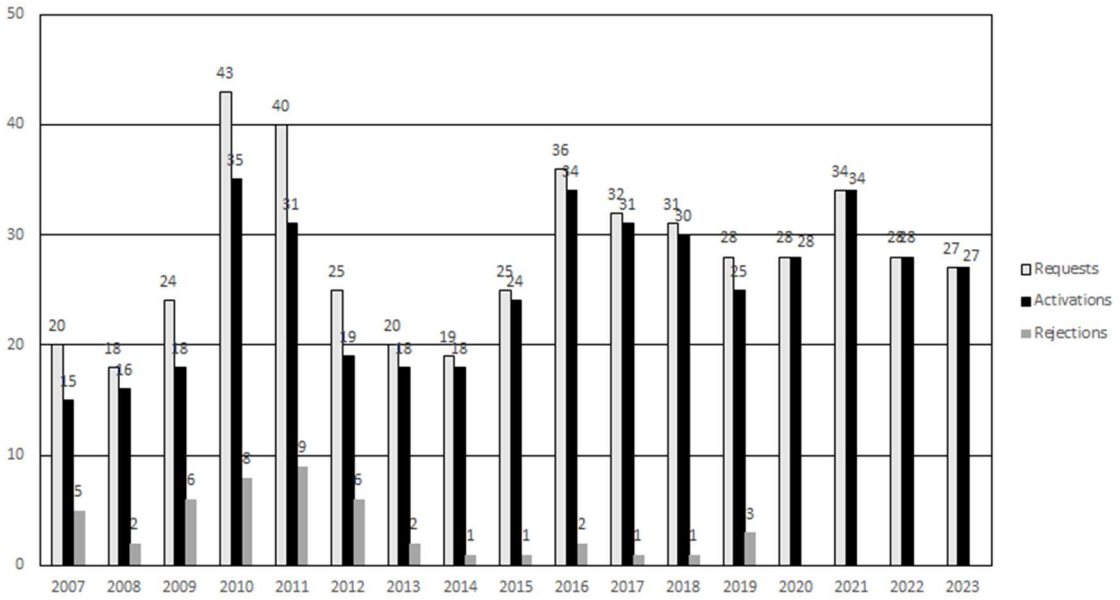

Figure 7: Comparison of the Number of Requests, Activations and Rejections for Emergency Observations

Figures 8 and 9 show a breakdown of emergency observations with requests and emergency observations with activation by disaster. On a request basis, floods represented the largest number of disasters, with 8 requests (29.6%), followed by earthquakes at 6 (22.2%), and typhoons at 6 (22.2%).

Table 2: List of 2023 Activations

Activation Number	Country	Disaster Type	Implementation	Requester
452	Turkey	Earthquake	2023/2/6	ADRC, AFAD
453	Philippines	Earthquake	2023/2/17	PHIVOLCS
454	Philippines	Oil spill	2023/3/1	PhilSA
455	Indonesia	Landslide	2023/3/7	BRIN
456	Myanmar	Storm, Flood	2023/5/11	AHA Center
457	Bangladesh	Storm	2023/5/14	BWDB
458	Philippines	Storm, Flood	2023/5/26	MO
459	India	Storm	2023/6/14	ISRO, DMS
460	Kazakhstan	Wildfire	2023/6/16	CAIAG
461	India	Storm, Flood	2023/7/13	ISRO, DMS
462	Vietnam	Storm, Flood	2023/7/17	MONRE
463	Bhutan	Flash Flood	2023/7/26	Ministry of Home Affairs (Bhutan)
464	Philippines	Flood, Landslide	2023/7/28	PhilSA
465	Vietnam	Flood, Landslide	2023/8/8	MONRE
466	Vietnam	Landslide	2023/8/16	MONRE
467	Tajikistan	Mudflow, Landslide	2023/8/30	CAIAG
468	Vietnam	Flood, Landslide	2023/9/13	MONRE
469	Vietnam	Flood, Landslide, Storm	2023/9/26	MONRE
470	Afghanistan	Earthquake	2023/10/9	ICIMOD, ANDMA (Afganistan)
471	Vietnam	Flood, Landslide	2023/10/14	MONRE
472	Vietnam	Flood, Landslide	2023/10/31	MONRE
473	Nepal	Earthquake	2023/11/5	Ministry of Home Affairs (Nepal)
474	Vietnam	Flood, Landslide, Storm	2023/11/15	MONRE
475	Bangladesh	Storm	2023/11/17	BWDB
476	Philippines	Earthquake	2023/11/18	PHIVOLCS
477	Indonesia	Volcanic Eruption	2023/12/5	BRIN
478	China	Earthquake	2023/12/19	CEA

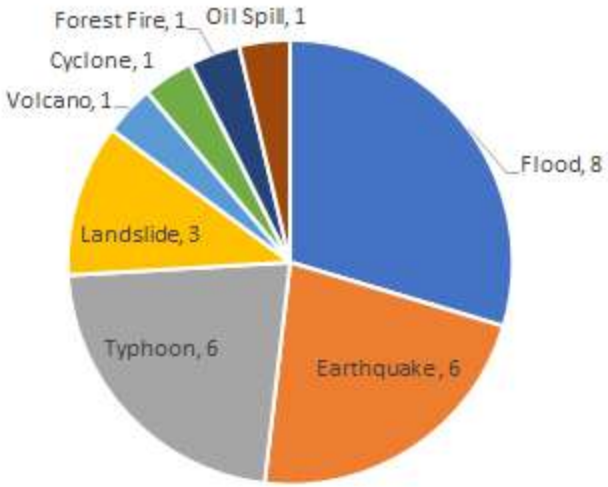

Figure 8: Breakdown of Emergency Observations by Disaster in 2023

***Requests (N=27)**

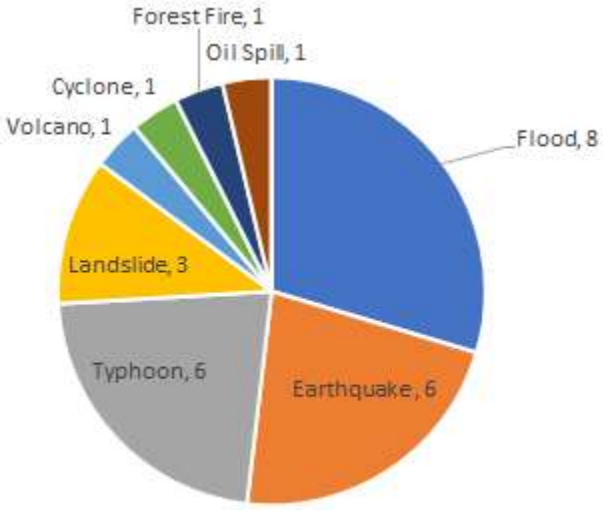

Figure 9: Breakdown of Emergency Observations by Disaster in 2023

***Activations (N=27)**

3.2. Results of Emergency Observations

During 2023, the monthly average of activations was 2.3. Figure 10 shows the monthly distribution of activations throughout 2023. The highest number of activations occurred in July to November, corresponding to 59.3% of the total number.

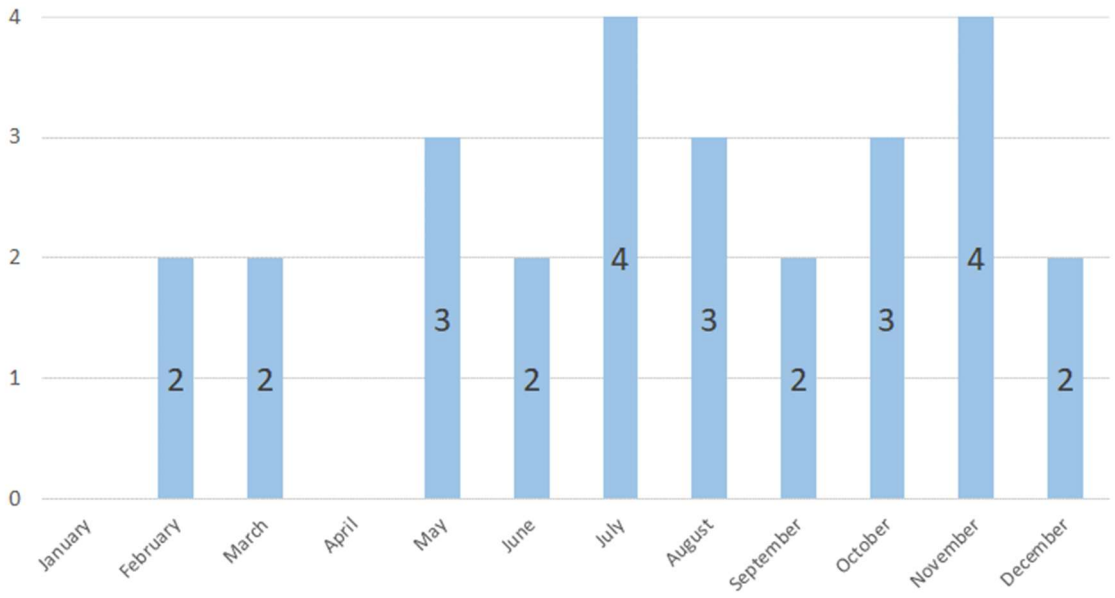

Figure 10: Number of Monthly Activations in 2023

Figure 11 shows the number of emergency observations by country. Countries and regions with a large number of requests are mostly located in Southeast Asia and South Asia, including Vietnam, the Philippines, Bangladesh, India, and Indonesia. The country with the highest number of activations was Vietnam, with 8 activations.

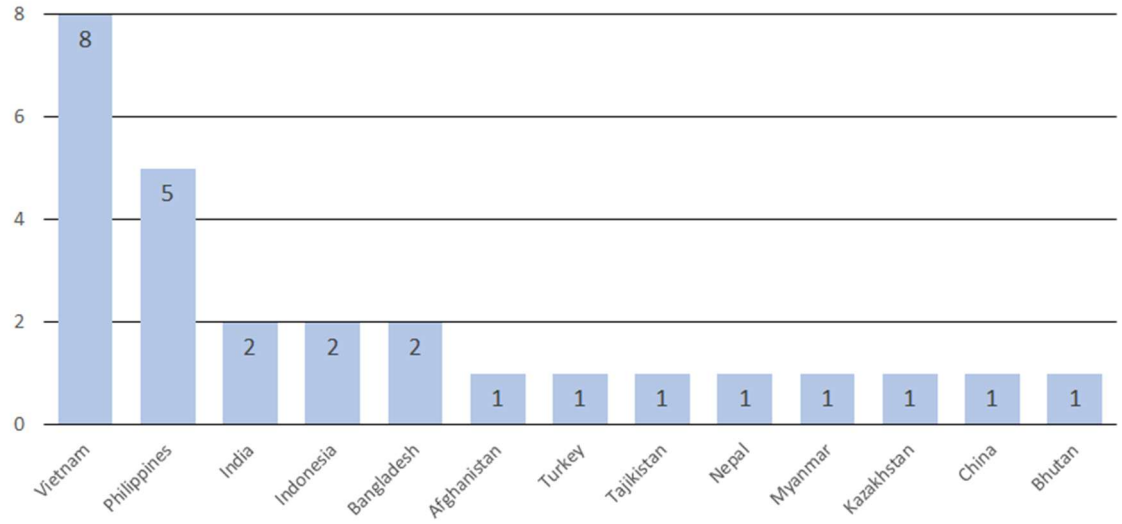

Figure 11: Number of Activations by Country in 2023

Figure 12 shows the number of implementations for providing Archive data and New Acquisition by DPN. In total, 32 implementations for providing Archive data and 85 implementations for providing New Acquisition were made in 2023.

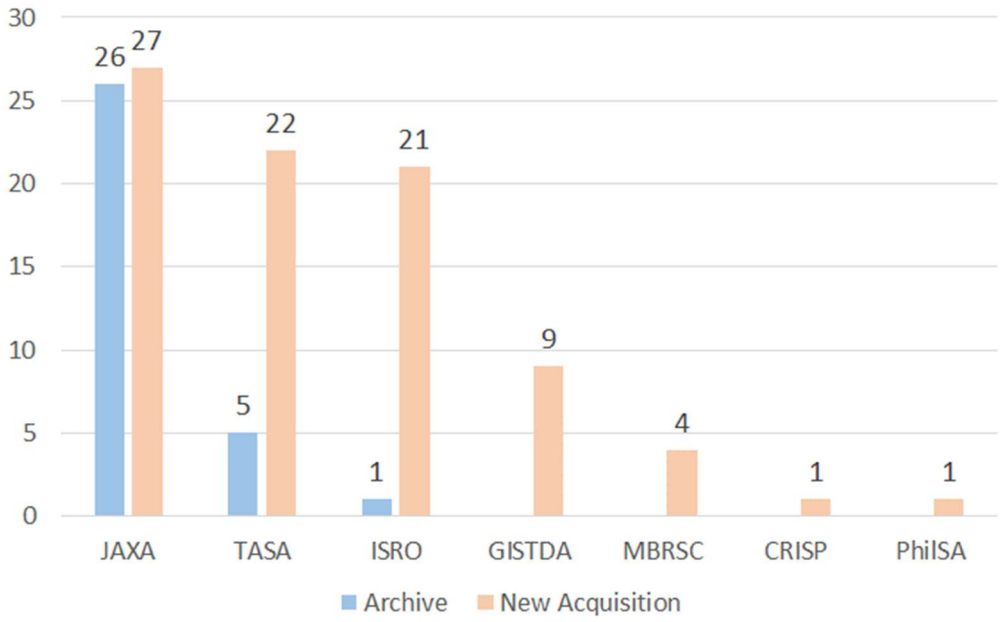

Figure 12: Number of Responses by DPN in 2023

DPN has been providing a lot of satellite images, including optical and radar data, when an EOR is activated. DAN have also been supportive by providing VAPs, including KMZ files and shapefiles for GIS. This data is uploaded to OPTEMIS and the SA website (https://sentinel-asia.org/EO/EmergencyObservation.html). Figure 13 shows the quantity of optical and radar data by DPN which was uploaded to the SA website. In total, 486 satellite imaged were provided to requesters.

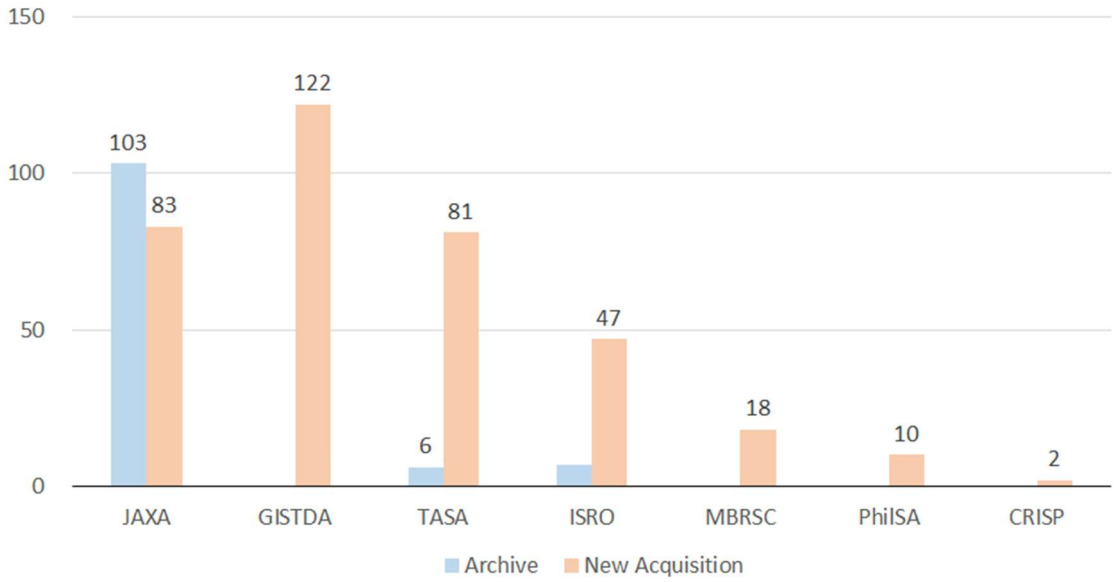

Figure 13: Data Consumption (Archive and New Acquisition) by DPN in 2023

Figure 14 shows the number of implementations by DAN in 2023. Figure 15 shows the number of provided VAPs in 2023. In total, 59 were implemented, and 269 VAPs were provided to requesters.

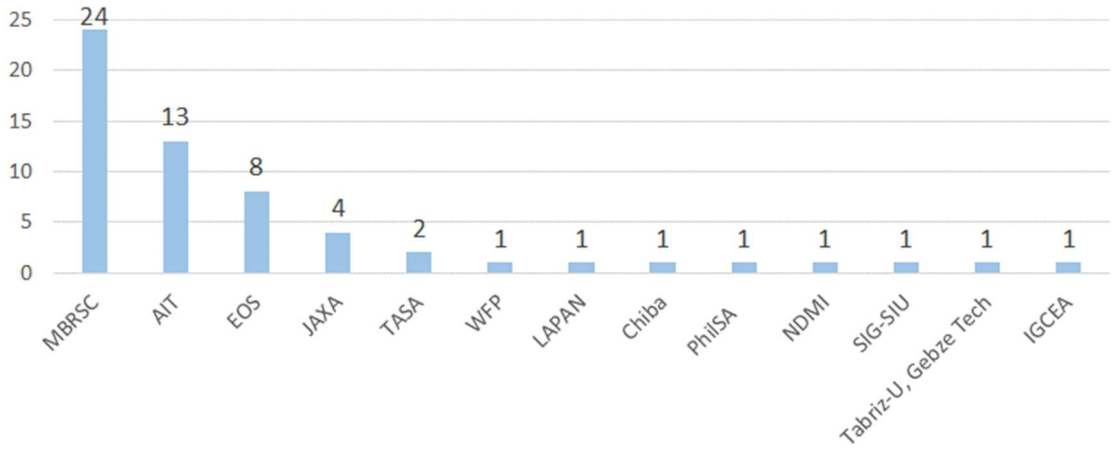

Figure 14: Number of responses by DAN in 2023

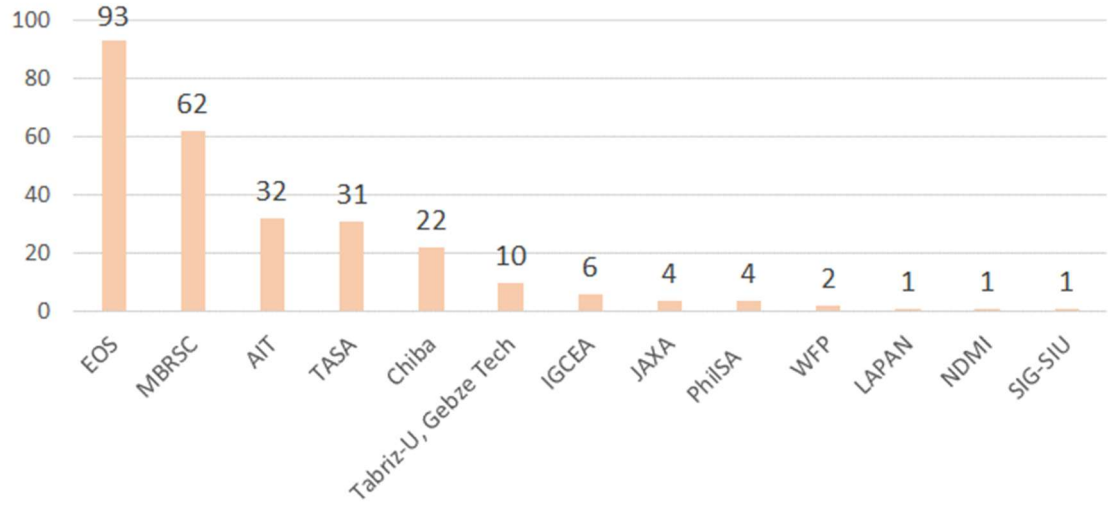

Figure 15: Number of VAP by DAN in 2023

3.3. Good Practices

3.3.1. Earthquake in Türkiye (February 2023)

[EOR Requester] Disaster and Emergency Management Presidency of Türkiye (AFAD)
[SA website URL] https://sentinel-asia.org/EO/2023/article20230206TR.html

On 6 February 2023, a large-scale earthquake (magnitude 7.8) and an aftershock (magnitude 7.5) occurred in south-eastern Türkiye with an epicentre further to the north. In Türkiye, more than 50,000 people were killed and 115,000 injured. A total of 9.1 million people is affected by the earthquake disaster, with 3 million people being displaced. It was a disaster of historic proportions.

ADRC registered and activated an EOR on behalf of Disaster and Emergency Management Presidency of Türkiye (AFAD) on 6 February 2023. The first satellite images from the DPN were provided on 7 February. Finally, 100 satellite images were provided by ISRO, JAXA, GISTDA, TASA, and MBRSC. And the first VAP from the DAN was provided on 9 February. Seventy-one (71) VAPs were provided by EOS, Chiba University, MBRSC, NDMI, SIG-SIU, TASA, CEA, and Tabriz-U, Gebze Tech, and Tokyo Tech. Also, JAXA provided a Web-GIS service that allows users to zoom in and out analysed damaged areas and optical satellite data which observed after the disaster by overlaying on map information.

AFAD shared the various data provided to AFAD's emergency response units and others and used it as one of the pieces of information to make decisions on disaster response.

(source: https://reliefweb.int/report/turkiye/turkey-earthquake-emergency-situation-report-05022024)

(Web-GIS : https://storymaps.arcgis.com/collections/78e00fd34fec4a5c86b1dfae99dc0e75?item=1)

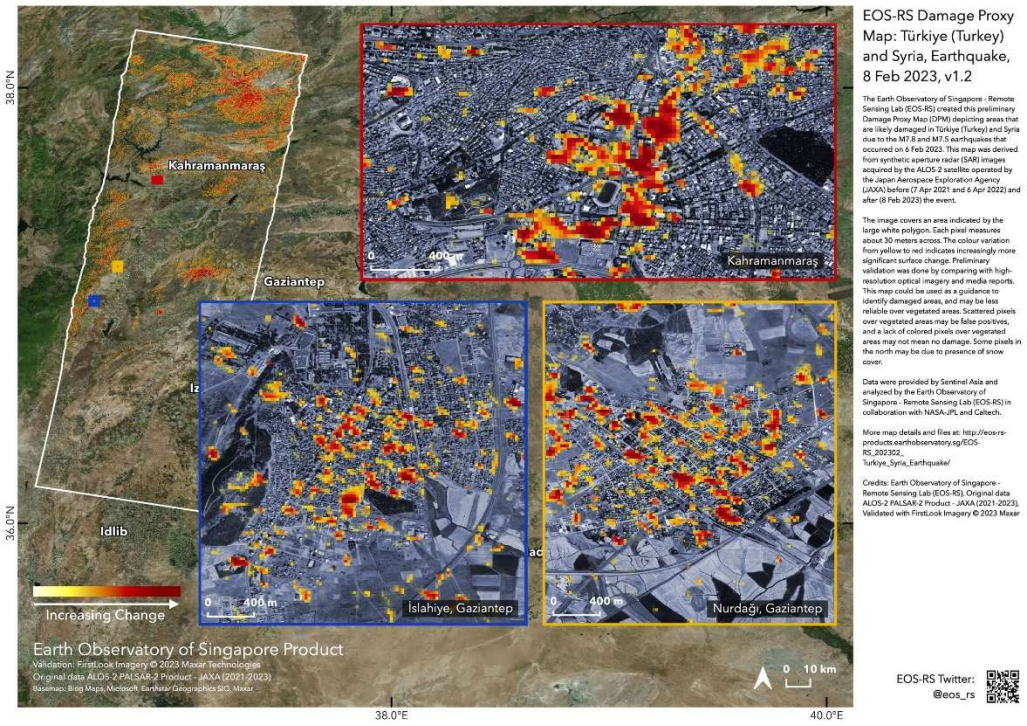

Figure 16: VAP (provided by EOS)

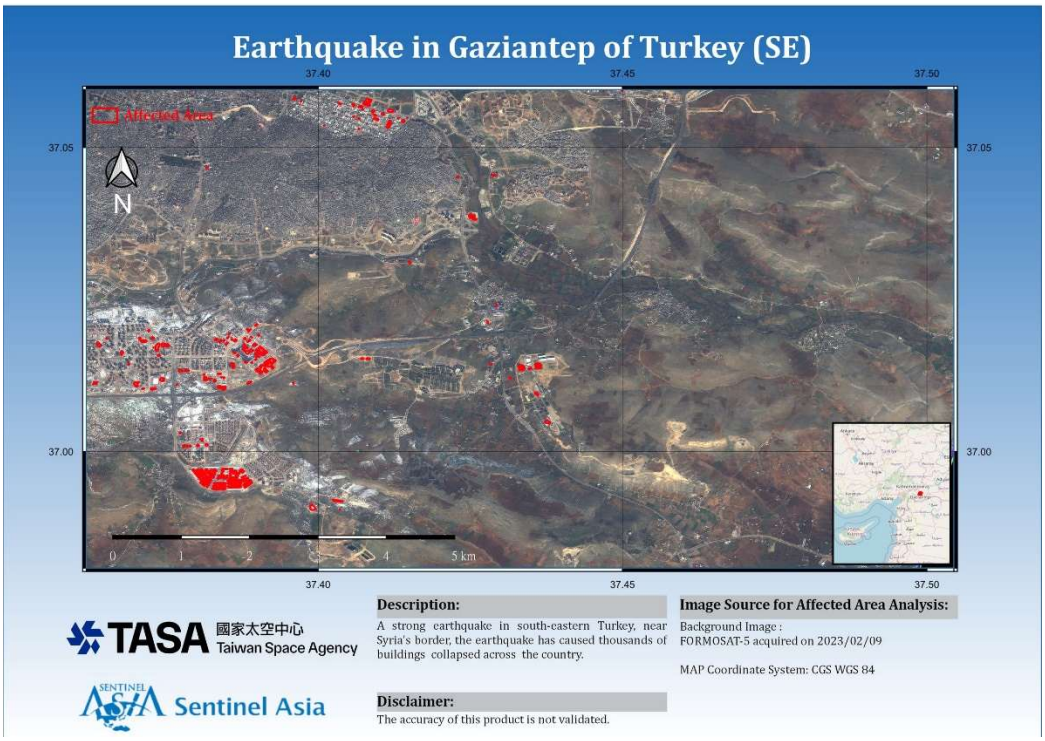

Figure 17: VAP (provided by TASA)

3.3.2. Oil spill in the Philippines (February 2023)

[EOR Requester] Philippine Space Agency (PhilSA)
[SA website URL] https://sentinel-asia.org/EO/2023/article20230228PH.html

According to the Philippine Coast Guard in the province and the manager of the Batangas port, a tanker carrying hundreds of thousands of litres of industrialized fuel oil sank on 28 February 2023. And a vessel carrying 800,000 litres of industrial fuel oil sank at around 2 am.

ADRC received the EOR from PhilSA and transferred DPNs/DANs on 1 March 2023. The first satellite images from the DPN were provided on 2 March. Finally, 20 satellite images were provided by ISRO, JAXA, GISTDA, and TASA. And the first VAP from the DAN was provided on 10 March. Fourteen (14) VAPs were provided by PhilSA and TASA. Also, JAXA provided a Web-GIS service that allows users to zoom in and out analysed oil spill detected areas and optical satellite data which observed after the disaster by overlaying on map information.

On 28 March, PhilSA held a press briefing and workshop to familiarize journalists on how to read and interpret these satellite images. The press briefing and workshop held at the PhilSA office in Eastwood Quezon City covered a discussion on PhilSA's Disaster, Hazard, and Risk Mapping (DHARMA) Project, PhilSA's membership to various international initiatives and charters, and a hands-on explanation of the different oil spill maps being issued to the public.

(source: https://philsa.gov.ph/news/philsa-shows-journalists-extent-of-mindoro-oil-spill-as-captured-by-satellite-images/)

(source: https://newsinfo.inquirer.net/1736213/oil-tanker-carrying-800000-liters-of-oil-sinks-off-romblon-no-info-on-oil-spill-yet/amp)

(source: https://www.philstar.com/nation/2023/02/28/2248256/tanker-carrying-800000-liters-fuel-sinks-oriental-mindoro)

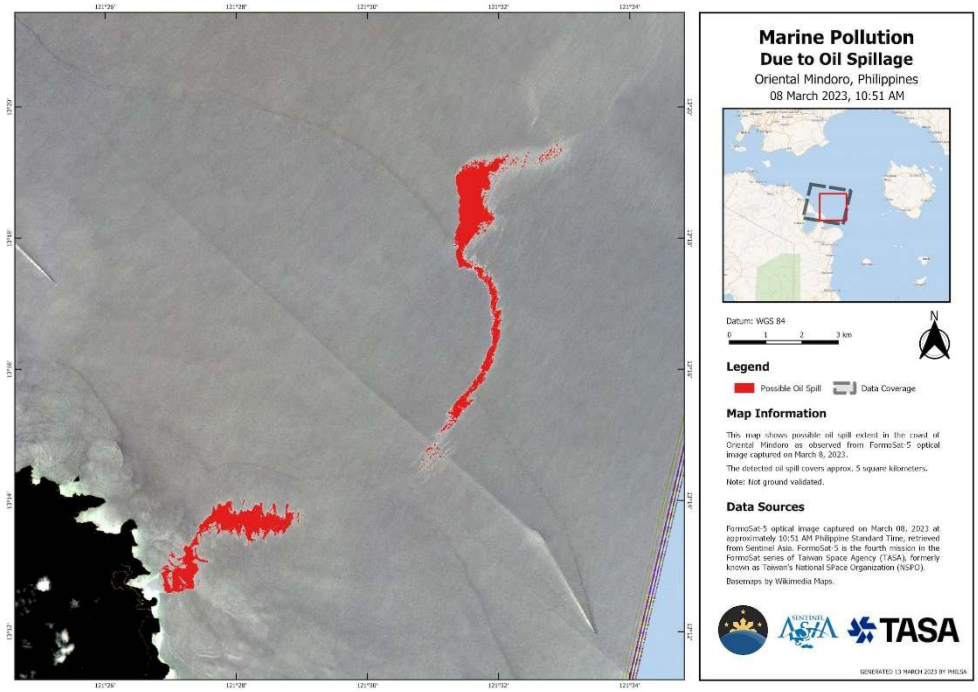

Figure 18: VAP (provided by TASA)

Photo 1: PhilSA Media Briefing and Press Conference on Oil Spill Maps (https://philsa.gov.ph/news/philsa-shows-journalists-extent-of-mindoro-oil-spill-as-captured-by-satellite-images/)

3.3.3. Cyclone MOCHA in Myanmar (May 2023)

[EOR Requester] ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre)

[SA website URL] https://sentinel-asia.org/EO/2023/article20230514MM.html

On 14 May 2023, tropical cyclone "MOCHA," a Category 4 storm on the Saffir–Simpson scale, made landfall in Myanmar. Strong winds, heavy rainfall and storm surges associated with the cyclone affected Myanmar and Bangladesh. The median estimate of total direct damage caused by Cyclone MOCHA is US$ 2.24 billion, equivalent to 3.4% of Myanmar's GDP in 2021. And more than 200,000 buildings, including individual houses, were damaged or destroyed by this disaster.

ADRC received the EOR from AHA Centre and transferred DPNs/DANs on 11 May 2023. The first satellite images from the DPN were provided on 14 May. Finally, 8 satellite images were provided by ISRO, JAXA, and TASA. And the first VAP from the DAN was provided on 15 May. Thirteen (13) VAPs were provided by AIT, EOS, WFP, and MBRSC. Also, JAXA provided a Web-GIS service that allows users to zoom in and out analysed detected water areas and optical satellite data which observed after the disaster by overlaying on map information .

AHA Centre used VAP for the situation report and published it on its own website for information sharing. And VAPs were utilized for an assessment of impacts and humanitarian needs. Details is shown in following situation report.

Also, AIT and EOS VAP along with WEB-GIS was used in a TV News program in Japan. The VAPs were recognized as making the area of the flood easier to grasp for the viewers of the TV program.

(source: https://thedocs.worldbank.org/en/doc/d547c7dcb949a8b07aea2cc2e66a7bbc-0070062023/original/GRADE-CycloneMochaMay23Myanmar.pdf)

(source: https://ahacentre.org/wp-content/uploads/2023/05/AHA-Situation_Report-3-TC-MOCHA-Myanmar.pdf)

(AHA Centre Situation Report : https://ahacentre.org/wp-content/uploads/2023/05/AHA-Situation_Report-3-TC-MOCHA-Myanmar.pdf)

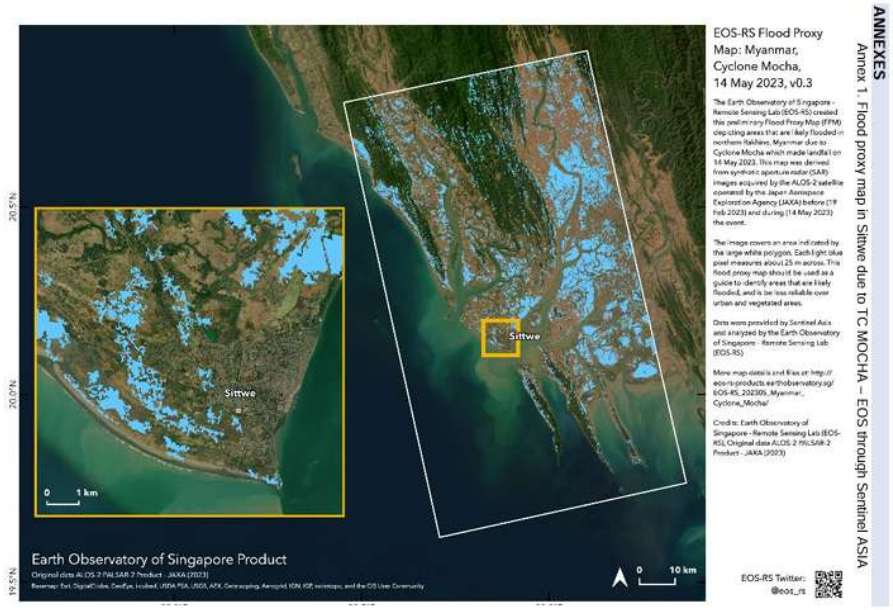

Figure 19: AHA Centre situation report (https://ahacentre.org/wp-content/uploads/2023/05/AHA-Situation_Report-3-TC-MOCHA-Myanmar.pdf)

3.3.4. Forest Fire in Kazakhstan (June 2023)

[EOR Requester] Central Asian Institute of Applied Geosciences (CAIAG)
[SA website URL] https://sentinel-asia.org/EO/2023/article20230608KZ.html

A large forest fire continued in the Abay region of Kazakhstan, and thick smoke covered several areas of the neighbouring Zhetysu region due to a change in the direction of the wind, the Kazakh service of Radio Liberty reports with reference to the Department of Emergency Situations of the Zhetysu region. The fire started on 8 June 2023 in the Semey-Ormany State Forest Nature Reserve, and 14 foresters died during the efforts to extinguish it.

ADRC received the EOR from CAIAG on 16 June 2023. The first satellite images were provided on 19 June. Finally, 13 satellite images were provided by ISRO, JAXA, and TASA. And the first VAP was provided on 28 June. AIT and MBRSC provided 4 VAPs. Also, JAXA provided a Web-GIS service that allowed users to zoom in and out analysed forest fire areas and optical satellite data which observed after the disaster by overlaying on map information.

CAIAG, as the requester of this EOR, shared it with the Ministry of Emergency Situation in Kazakhstan as a DRR organization. And CAIAG utilized the data for making internal reports.

(source: https://www.currenttime.tv/a/kazahstan-pozhar/32455116.html)

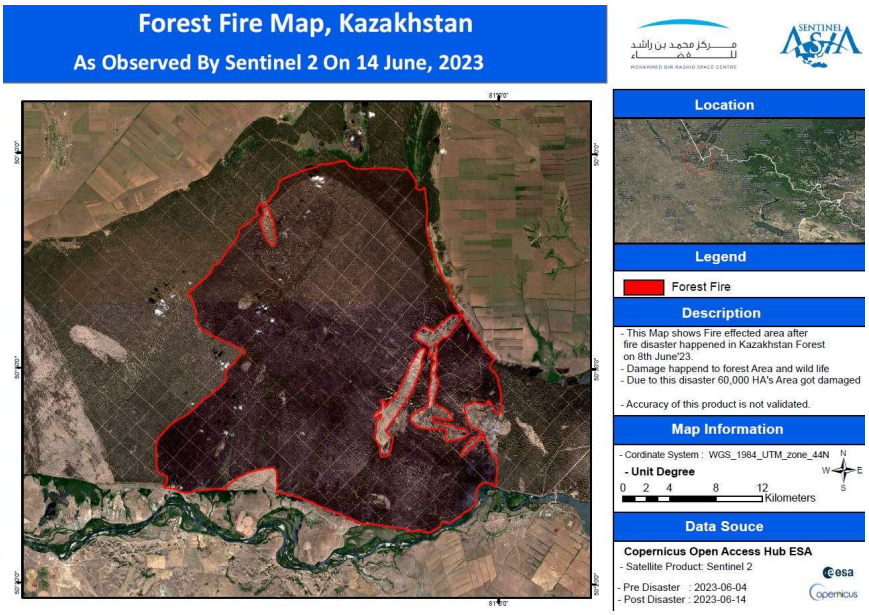

Figure 20: VAP (provided by MBRSC)

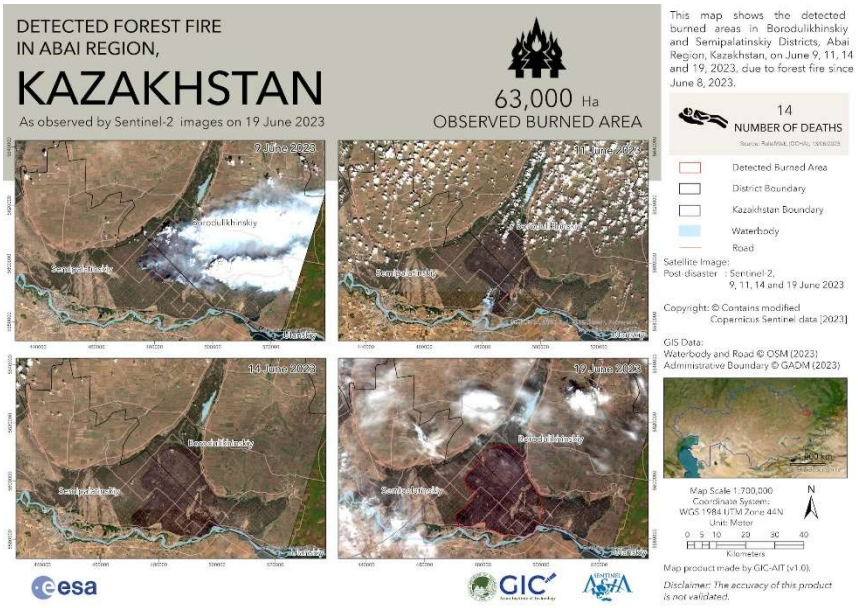

Figure 21: VAP (provided by AIT)

3.3.5. Cyclone Midhili in Bangladesh (November 2023)

[EOR Requester] Bangladesh Water Development Board (BWDB)
[SA website URL] https://sentinel-asia.org/EO/2023/article20231117BD.html

Cyclone Midhili made landfall along Bangladesh Coast in early hours of 18 November 2023. This cyclone caused heavy rains and caused tragic damage in Chattogram port and river transport services across the country.

ADRC received the EOR from BWDB on 17 November 2023. The first satellite images were provided on 18 November. Finally, 35 satellite images were provided by ISRO, JAXA, GISTDA, TASA, and PhilSA. And the first VAP was provided on 11 December. MBRSC provided 4 VAPs. Also, JAXA provided a Web-GIS service that allowed users to zoom in and out analysed detected flood areas and optical satellite data which observed after the disaster by overlaying on map information.

Before occurring of the Cyclone Midhili, BWDB as the requester held a coordination meeting with Bangladesh Space Research and Remote Sensing Organization (SPARRSO), Department of Disaster Management (DDM), and Institute of Water Modelling (IWM) in Bangladesh. They had already developed a draft Standard Operation Procedure (SOP) by themselves. Based on this experience, these organizations had well organized coordination for Cyclone Midhili.

(source: https://www.downtoearth.org.in/natural-disasters/cyclone-midhili-to-make-landfall-along-bangladesh-coast-in-early-hours-of-november-18-92835)

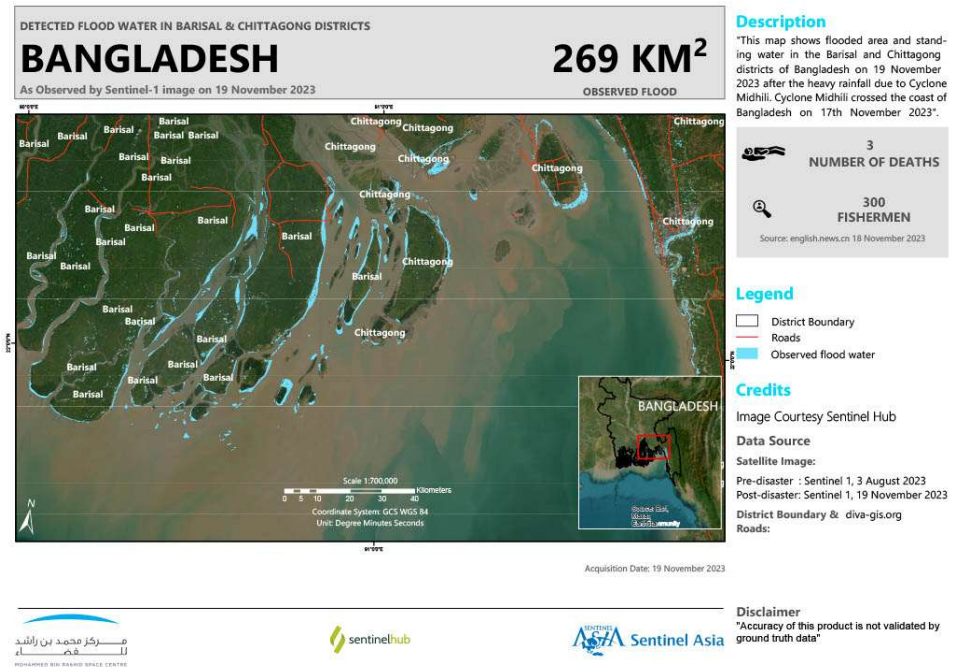

Figure 22: VAP (provided by MBRSC)

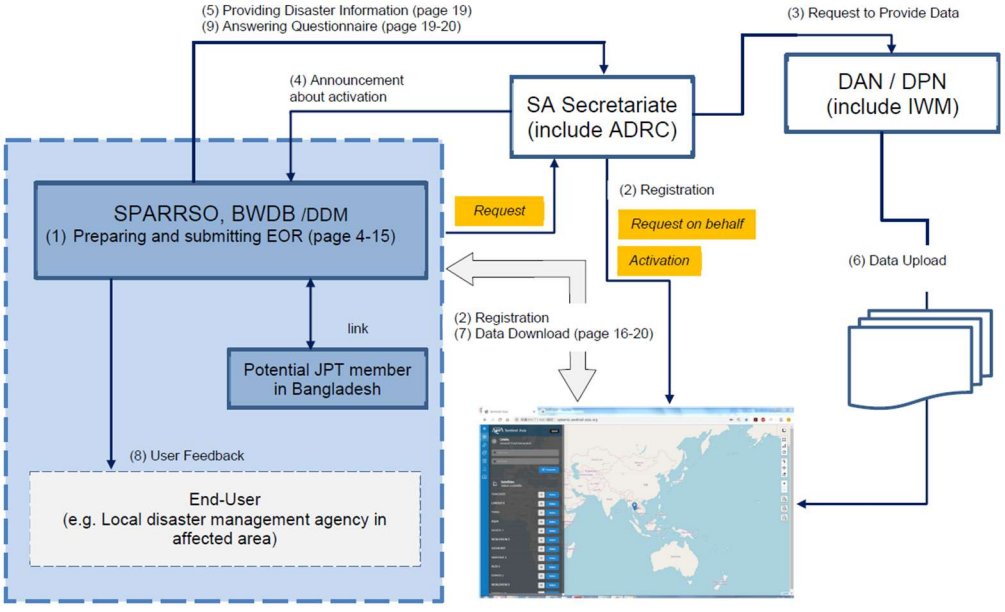

Figure 23: Flowchart (shown in the SOP)

4. External Relations

4.1. Accession of New Members

In 2023, the following organizations joined SA.

- Bangladesh Water Development Board (BWDB)
- Philippine Space Agency (PhilSA)

4.2. Collaboration and Cooperation

4.2.1 International Disaster Charter

The rollout to IDC began in February 2010 as required. Seven (7) disasters were escalated through SA in 2023 as shown in Table 3. This figure means that 7 out of 27 EORs, corresponding to 25.9%, were referred to IDC via Sentinel Asia.

Table 3: List of Charter Escalations in 2023

Activation Number	Country	Disaster Type	Activation Date	Requester	Project Manager
464	Phillipines	Earthquake	17-Feb-23	ADRC on behalf of PHIVOLCS (Philippines)	PHIVOLCS
465	Phillipines	Oil spill	1-Mar-23	ADRC on behalf of Philippine Space Agency (PhilSA)	PhilSA
467	Indonesia	Landslide	7-Mar-23	ADRC on behalf of BRIN	GIC-AIT
468	Myanmar	Storm, Flood, Landslide	11-May-23	ADRC on behalf of AHA Center	GIC-AIT
478	Vietnam	Landslide	16-Aug-23	ADRC on behalf of MONRE	MONRE
488	Philippines	Earthquake	18-Nov-23	ADRC on behalf of PHIVOLCS	PHIVOLCS
489	Indonesia	Volcanic Eruption	5-Dec-23	ADRC on behalf of National Research and Innovation Agency (BRIN)	GIC-AIT

5. Conferences and Press Releases

5.1. Conferences

5.1.1 8th Joint Project Team Meeting (JPTM2023)

The 8th Joint Project Team Meeting (JPTM2023) was held in Jakarta, Indonesia from 17 to 18 September 2023. JPTM2023 was co-organized by the National Research and Innovation Agency (BRIN) and JAXA. In total, 85 participants from 35 organizations joined for this meeting.

JPTM2023 consisted of 6 sessions plus 4 training workshops, and 37 presentations were made during the 2 days meeting. JPT members presented their own reports on their activities in Sentinel Asia, case studies of the latest technologies, and reports as feedback information on how provided data were utilized for end-users, etc. For instance, new SA members BWDB and PhilSA who joined in 2023 reported. BWDB made a presentation about flood monitoring using GSMaP and training activities in Bangladesh. And PhilSA reported an example of good practice, “Mindoro Oil Spill Response Using Space Data,” and introduced the function of their own satellites.

In the special Indonesia session titled “Accelerating Satellite-based Data and Information for Disaster Risk Management in Indonesia,” five panellists from various organizations who are engaged in disaster management talked about their activities and experiences. As there are many volcanoes in Indonesia, panellists emphasized the importance of high temporal/spatial/spectral resolution for regular monitoring of volcanoes, and updating geological mapping of them.

Photo 2: Group Photo

(https://sentinel-asia.org/meetings/SA3JPTM8/index.html)

5.1.2 29th Asia-Pacific Regional Space Agency Forum (APRSAF)

The 29th Session of the Asia-Pacific Regional Space Agency Forum (APRSAF-29) was held in Jakarta, Indonesia from 19 to 22 September 2023. APRSAF was co-organized by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), JAXA, and BRIN.

At the Satellite Applications for Societal Benefit Working Group (SAWG) session, which was held on 20 September, Sentinel Asia reported its recent activities including the 8th Joint Project Team Meeting that was held back-to-back with the APRSAF-29. Some Sentinel Asia members including Philippine Space Agency (PhilSA), Pakistan Space & Upper Atmosphere Research Commission (SUPARCO), and Yamaguchi University presented their activities.

Photo 3: Group Photo

(https://www.aprsaf.org/annual_meetings/aprsaf29/meeting_details.php)

5.2. Documents, Press Releases and Papers

5.2.1 Images from Taiwan satellite aid in Türkiye earthquake relief

Taipei Feb. 12 (CNA) Taiwan's Formosa Satellite 5 (Formosat-5) has been providing satellite imagery to assist disaster relief work in Türkiye following a deadly magnitude 7.8 earthquake in that country last Monday, with its latest orbital rotation scheduled for Feb. 13.

Posted on Focus Taiwan on 12 February 2023
(https://focustaiwan.tw/sci-tech/202302120010)

5.2.2 Earthquake in Türkiye and Syria: How Satellites Can Help Rescue Efforts

In disasters like the 7.8 magnitude earthquake and 7.5-magnitude aftershock that struck Syria and Türkiye on February 6, 2023, international cooperation on satellite imaging plays a crucial role in the rescue and recovery efforts.

Posted on BRINK News on 14 February 2023
(https://www.brinknews.com/earthquake-in-turkey-and-syria-how-satellites-can-help-rescue-efforts/)

5.2.3 NTU scientists create proxy maps of damage from Türkiye-Syria quake to guide rescue work

SINGAPORE - A few hours after a deadly earthquake devastated Türkiye and Syria earlier in February, a team from Nanyang Technological University's Earth Observatory of Singapore (EOS) began to build maps showing the extent of the damage in the afflicted regions.

Posted on THE STRAITS TIMES, Singapore on 20 February 2023
(https://www.straitstimes.com/singapore/ntu-scientists-create-proxy-maps-of-damage-from-turkey-syria-quake-to-guide-rescue-work)

5.2.4 PhilSA joins Asia-Pacific initiative to provide satellite data for DRRM activities

On 24 January 2023, the Philippine Space Agency (PhilSA) was accepted as a Data Provider Node (DPN) member of Sentinel Asia.

Sentinel Asia is an international initiative by the Asia-Pacific Regional Space Agency Forum (APRSAF) that supports disaster risk reduction and management (DRRM) activities in the Asia-Pacific region using space technology and Web-GIS. It works to enhance disaster preparedness and post-disaster recovery through the sharing of Earth observation technologies with near-real-time internet information dissemination methods to improve safety and minimize the number of victims and social/economic losses resulting from disasters.

Posted on PhilSA news on 2 March 2023
(https://philsa.gov.ph/news/philsa-joins-asia-pacific-initiative-to-provide-satellite-data-for-drrm-activities/)

5.2.5 PhilSA shows journalists extent of Mindoro oil spill as captured by satellite images

Following the oil spill caused by the sinking of the MT Princess Empress vessel on 28 February 2023 off the coast of Oriental Mindoro, the Philippine Space Agency (PhilSA) produced maps derived from satellite images showing the possible extent of oil spill.

Posted on PhilSA news on 29 March 2023
(https://philsa.gov.ph/news/philsa-shows-journalists-extent-of-mindoro-oil-spill-as-captured-by-satellite-images/)

5.2.6 Sentinel Asia website is updated

The Sentinel Asia website was updated in March. The following pages have been updated or added.

About Sentinel Asia
(https://storymaps.arcgis.com/stories/ae487f74e92741c2b14bb396cc1e3cd7)
History (https://storymaps.arcgis.com/stories/e73027ddedff4dd792b4eebb65945655)
Capacity Development (https://sentinel-asia.org/e-learning/TechnicalMaterials.html)
Systems (https://sentinel-asia.org/activities/Systems.html)
Media (https://sentinel-asia.org/media/Media.html)
Academic Papers (https://sentinel-asia.org/reports/AcademicPapers.html)

6. Assessment of Sentinel Asia Operations

6.1. Analysis of Operational Performance

Figure 24 summarizes the average number of days from the occurrence of a disaster to the request for each disaster and their respective years. Overall, this shows that it took a number of days from the first occurrence of the disaster to a request for the period between 2011 and 2023.

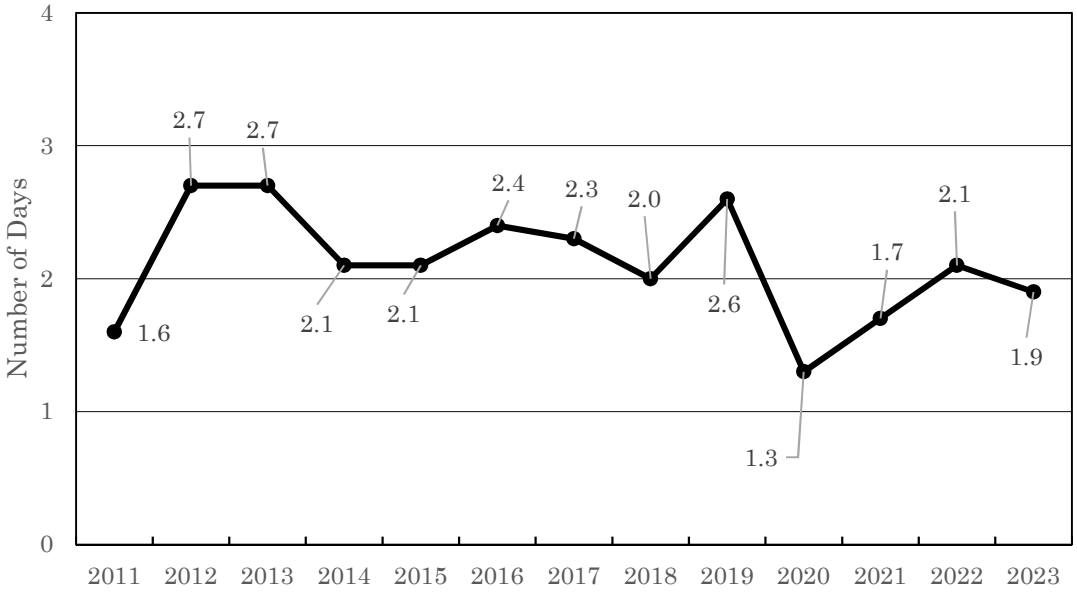

Figure 24: Number of Days Required from Disaster Occurrence to Request

Figure 25 shows the average number of days that were required from the date the request was received to activation. Overall, it took 0.11 days from request to activation in 2023.

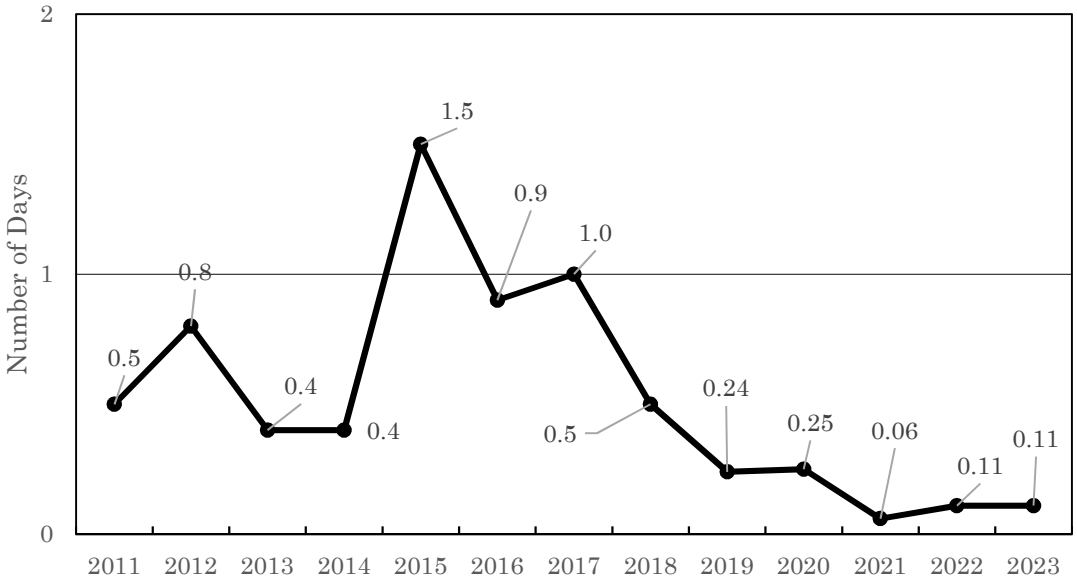

Figure 25: Number of Days Required from Request to Activation

Figure 26 shows the average number of days required to provide archive satellite data after activation (shown by the black line), and how often data could be provided relative to the total number of requests (shown by the blue line).

Figure 26's provision rate for Archive Satellite Data indicates that the percentage of provisions improved from 2016 to 2023. This figure in 2023 was 96.3%. And the average number of days was 2.7 days as same as 2022.

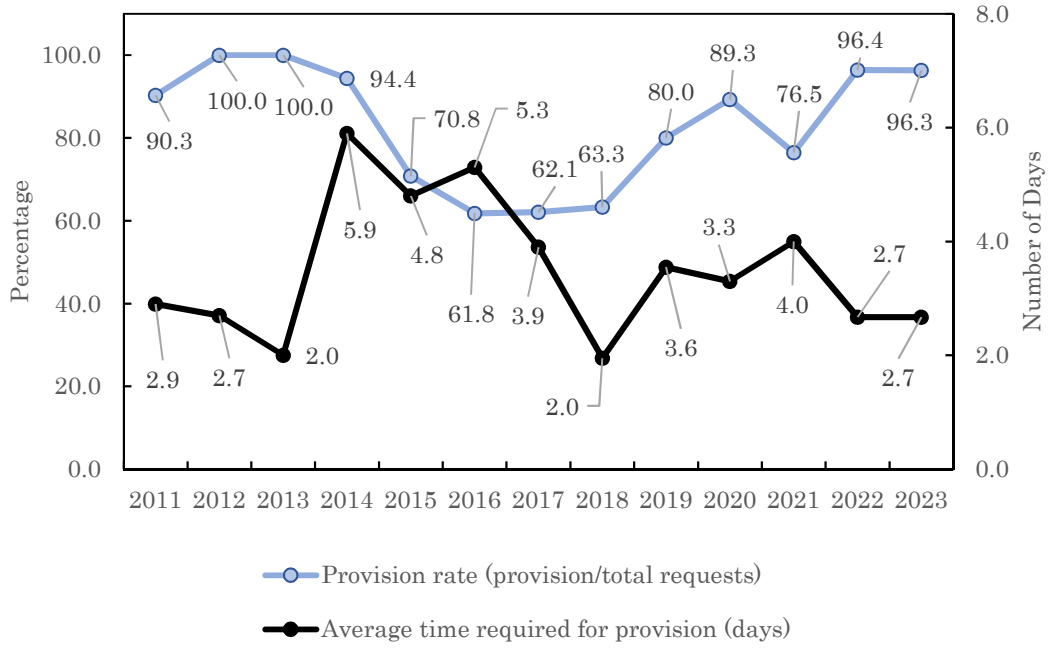

Figure 26: Average Number of Days Required to Provide Archive Satellite Data and Provision Rate for Each Year

Figure 27 shows the average number of days required to provide post-disaster satellite data after activation (shown by the black line), and how often data could be provided relative to the total number of requests (shown by the blue line).

Figure 27's provision rate for Satellite Data after Disaster shows that the percentage of provisions increased sharply from 2014 onward, while the number of days required for data provision has decreased in recent years. The average number of days required for provision in 2023 was 3.3 days. And provision rate in 2023 reached 100%.

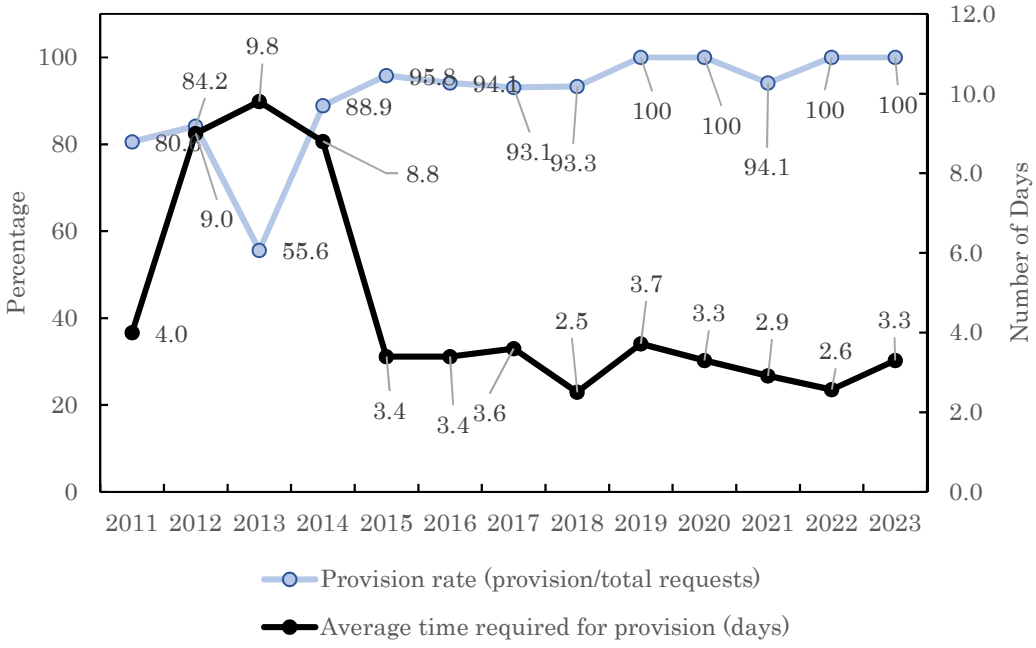

Figure 27: Average Number of Days Required to Provide Satellite Data After Disaster and Provision Rate for Each Year

Figure 28 shows the average number of days required to provide products after activation (shown by the black line), and the how often data could be provided relative to the total number of requests (shown by the blue line).

Figure 28's provision rate for products was 96.3% in 2023. Many DANs supported the provision of products for each EOR. The average number of days required for provision was 6.7 days in 2023.

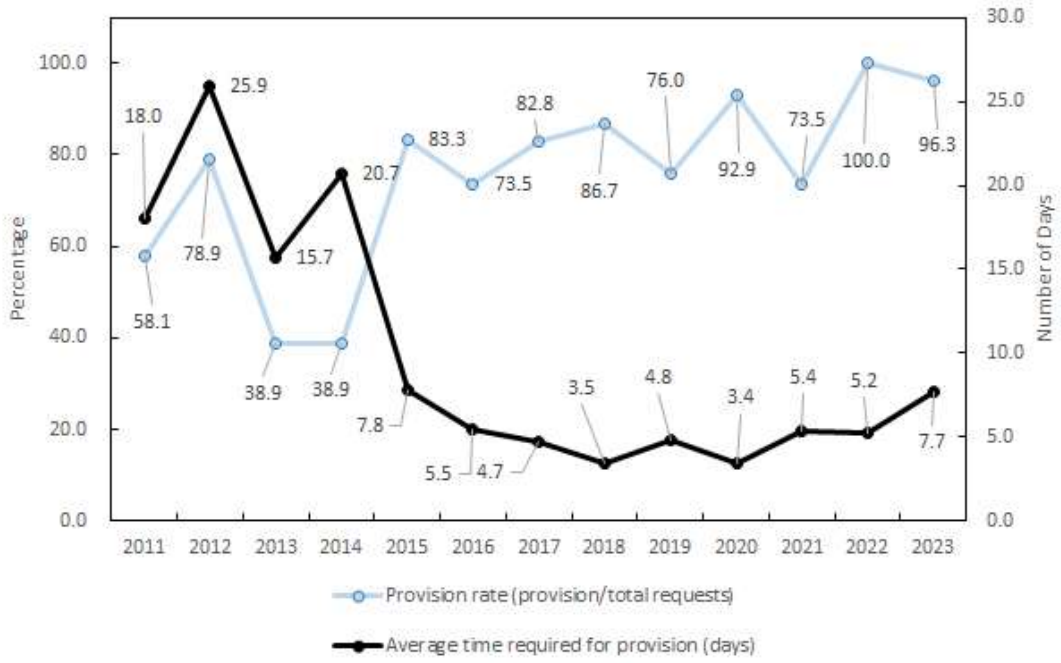

Figure 28: Average Number of Days Required to Provide Products and Provision Rate for Each Year

(note: There are rare cases that a large number of days were required to provide VAPs. In this case, the average number of days required to provide products could vary significantly.)

7. Conclusions

Since the start of 2007, we have accepted 478 EORs and activated 431. In 2023, 27 EORs were requested and all EORs were activated. One major incident was the February 2023 earthquake disaster in Türkiye and Syria. This disaster was one of the largest disasters in history. However, Sentinel Asia was able to contribute their support by providing effective data even in times of disaster. Another major topic in 2023 is that Bangladesh Water Development Board (BWDB) and Philippine Space Agency (PhilSA) has become a new member of Sentinel Asia.

The following points are conclusive statements based on activities in 2023.

- In 2023, around 29.6% of the EORs were related to floods.
- The largest number of requests were submitted from the Vietnam, with 8 EORs, followed by the Philippines, with 5 EORs, in 2023.
- In total, 486 satellite images and 263 VAPs were provided by DPN and DAN in 2023.
- Seven (7) out of twenty-seven (27) Sentinel Asia activations were escalated to the IDC in 2023.
- Sentinel Asia members are promoting their own activities, including a press conference by PhilSA in the Philippines and the development of SOP by BWDB in Bangladesh.

** January 2023 News from Sentinel Asia Project Office **

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Topics:

1. [News] Emergency Observation of Disasters
2. [Interview] Dr. Sang-Ho Yun, Earth Observation of Singapore
3. How to Send an Emergency Observation Request
4. Using the Sentinel Asia Operation System, OPTEMIS

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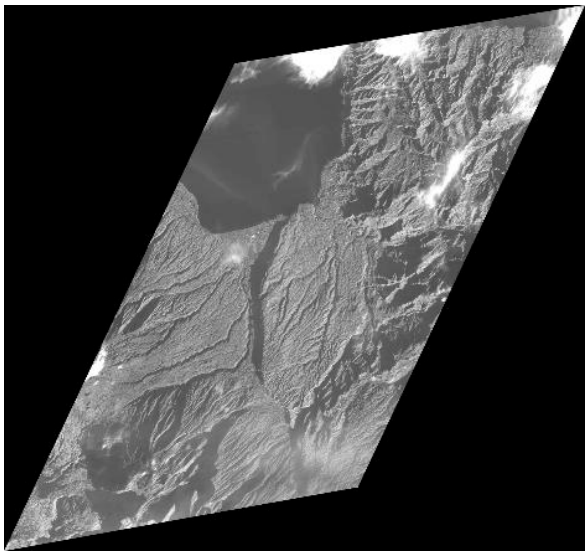
1. [News] Emergency Observation of Disasters (as of 30 January)

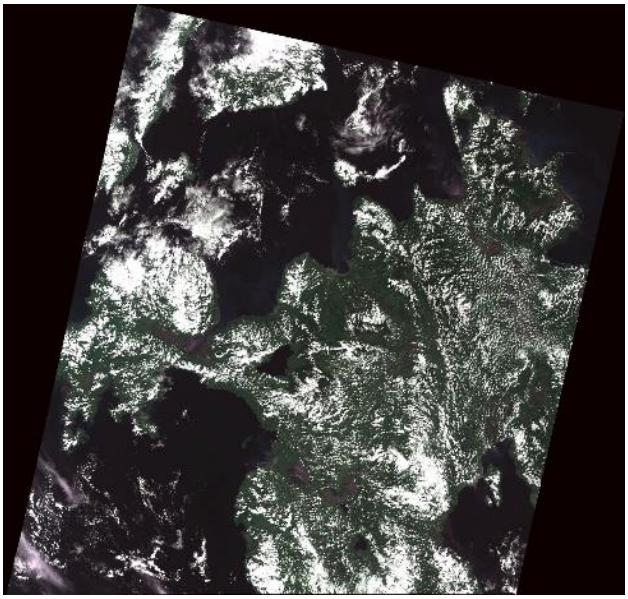
   (1) Flood and Landslide in Philippines on 27 December, 2022 (GLIDE Number FL-2022-000385-PHL)

   Heavy rain during holidays caused landslides and floodings in the Philippines. Philstar reported the number of deaths counted 33 as of 29 December and most fatalities was in the province of Misamis Occidental on Mindanao island, where 15 people died from drowning or rain-induced landslides.
   (https://www.philstar.com/headlines/2022/12/29/2234054/death-toll-christmas-shear-line-floods-landslides-climbs-33)

   The Manila Observatory (MO) made an Emergency Observation Request (EOR) to Sentinel Asia on 28 December, 2022. Among Data Provider Nodes (DPNs), the Centre for Remote Imaging, Sensing and Processing (CRISP) of the National University of Singapore, the Indian Space Research Organization (ISRO), and the National Applied Research Laboratories (NARL) provided data. Among Data Analysis Nodes (DANs), Asian Institute of Technology (AIT) provided its Value-Added Products (VAPs). Information on the latest response by Sentinel Asia is available at the link below.
   https://sentinel-asia.org/EO/2022/article20221227PH.html

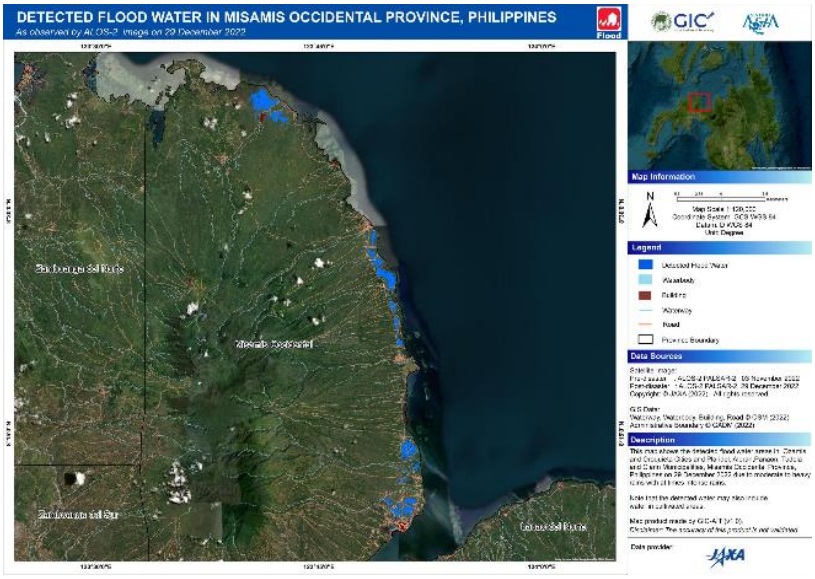


Post-disaster satellite image (TELEOS-1) provided by CRISP



Post-disaster satellite image (Resourcesat-2A) provided by ISRO

Post-disaster satellite image (FORMOSAT-5) provided by NARL



Value-Added Product by AIT

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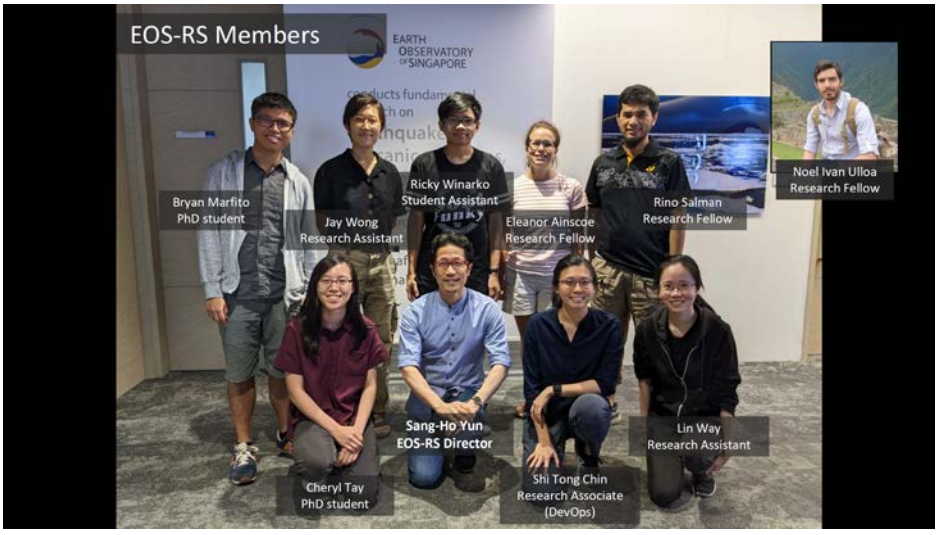
2. [Interview] Dr. Sang-Ho Yun, Earth Observation of Singapore

The Earth Observatory of Singapore (EOS) was created in 2008 with the mission to conduct fundamental research on earthquakes, volcanic eruptions, tsunamis, and climate change in and around Southeast Asia, toward safer and more sustainable societies. Since their joining Sentinel Asia, they work very actively as a Data Analysis Node (DAN) member and provided Value Added Products to Sentinel Asia's Emergency Observation Requests (EORs). The Sentinel Asia Secretariat interviewed Dr. Sang-Ho Yun regarding the backgrounds of their contribution.

Dr. Sang-Ho Yun is the Director of the Earth Observatory of Singapore – Remote Sensing Lab (EOS-RS) and Associate Professor of the Asian School of the Environment (ASE) and the School of Electric and Electronic Engineering (EEE) at Nanyang Technological University (NTU) in Singapore. Prior to joining NTU, he was a geophysicist and radar scientist at NASA's Jet Propulsion Laboratory (JPL). He received the 2018 NASA Exceptional Public Achievement Medal and the 2014 NASA Exceptional Early Career Medal for innovative use of satellite Synthetic Aperture Radar (SAR) data in support of rapid post-disaster response. Prior to his work at JPL, Sang-Ho was a postdoctoral fellow at the US Geological Survey in Menlo Park, California. He received his PhD in geophysics and MS in electrical engineering from Stanford University in California and his BS in earth system science from Seoul National University in Korea.



Sentinel Asia Secretariat:

The Sentinel Asia Secretariat very much appreciates your participation in Sentinel Asia in 2017 and your continuous efforts as a Data Analysis Node (DAN) in providing Value Added Products (VAPs). Especially, international humanitarian aid agencies including UNWFP and JICA are very interested in and very much appreciate your damage estimation map for earthquakes and volcanic eruptions. We

share this gratefulness, too. Can you introduce EOS to our readers?

Dr. Sang-Ho Yun, EOS
We are sincerely grateful for the opportunity to be a part of Sentinel Asia. It means a lot to us when we learn that our products are well-received by users. Our participation in this collaborative initiative has also greatly benefited our research institution.

The Earth Observatory of Singapore (EOS), founded in 2008, is dedicated to conducting fundamental research on earthquakes, volcanic eruptions, tsunamis, and climate change in Southeast Asia, with the goal of promoting safer and more sustainable societies. This mission is particularly important for Singapore and Southeast Asia, where the threat of natural hazards is exacerbated by the impact of climate change and rising sea levels.

Sentinel Asia Secretariat:
In 2021, the Remote Sensing Lab was established. Could you also introduce it?

Dr. Yun
The EOS Remote Sensing Lab (EOS-RS) is a new flagship laboratory that uses satellite remote-sensing data for rapid disaster response and hazard monitoring. To give a tangible example, EOS-RS generates damage proxy maps (DPMs) and flood proxy maps (FPMs), using satellite Synthetic Aperture Radar (SAR) data. SAR data is particularly useful for Southeast Asia as radar signals can penetrate clouds and provide imagery day and night. Our maps are frequently shared on Sentinel Asia, to aid regional and local stakeholders in their disaster response efforts.

Sentinel Asia Secretariat:
We suppose that you have only a few natural disasters in Singapore. Could you tell us the background of your participation in Sentinel Asia and what you expect from it?

Dr. Yun
As Singapore experiences relatively few natural hazards and disasters, it provides a stable environment for reliable operations and data gathering. That puts EOS in an ideal position for implementing rapid discovery and access to relevant satellite data and processing and disseminating value-added geospatial information for decision-making.

Joining Sentinel Asia was a logical step for us as it allows us to put our technical know-how into practice and have a direct impact through our research and innovation. Additionally, being a part of Sentinel Asia enables us to gather timely feedback from users, which enables user-driven improvements to our algorithms and products. For instance, user queries about how to interpret our DPMs prompted us to add a color bar and legend to our maps, which helps to improve the readability of our products.

Sentinel Asia Secretariat:
From Singapore, the Centre for Remote Imaging, Sensing and Processing (CRISP) and the National University of Singapore (NUS) are members of Sentinel Asia as DPN and DAN, respectively. Do you cooperate with CRISP? If so, do you have any examples of such cooperation in Sentinel Asia Emergency Observation Requests (EORs)? And if not, do you have any plans for cooperation with them?

Dr. Yun
EOS-RS was established in late 2021 and since then we have been building our team and undertaking a variety of research projects while supporting disaster response efforts in the region. Also, we are actively collaborating and in the process of building collaborative relationships with other institutions, including NUS and CRISP, as well as with industry.

Sentinel Asia Secretariat:
Regarding your activities with Sentinel Asia, are there any experiences that stand out?

Dr. Yun
Witnessing the level of cohesiveness and sincere spirit amongst members at Sentinel Asia's annual Joint Project Team (JPT) meetings has been heartening. Through this space-based disaster management support system, we have also expanded our networks and had the opportunity to connect directly with major disaster management organizations. Our interactions with ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre) and Asian Disaster Preparedness Center (ADPC) have been particularly beneficial, as the feedback we received has helped to improve our mapping products, making them more lightweight and easily accessible for on-ground responders in disaster situations who may have limited access to the internet following a disaster event. We also actively collaborate with many local, regional, and global organizations for more efficient and effective support for response and recovery.

We have also received positive attention from Data Provider Nodes (DPNs) of Sentinel Asia like Japan Aerospace Exploration Agency (JAXA), who have provided support for satellite tasking requests and access to archived data, allowing us to produce advanced mapping products.

Sentinel Asia Secretariat:
Are there any Sentinel Asia EORs in which you provided VAPs that stand out, and why?

Dr. Yun
When Super Typhoon Rai (Odette) made landfall in the Philippines, we received requests from the United Nations World Food Programme (WFP) and Manila Observatory via the Sentinel-Asia network. We were able to quickly produce two FPMs and six DPMs which we distributed within a week of receiving the satellite data. The AHA Center utilized our maps in their Situation Update reports. This event was particularly significant as it required us to make use of radar data acquired over six orbital tracks by JAXA's ALOS-2 and Copernicus Sentinel-1 satellites covering a vast area

of 418,700 km2. Of all the events we have responded to thus far, this event set a new record for EOS-RS: it produced the most mapping products for a short period of time and covered the largest area of any response.
https://sentinel-asia.org/EO/2021/article20211214PH.html

Sentinel Asia Secretariat:
Are there any EORs that functioned effectively? And why?

Dr. Yun
We are proud to share that many EORs have functioned effectively, as we strive to create maps that are useful for on-the-ground responses. Here are some examples:

1. The DPMs we generated in response to the Semeru volcano eruption in 2021 https://sentinel-asia.org/EO/2021/article20211204ID.html were used by Japan International Cooperation Agency (JICA) to prioritize areas for field surveys, and they also confirmed that our maps closely matched the results of the field surveys. As a DAN, every EOR is an opportunity for gaining on-ground feedback to improve our algorithms and products, hence it is great that users of all levels keep this in mind while evaluating the crisis.

2. Across the 2019 Kajiki Tropical Storm, 2020 Super Typhoon Goni, 2021 Super Typhoon Odette/Rai, 2022 Storm Nalgae, and 2022 Typhoon Noru, AHA Center also used our FPMs as reference for their situation update reports. In some of these instances, our maps were used to estimate populations affected and the amount of supplies that should be sent for emergency and relief. While we know that the maps we create are published for all Sentinel Asia members to access, it is heartening to know that these maps are also being utilized for situational awareness and decision-making processes for real responses.

*Details of the above mentioned EORs are on the Sentinel Asia website:
https://sentinel-asia.org/EO/2019/article20190905VN.html
https://sentinel-asia.org/EO/2020/article20201101PH.html
https://sentinel-asia.org/EO/2021/article20211214PH.html
https://sentinel-asia.org/EO/2022/article20221029PH.html
https://sentinel-asia.org/EO/2022/article20220925PH.html

Sentinel Asia Secretariat:
What are the advantages of Sentinel Asia?

Dr. Yun
As a part of the Asia-Pacific region, known to be one of the most disaster-prone areas in the world, EOS-RS aims to conduct user-driven innovation of space-based remote sensing technology to support response to natural disasters or crises. Our goal is to potentially help save lives in the crucial moments after a disaster strikes, and to contribute to informed decision-making for effective response and

recovery toward more resilient societies in the region.

Sentinel Asia aligns perfectly with our vision as it provides a platform for members to understand their roles and actively participate and collaborate in helping EOR requestors in times of crisis, regardless of nationality. The well-established workflow of the platform enables a seamless flow of requests from users (including timely information on geographic areas of interest and event timelines), information on satellite observations from data providers, and updates about what other products are being generated by other contributors. This makes coordination amongst DANs like us and DPNs extremely smooth, allowing for rapid decision-making on our side and the creation and dissemination of our mapping products.

Furthermore, Sentinel Asia also enables us to gain support from corporates and external organizations to improve our responses. For example, upon our membership to the Sentinel Asia network, we approached the Amazon Web Services Open Data program and were provided free cloud storage for Sentinel-1 Synthetic Aperture Radar (SAR) in the Asia-Pacific region. This greatly reduced the time for data downloads, speeding up our responses.

Sentinel Asia Secretariat:
Sentinel Asia greatly contributes to the promotion of solutions to socioeconomic challenges, which are mentioned in "APRSAF Nagoya Vision" https://www.aprsaf.org/annual_meetings/aprsaf26/outcome_documents.php . For Sentinel Asia to be included in these solutions in Southeast Asia further, what is needed?

Dr. Yun
As a DAN, EOS-RS generates satellite SAR-based maps. We always validate our maps before dissemination, and often a few words in the corner of a news media report were all we find for our validation. It would be helpful if Sentinel Asia could also encourage the regional community to share any timely information relevant to validation, such as a simple GIS layer of observed/reported/crowdsourced areas of damage or floods even if they are just a few locations. This would provide an additional opportunity for quality assurance and ensure that our maps are as accurate as possible at the time of dissemination.

From our perspective, this would align with the Nagoya Vision, in advancing solutions and science-technology capability.

Sentinel Asia Secretariat:
As the final question, could you tell us what your expectations are of Sentinel Asia and how you will contribute to Sentinel Asia?

Dr. Yun
We have no doubt that Sentinel Asia will continue to make important contributions to supporting response efforts in the face of the ever-growing frequency and intensity of natural disaster events and the impacts of ongoing climate change.

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3. How to send an Emergency Observation Request

JPT member organizations are entitled to send an Emergency Observation Request (EOR) for disasters in the Asia-Pacific region. Please refer to https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html.

EOR Order Desk:
Asian Disaster Reduction Center (ADRC)
HP: http://www.adrc.asia/
E-mail: sarequest@adrc.asia
FAX: +81-78-262-5546,
TEL: +81-78-262-5540

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4. Using Sentinel Asia Operation System, OPTEMIS

Sentinel Asia launched a new operation system, OPTEMIS. Please refer to the website on how to create an account for OPTEMIS. https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html

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FAX: +81-3-5777-1580

** February 2023 News from Sentinel Asia Project Office **

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Topics:

1. [News] Emergency Observation of Disasters
   https://sentinel-asia.org/EO/EmergencyObservation.html
2. [News] Philippine Space Agency became a member of Sentinel Asia as a Data Provider Node
   https://sentinel-asia.org/event/Event.html
3. [News] PHIVOLCS organized Project Manager training on Disasters Charter for Filipino agencies
4. [Interview] Dr. Arturo Daag, PHIVOLCS
   https://sentinel-asia.org/interview/interview_PHIVOLCS.html
5. How to Send an Emergency Observation Request
6. Using the Sentinel Asia Operation System, OPTEMIS

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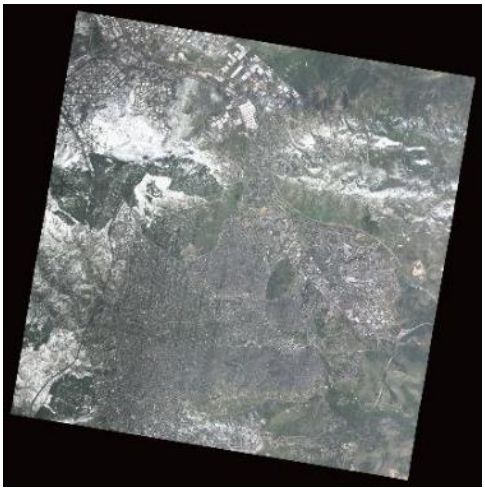
1. [News] Emergency Observation of Disasters (as of 28 February)

   (1) Earthquake in Turkey on 06 February, 2023 (GLIDE Number EQ-2023-000015-TUR)

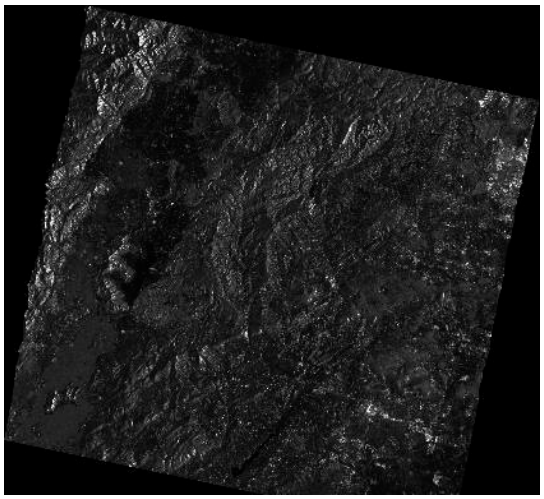
   On 06 February, a magnitude 7.8 earthquake occurred in Gaziantep Province, Turkey, near the border with Syria. A large number of aftershocks including one with a magnitude of 7.5 followed in the region. ReliefWeb reported that over 36,100 people were killed and 216,347 people from affected areas have been relocated to other provinces, according to Turkey's Disaster and Emergency Management Authority (AFAD) on 16 February. (https://reliefweb.int/disaster/eq-2023-000015-tur)

   The AFAD made an Emergency Observation Request (EOR) to Sentinel Asia on 6 February, 2023. Among Data Provider Nodes (DPNs), GISTDA, ISRO, JAXA, MBRSC, and TASA provided data. Among Data Analysis Nodes (DANs), the Institute of Geology, China Earthquake Administration (CEA), Chiba University, the Earth Observatory of Singapore (EOS), TASA, the Tokyo Institute of Technology (TIT) with the University of Tabriz and Gebze Technical University, MBRSC, the National Disaster Management Research Institute (NDMI), and Symbiosis Institute of Geoinformatics (SIG) , Symbiosis International University (SIU) provided their Value-Added Products (VAPs). Information on the latest response by Sentinel Asia is available at the link below.
   https://sentinel-asia.org/EO/2023/article20230206TR.html

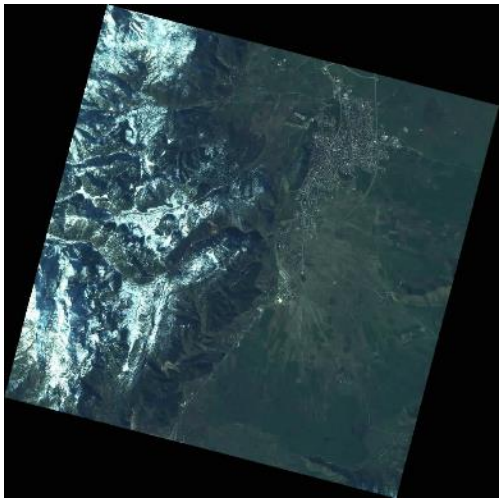
Post-disaster satellite image (THEOS-1) provided by GISTDA



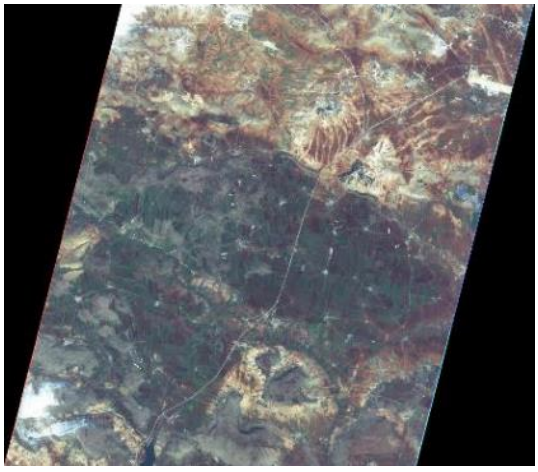
Post-disaster satellite image (CARTOSAT-3) provided by ISRO



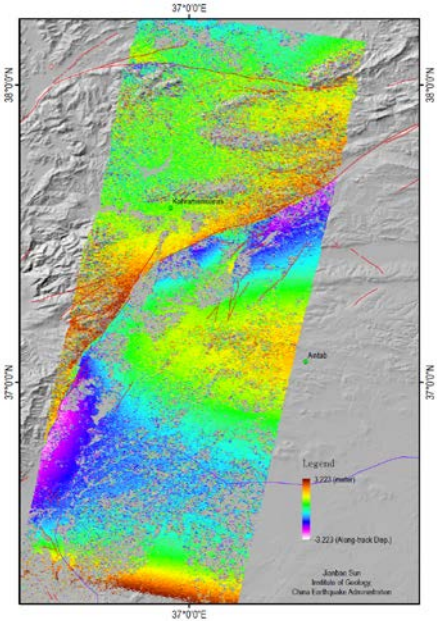
Post-disaster satellite image (ALOS-2) provided by JAXA



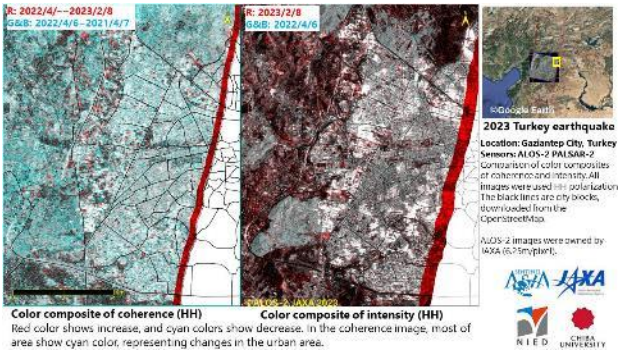
Post-disaster satellite image (KhalifaSat) provided by MBRSC



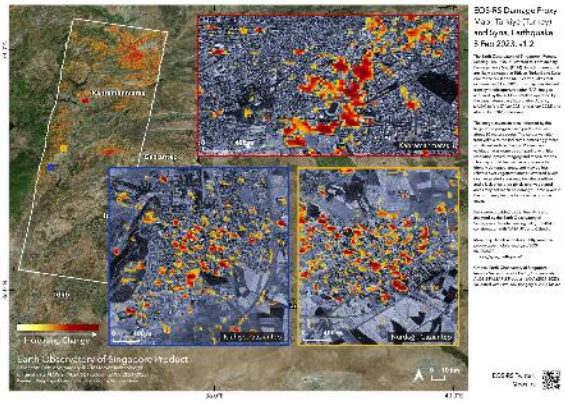
Post-disaster satellite image (FORMOSAT-5) provided by TASA



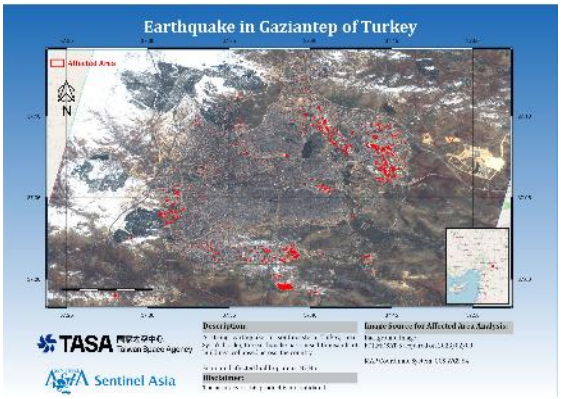
Value-Added Product by CEA



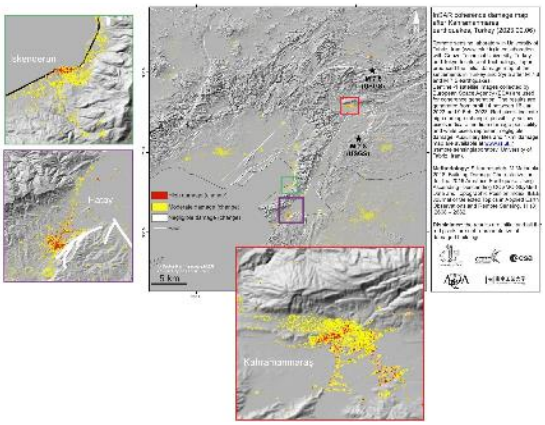
Value-Added Product by Chiba University



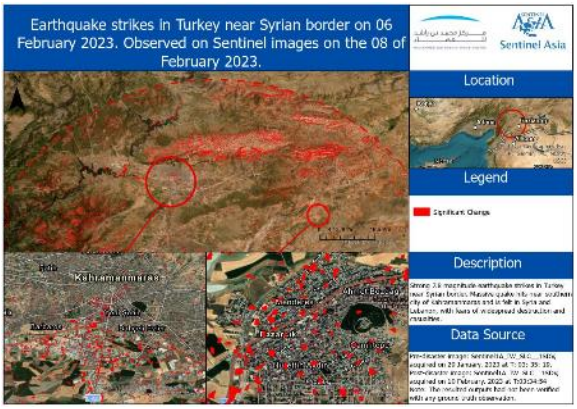
Value-Added Product by EOS



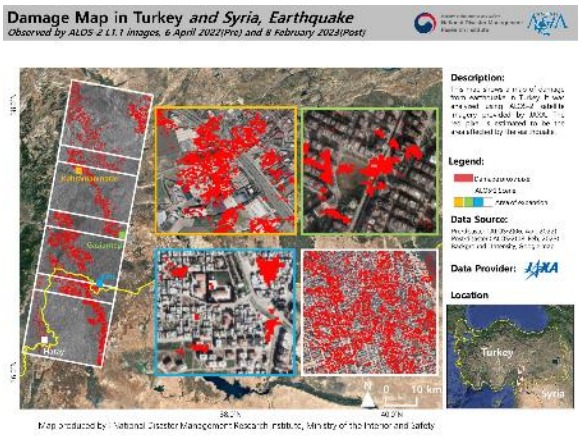
Value-Added Product by TASA



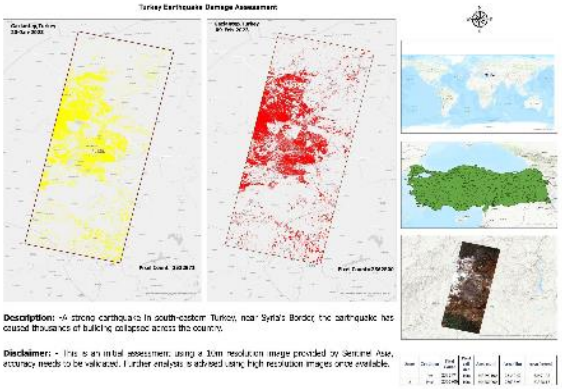
Value-Added Product by TIT with the University of Tabriz and Gebze Technical University



Value-Added Product by MBRSC



Value-Added Product by NDMI

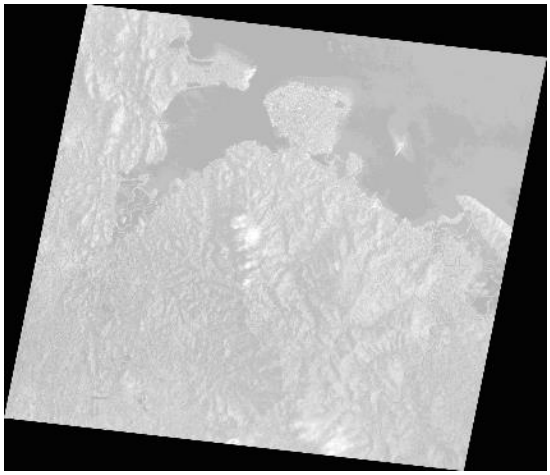


Value-Added Product by SIG-SIU

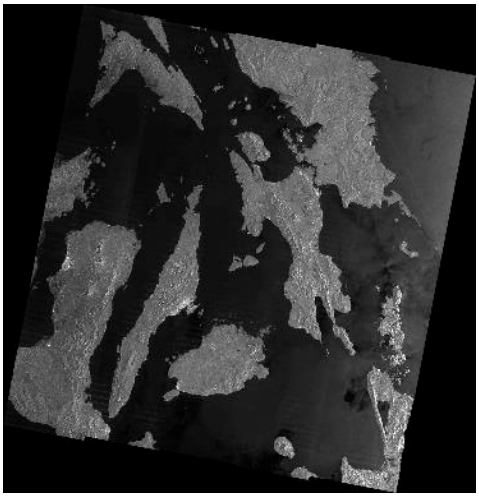
(2) Earthquake in the Philippines on 16 February, 2023 (GLIDE Number EQ-2023-000025-PHL)

A magnitude 6.0 earthquake hit Masbate Island near Luzon and Samar islands in the Philippines on 16 February. Philippine News Agency reported the day after the quake that 61 houses, 15 schools, and six buildings were damaged, but there were no casualties. (https://www.pna.gov.ph/articles/1195447)

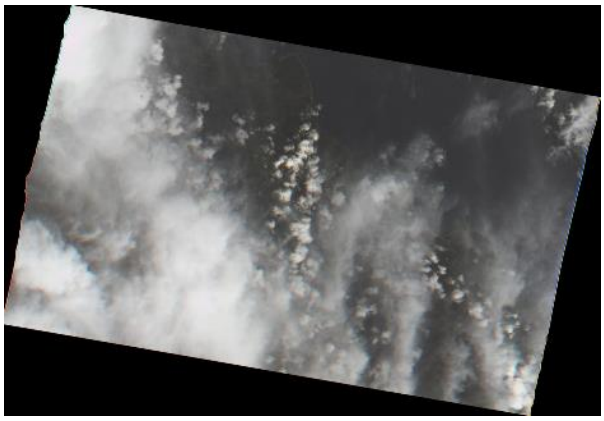
The Philippine Institute of Volcanology and Seismology (PHIVOLCS) made an Emergency Observation Request (EOR) to Sentinel Asia on 17 February, 2023. This EOR was escalated to the International Disasters Charter. PHIVOLCS assumed the role of Project Manager for this Charter activation. Among DPNs, CRISP, JAXA, and TASA provided data. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230216PH.html



Post-disaster satellite image (TelEOS-1) provided by CRISP



Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (FORMOSAT-5)
provided by TASA

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2. [News] Philippine Space Agency became a member of Sentinel Asia as a Data Provider Node

On 24 January, 2023, the Philippine Space Agency (PhilSA) became a member of Sentinel Asia as a Data Provider Node, which provides Earth observation satellite images when Sentinel Asia is activated.

Sentinel Asia is an international cooperative project that aims to contribute to disaster management in the Asia-Pacific region by utilizing space technology. The purpose is to reduce the damage caused by natural disasters by sharing disaster-related information, such as Earth observation satellite images, via the Internet. Sentinel Asia was established in 2006 as an initiative of the Asia-Pacific Regional Space Agency Forum (APRSAF), with JAXA playing the role of secretariat.

PhilSA, established in 2019, is the central government agency addressing all national issues and activities related to space science and technology applications. As a Data Provider Node, PhilSA is expected to provide Earth observation satellite images from two satellites: DIWATA-2 and NovaSAR-1.

DIWATA-2, an Earth observation microsatellite, was built by researchers from the University of the Philippines Diliman (UPD) and the Advanced Science and Technology Institute of the Department of Science and Technology (DOST-ASTI) in cooperation with Tohoku University and Hokkaido University in Japan and launched from the Tanegashima Space Center in October, 2018.

NovaSAR-1 is a Synthetic Aperture Rader (SAR) satellite. Other mission partners include UK Space Agency (UKSA), Australia’s Commonwealth Scientific and Industrial Research Organization (CSIRO), and the Indian Space Research Organisation (ISRO).

The total number of Sentinel Asia members in the Philippines is now 10, including Data Analysis Nodes and Disaster Management Organizations. As an executive secretariat of Sentinel Asia, JAXA will continue working with the Sentinel Asia member to deepen and revitalize community cooperation and establish Sentinel Asia as a tool for disaster management in the affected countries.

The Sentinel Asia Secretariat visited PhilSA and handed over an approval letter to become a member of Sentinel Asia (January 25, 2023)

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3. [News] PHIVOLCS organized Project Manager training on the Disasters Charter for Filipino agencies

"The International Charter Space and Major Disasters," or "the Charter," is an international framework for space agencies, currently 17, to provide satellite observation images in response to disaster emergencies worldwide. Sentinel Asia has close relations to the Charter. In addition to some members of Sentinel Asia also being members of the Charter, any member organizations of Sentinel Asia can request emergency observation by Charter satellites at the same time that they send an Emergency Observation Request (EOR) to Sentinel Asia when needed.

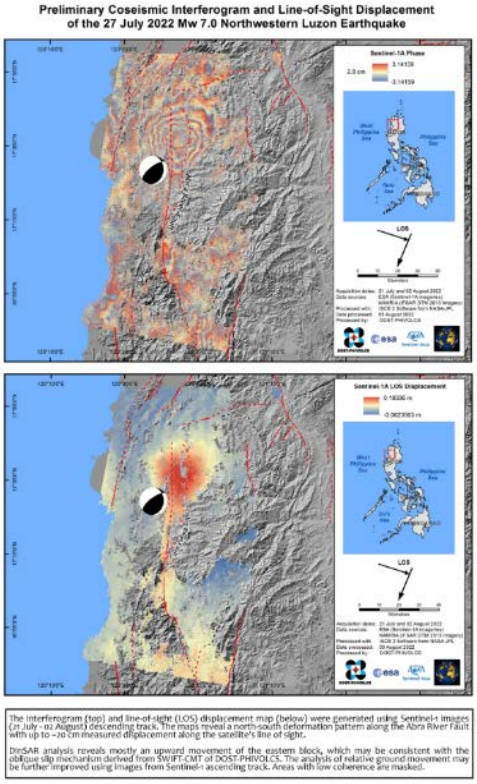
The Philippine Institute of Volcanology and Seismology (PHIVOLCS) is an active member of Sentinel Asia and has contributed to Sentinel Asia activities by providing its analysis for EORs. PHIVOLCS is also a member of the Sentinel Asia Steering Committee. On 24 January, 2023, PHIVOLCS, with the support of JAXA, organized Project Manager training in Quezon City, Philippines.

"Project Manager" is a role within the Charter to manage activation and communicate with users and space agencies. PHIVOLCS has been working as a project manager for Charter activations in

the Philippines. Considering the importance of the project manager from the country requesting Charter activation, PHIVOLCS invited the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), the Mines and Geoscience Bureau (MGB), the Department of Environment and Natural Resources, the Advanced Science and Technology Institute (ASTI), the Manila Observatory, and the newly established Philippine Space Agency (PhilSA) for the training and 38 people participated in total.

The training started with remarks by Dr. Teresito C. Bacolcol, Director of PHIVOLCS, and the participants learned about how the Charter works and the role of the Project Manager in Charter activations. They also deepened their understanding of Sentinel Asia and discussed the role of each participating agency and protocol when a disaster occurs in the Philippines.

The International Charter Space and Major Disasters
https://disasterscharter.org/
How the Charter Works
https://disasterscharter.org/web/guest/how-the-charter-works



A Value-Added Product produced by PHIVOLCS for an earthquake in the Philippines, 27 July, 2022. PHIVOLCS also worked as a project manager.

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4. [Interview] Dr. Arturo Daag, Philippine Institute of Volcanology and Seismology (PHIVOLCS)

The Philippine Institute of Volcanology and Seismology (PHIVOLCS) is a service institute of the Department of Science and Technology (DOST) that is principally mandated to mitigate disasters that may arise from volcanic eruptions, earthquakes, tsunami and other related geotectonic phenomena. They provide timely, quality and socially-inclusive information and services for warning, disaster preparedness and mitigation. They do through the development and application of technologies for the monitoring and accurate prediction of, and determination of areas prone to, volcanic eruptions, earthquakes, tsunamis and other related hazards, and gender-responsive capacity enhancement for comprehensive disaster risk reduction.

Sentinel Asia secretariat interviewed Dr. Arturo S. Daag, Associate Scientist at DOST-PHIVOLCS, on their activities relating to Sentinel Asia.

Sentinel Asia Secretariat

The Sentinel Asia Secretariat is grateful for PHIVOLCS' long-time contribution to our activities. As one of our Data Analysis Nodes (DANs), we understand that you are one of the principal institutions that work against disasters in the Philippines. We also expect you to continue to serve this role. Could you tell us the background of your joining Sentinel Asia (SA)?

Dr. Arturo Daag

PHIVOLCS joined SA more than a decade ago through joint projects, mainly on capacity building, partnering with Japan Aerospace Exploration Agency (JAXA). Some of those projects were conducted with the full support of JAXA and in partnership with PASCO-Philippines in which several educators came from Japan and provided knowledge of processing optical and later SAR (JERS, ALOS1 & 2) remote sensing data.

Some of the successful projects concerned the use of ALOS-2 and GIS data for detecting land deformation and subsidence near metro Manila, fault system studies, and volcano activity monitoring.

In more recent activities, JAXA supported PHIVOLCS' partnership with NTT data for using Global Satellite Mapping of Precipitation (GSMaP) (near real-time rainfall observation) data and RADAR for landslide management. In this project, the calibration of the satellite observation showed a strong correlation with the field observations especially on heavy to moderate rainfall. These data were then utilized on a Web-based application for a landslide monitoring and warning system. Based on such a system, PHIVOLCS conducted capacity building for local people in Rizal Province as a pilot site. At the moment and in more recent years, PHIVOLCS uses the capacity of Sentinel Asia for data acquisition in times of disaster.

Sentinel Asia Secretariat

The Philippines has the largest number of SA members next to Japan. Can you tell us the framework of these institutions and the roles of each member in your country?

Dr. Arturo Daag

The Philippines is prone to various disasters, from meteorological and geologic hazards. The frequency of disasters is higher compared to other countries. Member disaster organizations, both government and non-government, are active during disasters and thus there is a good network and collaborations.

The Sentinel Asia Project Manager training session can be considered as the starting point for better collaborations. Now, the Philippine Space Agency (PhilSA) is also on board with Sentinel Asia activities, and since it acts as a mother agency, by designing a proper protocol as a leader, I expect to have more agencies/institutes contributing to Sentinel Asia.

Sentinel Asia Secretariat
"World Disaster Risk 2022" by Bündnis Entwicklung Hilft and the Institute for International Law of Peace (RUB) and Armed Conflict at Ruhr University Bochum (IFHV) points out the Philippines as the highest disaster risk country. Disaster management is the top priority of your country. Could you please tell us what is the role of SA in your country? And what is PHIVOLCS' motivation for joining SA?

Dr. Arturo Daag
One of PHIVOLCS' mandates is to study and monitor earthquake and volcanic eruptions. In the case of a large-scale event, PHIVOLCS is required to provide an immediate update/map of the impacted area. Since PHIVOLCS was trained to conduct image processing and use satellite observations, now we have the capacity to use the Sentinel Asia Portal for Earth Observation Request (EOR) at the time of a disaster to generate those maps and information.

Sentinel Asia Secretariat
Q4: On another topic, the former director of PHIVOLCS, Dr. Renato Solidum, is now the Secretary of the Department of Science and Technology (DOST). Does this change in your organization cause any revisions in your goals or plans? If so, do you have any changes in relation to SA?

Dr. Arturo Daag
Since the new PHIVOLCS' director is also in the remote sensing field and GPS, PHIVOLCS values the usefulness of remote sensing data in disaster management, and I'm sure the role and interest of PHIVOLCS will remain the same. Also, our human resources are now trained, and they can make the most of the remote sensing data. The newly established "Remote Sensing" unit at PHIVOLCS is part of the PHIVOLCS strategy of better-using satellite observation for disaster management.

Sentinel Asia Secretariat
We suppose that PHIVOLCS mainly handles disasters related to volcanic eruptions and earthquakes. How do you combine Sentinel Asia in your disaster management activities?

Dr. Arturo Daag
Sentinel Asia plays a crucial role in disaster management in the Philippines. Especially in the time of a large-scale event, the only timely way to grasp the situation is through satellite observation. Sentinel Asia plays an important role in times of disaster through the coordinated efforts of Satellite Data Providers by providing data free of charge in times of disaster, which is very important in disaster management.

Sentinel Asia Secretariat
PHIVOLCS has handled disasters related to storms, like Typhoon Haiyan (Yolanda) in 2013. Considering that there is so much damage from such storms, what do you expect from SA for the storms?

Dr. Arturo Daag
Large events such as Typhoon Haiyan require huge international effort since the demand for data download and processive are intensive. At that time, Project Management and all the related coordination usually take an enormous effort; luckily, international partners helped in the value-added product development.

If the event is related to a flood, landslide, or typhoon, it is better if PHIVOLCS does not act as a project manager, as those issues are not part of PHIVOLCS' mandate. However, for several flood and landslide events, we act as Project Manager since there are no other available personnel to take over. However, since we just conducted Project Management Training, agencies concerned with meteorological hazards should act as PM, such as PAGASA and other agencies.

Sentinel Asia Secretariat
What are the advantages of SA, for example, the provision of Value-Added Products by DAN in a timely manner, etc.? And can you tell us what you expect from SA?

Dr. Arturo Daag
One of the important aspects of the SA is collaborations with other international partners. Some of the resources and expertise come from other SA member countries. For example, at the time of a flood, if the Philippines DAN does not process the data due to other response priorities related to the disaster, other DANs like the Asian Institute of Technology (AIT) could support us by processing the data and provide the information to the Philippines. Some DAN partners also provide training sessions as part of capacity building for SA members.

Sentinel Asia Secretariat
PhilSA develops Philippines earth observation satellites. What do you expect from these satellites?

Dr. Arturo Daag
PhilSA satellites at the moment are mainly in the experimental stage and are mostly small satellites such as CubeSat and NanoSatellite, which were part of the early development under DOST-ASTI. With the creation of PHILSA, the development of EOS will be faster since manpower and resources has increased. In the near future, PHILSA will join as Data Provider Node.

Sentinel Asia Secretariat
SA is expected to contribute to promoting the resolution of socioeconomic challenges in the "Nagoya Vision" of the Asia Pacific Regional Space Agency Forum (APRSAF) (https://www.aprsaf.org/annual_meetings/aprsaf26/outcome_documents.php#Vision). Is SA combined for solving these challenges in the Philippines, or will it be?
contribute to SA?

Dr. Arturo Daag

PHIVOLCS can contribute to developing good practices and highlighting the importance and impact of the data provided by SA for other stakeholders and agencies in the Philippines when it comes to disasters.

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5. How to send an Emergency Observation Request

JPT member organizations are entitled to send an Emergency Observation Request (EOR) for disasters in the Asia-Pacific region. Please refer to https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html.

EOR Order Desk:
Asian Disaster Reduction Center (ADRC)
HP: http://www.adrc.asia/
E-mail: sarequest@adrc.asia
FAX: +81-78-262-5546,
TEL: +81-78-262-5540

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6. Using Sentinel Asia Operation System, OPTEMIS

Sentinel Asia launched a new operation system, OPTEMIS. Please refer to the website on how to create an account for OPTEMIS. https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html

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** March 2023 News from Sentinel Asia Project Office **

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Topics:

1. [News] Emergency Observation of Disasters
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4. How to Send an Emergency Observation Request
5. Using the Sentinel Asia Operation System, OPTEMIS

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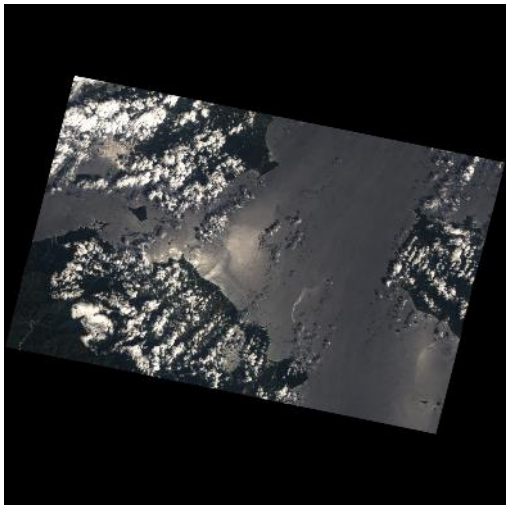
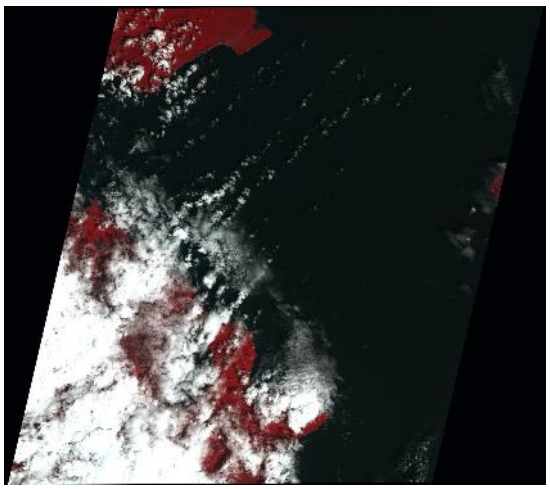
1. [News] Emergency Observation of Disasters (as of 31 March)

(1) Oil spill in the Philippines on 28 February, 2023
A tanker “MT Princess Empress” carrying 900,000 liters of industrial fuel oil sank off the northeast coast of Mindoro Island in the Philippines on 28 February, CNN reported. All 20 people onboard were rescued but the oil leaked into the ocean.
http://www.cnnphilippines.com/news/2023/3/21/mt-princess-empress-spotted.html

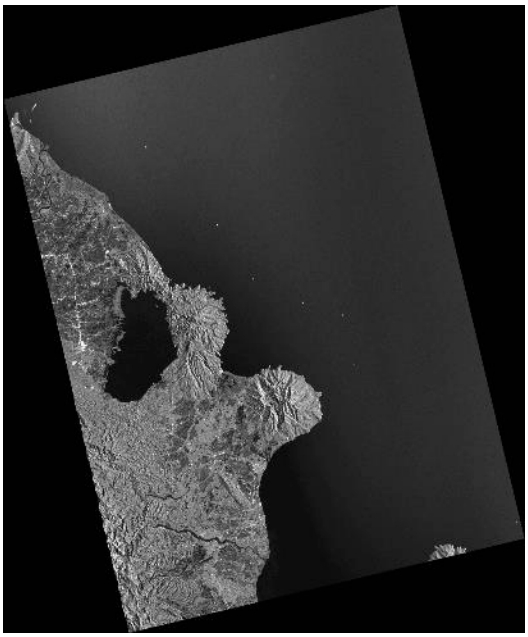
The Philippine Space Agency (PhilSA) made an Emergency Observation Request (EOR) to Sentinel Asia on 1 March, 2023. This is the PhilSA’s first EOR since it joined Sentinel Asia in January this year. This EOR was escalated to the International Disasters Charter. PhilSA assumed the role of Project Manager for this Charter activation. Among Data Provider Nodes (DPNs), GISTDA, ISRO, JAXA, and TASA provided data. Among Data Analysis Nodes (DANs), PhilSA and TASA provided their Value-Added Products (VAPs). Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230228PH.html



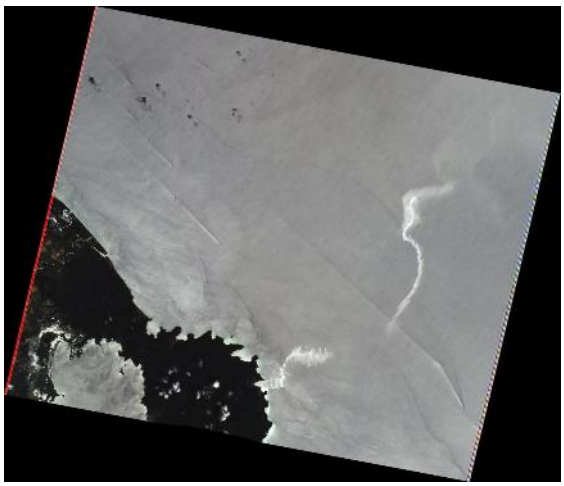
Post-disaster satellite image (THEOS-1) provided by GISTDA



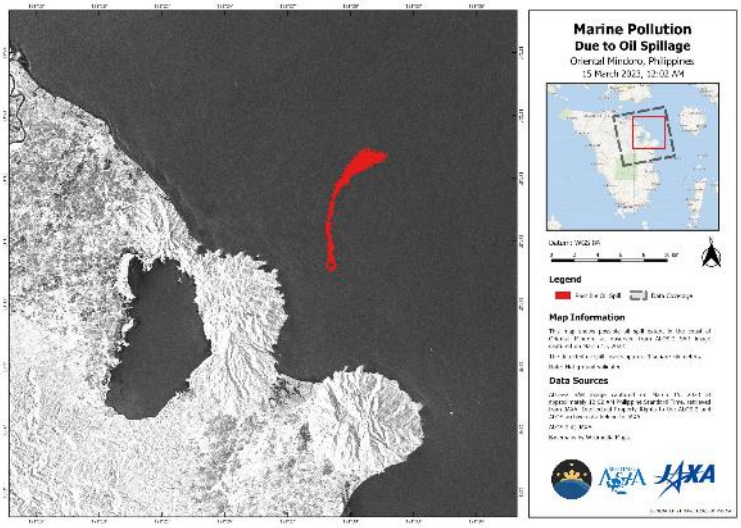
Post-disaster satellite image (Resourcesat-2A) provided by ISRO



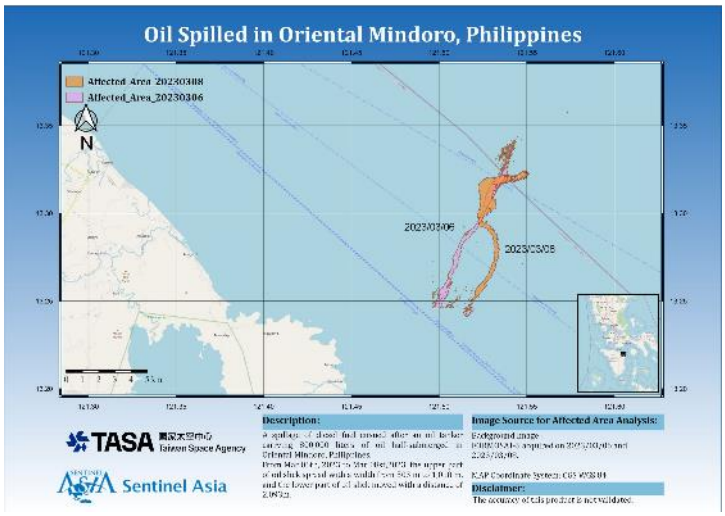
Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (FORMOSAT-5) provided by TASA



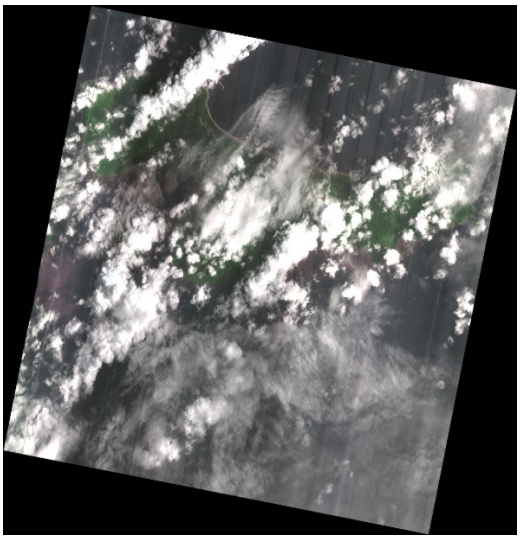
Value-Added Product by PhilSA



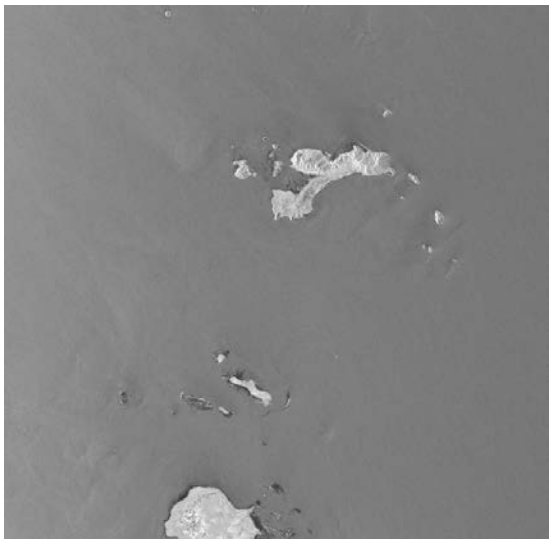
Value-Added Product by TASA

(2) Landslide in Indonesia on 06 March, 2023 (GLIDE Number LS-2023-000032-IDN)
AP reported that a massive landslide following heavy rain occurred in Natuna Regency, Riau Islands in Indonesia on 6 March and killed 32 people as of 10 March.
https://apnews.com/article/indonesia-landslide-rain-natuna-death-toll-island-11a3d7d1accf1dacbf74b00ba4014192

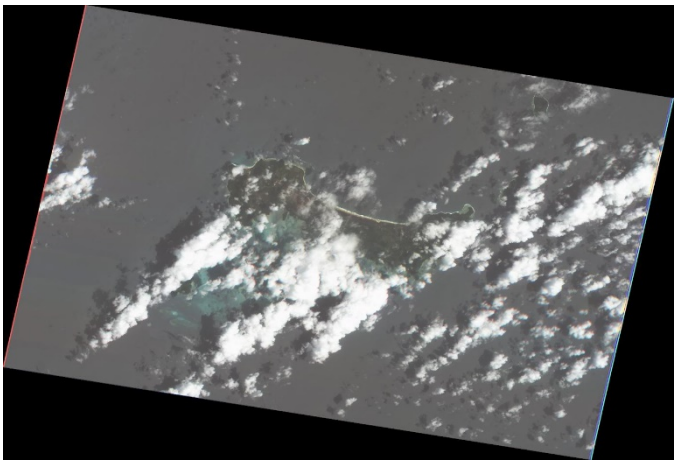
The Indonesian National Institute of Aeronautics and Space (LAPAN) made an EOR to Sentinel Asia on 7 March, 2023. This EOR was escalated to the International Disasters Charter. The Asian Institute of Technology (AIT) assumed the role of Project Manager for this Charter activation. Among DPNs, ISRO, JAXA, and TASA provided data. Among DANs, the Earth Observatory of Singapore (EOS) and LAPAN provided their VAPs. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230306ID.html



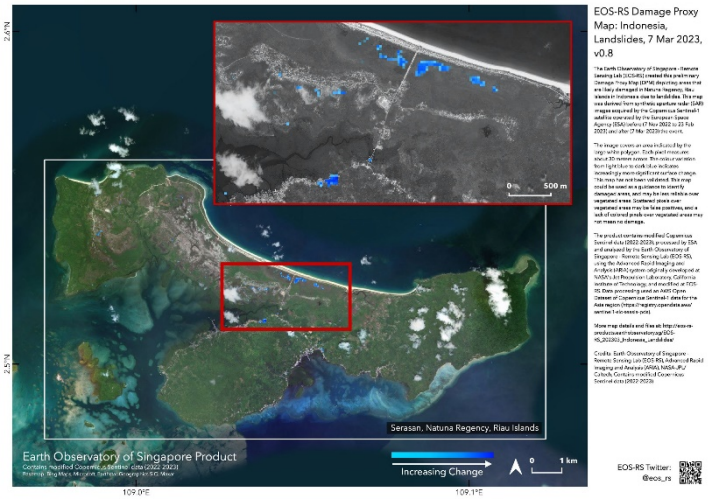
Post-disaster satellite image (CARTOSAT-3) provided by ISRO



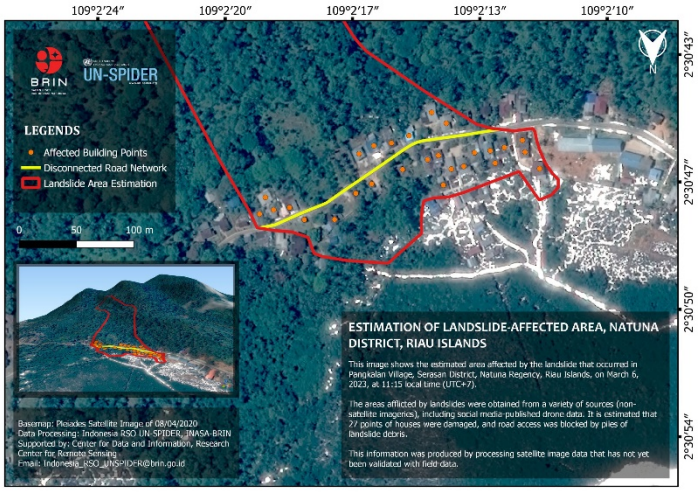
Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (FORMOSAT-5) provided by TASA



Value-Added Product by EOS



Value-Added Product by LAPAN

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2. [Interview] Mr. Koji Suzuki, Asian Disaster Reduction Center (ADRC)

The Asian Disaster Reduction Center (ADRC) was established in Kobe, Hyogo Prefecture, in 1998 with the mission of enhancing the disaster resilience of its member countries, building safe communities, and creating a society where sustainable development is attainable. They are one of the founding members of Sentinel Asia and have played crucial role.

Mr. Koji Suzuki has been serving as Executive Director of the ADRC for more than five years and promoting satellite-based technology/data/information application to disaster risk reduction and disaster management. Currently, he works with Oriental Consultants Global as Senior Advisor and with the Emergency Preparedness Working Group of APEC as Co-Chair (2020-2023). He is also a member of the National Committee for QZSS Technology Application at the Cabinet Office for

National Space Policy Secretariat. He served as one of the co-chairs of the Sentinel Asia Steering Committee from 2017 to 2023. The Sentinel Asia Secretariat interviewed Mr. Suzuki about the ADRC's activities and its cooperation with Sentinel Asia.

Sentinel Asia Secretariat
First, on behalf of the Sentinel Asia Secretariat, I would like to thank you for your great contribution to Sentinel Asia from its early days to the present, and especially for taking on the important responsibility of Co-Chair of the Steering Committee from 2017 to the present.

Mr. Koji Suzuki
During my first post at the Asian Disaster Reduction Center (ADRC), I was involved in Capacity Development for remote sensing through the ASEAN Fund of the Ministry of Foreign Affairs (MOFA). There, I was involved in activities to promote the use of earth observation through Capacity Development Programs for local civil servants in disaster management.

I first became involved with Sentinel Asia when I was working at the National Research Institute for Earth Science and Disaster Prevention (NIED), and at that time I was busy learning about remote sensing technologies and the countries involved. The second time I was involved was during my second stint at the ADRC, when I became Chair of the Steering Committee and was involved in the creation of the Strategic Plan. Initially, I was very conscious of the fact that Sentinel Asia is a voluntary-based framework, and I was doubtful whether I would be able to create a Strategic Plan capable of bringing together the members of the Steering Committee. Part of me was scared; however, I did not think too much about it and decided to implement it.

Sentinel Asia Secretariat
The frequency of emergency observations and the types of disasters vary among the participating countries and regions, and I am sure you have had a difficult time organizing the discussions as co-chairpersons amidst the diversity of expectations for Sentinel Asia. Can you talk about what has impressed you most in your role as Co-Chair of the Sentinel Asia Steering Committee?

Mr. Koji Suzuki
It is a great surprise and pleasure that the Lead Agency of the Strategic Plan has taken this activity seriously, even though it is a voluntary activity. We had prepared a Strategic Plan document but had doubts about how far we could accomplish it. I was glad that the Lead Agencies led the implementation.

Sentinel Asia Secretariat
You have been a long-term supporter of Sentinel Asia, even before you became co-chair. What do you consider Sentinel Asia to be in the disaster management community?

Mr. Koji Suzuki
Many of those involved in the disaster management community are not scientists, especially not space-related scientists, so space technology was distant to them. It was a major task to make them aware that space technology could be used for emergency response to disasters. To this end, satellite technology was introduced through Capacity Development and other programs to broaden the scope and build a foundation. At that time, we were asking institutions in various countries to join Sentinel Asia. Some, including some in Japan, wondered what Sentinel Asia could do for them. Recently, institutions wishing to become members have been contacting us on their own. I think this indicates that Sentinel Asia's visibility is spreading and people's views on satellite technology are changing.

We are currently helping to strengthen the disaster management agencies in Nepal and Fiji. One of the items necessary to strengthen as a national disaster management organization is satellite technology, which I believe has now become the standard technology in disaster management. I feel that the times are changing. I was happy to be involved with Sentinel Asia during this transitional period.

Sentinel Asia Secretariat
What was the reaction of initial ADRC member countries when the collaboration between Sentinel Asia and the ADRC started and ADRC member countries were also able to access Sentinel Asia?

Mr. Koji Suzuki
At the beginning of Sentinel Asia's establishment, the ADRC was also in the process of publicizing

the use of satellites to its member countries. At that time, there was almost no knowledge of satellites, and the mere mention of the word “satellite” was enough to make the other country stop thinking. When the ADRC did not have much content to publicize, the idea of disaster prevention using satellites was easy to promote. We were very happy to receive the support of JAXA for this. In the meantime, some of the national disaster management organizations in ADRC member countries, such as Turkey and Nepal, have expressed interest in joining Sentinel Asia. Furthermore, the fact that some agencies have expressed interest in becoming Data Analysis Nodes (DANs) leads us to believe that satellite technology is becoming more common. When I think of the time of the inauguration of Sentinel Asia., I feel I am living in a completely different age.

Sentinel Asia Secretariat
Disasters occur day and night, and it is often difficult to verify what is happening. What impact has the addition of space-based observation in collaboration with Sentinel Asia had on the activities of disaster management agencies, including the ADRC?

Mr. Koji Suzuki
I don’t think we have reached the point where satellite technology is indispensable yet. Although it has become an indispensable item for emergency response, there is still room to improve its use for risk assessment and other purposes. There are still countries where surveying on the ground is not possible. In such countries, it may be possible to generalize the surveying to include even a rough assessment of water flow. However, there is a high hurdle when it comes to buying data. If there is data that can be used in everyday operations, and if there is analytical technology that can be used to perform risk assessment, I think the scope of the project will expand. In this sense, the Cabinet Office plans to provide free communications service for Early Warning using the Quasi-Zenith Satellite System (QZSS), which is currently being worked on. The QZSS signal receiver is also small and inexpensive, so no large investment is required. Especially in countries with remote islands, currently there is no way to broadcast early warnings directly, but the use of QZSS would be highly feasible, as no loudspeakers or network would be needed.

I think the core of space technology utilization in disaster management is risk assessment and risk monitoring. I think we need to respond here and now, but the challenge is how and what data we can provide to do so.

Sentinel Asia Secretariat
I believe that there have been cases in which ADRC member countries have actually requested emergency observations and obtained satellite data from Sentinel Asia in the event of a disaster. Can you tell us about a memorable case where satellite data was used in an actual disaster response?

Mr. Koji Suzuki

The most memorable one was the explosion in Beirut, Lebanon, where Sentinel Asia was activated by the Turkish Disaster and Emergency Management Presidency (AFAD).
https://sentinel-asia.org/EO/2020/article20200808LB.html
It made an impression on me because it was a non-natural disaster and because we were trying to strengthen cooperation with Turkey at the time.

In addition, satellite observations were essential to grasp the overall picture of the Great East Japan Earthquake of 2011.
https://sentinel-asia.org/EO/2011/article20110311JP.html
https://disasterscharter.org/web/guest/activations/-/article/earthquake-in-japan

These two cases were particularly memorable.

Sentinel Asia Secretariat
Through your experience working with disaster management agencies around the world and as a disaster management-related organization at ADRC, MLIT, and NIED, can you tell us how satellite data can be processed and when it would be useful to provide it to the affected countries' areas? We would also like to hear your thoughts on obtaining local disaster information to improve the accuracy of the information being provided, and on effective and sustainable ways to receive feedback from disaster management agencies.

Mr. Koji Suzuki
A major issue is the timing of when information is received during emergencies. Even if there is good analysis, if it is not received when it is needed, its value will be small. This is a major problem. Seamless timing of observations and seamless timing of analysis would be ideal. It would be nice if there were observations and analysis outside of Sentinel Asia that could fulfill our requirements at the required time, but that is not the case. It would be nice if we could get to that point. I think it is important to be able to provide at the time of emergencies what is most wanted, when it is most wanted. However, responding to emergencies is part of satellite technology, and we still really need to think about what we can offer for risk assessment and monitoring before a disaster occurs. Sentinel Asia is still focused on responding to emergencies, but I think the challenge is to be able to provide data in other phases, including historical data provision. Regarding timing, how to respond to requests from the field is also important. I was on-site during the Great East Japan Earthquake, and on-site there is no room to demand what you want. Ideally, it would be nice if a third-party function could deliver what you want, but I don't think that is possible in a small country. It would be good if, for example, Japan International Cooperation Agency (JICA) or the Asian Disaster Preparedness Center (ADPC) could provide such a function, based on their understanding of the on-site situation.

Sentinel Asia Secretariat

We would also like to hear your thoughts on what kind of capacity building is needed to make effective use of satellite information in the affected countries.

Mr. Koji Suzuki

While capacity building is necessary, it is also important to identify requests for new analytical techniques and data, for example, through capacity development. I think it is important for the participants to develop their capacity, and for the implementers to conduct a survey of their demands and provide feedback to their own organizations.

Sentinel Asia Secretariat

Sentinel Asia is mainly providing remote sensing data after a disaster from participating space agencies, but we would like to hear your opinion on the role of satellite data in disaster management in general. Please let us know if you have any requests for the data provider to contribute to this role.

Mr. Koji Suzuki

For example, risk monitoring in routine operations, such as monitoring land subsidence and water levels in glacial lakes by creating topographies, is mainstream in terms of promoting the use of space technology, especially in areas that are difficult to monitor from the ground. To achieve this, collaboration with the local community is essential. Validation of the analysis results also requires collaboration with the local community.

Sentinel Asia Secretariat

I would like to hear any opinions you may have about the future expansion and development of Sentinel Asia's activities. In particular, we would be happy to hear your outlook on your efforts to realize STEP 3.

Mr. Koji Suzuki

We hope to put people at the site who will agitate space utilization in a positive way. Senior volunteers could serve in such a role. I believe that this will broaden the scope of space utilization and stimulate demand. I think it is very important to be close to the site.

Sentinel Asia Secretariat

With recent climate change, the scale and frequency of pre-disasters are said to be increasing. What are your expectations for Sentinel Asia in the future?

Mr. Koji Suzuki

We are currently collaborating with Kyoto University, ICHARM, the Meteorological Research

Institute, and others under the Ministry of Education, Culture, Sports, Science and Technology's "Advanced Research Program for Climate Change Prediction". This is a downscaled projection of the effects of climate change and a disaster response based on this projection. We are wondering if satellite technology could be utilized here. I think there are two ways to think about climate change: studying trends and creating dynamic models. There is interest in using satellite technology for modeling, but no conclusion has been reached. We are also interested in developing dynamic risk and hazard maps with several flexible parameters, and we believe that satellite technology can be used for this purpose. We are considering the possibility of not only modeling the current situation, but also varying patterns of different situations.

Sentinel Asia Secretariat
Can you share with us some of the most memorable moments of Sentinel Asia's activities?

Mr. Koji Suzuki
Sentinel Asia is now a mainstay of the ADRC's activities, for which we are grateful. I appreciate that they gave me an opportunity to make myself involved in Sentinel Asia, which has allowed the ADRC to expand its activities to the use of Quasi-Zenith Satellites. Even though I am not a satellite expert myself, the National Space Policy Secretariat's QZSS Strategy Office asked me to help. This would not have been possible had I not been involved with Sentinel Asia. Sentinel Asia's activities are a great asset to me.

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3. [Interview] Mr. Mr. Hideaki Matsumoto, Japan International Cooperation Agency (JICA)

Japan International Cooperation Agency (JICA), an incorporated administrative agency in charge of administering Japan's Official Development Assistance (ODA), is one of the world's largest bilateral aid agencies supporting socioeconomic development in developing countries in different regions of the world. JICA supports the resolution of issues in developing countries through a flexible combination of various types of cooperation methods. They became a member of Sentinel Asia in in 2019 to support disaster management in those countries.

Mr. Matsumoto is the Director of Disaster Risk Reduction Team 2, (Disaster Risk Reduction Group), Global Environment Department of JICA, and has been involved in DRR-related projects with JICA for more than 10 years, including his current position. DRR Team 2 is in charge of disaster risk reduction projects in developing countries, including earthquake disaster, coastal disaster, and meteorological, seismic and volcanic observation projects.

For the cases of post-disaster recovery and reconstruction projects in which the Sentinel Asia framework has been used most commonly, He has been involved such as the 2003 Bam earthquake in Iran, the 2004 Sumatra Earthquake and Tsunami, the 2005 Pakistan Earthquake, the 2011 Thailand Floods, the 2013 Typhoon in the Philippines, the 2022 Volcanic eruption and Tsunami disaster in Tonga, and the 2023 Earthquake disaster in Turkey.

Sentinel Asia Secretariat interviewed Mr. Matsumoto to hear JICA's disaster management activities relating Sentinel Asia.

Sentinel Asia Secretariat
Thank you for joining Sentinel Asia as a member in March 2019. If I may ask, how did you become a member of Sentinel Asia?

Mr. Hideaki Matsumoto
JICA joined Sentinel Asia triggered by our support activities for the September 2018 earthquake in Sulawesi, Indonesia (https://sentinel-asia.org/EO/2018/article20180928ID.html). JICA used data provided by Sentinel Asia when considering our reconstruction assistance.

After the Sulawesi earthquake, the ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre), which was a member of Sentinel Asia, requested that Sentinel Asia be activated. Using the satellite information obtained from Sentinel Asia, the situation was analyzed by JICA's Japanese expert who was dispatched to Indonesia at the time, and this information was then used for subsequent support planning.

This experience led JICA to become a member of Sentinel Asia so that JICA could directly request the activation of Sentinel Asia.

Euronews introducing the Sulawesi earthquake and Sentinel Asia's effort:
https://www.youtube.com/watch?v=7Jtj8uwbB3c

Sentinel Asia Secretariat
If you have had any particularly useful emergency observation cases since you became a member, please tell us about them and why.

Mr. Hideaki Matsumoto
In the response after the eruption of Indonesia's Mount Semeru Volcano in December 2021 (https://sentinel-asia.org/EO/2021/article20211204ID.html), we were able to use the results of satellite image analysis by Sentinel Asia to get an overview of the situation and extent of the disaster, which enabled us to consider disaster surveillance plans while we were unable to approach the site after the disaster occurred. Especially, the pyroclastic flow extent map as well as the damage proxy maps provided by the Earth Observatory of Singapore - Remote Sensing Lab (EOS-RS), Nanyang Technological University, and the optical satellite image provided by Fromosat-5 were useful.
In addition, since volcanic eruption disasters affect a wide area and their characteristics change continuously, satellite images were very effective in quickly obtaining the situation over a wide area.

Furthermore, JICA made a presentation titled “the Practical utilization of Value added products (VAPs) for JICA operations” at the 28th Session of the Asia-Pacific Regional Space Agency Forum (APRSAF-28) held in Hanoi, Vietnam in November 2022. I think her presentation material may deepen your understanding.
https://sentinel-asia.org/meetings/APRSAF/pdf/03-15Nov_JAXA_AyaGOHO%20(002)_for%20public.pdf

Sentinel Asia Secretariat
JICA’s Global Agenda 20 states “Disaster Risk Reduction through Disaster Prevention and Reconstruction.” Could you briefly introduce your specific activities?

Mr. Hideaki Matsumoto
The Global Agenda outlines a policy of support for the disaster management field. First, we believe that the role of disaster reduction in society is not only to contribute to human security by protecting human lives from disasters, but also to contribute to sustainable development by reducing social and economic damage from disasters, in other words, by building the foundation for a stable society. To this end, we believe that efforts to promote disaster risk reduction through pre-disaster investment are most necessary, and this is our first priority. However, disaster risk reduction through pre-disaster investment takes time, and some disasters occur on a scale beyond our expectations. We believe that it is necessary not only to encourage disaster risk reduction efforts, but also to combine efforts to promote comprehensive disaster reduction measures throughout the country and the region. In reality, these two efforts take a considerable amount of time in some countries, during which time disaster damage often occurs. The third initiative is “Build Back Better,” which is not to reconstruct a city that will suffer the same kind of damage from a disaster, but to make it a more disaster-resistant region; and review the national and social systems to reconstruct a country and society that are resilient to natural disasters.

Sentinel Asia Secretariat
Regarding disaster risk reduction, it seems essential that all parts of the disaster cycle function in a sound manner. Please tell us how space technology can potentially contribute to this when you consider the collaboration with Sentinel Asia.

Mr. Hideaki Matsumoto
First, what we expect from Sentinel Asia are efforts from disaster emergency response to recovery, which are already taking place even now. If the disaster is widespread or in an area that is difficult to access, the availability of information by satellite would be very useful. I believe that as technology continues to develop and we can more accurately assess the extent of such damage in the future, it will lead to faster and more efficient disaster response and subsequent restoration and reconstruction discussions. In terms of the disaster cycle, in addition to emergency response and recovery/reconstruction as described above, there is also disaster prevention/mitigation and preparation. In disaster mitigation and prevention, it is necessary to understand the mechanisms of disasters and natural phenomena when planning disaster countermeasures, and for this purpose, it is necessary to track changes in topography and other factors from the past. Also, in preparations, if information can be obtained by satellite in a timely manner, it can be used effectively.

Sentinel Asia Secretariat
Disaster management is also a major part of the SDGs, and we would like to hear about any plans you have for the use of space technology in disaster management from the perspective of promoting

the SDGs.

Mr. Hideaki Matsumoto
As I mentioned when I explained about the Global Agenda, I believe that disaster management is the foundation and basis for sustainable development, and similarly, space technology can be the basis for promoting the SDGs. Relative to disaster management and disaster prevention, information on disaster hazards is necessary for disaster prevention and development considerations. I believe that we can contribute to the SDGs by providing society with information on disaster hazards through space technology and in combination with other technologies and knowledge.

Sentinel Asia Secretariat
In closing, please tell us about your aspirations as a Sentinel Asia member and your hopes and expectations for Sentinel Asia in the future.

Mr. Hideaki Matsumoto
The impetus for joining Sentinel Asia was the thought that satellite images would be very useful in considering reconstruction assistance, etc. In reality, however, I believe that most requests to activate Sentinel Asia are made by individual countries, which is the standard practice. Of course, JICA could also make a contribution by sending a request if a member authority of the affected country is unable to do so.

I think the biggest change since we joined is that we have become more actively involved in satellite and space technology in the field of disaster management, although this may have been driven by the times and society. I feel that this has led to a better understanding of space technology and, as a result, more opportunities to utilize it.

In order to make the best use of this information, we still do not have enough knowledge, and there are gaps in knowledge within the disaster management group, so we need to improve our level of knowledge within JICA. We have also heard that communicating needs from the user side and providing feedback on the results of use are effective in improving satellite technology. I also believe that the use of space technology in JICA will promote its use. We hope to make even a small contribution with the awareness that we are not just users of space technology, but also stakeholders in it.

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4. How to send an Emergency Observation Request

JPT member organizations are entitled to send an Emergency Observation Request (EOR) for disasters in the Asia-Pacific region. Please refer to https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html.

EOR Order Desk:
Asian Disaster Reduction Center (ADRC)
HP: http://www.adrc.asia/
E-mail: sarequest@adrc.asia
FAX: +81-78-262-5546,
TEL: +81-78-262-5540

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5. Using Sentinel Asia Operation System, OPTEMIS

Sentinel Asia launched a new operation system, OPTEMIS. Please refer to the website on how to create an account for OPTEMIS. https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html

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** April 2023 News from Sentinel Asia Project Office **

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Topics:

1. [News] Indonesia to host JPT meeting this September
2. [News] Sentinel Asia website is updated
3. How to Send an Emergency Observation Request
4. Using the Sentinel Asia Operation System, OPTEMIS

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1. [News] Indonesia to host JPT meeting this September

After a four-year absence, we are delighted to announce that the Joint Project Team Meeting (JPTM) will be held again this year. The National Research and Innovation Agency (BRIN) will host JPTM on 17 and 18 September at the BRIN Office in Jakarta, Indonesia.

DAY 1: 9:00 - 18:00 (Jakarta Time), Sunday, 17 September 2023
DAY 2: 9:00 - 17:00 (Jakarta Time), Monday, 18 September 2023

The details of the meeting will be announced soon. The Sentinel Asia Secretariat expects to have many participants from among the Sentinel Asia member organizations.

In addition, the 29th session of the Asia-Pacific Regional Space Agency Forum (APRSAF-29) will be organized in Jakarta, Indonesia, succeeding to the JPTM. For details, please check the first announcement of the APRSAF-29 at the following link:
https://www.aprsaf.org/annual_meetings/aprsaf29/meeting_details.php

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3. [News] Sentinel Asia website has been updated

The Sentinel Asia website was updated in March. The following pages have been updated or added.

About Sentinel Asia
https://storymaps.arcgis.com/stories/ae487f74e92741c2b14bb396cc1e3cd7

History
https://storymaps.arcgis.com/stories/e73027ddedff4dd792b4eebb65945655

Capacity Development
https://sentinel-asia.org/e-learning/TechnicalMaterials.html

Systems
https://sentinel-asia.org/activities/Systems.html

Media
https://sentinel-asia.org/media/Media.html

Academic Papers
https://sentinel-asia.org/reports/AcademicPapers.html

If you have any publications on news related to Sentinel Asia activities or academic papers on disaster management, please contact the Sentinel Asia Secretariat so that we can post them on our website.

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4. How to send an Emergency Observation Request

JPT member organizations are entitled to send an Emergency Observation Request (EOR) for disasters in the Asia-Pacific region. Please refer to https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html.

EOR Order Desk:
Asian Disaster Reduction Center (ADRC)
HP: http://www.adrc.asia/
E-mail: sarequest@adrc.asia
FAX: +81-78-262-5546,
TEL: +81-78-262-5540

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5. Using Sentinel Asia Operation System, OPTEMIS

Sentinel Asia launched a new operation system, OPTEMIS. Please refer to the website on how to create an account for OPTEMIS.
https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html

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Sentinel Asia Project Office
Satellite Applications and Operations Center (SAOC)
Japan Aerospace Exploration Agency (JAXA)
Ochanomizu Sola City, 4-6 Kandasurugadai, Chiyoda-ku, Tokyo 101-8008 Japan
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** May 2023 News from Sentinel Asia Project Office **

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Topics:

1. [News] Emergency Observation of Disasters
2. How to Send an Emergency Observation Request
3. Using the Sentinel Asia Operation System, OPTEMIS

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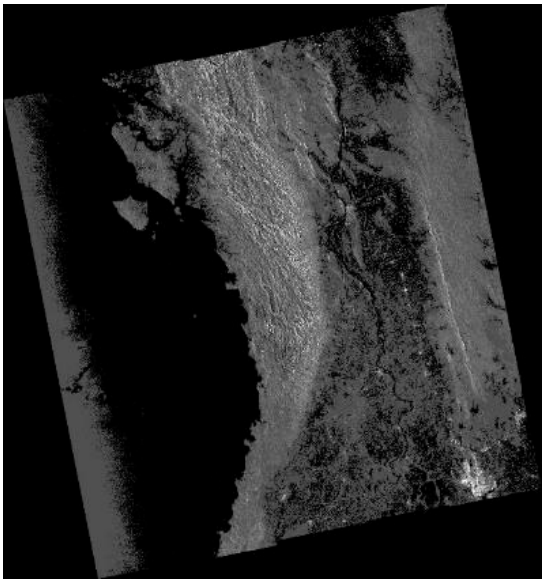
1. [News] Emergency Observation of Disasters (as of 29 May)

(1) Cyclone MOCHA in Myanmar on 14 May, 2023 (GLIDE Number TC-2023-000069-MMR)
According to the International Federation of Red Cross and Red Crescent Societies (IFRC), Cyclone Mocha, the strongest cyclone in the Bay of Bengal in the past 10 years has crossed the coast between Cox's Bazar in Bangladesh and Kyaukpyu township, near Rakhine's capital of Sittwe, Myanmar, on 14 May with winds estimated to be as strong as 250 kph, bringing heavy rains, storm surges, flash floods and landslides. In Myanmar, the cyclone has caused significant damage: houses were destroyed, electricity lines were down, and power and water services were disrupted. Resulting storm surges have also knocked out bridges and inundated homes.

They reported that, based on early reports, around 355 households in Yangon, Magway and Ayeyarwady regions are reported affected, while initial reports from Chin State also highlight damage, and more than 130,000 people were evacuated to temporary shelters.
https://www.ifrc.org/press-release/cyclone-mocha-access-and-time-essence-help-affected-families-bangladesh-and-myanmar

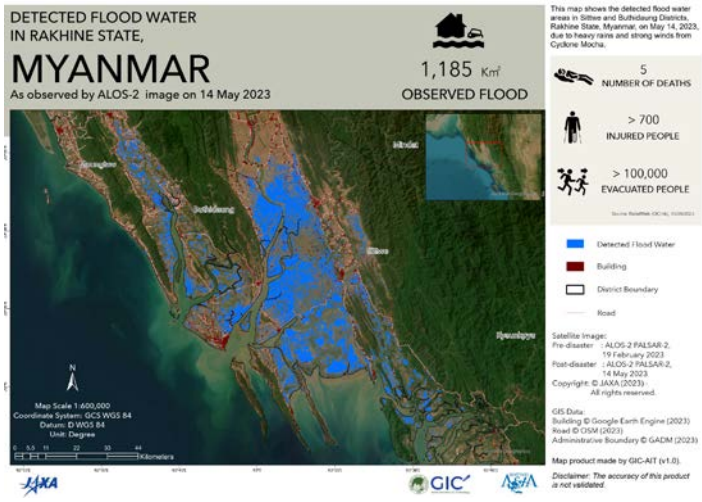
The ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre) made an Emergency Observation Request (EOR) to Sentinel Asia on 11 May, 2023, in anticipation of the approach of Mocha. This EOR was escalated to the International Disasters Charter and Geoinformatics Center of Asian Institute of Technology (GIC-AIT) assumed the role of Project Manager for this Charter activation. Among Data Provider Nodes (DPNs), ISRO, JAXA, and TASA provided data. Among Data Analysis Nodes (DANs), AIT, EOS, MBRSC, and United Nations' World Food Programme (WFP) provided their Value-Added Products (VAPs). Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230514MM.html

Post-disaster satellite image (Resourcesat-2A) provided by ISRO

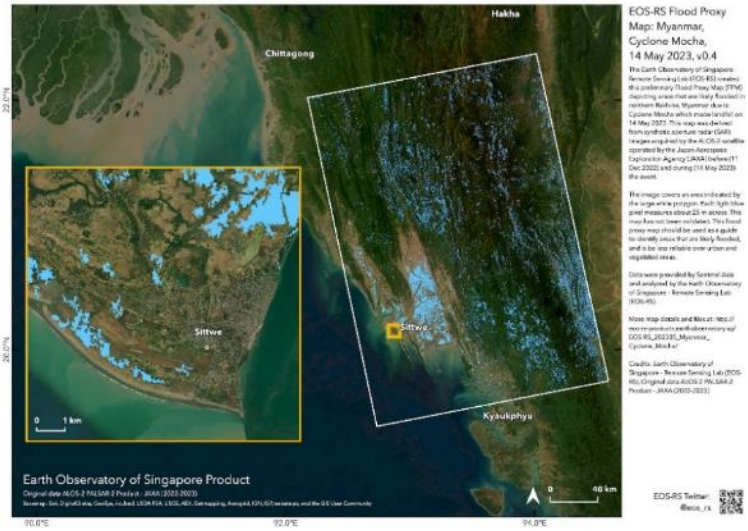


Post-disaster satellite image (ALOS-2) provided by JAXA

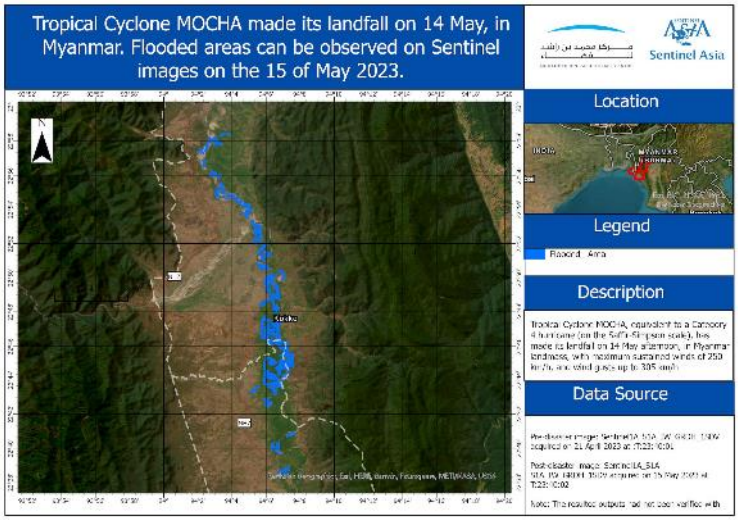
Post-disaster satellite image (FORMOSAT-5) provided by TASA



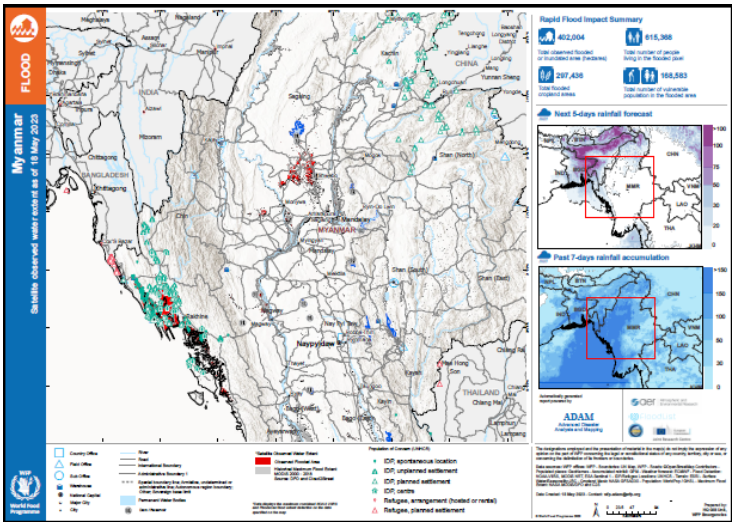
Value-Added Product by AIT



Value-Added Product by EOS



Value-Added Product by MBRSC

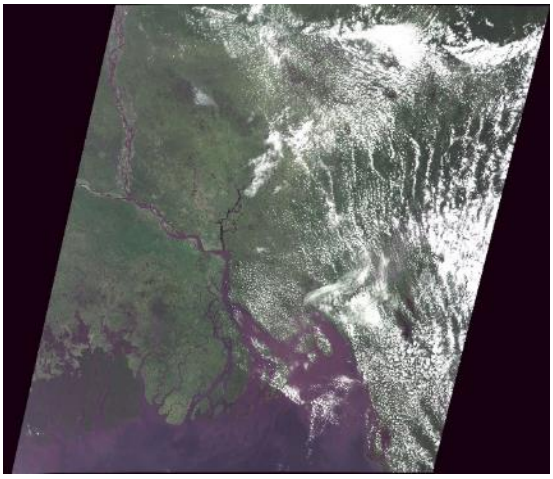


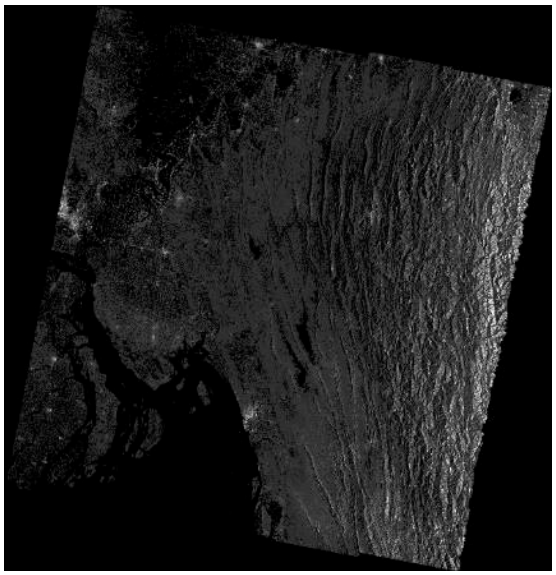
Value-Added Product by WFP

(2) Cyclone MOCHA in Bangladesh on 14 May, 2023 (GLIDE Number TC-2023-000071-BGD)

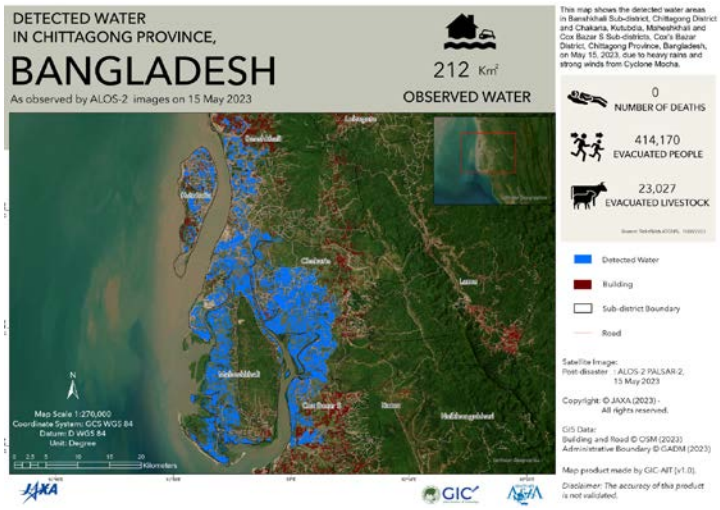
Cyclone Mocha also hit Bangladesh. According to the BBC, no casualties have been reported in Bangladesh but 750,000 people had evacuated ahead of the storm.
https://www.bbc.com/news/world-asia-65587321

The Bangladesh Water Development Board (BWDB), which is a new member of Sentinel Asia, made an EOR to Sentinel Asia on 14 May. Among DPNs, ISRO and JAXA provided data. Among DANs, AIT and MBRSC provided their VAPs. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230514BD.html

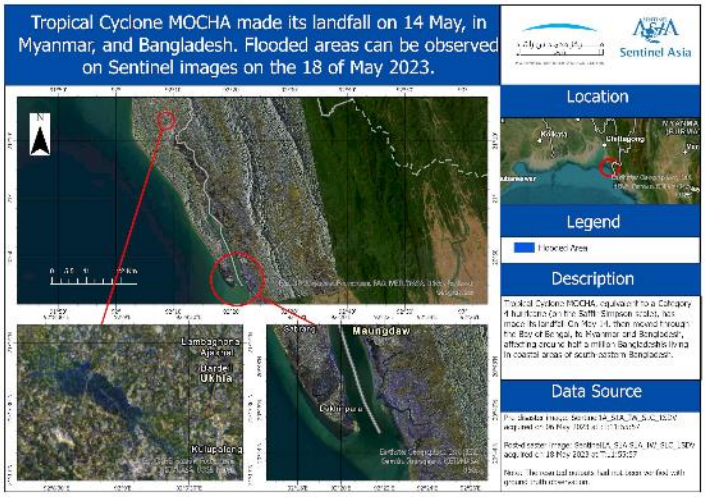

Post-disaster satellite image (Resourcesat-2A) provided by ISRO



Post-disaster satellite image (ALOS-2) provided by JAXA



Value-Added Product by AIT

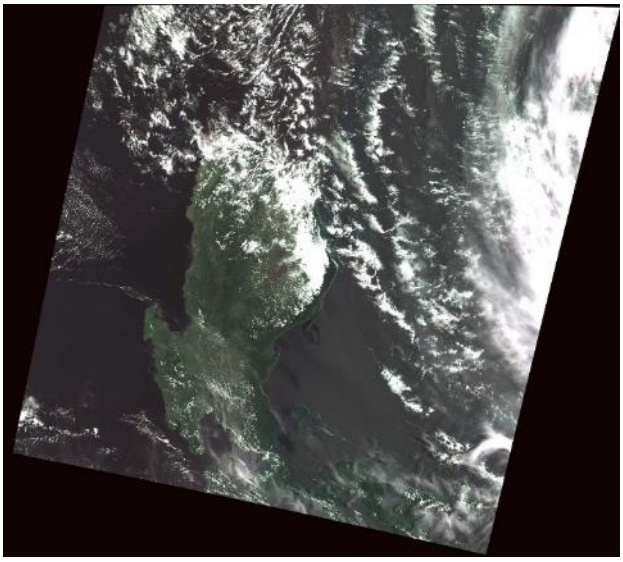


Value-Added Product by MBRSC

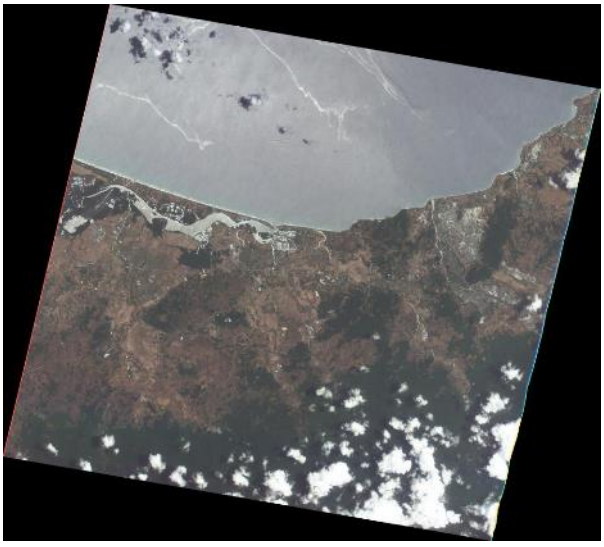
(3) Typhoon Mawar in the Philippines on 27 May, 2023 (GLIDE Number TC-2023-000077-PHL)

After damaging the Island of Guam, Typhoon Mawar (Betty) approached the Philippines, although it is predicted to stay off the island of Luzon, the Philippines.
https://www.nytimes.com/article/typhoon-mawar.html

Anticipating the damage in the country, the Manila Observatory (MO) made an EOR to Sentinel Asia on 25 May. Among DPNs, ISRO and TASA provided data. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230527PH.html



Post-disaster satellite image (Resourcesat-2) provided by ISRO



Post-disaster satellite image (FORMOSAT-5) provided by TASA

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Asian Disaster Reduction Center (ADRC)
HP: http://www.adrc.asia/
E-mail: sarequest@adrc.asia
FAX: +81-78-262-5546,
TEL: +81-78-262-5540

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3. Using Sentinel Asia Operation System, OPTEMIS

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https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html

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** June 2023 News from Sentinel Asia Project Office **

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Topics:

1. [News] Emergency Observation of Disasters
2. [Interview] Mr. Tatiya Chuentragun, Geo-Informatics and Space Technology Development Agency (GISTDA)
3. How to Send an Emergency Observation Request
4. Using the Sentinel Asia Operation System, OPTEMIS

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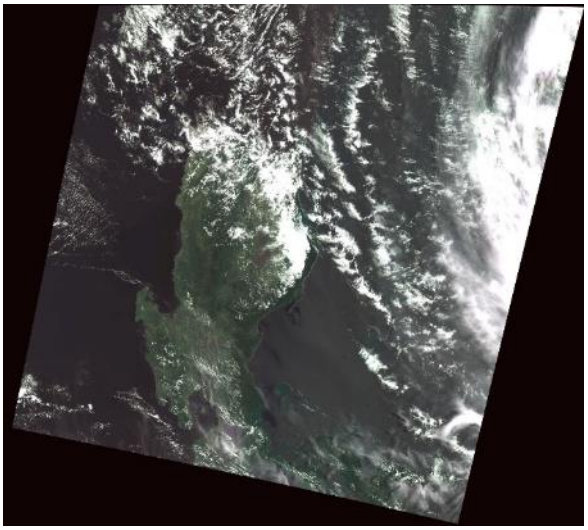
1. [News] Emergency Observation of Disasters (as of 29 June)

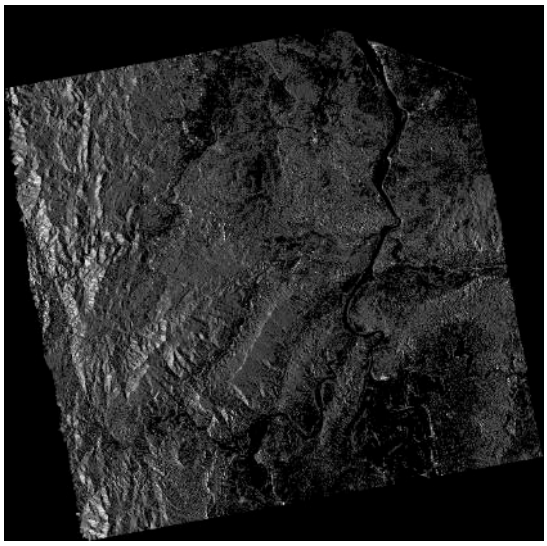
(1) Typhoon Mawar in the Philippines on 27 May, 2023 (GLIDE Number TC-2023-000077-PHL)

After having caused damage on the Island of Guam, Typhoon Mawar (Betty) approached the Philippines, although it proceeded off the country's island of Luzon.
https://www.nytimes.com/article/typhoon-mawar.html

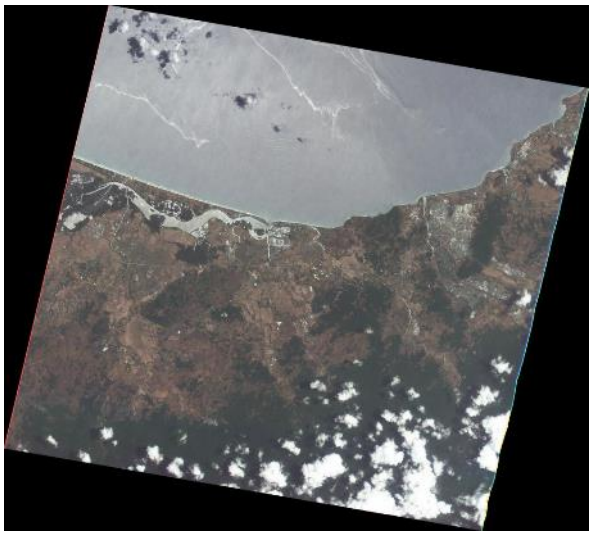
Anticipating damage in the country, the Manila Observatory (MO) made an EOR to Sentinel Asia on 25 May. Among DPNs, ISRO, JAXA, and TASA provided data. Among DANs, AIT and MBRSC provided their VAPs. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230527PH.html



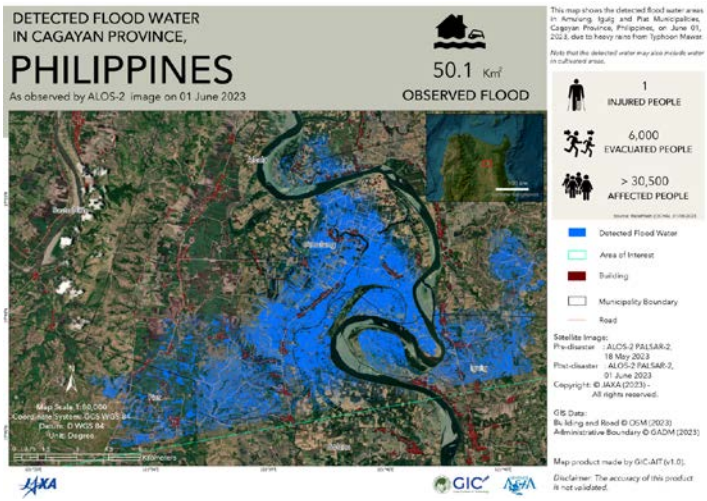
Post-disaster satellite image (Resourcesat-2) provided by ISRO



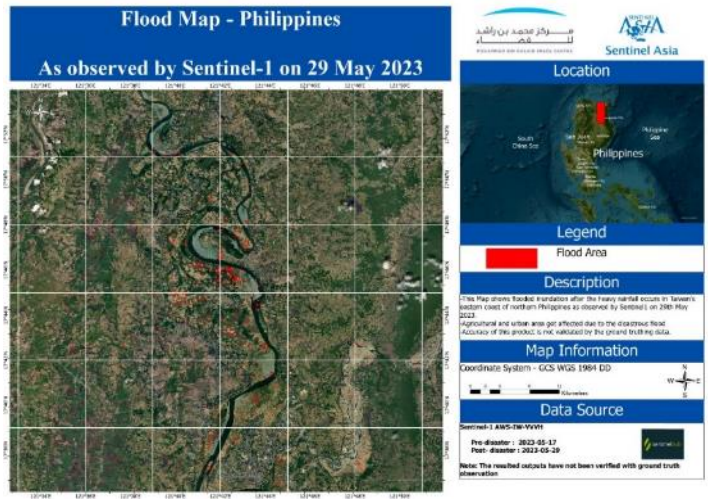
Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (FORMOSAT-5) provided by TASA



Value-Added Product by AIT

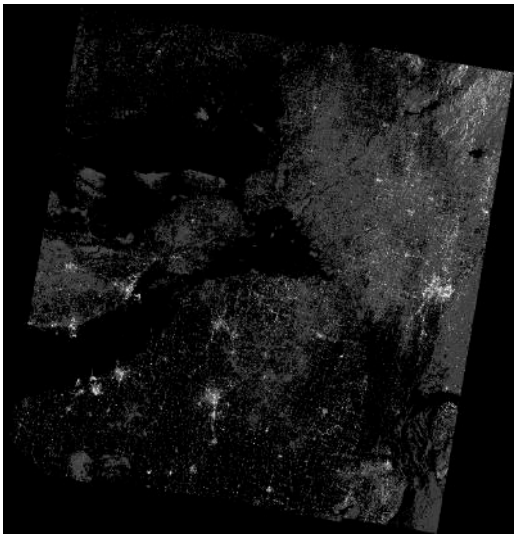


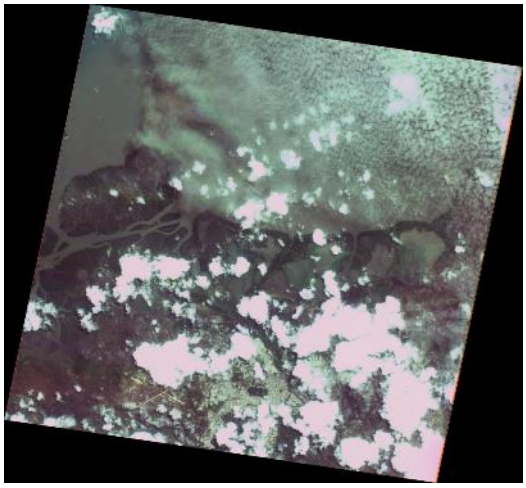
Value-Added Product by MBRSC

(2) Cyclone Biparjoy in India on 15 June, 2023 (GLIDE Number TC-2023-000095-IND)

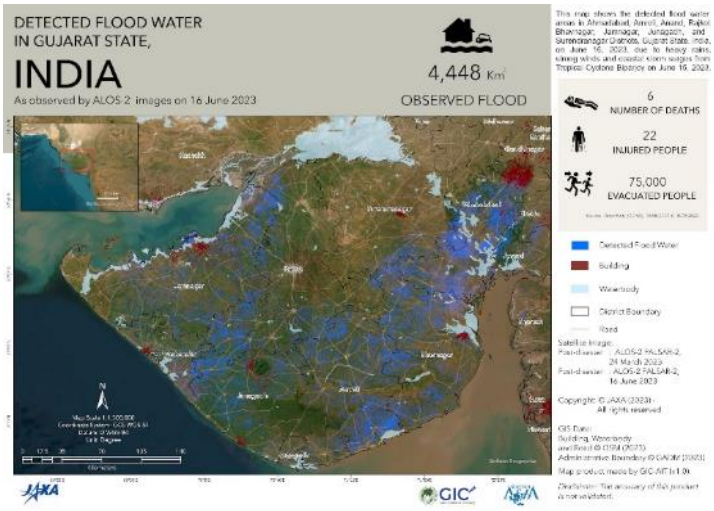
Cyclone Biparjoy made landfall in India's western Gujarat state on the northeastern coast of the Arabian Sea on 15 June. Al Jazeera reported that more than 100,000 people have been evacuated from eight coastal districts in Gujarat and moved to shelters.
https://www.aljazeera.com/news/2023/6/15/cyclone-biparjoy-damages-power-lines-makes-landfall-in-india?traffic_source=KeepReading

ISRO made an EOR to Sentinel Asia on 14 June in anticipation of the approach of the cyclone. Among DPNs, JAXA and TASA provided data. Among DANs, AIT provided its VAPs. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230615IN.html


Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (FORMOSAT-5) provided by TASA

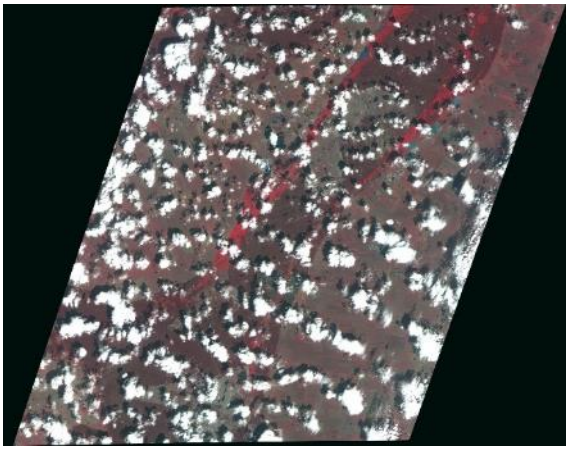


Value-Added Product by AIT

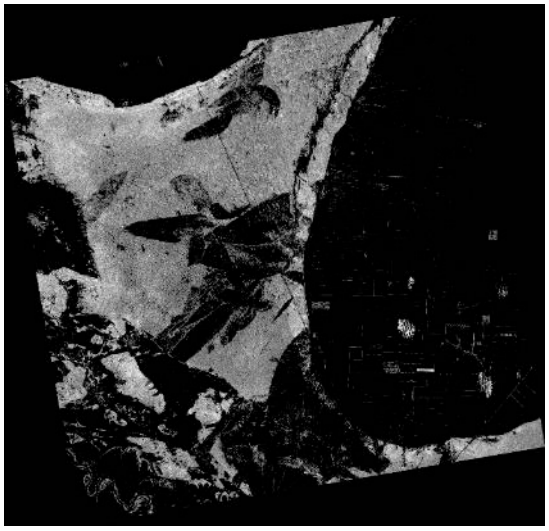
(3) Forest Fire in Kazakhstan on 08 June, 2023 (GLIDE Number WF-2023-000100-KAZ)

A massive wild fire started on the natural reserve of “Semei Ormany” in the eastern part of Kazakhstan on 8 June. According to the Astana Times, 14 people died in the fire. https://astanatimes.com/2023/06/president-of-kazakhstan-declares-june-12-as-national-day-of-mourning-for-forest-fires-victims-in-abai-region/

Central Asian Institute of Applied Geosciences (CAIAG) made an EOR to Sentinel Asia on 16 June. Among DPNs, ISRO, JAXA and TASA provided data. Among DANs, AIT provided its VAPs. Information on the latest response by Sentinel Asia is available at the link below. https://sentinel-asia.org/EO/2023/article20230608KZ.html



Post-disaster satellite image (Resourcesat-2) provided by ISRO



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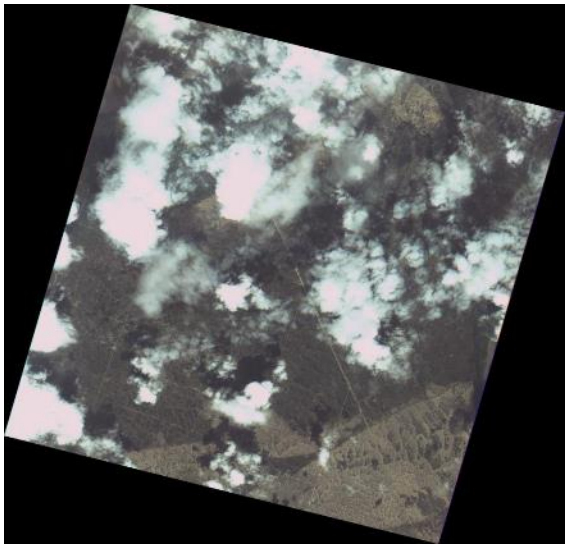
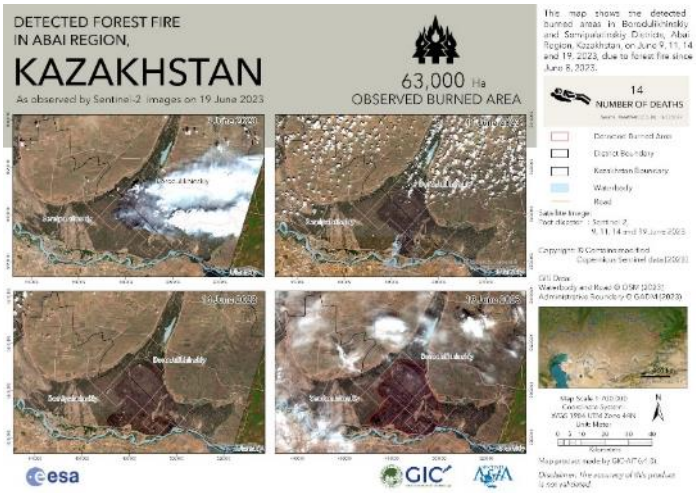


Post-disaster satellite image (FORMOSAT-5) provided by TASA



Value-Added Product by AIT

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2. [Interview] Mr. Tatiya Chuentragun, Geo-Informatics and Space Technology Development Agency (GISTDA)

Geo-Informatics and Space Technology Development Agency (GISTDA) is a longtime member of the Sentinel Asia. They provide satellite imagery from their Thaichote or THEOS-1 satellite as Data Provider Node and provide Value Added Products as Data Analysis Node also.

Mr. Tatiya Chuentragun, Deputy Executive Director of GISTDA, serves as a co-chair of the Steering Committee of Sentinel Asia. Sentinel Asia Secretariat interviewed him on his effort for Sentinel Asia, GISTDA's contribution to Sentinel Asia, and the disaster management scheme in Thailand.

Sentinel Asia Secretariat

First of all, the Sentinel Asia Secretariat would like to express our appreciation for GISTDA's long-time contributions to Sentinel Asia, including ones by the National Remote Sensing Center (NRSC) and the National Research Council of Thailand (NRCT), former bodies of GISTDA. GISTDA is now working as a Data Provider Node (DPN) as well as a Data Analysis Node (DAN). What is the history of Thailand and GISTDA joining Sentinel Asia and what is the motivation for being a member of Sentinel Asia?

Mr. Tatiya Chuentragun

When Thailand joined Sentinel Asia (SA), we intended to learn how to use new technologies for disaster monitoring. We strongly believe that we had received for some time and that when the right time arrived, we must give back. This mindset was one of the reasons for the development

of our Earth Observation (EO) satellite Thaichote or THEOS-1, to contribute to SA by data provision. Since the beginning of Thailand's participation in SA, we have gained a lot of expertise in the field of disaster monitoring using EO data and its data provision. Based on those experiences we have also acted as a Data Analysis Node (DAN). And since Thailand is very prone to different disasters, using that gained knowledge, our staff is busy all year round to provide analytics related to disasters to different parties.

Sentinel Asia Secretariat

We also appreciate your co-chairship at the Sentinel Asia Steering Committee. As a co-chair, do you have anything you would like to achieve in the activities of Sentinel Asia?

Mr. Tatiya Chuentragun

I don't know how to give a full and fair picture of what I wished I could do as co-chair of the Steering Committee when I have been appointed. But let me begin with the fact that SA is a volunteer-based activity and therefore it is not easy to get all the members to actively participate in SA. And as a co-chair of the Steering Committee, I wish I could enhance collaborations among the members. To enhance collaborations, more communication is needed, and this is where I think we can start to work. Unfortunately, in the past, SA only had face-to-face meetings, which are very important for initiating collaborations, a few times. We can take meeting opportunities to show and expand our past success stories and projects. Of course, the budget will always be an issue, but even with the limited budget, we can engage members through training and workshops that not only transfer knowledge and technologies but also enhance communication and dialogue among all the members.

The other fact is that SA has been collaborating with different disaster-related international entities such as the International Disasters Charter. It's truly a wise move on SA's part to place such collaborations at the forefront, enabling all SA members to witness firsthand the remarkable strength of the network and the availability of data access.

Sentinel Asia Secretariat

Are there any cases that stand out of disasters in your country where Sentinel Asia observation was useful?

Mr. Tatiya Chuentragun

Yes, in 2011, Thailand experienced one of the biggest flood events in its history. At that time, Thailand sought related data from different entities and organizations. Those data helped Thailand to get through that disaster and I believe that in that experience, Thailand's continuous efforts in collaboration with different entities and organizations paid off.

After the disaster response by GISTDA, the Thailand government could get a clearer and fairer image of how the EO data can support disaster management. Before the mentioned flood event, such EO-related activities have been used in the planning phase, but only during that event, for

the first time in Thailand's history, the space application had been put in front of the decision-makers for their decisions.

Sentinel Asia Secretariat
Do you have any lessons learned through such cases?

Mr. Tatiya Chuentragun
To answer this question, I refer to the experience mentioned in the last question. Looking at such experiences, we realized that the data and technology are out there, but it is important to know/learn how to show the potential of such data to decision-makers. From those experiences, we learned that to make that potential recognized by decision-makers, the data must be presented to the right people at the right time and in the right format. That is why after the 2011 flood event, we initiated an "Actionable Intelligence Policy" (AIP), which requires us to engage more with policymakers and decision-makers along with other end-users.

Sentinel Asia Secretariat
Currently, Thailand has eight Sentinel Asia member agencies. Do they have any roles or responsibilities regarding disasters in Thailand? What role does GISTDA play among them? How does GISTDA cooperate with them? In addition, does GISTDA get any feedback from Disaster Management Organizations such as the Department of Disaster Prevention and Mitigation (DDPM)? And is there any cooperation between GISTDA and International Organizations in Thailand such as the Asian Disaster Preparedness Center?

Mr. Tatiya Chuentragun
In this regard, I should mention that out of seven SA member organizations in Thailand, namely the Department of Water Resources (DWR), the Royal Forest Department (RFD), the National Park and Wildlife Plan Department, the Royal Irrigation Department (RID), the Land Development Department (LDD), and the Andaman Environment and Natural Disaster Research Center, Prince of Songkla University (ANED, PSU), GISTDA has been collaborating with most SA members organizations in Thailand. Unfortunately, I cannot remember whether we signed an MoU with all of them or not. Typically, at the time of a disaster, DDPM is our focus organization since it is the main department that is responsible for disaster relief along with some others. Based on the MOU with DDPM and GISTDA, even if GISTDA doesn't push particular data to DDPM platforms directly, DDPM can have direct access to the GISTDA servers and most of its data through some APIs. Usually, GISTDA prepares the final product such as flood maps and flood area in the form of shapefiles and map services, and shares them with DDPM so they can focus on their tasks and leave most of the remote sensing and experience to us.
Based on an MoU with DDPM and GISTDA, even if GISTDA doesn't push particular data to DDPM platforms directly, DDPM can have direct access to the GISTDA servers and most of its data through some APIs. However, usually, GISTDA prepares the final products, such as flood

maps, etc., and shares them with DDPM so they don't need to acquire remote sensing knowledge and experience.

Sentinel Asia Secretariat

The recently established "Thai Space Consortium" has developed its own EO program. As such, you have many public and private players in space development and applications in Thailand. Do they have any plan for a disaster monitoring program using space technology?

Mr. Tatiya Chuentragun

The Thai Space Consortium is a collaborative initiative between space-related activities in Thailand and mainly focuses on research, and of course, GISTDA is a major part on the Consortium. On top of that, GISTDA as the National Space Agency mainly focuses on the National Space Master Plan, which comprises a whole range of space activities, and TSC is definitely a program in the master plan. We also are planning the next generation of EO satellites. Based on such plans, by the fourth quarter of 2023, GISTDA will have two new EO satellites, "THEOS-2" and "THEOS-2A", to be launched with aims that include disaster monitoring and international collaborations. Although the sensors onboard both satellites will be optical, GISTDA will use all its potential to utilize those data for disaster monitoring not only nationwide but also for international collaborations such as the SA. These two satellites are equipped with 50-cm and 1.1-m spatial resolution and we expect to provide detailed information. And the application is not only just the inundated area but also the direction of the flood at the time of a disaster.

We are working on the enhancement of our system accordingly. Apart from their abilities, both satellites will be dedicated to our international collaborations such as SA, and GISTDA plans to provide the data for international collaborations.

With regard to future satellite programs and the National Space Master Plan, right now GISTDA is conducting feasibility studies for a next-generation satellite with an optical sensor to be launched in next 3–5 years. When the necessary technical advancement is acquired through several satellites, GISTDA hopes to have its first SAR satellite.

Sentinel Asia Secretariat

Your Executive Director, Dr. Pakorn Apaphant, mentioned that GISTDA is providing solutions in the six areas, namely, agriculture, disaster, water management, mapping, natural resource, and urban, at the CEOS Plenary in 2022. Could you tell us about GISTDA's program on disaster management?

Mr. Tatiya Chuentragun

As mentioned above, we will have more satellites in the future the data from which we will dedicate to our international collaborations. Also, we already have our system to disseminate the data to the end-user agencies. We are continuously improving our systems to serve more

especially not only governments and organizations but also citizens and the private sector.

Sentinel Asia Secretariat
Can you tell us what you expect from Sentinel Asia and what you will contribute to Sentinel Asia?

Mr. Tatiya Chuentragun
I have quite a lot to say here. But to begin with, I'd like to refer to the scope of SA, which is not only response and post-disaster but also disaster mitigation and preparation, which are very important, especially for areas more prone to disasters such as Thailand. Disaster preparation mainly deals with early data acquisition and hot-spot mapping of prone areas. This requires historical data collection and regional collaboration, which is something that I expect in SA.
As mentioned before in earlier questions, I also expect SA to show how we can take benefits from our collaborations to its members, as such stories can motivate all members to actively collaborate and communicate in SA.

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3. How to send an Emergency Observation Request

JPT member organizations are entitled to send an Emergency Observation Request (EOR) for disasters in the Asia-Pacific region. Please refer to https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html.

EOR Order Desk:
Asian Disaster Reduction Center (ADRC)
HP: http://www.adrc.asia/
E-mail: sarequest@adrc.asia
FAX: +81-78-262-5546,
TEL: +81-78-262-5540

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4. Using Sentinel Asia Operation System, OPTEMIS

Sentinel Asia launched a new operation system, OPTEMIS. Please refer to the website on how to create an account for OPTEMIS.
https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html

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** July 2023 News from Sentinel Asia Project Office **

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Topics:

1. [News] Emergency Observation of Disasters
2. How to Send an Emergency Observation Request
3. Using the Sentinel Asia Operation System, OPTEMIS

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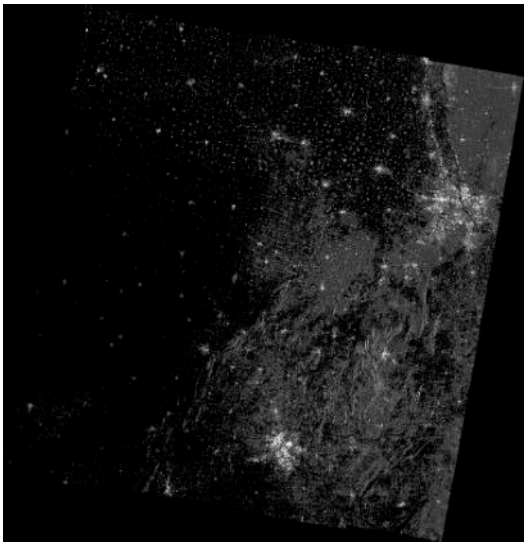
1. [News] Emergency Observation of Disasters (as of 28 July)

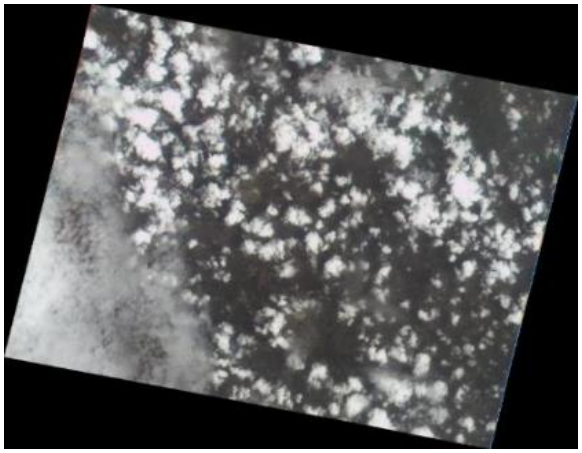
(1) Flood, Landslide and Storm in India on 13 July, 2023 (GLIDE Number FL-2023-000112-IND)

Unprecedented rainfall caused flooding and landslides in northern India. CNN reported that 41 people were killed as of 12 July, 31 in Himachal Pradesh and 10 were killed in Punjab.
https://edition.cnn.com/2023/07/12/india/india-himachal-pradesh-rain-flood-deaths-intl-hnk/index.html

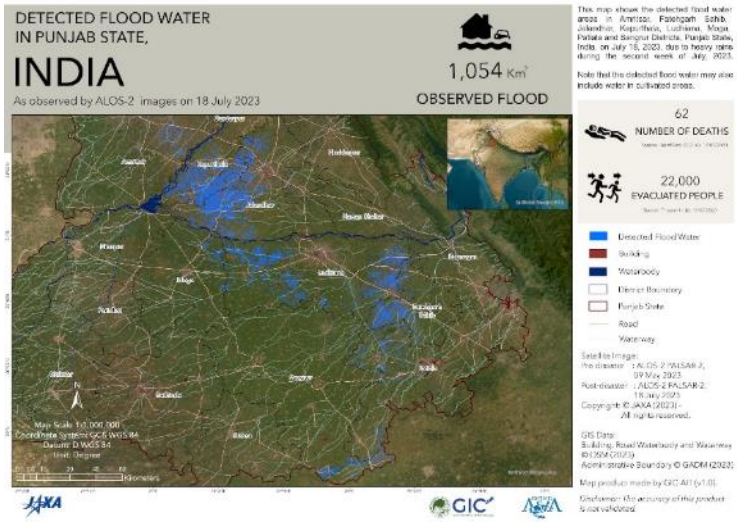
ISRO made an EOR to Sentinel Asia on 14 July. Among DPNs, JAXA and TASA provided data. Among DANs, AIT and EOS provided their VAPs. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230713IN.html



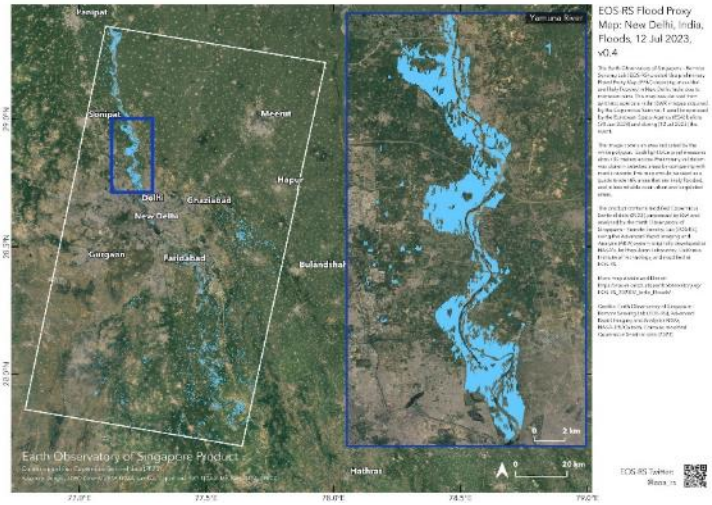
Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (FORMOSAT-5) provided by TASA



Value-Added Product by AIT

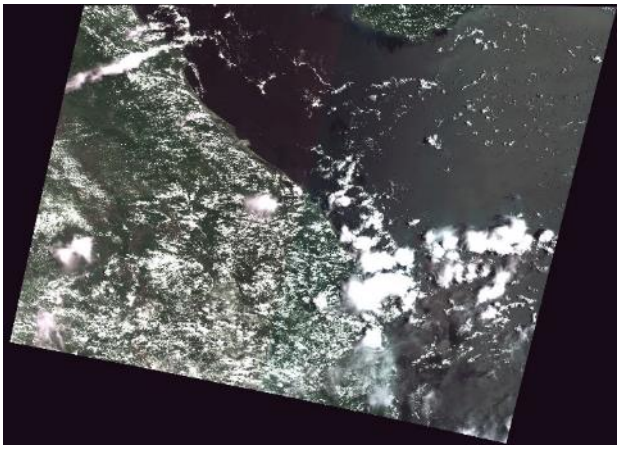


Value-Added Product by EOS

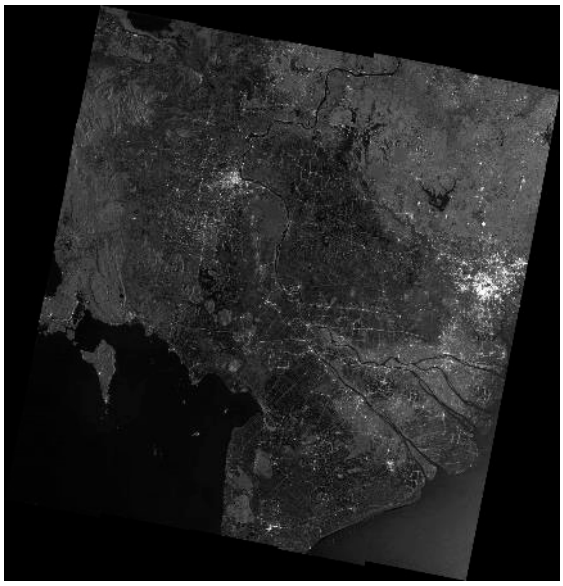
(2) Flood, Landslide and Storm in Vietnam on 18 July, 2023 (GLIDE Number FL-2023-000125-VNM)

Typhoon Talim made landfall in southern China on 17 July and, after having weakened to tropical depression, it reached Vietnamese island of Bach Long Vi on the day after. According to CNA, no deaths are reported in either country. In Vietnam 30,000 people were relocated.
https://www.channelnewsasia.com/asia/weakened-typhoon-talim-hits-vietnam-after-passing-through-china-3636296

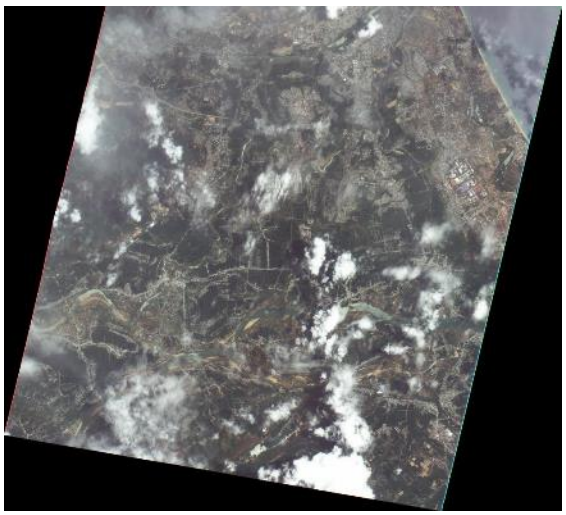
Ministry of Natural Resources and Environment of Vietnam (MONRE) made an EOR to Sentinel Asia on 17 July in anticipation of the approach of the typhoon. Among DPNs, ISRO, JAXA, and TASA provided data. Among DANs, AIT provided its VAPs. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230718VN.html



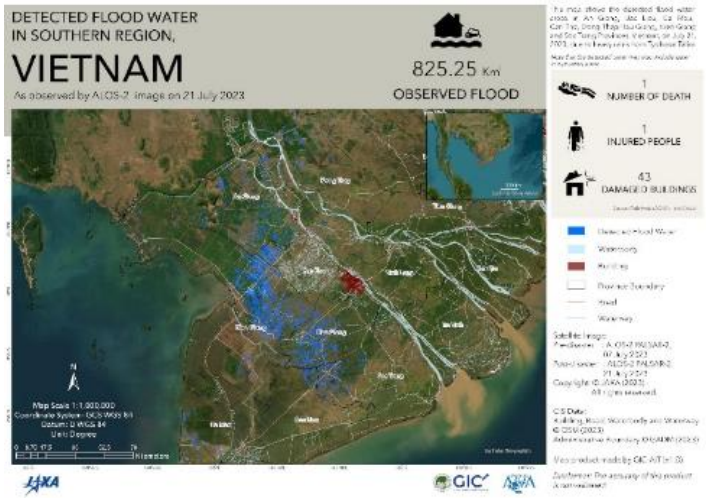
Post-disaster satellite image (Resourcesat-2) provided by ISRO



Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (FORMOSAT-5) provided by TASA



Value-Added Product by AIT

(3) Flood in Bhutan on 20 July, 2023 (GLIDE Number FF-2023-000122-BTN)

On 20 July, a flash flood occurred in Ungar village in Bhutan and swept away 23 people. As of 22 July, six bodies were found, with the rest still missing, Kuensel reported.
https://kuenselonline.com/seventeen-still-missing-in-ungar-flash-flood/

Ministry of Home Affairs, Royal Government of Bhutan made an EOR to Sentinel Asia on 26 July. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230720BT.html

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2. How to send an Emergency Observation Request

JPT member organizations are entitled to send an Emergency Observation Request (EOR) for disasters in the Asia-Pacific region. Please refer to https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html.

EOR Order Desk:
Asian Disaster Reduction Center (ADRC)
HP: http://www.adrc.asia/
E-mail: sarequest@adrc.asia
FAX: +81-78-262-5546,
TEL: +81-78-262-5540

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3. Using Sentinel Asia Operation System, OPTEMIS

Sentinel Asia launched a new operation system, OPTEMIS. Please refer to the website on how to create an account for OPTEMIS.
https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html

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** August 2023 News from Sentinel Asia Project Office **

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Topics:

1. [News] Emergency Observation of Disasters (as of 29 August)
2. [News] BRIN organized Project Manager training on the Disasters Charter for Indonesian agencies
3. How to Send an Emergency Observation Request
4. Using the Sentinel Asia Operation System, OPTEMIS

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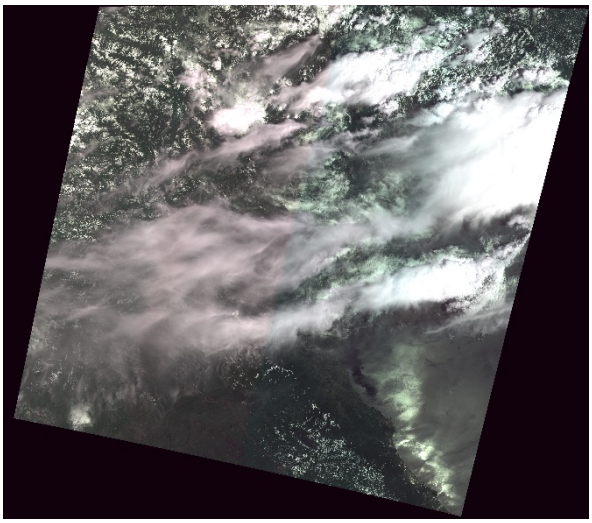
1. [News] Emergency Observation of Disasters (as of 29 August)

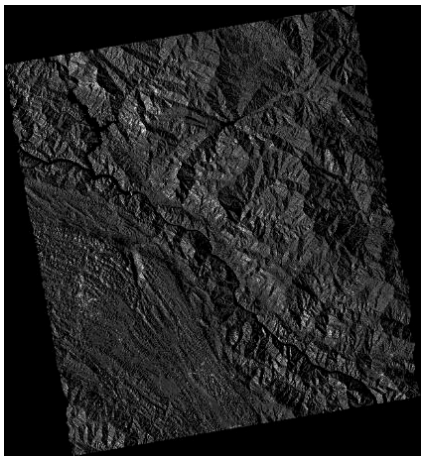
(1) Flood, Landslide, and Storm in Vietnam on 5 August, 2023 (GLIDE Number FF-2023-000136-VNM)

Heavy rain affected northern Vietnam, causing floods and resulting in damage. The VIETNAM POSTS reported that as of 9 August, floods in Yen Bai province have killed four people and 189 houses were lost in Mu Cang Chai district.
https://vietnam.postsen.com/local/432162/Flooding-in-Yen-Bai-killed-4-people-washed-away-80-billion-VND.html

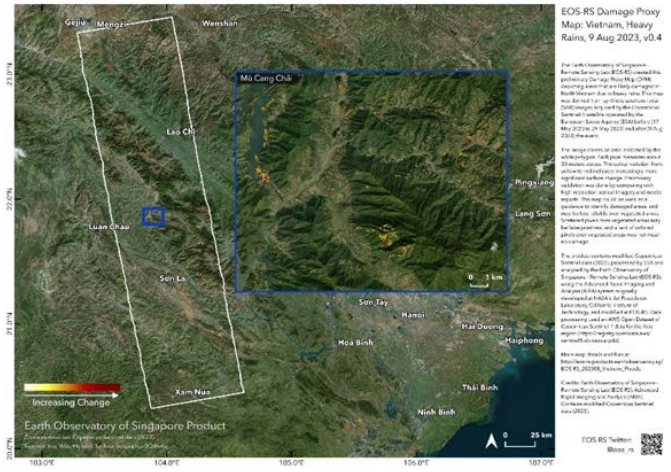
Ministry of Natural Resources and Environment (MONRE) of Vietnam made an EOR to Sentinel Asia on 8 August. Among DPNs, ISRO and JAXA provided data. Among DANs, EOS and MBRSC provided their VAPs.
Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230805VN.html



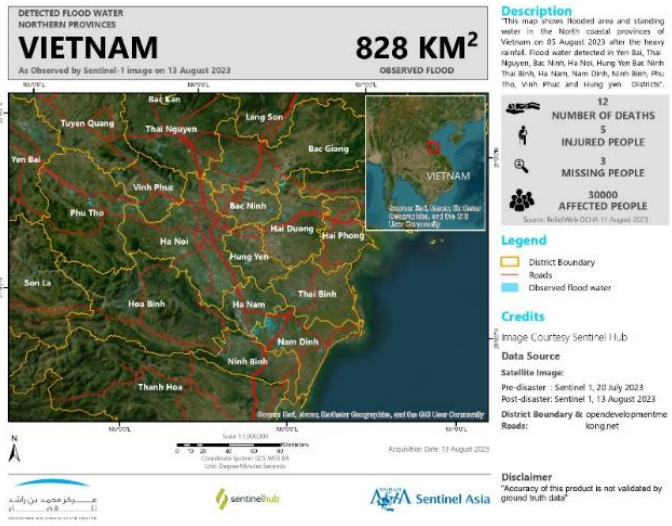
Post-disaster satellite image provided by ISRO



Post-disaster satellite image (ALOS-2) provided by JAXA



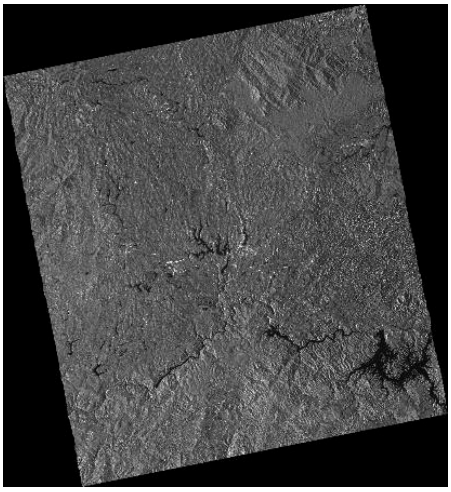
Value-Added Product by EOS



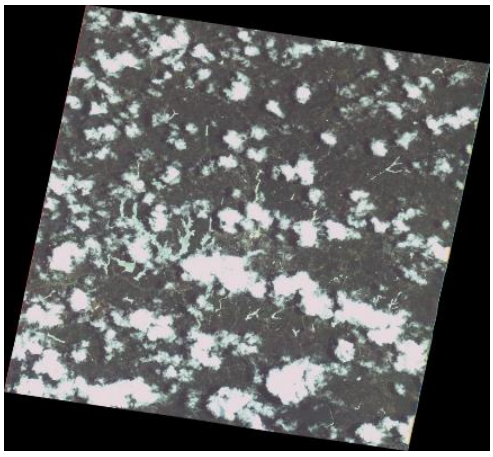
Value-Added Product by MBRSC

(2) Landslide in Vietnam on 4 August, 2023 (GLIDE Number LS-2023-000143-VNM)
A landslide occurred in Dak Nong province in Vietnam and the cracks on National Highway 14 through Dak Nong City continue to widen. Cracks and subsidence have widened 30–50 cm, and in some places nearly 1m. There are sections of the road that are split, falling 1–2 m deep.
https://vietnam.postsen.com/news/425052/The-crack-on-National-Highway-14-through-Dak-Nong-widens-and-lengthens.html

MONRE made an EOR to Sentinel Asia on 16 August and this EOR was escalated to the International Disasters Charter. MONRE assumed the role of Project Manager for this Charter activation. Among DPNs, JAXA and TASA provided data.
Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230816VN.html



Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (FORMOSAT-5) provided by TASA

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2. [News] BRIN organized Project Manager training on the Disasters Charter for Indonesian agencies

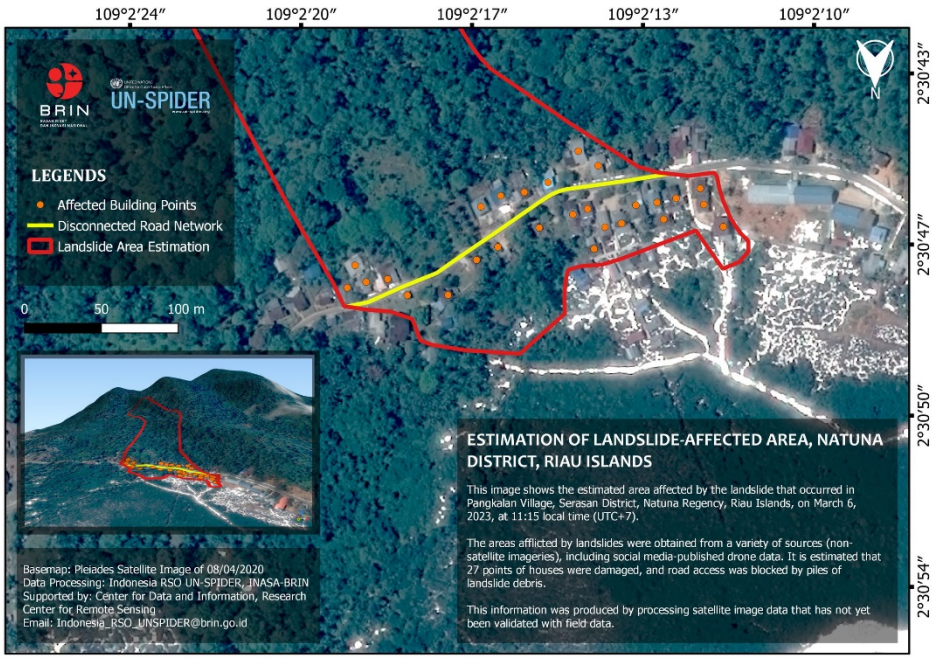
“The International Charter: Space and Major Disasters” (“the Charter”) is an international framework for space agencies, currently 17, to provide satellite observation images in response to disaster emergencies worldwide. Sentinel Asia has close relations to the Charter. In addition to some members of Sentinel Asia also being members of the Charter, any member organizations of Sentinel Asia can request emergency observation by Charter satellites at the same time that they send an Emergency Observation Request (EOR) to Sentinel Asia when needed. “Project Manager” is a role within the Charter to manage activation and communicate with users and space agencies.

The National Research and Innovation Agency (BRIN) is an active member of Sentinel Asia. On 12th July 2023, BRIN, with the support of the Japan Aerospace Exploration Agency (JAXA), organized Project Manager Training at the BRIN Office in Jalan Pemuda, Rawamangun, Jakarta.

BRIN was launched in 2021 by merging research institutes under Indonesian ministries, including the National Institute of Aeronautics and Space of Indonesia (LAPAN) and the Agency for the Assessment and Application of Technology Indonesia (BPPT), both of which are long-time members of Sentinel Asia. The Secretariat of the Indonesian Space Agency (INASA) of BRIN handles international collaboration activities with other space agencies of the world, as well as administrative matters for Sentinel Asia.

For the Project Manager Training, in addition to the participants from BRIN, they invited the National Disaster Management Agency (BNPB) and ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre), and 21 people participated in total.
The training started with opening remarks by Prof. Dr. Erna Sri Adiningsih, Executive Director, INASA, BRIN, and participants learned about how Sentinel Asia’s cooperation process works and the importance of the role of Project Managers in invoking it. There was a presentation by Mr. Suwarsono, who has been a Project Manager at BRIN, including its former organization LAPAN, and shared his own experience. In the second half of the training, the European Space Agency joined and lectured on the Charter Mapper, the Charter’s newly introduced processing environment. The participants deepened their understanding of its web-based operation system.

The International Charter: Space and Major Disasters
https://disasterscharter.org/
How the Charter Works
https://disasterscharter.org/web/guest/how-the-charter-works



A Value-Added Product produced by BRIN for a landslide in Indonesia, 06 March, 2023.

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3. How to Send an Emergency Observation Request

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E-mail: sarequest@adrc.asia
FAX: +81-78-262-5546,
TEL: +81-78-262-5540

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4. Using the Sentinel Asia Operation System, OPTEMIS

Sentinel Asia launched a new operation system, OPTEMIS. Please refer to the website on how to create an account for OPTEMIS.
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Sentinel Asia Project Office
Satellite Applications and Operations Center (SAOC)
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E-mail: Z-SENTINEL.ASIA@ml.jaxa.jp

** September 2023 News from Sentinel Asia Project Office **

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Topics:

1. [News] Emergency Observation of Disasters (as of 29 September)
2. [News]JPTM 2023 was successfully held
3. [News] Sentinel Asia participated in a session at APRSAF-29
4. How to Send an Emergency Observation Request
5. Using the Sentinel Asia Operation System, OPTEMIS

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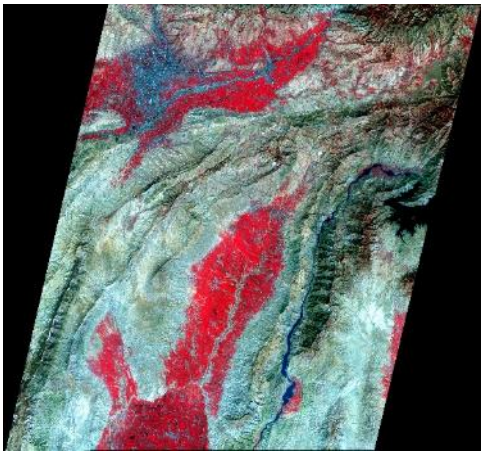
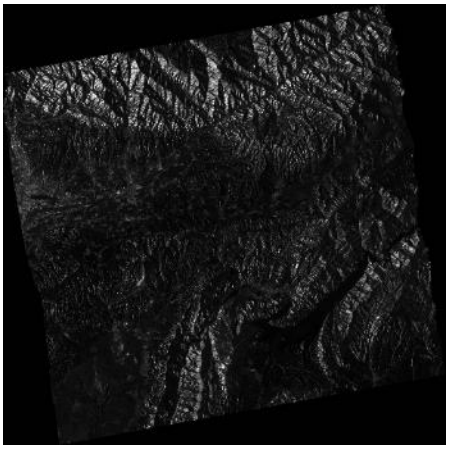
1. [News] Emergency Observation of Disasters (as of 29 September)

(1) Landslide in Tajikistan on 27 August, 2023 (GLIDE Number FL-2023-000159-TJK)
ReliefWeb reported that heavy rainfall has affected central-western Tajikistan, causing flash floods and landslides and resulting in casualties and damage. At least 13 people have died, 11 in the city of Vahdat (western Tajikistan) due to floods, and two others due to a mudslide in Rohati village west of the capital, Dushanbe. In addition, several houses, roads and crops have been flooded, particularly in the area of the capital.
https://reliefweb.int/report/tajikistan/tajikistan-flash-floods-and-landslides-meteo-tajikistan-noaa-cpc-media-echo-daily-flash-29-august-2023

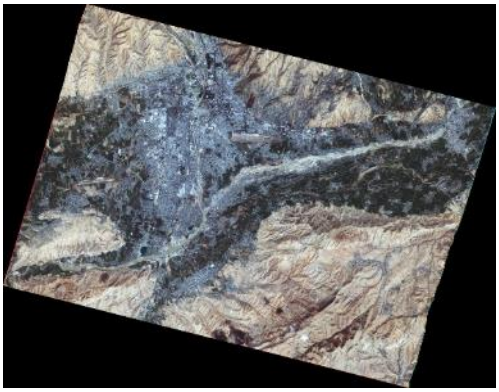
Central-Asian Institute for Applied Geosciences (CAIAG) of Kyrgyz made an EOR to Sentinel Asia on 30 August. Among DPNs, ISRO, JAXA and TASA provided data. Among DANs, MBRSC provided their VAPs.
Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230827TJ.html



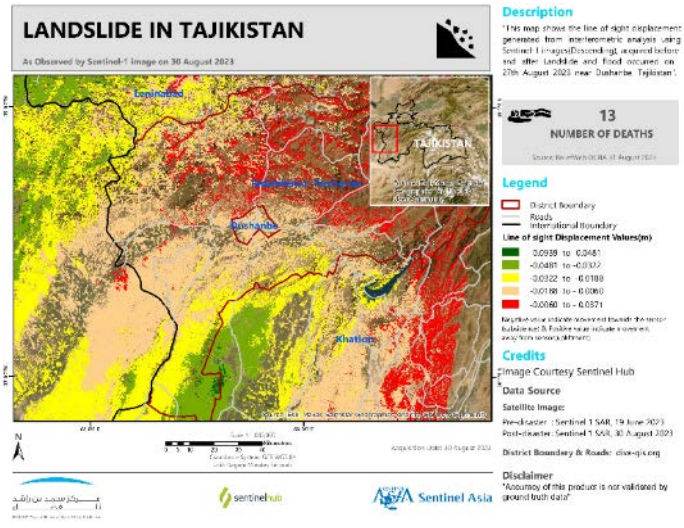
Post-disaster satellite image provided by ISRO



Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image provided by TASA

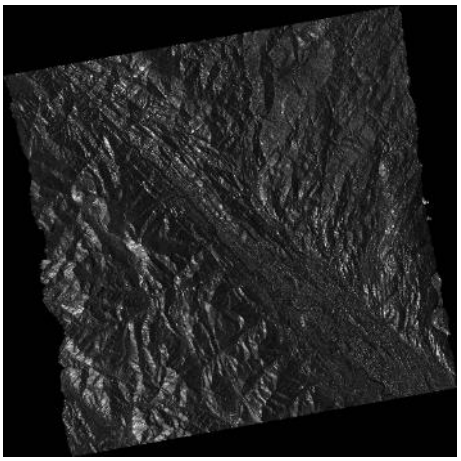


Value-Added Product by MBRSC

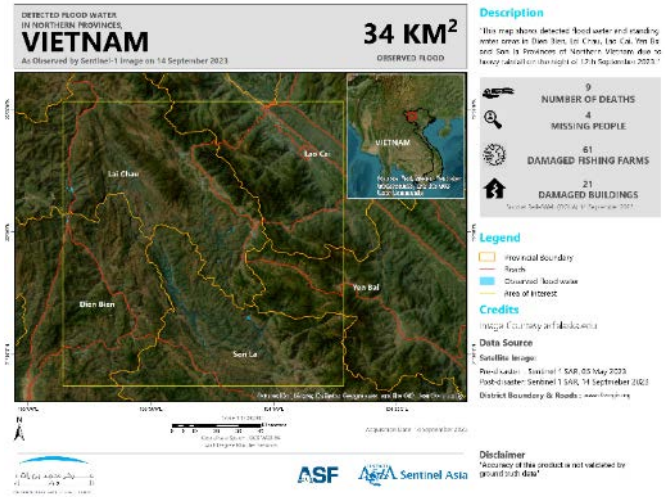
(2) Flood, Landslide, and Storm in Vietnam on 12 September, 2023 (GLIDE Number FF-2023-000172-VNM)

According to Vietnamnet, heavy rain in Lao Cai Province on the night of 12 September caused flash floods and landslides in several areas, killing two people, with four people missing, and washing away many residents' property in Lien Minh Commune.
https://vietnamnet.vn/en/lao-cai-10-people-died-and-went-missing-due-to-floods-2189158.html

Ministry of Natural Resources and Environment (MONRE) of Vietnam made an EOR to Sentinel Asia on 13 September. Among DPNs, JAXA provided data. Among DANs, JAXA and MBRSC provided their VAPs.
Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20230912VN.html



Post-disaster satellite image (ALOS-2) provided by JAXA



Value-Added Product by MBRSC

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2. [News] JPTM 2023 was successfully held

The 8th Joint Project Team Meeting for Sentinel Asia STEP3 (JPTM 2023) was held on 17 and 18 September at the National Research and Innovation Agency of Indonesia (BRIN) in Jakarta, Indonesia, with BRIN and JAXA serving as co-hosts. It was the first meeting following JPTM 2019 held in November of that year in Bangkok. At JPTM 2023, a record 85 participants from 35 organizations gathered.

The meeting consisted of six sessions—overview, new membership, user's session, special session (Indonesia session), discussion session, and data analysis node session—for members to share information about disaster management activities, experiences, and challenges. Also, there were four training workshops allowing participants to learn about satellite data analysis methods for the provision of disaster assessment maps and about developed systems for disaster risk reduction from presenters.

In the special Indonesia session titled "Accelerating Satellite-based Data and Information for Disaster Risk Management in Indonesia," five panelists from various organizations who are engaged in disaster management talked about their activities and experiences. As there are many volcanoes in Indonesia, panelists emphasized the importance of high temporal/spatial/spectral resolution for regular monitoring of volcanoes, and updating geological mapping of them.

To seek ways to further promote Sentinel Asia's activities for each phase of disaster management such as mitigation, preparedness, response, and recovery, five panelists shared their good practices, systems that have been developed for disaster risk reduction, and challenges of disaster management activities under facilitation by the co-chair of the Steering Committee of Sentinel Asia.

Throughout the meeting, several presenters shared their developed systems and tools. Some of them have been developed to share satellite images and disaster-related information more quickly using Web-Geographic Information Systems (Web-GIS). Others have been developed to satisfy the

demand for faster provision of analyzed data, such as eliminating time required to download large amounts of data and reducing analysis time through automation.

More details about JPTM 2023 including presentation materials and a summary of JPTM 2023 are available on the Sentinel Asia website:
https://sentinel-asia.org/meetings/SA3JPTM8/index.html
JPTM 2024 is planned and is to be determined.

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3. [News] Sentinel Asia participated in a session at APRSAF-29

The 29th session of Asia-Pacific Regional Space Agency Forum (APRSAF-29) was held in Jakarta, Indonesia, from 19–22 September, co-organized by the National Research and Innovation Agency (BRIN), the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan, and the Japan Aerospace Exploration Agency (JAXA). At the Satellite Applications for Societal Benefit Working Group (SAWG) session, Sentinel Asia reported its recent activities including the 8th Joint Project Team Meeting that was held back-to-back with the APRSAF-29. Some Sentinel Asia members including Philippine Space Agency (PhilSA), Pakistan Space & Upper Atmosphere Research Commission (SUPARCO) , and Yamaguchi University presented their activities.

Group photo of SAWG 2023

At the plenary session, Mr. Koji SUZUKI, Project Director, ADRC, who also serves as co-chair of the Sentinel Asia Steering Committee, gave a summary report of the Sentinel Asia session.
The detail of the Sentinel Asia session can be found at the link below.
https://sentinel-asia.org/meetings/APRSAF29/APRSAF_29.html

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4.How to Send an Emergency Observation Request

JPT member organizations are entitled to send an Emergency Observation Request (EOR) for

disasters in the Asia-Pacific region. Please refer to https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html.

EOR Order Desk:
Asian Disaster Reduction Center (ADRC)
HP: http://www.adrc.asia/
E-mail: sarequest@adrc.asia
FAX: +81-78-262-5546,
TEL: +81-78-262-5540

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5. Using the Sentinel Asia Operation System, OPTEMIS

Sentinel Asia launched a new operation system, OPTEMIS. Please refer to the website on how to create an account for OPTEMIS.
https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html

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Sentinel Asia Project Office
Satellite Applications and Operations Center (SAOC)
Japan Aerospace Exploration Agency (JAXA)
Ochanomizu Sola City, 4-6 Kandasurugadai, Chiyoda-ku, Tokyo 101-8008 Japan
E-mail: Z-SENTINEL.ASIA@ml.jaxa.jp

** October 2023 News from Sentinel Asia Project Office **

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Topics:

1. [News] Emergency Observation of Disasters
2. How to Send an Emergency Observation Request
3. Using the Sentinel Asia Operation System, OPTEMIS

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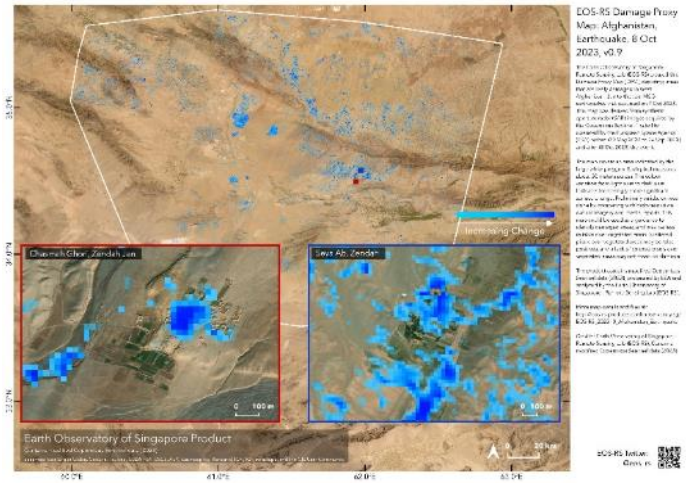
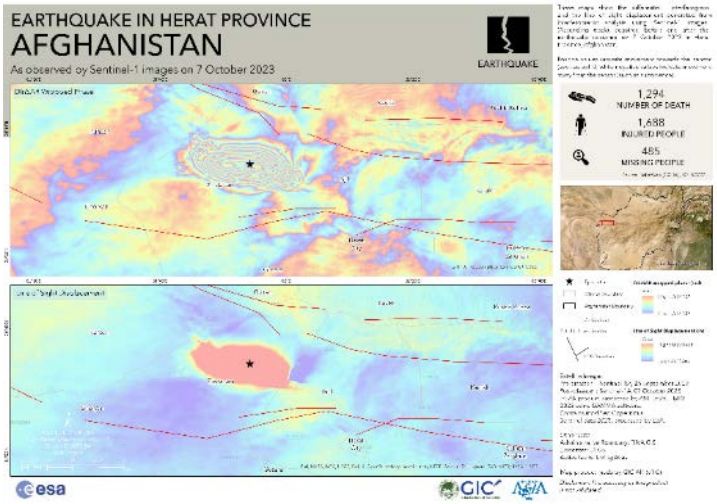
1. [News] Emergency Observation of Disasters (as of 29 October)

(1) Earthquake in Afghanistan on 7 October, 2023 (GLIDE Number EQ-2023-000184-AFG)
According to BBC, hundreds of people were feared dead after a powerful earthquake hit western Afghanistan on 7 October near the Iranian border.
The 6.3-magnitude quake devastated at least 12 villages near the city of Herat.
https://www.bbc.com/news/world-asia-67039463

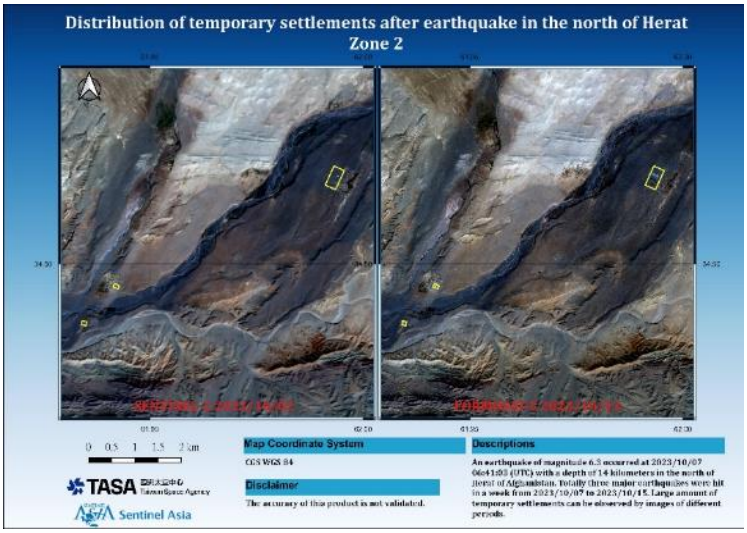
The International Center for Integrated Mountain Development (ICIMOD) made an EOR to Sentinel Asia on 9 October. Among DPNs, JAXA, TASA, and ISRO provided data. Among DANs, EOS, AIT, TASA, and MBRSC provided their VAPs. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20231007AF.html



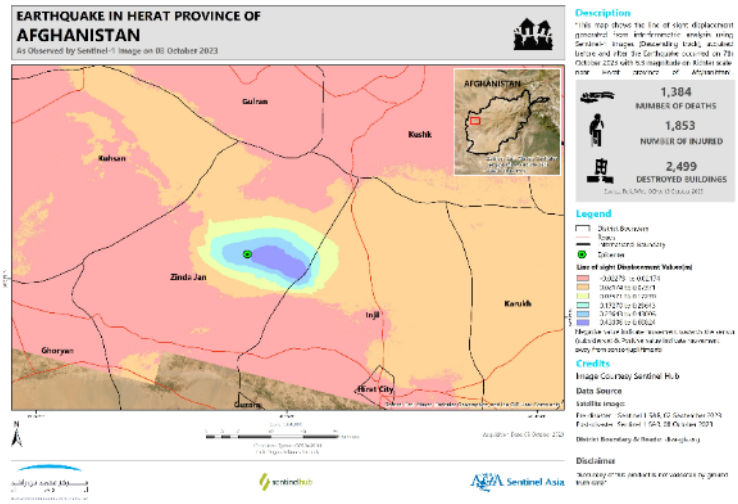
Value-Added Product by EOS



Value-Added Product by AIT



Value-Added Product by TASA



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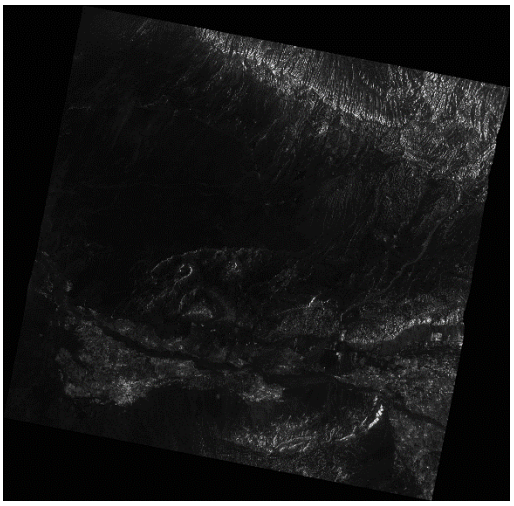
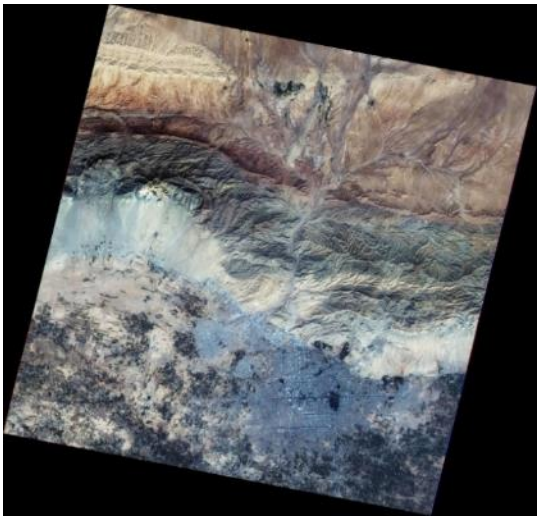


Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (FORMOSAT-5) provided by TASA

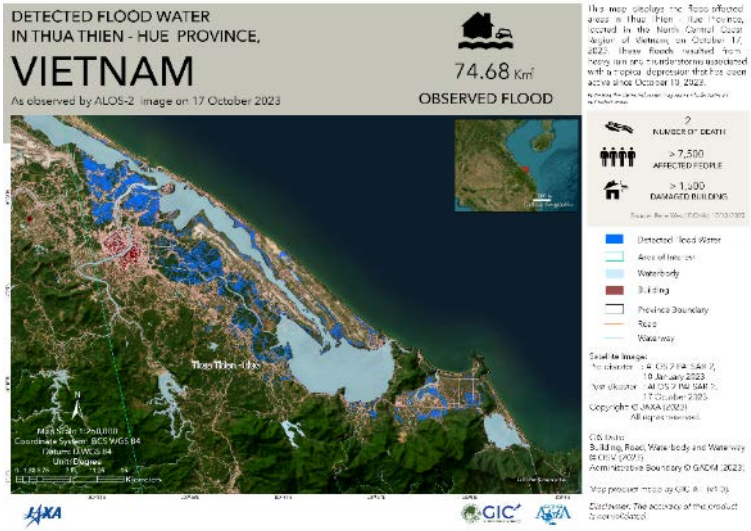
Post-disaster satellite image (CARTOSAT-2E) provided by ISRO

(2) Heavy Rains Flood in Central Vietnam on 13 October, 2023 (GLIDE Number FL-2023-000194-VNM)

ReliefWeb reported since 10 October, heavy rain and floods have affected central-northern Vietnam, resulting in casualties and damage. As of 14 October, in Quang Tri, Thua Thien-Hue, and Quang Nam provinces in central Vietnam, two people died, 7,820 people have been affected, and 3,910 have been internally displaced, 3,763 of whom are from Da Nang City and 147 from Hue City. In addition, 1,564 houses were damaged, 1,432 of which are in Da Nang City.
https://reliefweb.int/report/viet-nam/vietnam-floods-adinet-vietnam-meteorological-and-hydrological-administration-echo-daily-flash-17-october-2023

The Ministry of Natural Resources and Environment of Vietnam (MONRE) made an EOR to Sentinel Asia on 14 October. Among DPNs, JAXA, and ISRO provided data. Among DANs, EOS, JAXA, AIT, and MBRSC provided their VAPs. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20231013VN.html

Value-Added Product by EOS



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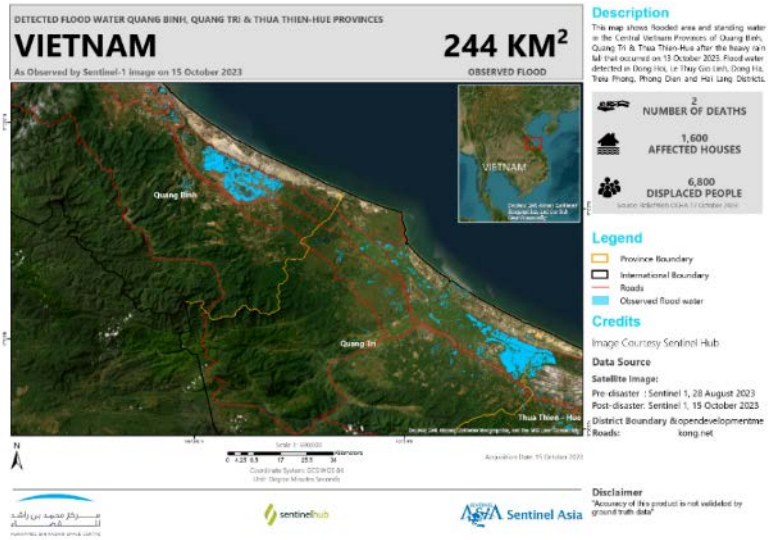
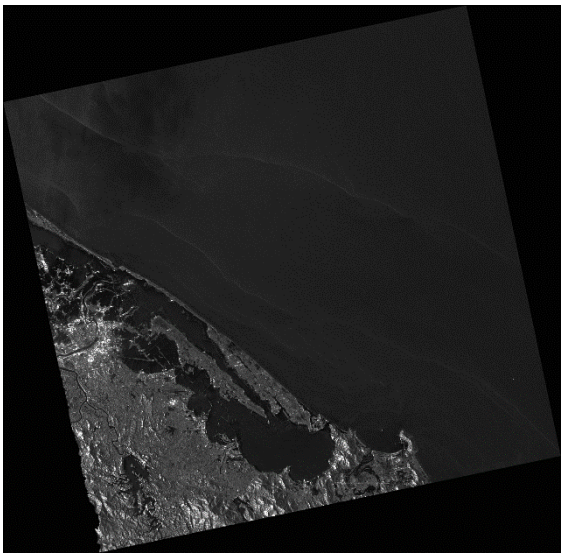
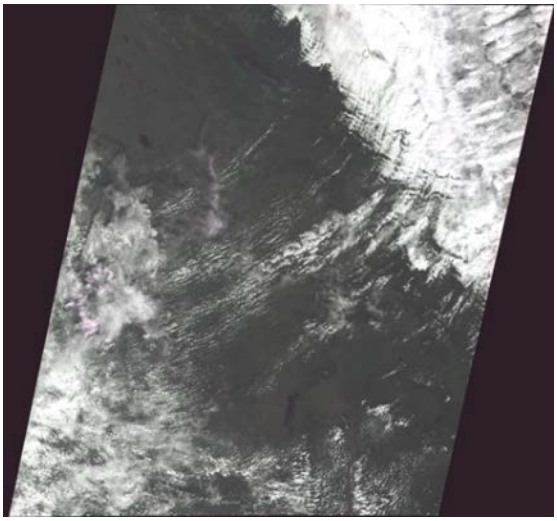


Value-Added Product by MBRSC



Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (Resourcesat-2) provided by ISRO

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2. How to send an Emergency Observation Request

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EOR Order Desk:
Asian Disaster Reduction Center (ADRC)
HP: http://www.adrc.asia/
E-mail: sarequest@adrc.asia
FAX: +81-78-262-5546,
TEL: +81-78-262-5540

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3. Using Sentinel Asia Operation System, OPTEMIS

Sentinel Asia launched a new operation system, OPTEMIS. Please refer to the website on how to create an account for OPTEMIS.
https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html

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Sentinel Asia Project Office
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Japan Aerospace Exploration Agency (JAXA)
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E-mail: Z-SENTINEL.ASIA@ml.jaxa.jp

** November 2023 News from Sentinel Asia Project Office **

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Topics:

1. [News] Emergency Observation of Disasters
2. How to Send an Emergency Observation Request
3. Using the Sentinel Asia Operation System, OPTEMIS

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1. [News] Emergency Observation of Disasters (as of 29 November)

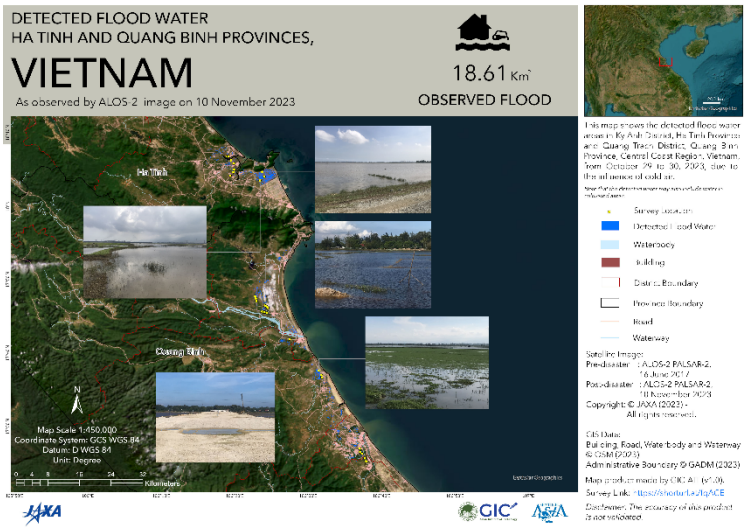
(1) Heavy Rains and Flooding in Ha Tinh Province, Vietnam, on 30 October, 2023 (GLIDE Number FL-2023-000213-VNM)

According to ReliefWeb, since 29 October, heavy rainfall, strong winds, and a tornado event hit several parts of Vietnam. One person died as a result, and another is still missing. Twenty-one people have been displaced and 9,361 affected in Hà Tinh Province due to widespread floods and landslides.

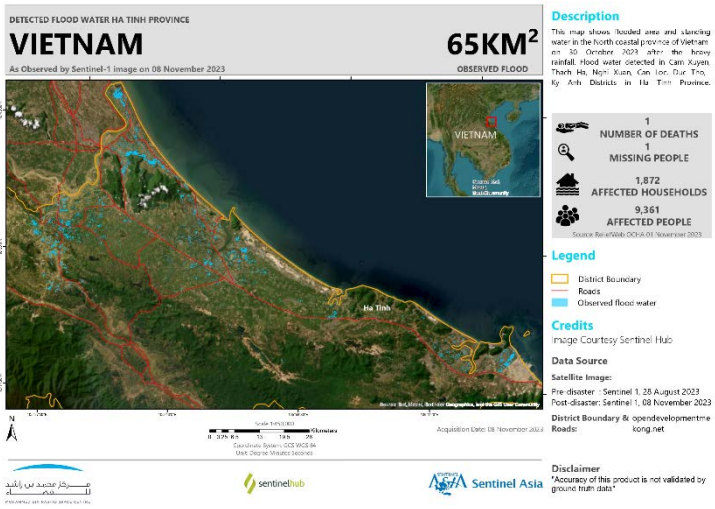
https://reliefweb.int/report/viet-nam/vietnam-severe-weather-floods-and-landslides-noaa-cpc-adinet-echo-daily-flash-03-november-2023

Ministry of Natural Resources and Environment (MONRE) of Vietnam made an EOR to Sentinel Asia on 31 October. Among DPNs, JAXA, TASA, ISRO, MBRSC and GISTDA provided data. Among DANs, AIT, JAXA, and MBRSC provided their VAPs. Information on the latest response by Sentinel Asia is available at the link below.

https://sentinel-asia.org/EO/2023/article20231030VN.html



Value-Added Product by AIT



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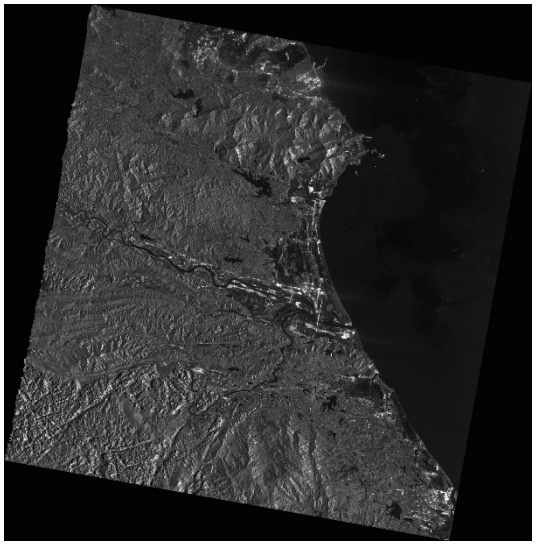
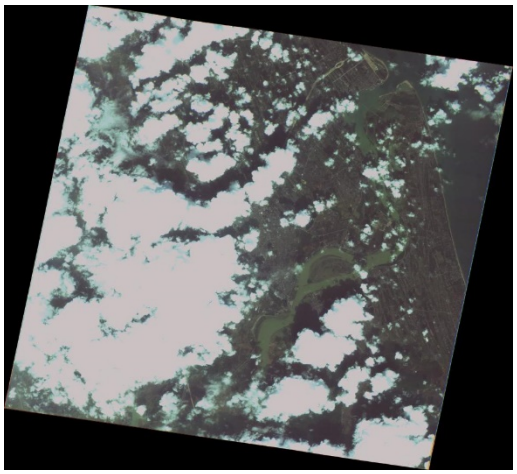
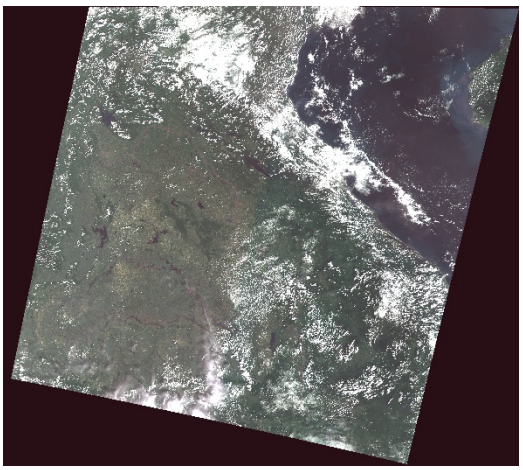


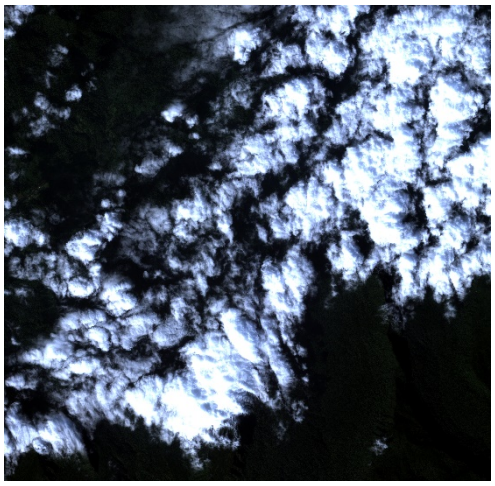
Post-disaster satellite image (ALOS-2) provided by JAXA



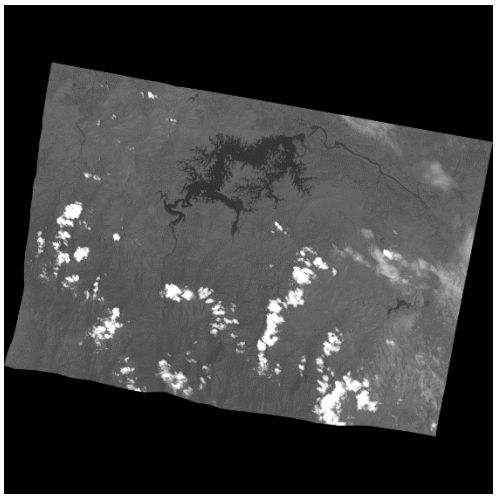
Post-disaster satellite image (FORMOSAT-5) provided by TASA



Post-disaster satellite image (Resourcesat-2) provided by ISRO



Post-disaster satellite image (KhalifaSat KHCS) provided by MBRSC



Post-disaster satellite image (THEOS1) provided by GISTDA

(2) Earthquake in Nepal on 3 November, 2023 (GLIDE Number EQ-2023-000214-NPL)

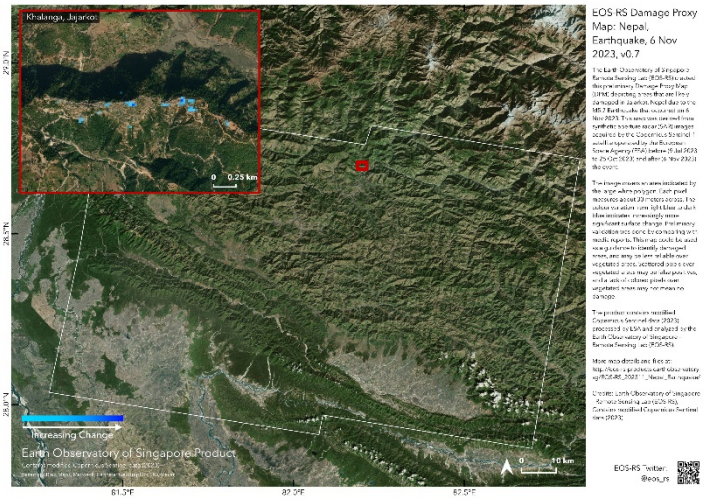
CNN reported on 4 November that a deadly quake struck Nepal. The magnitude of this earthquake was 5.6 according to the United States Geological Survey and it struck about 42 kilometers from Jumla, Nepal, in Karnali Province. The depth was relatively shallow at 18 km, and the tremors could be felt as far away as India's capital, New Delhi.

The quake killed 157 people and injured 170 others, making this quake the deadliest in the country since 2015.

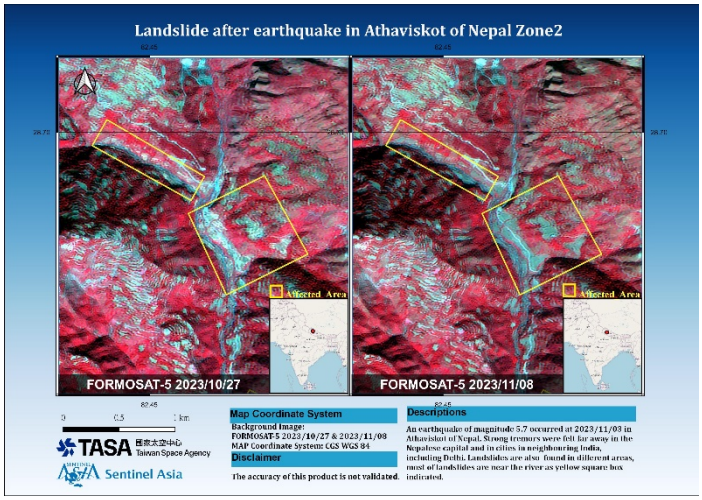
https://edition.cnn.com/2023/11/03/asia/nepal-earthquake-northwest-hnk-intl/index.html?trk=public_post_comment-text

The Disaster and Conflict Management Division, Ministry of Home Affairs of Nepal made an EOR to Sentinel Asia on 5 November. Among DPNs, JAXA, TASA, and ISRO provided data. Among DANs, EOS, TASA, and MBRSC provided their VAPs. Information on the latest response by Sentinel Asia is available at the link below.

https://sentinel-asia.org/EO/2023/article20231103NP.html



Value-Added Product by EOS



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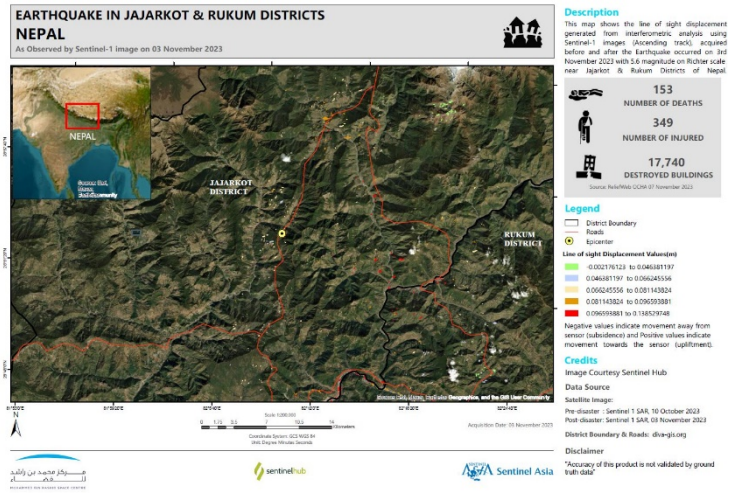
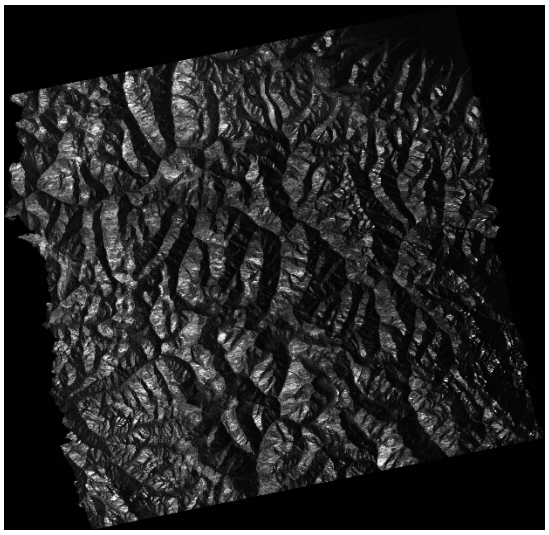
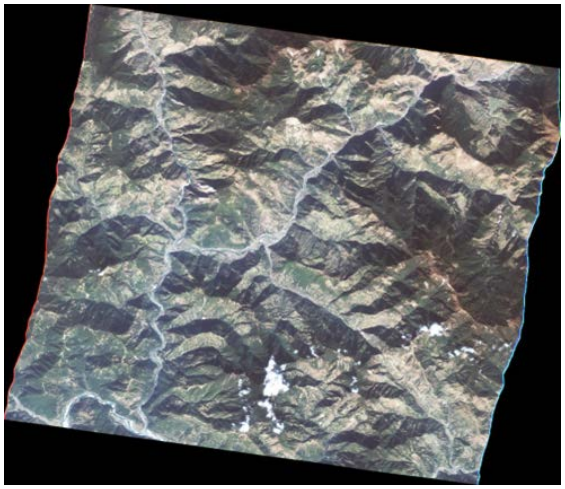


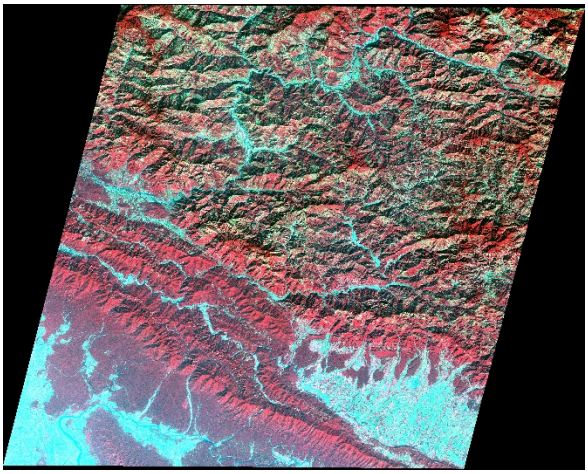
Value-Added Product by MBRSC



Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (FORMOSAT-5) provided by TASA



Post-disaster satellite image (Resourcesat-2) provided by ISRO

(3) Flood in Thua Thien Hue Province, Vietnam, on 15 November, 2023 (GLIDE Number FL-2023-000222-VNM)

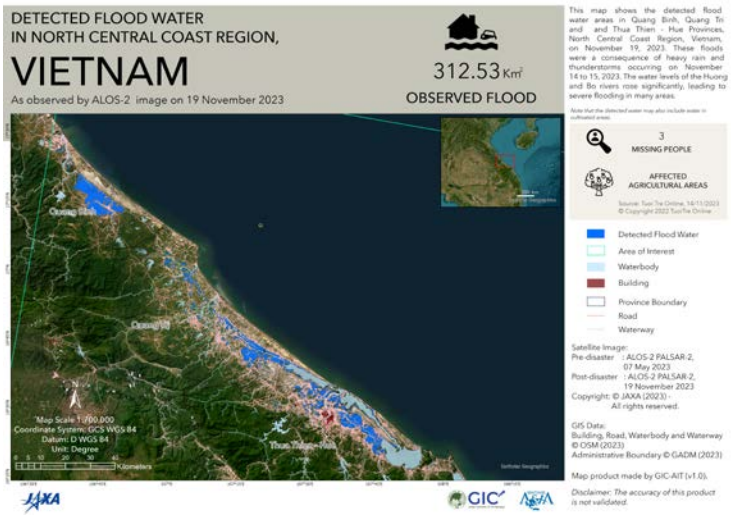
Heavy rainfall, thunderstorms, and strong winds affected several parts of Vietnam on 13-14 November, causing floods and landslides that resulted in casualties and damage.

Three people were missing in Quang Tri Province. At least 525 people have been displaced in shelters and a total of 6,820 people have been affected by floods across Quang Tri, Thua Thien Hue, and Ha Tinh provinces in central Vietnam, ReliefWeb reported.

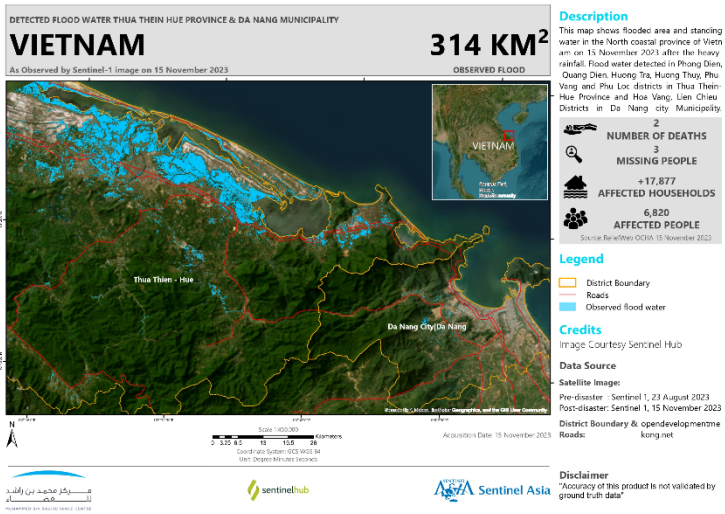
https://reliefweb.int/report/viet-nam/vietnam-severe-weather-floods-and-landslides-adinet-nckmf-echo-daily-flash-15-november-2023

MONRE made an EOR to Sentinel Asia on 15 November. Among DPNs, ISRO, TASA and GISTDA provided data. Among DANs, AIT and MBRSC provided their VAPs. Information on the latest response by Sentinel Asia is available at the link below.

https://sentinel-asia.org/EO/2023/article20231115VN.html



Value-Added Product by AIT



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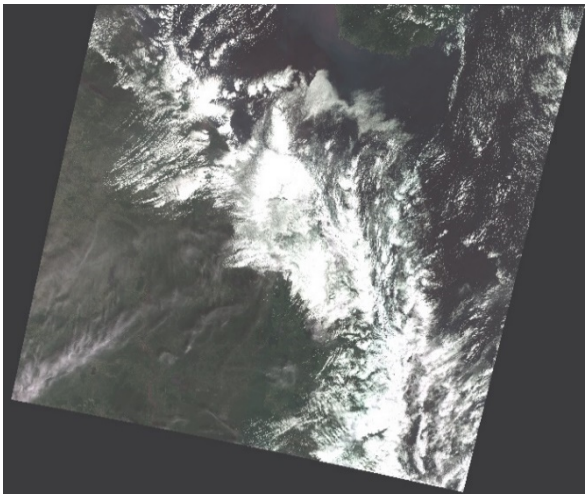
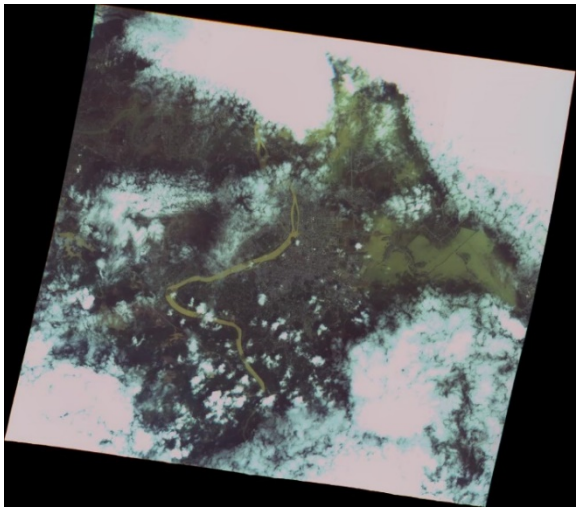
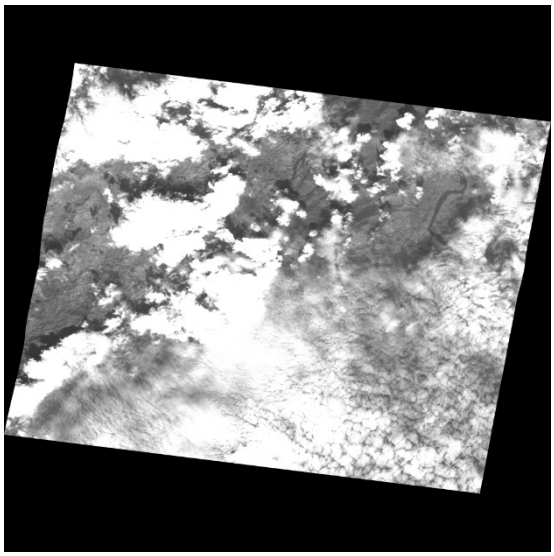


Post-disaster satellite image (Resourcesat-2) provided by ISRO



Post-disaster satellite image (FORMOSAT-5) provided by TASA

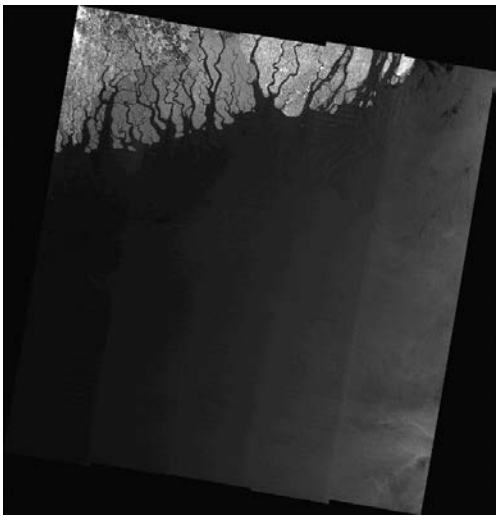


Post-disaster satellite image (THEOS1) provided by GISTDA

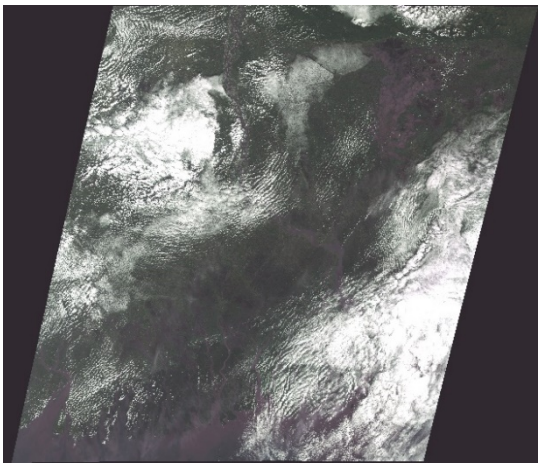
(4) Cyclone Midhili in Bangladesh on 17 November, 2023 (GLIDE Number TC-2023-000230-BGD)

According to La prensa Latina, as of 18 November at least three people died and 39 remained missing as tropical cyclone Midhili made landfall on the Bangladesh coast. Midhili is the second cyclone to hit the Bangladesh coast in less than a month, after Hamoon struck the southeastern Cox's Bazar coast in late October, killing at least five people.
https://www.laprensalatina.com/three-dead-39-missing-in-bangladesh-due-to-cyclone-midhili/

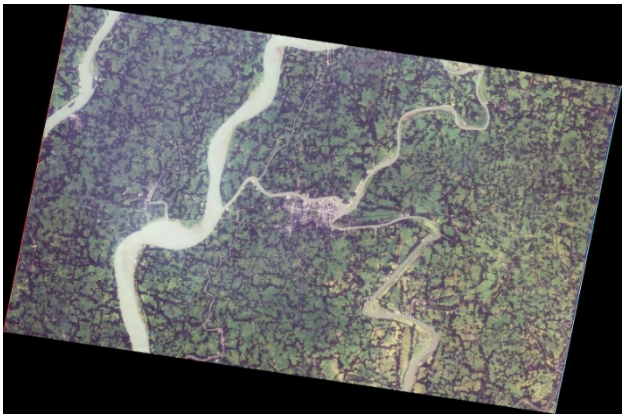
The Bangladesh Water Development Board made an EOR to Sentinel Asia on 17 November. Among DPNs, JAXA, ISRO, and TASA, GISTDA provided data. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20231117BD.html



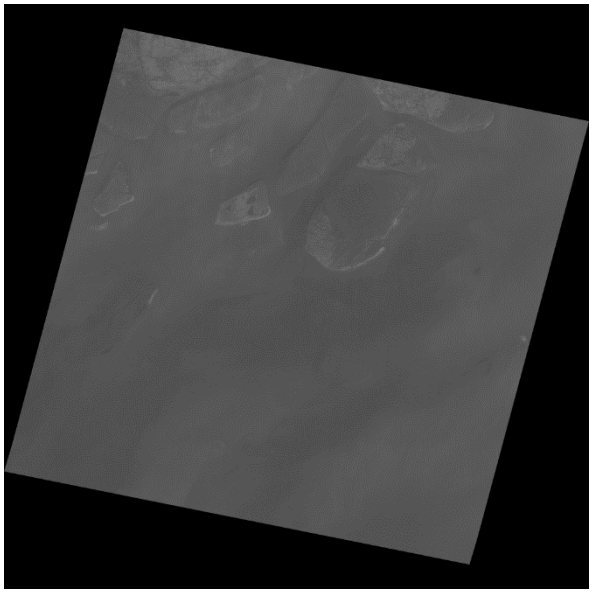
Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (Resourcesat-2) provided by ISRO



Post-disaster satellite image (FORMOSAT-5) provided by TASA

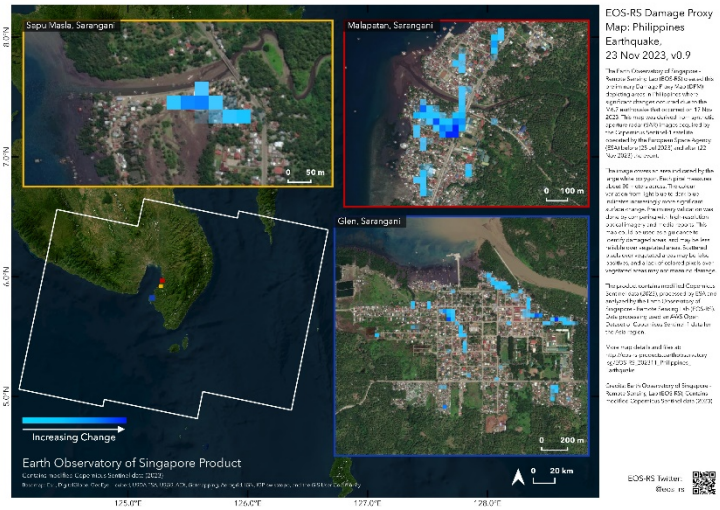


Post-disaster satellite image (THEOS1) provided by GISTDA

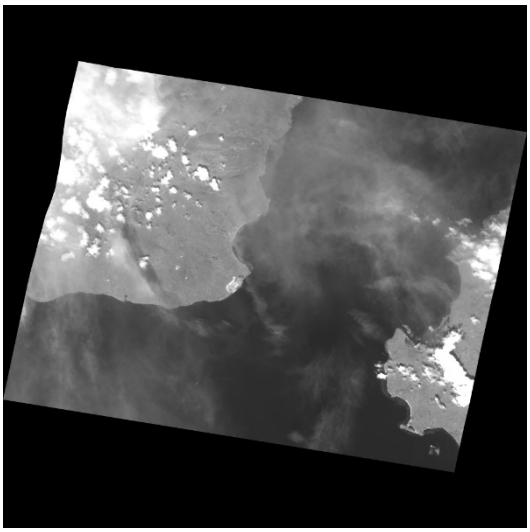
(5) Earthquake in Southern Mindanao, Philippines on 17 November, 2023 (GLIDE Number EQ-2023-000228-PHL)

A magnitude-6.7 earthquake struck the southern Philippines on 17 November, killing six people, injuring dozens, and damaging buildings. The undersea earthquake struck off Mindanao island, the Philippines, at a depth of 60 kilometers, ABC News reported.
https://www.abc.net.au/news/2023-11-18/philippines-earthquake-mindanao-island-magnitude-6-7/103121352

The Philippine Institute of Volcanology and Seismology (PHIVOLCS) made an EOR to Sentinel Asia on 17 November and this EOR was escalated to the International Disasters Charter. PHIVOLCS assumed the role of Project Manager for this Charter activation. Among DPNs, GISTDA and TASA provided data. Among DANs, EOS provided its VAP. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20231117PH.html



Value-Added Product by EOS



Post-disaster satellite image (THEOS1) provided by GISTDA

Post-disaster satellite image (FORMOSAT-5) provided by TASA

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2. How to send an Emergency Observation Request

JPT member organizations are entitled to send an Emergency Observation Request (EOR) for disasters in the Asia-Pacific region. Please refer to https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html.

EOR Order Desk:
Asian Disaster Reduction Center (ADRC)
HP: http://www.adrc.asia/
E-mail: sarequest@adrc.asia
FAX: +81-78-262-5546,
TEL: +81-78-262-5540

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3. Using Sentinel Asia Operation System, OPTEMIS

Sentinel Asia launched a new operation system, OPTEMIS. Please refer to the website on how to create an account for OPTEMIS.
https://sentinel-asia.org/e-learning/Emergency_Observation_Request.html

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Sentinel Asia Project Office
Satellite Applications and Operations Center (SAOC)
Japan Aerospace Exploration Agency (JAXA)
Ochanomizu Sola City, 4-6 Kandasurugadai, Chiyoda-ku, Tokyo 101-8008 Japan
E-mail: Z-SENTINEL.ASIA@ml.jaxa.jp

** December 2023 News from Sentinel Asia Project Office **

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Topics:

1. [News] Emergency Observation of Disasters
2. [News] Announcement of Website Renewal
3. How to Send an Emergency Observation Request
4. Using the Sentinel Asia Operation System, OPTEMIS

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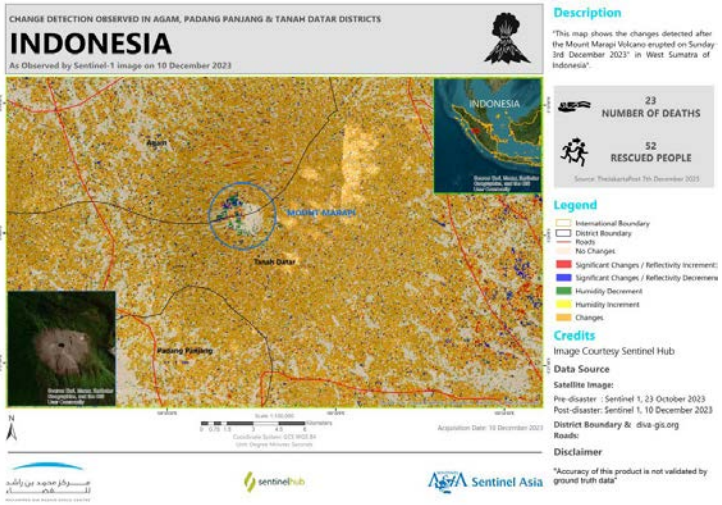
1. [News] Emergency Observation of Disasters (as of 27 December)

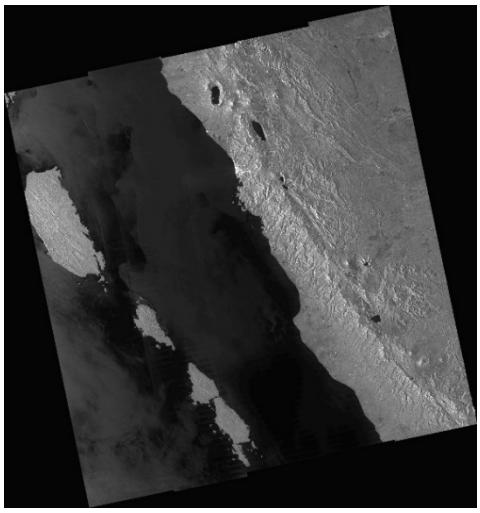
(1) Volcano eruption in Indonesia on 03 December, 2023 (GLIDE Number VO-2023-000247-IDN)

CNN reported that Indonesia's Marapi volcano in West Sumatra Province erupted on 03 December, 2023, spewing volcanic ash as high as 3,000 meters (9,843 ft) into the air, according to country's disaster management agency BNPB. Authorities have barred residents and visitors from carrying out any activities within 3 kilometers of the crater and have set the second-highest alert level for Marapi mountain.
https://edition.cnn.com/2023/12/03/asia/indonesia-marapi-volcano-erupts-intl/index.html#:~:text=Volcanic%20ash%20spews%20from%20Mount%20Marapi%20in%20West,air%2C%20according%20to%20country%E2%80%99s%20disaster%20management%20agency%20BNPB.

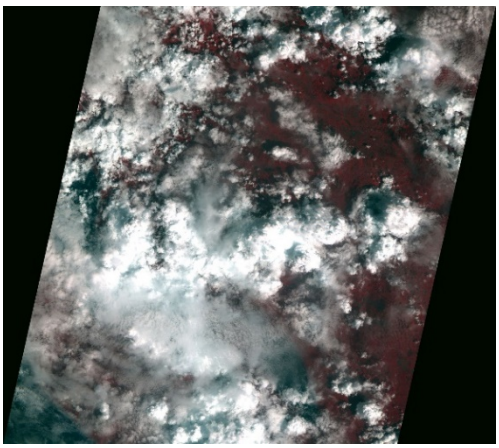
The National Research and Innovation Agency (BRIN) made an EOR to Sentinel Asia on 05 December and this EOR was escalated to the International Disasters Charter. Geoinformatics Center - Asian Institute of Technology (GIC-AIT) assumed the role of Project Manager for this Charter activation. Among DPNs, JAXA, and ISRO provided data. Among DANs, MBRSC provided its VAP. Information on the latest response by Sentinel Asia is available at the link below.
https://sentinel-asia.org/EO/2023/article20231203ID.html



Value-Added Product by MBRSC



Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (Resourcesat-2a) provided by ISRO

(2) Earthquake in China on 18 December, 2023 (GLIDE Number EQ-2023-000252-CHN)

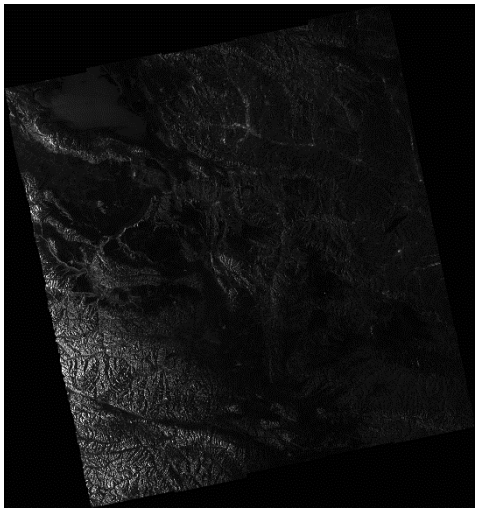
According to ReliefWeb, at 15:59 UTC (23:59 local time) on 18 December, an earthquake with a depth of 10 km and a magnitude of 5.9 occurred in Gansu Province. The epicenter was about 37 km west-northwest of Linxia Chengguan Township and about 100 km southwest of Lanzhou City, the capital and largest city of Gansu Province.

At least 118 people were killed and more than 500 injured. In addition, 20 people are missing as a result of the landslide caused by the quake.

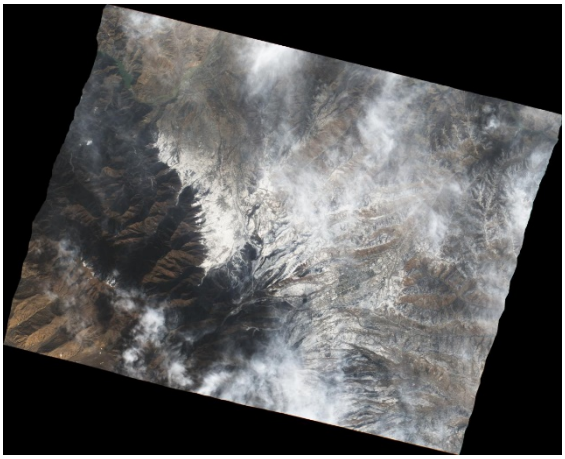
https://reliefweb.int/report/china/china-earthquake-gdacs-usgs-media-echo-daily-flash-19-december-2023

The Institute of Geology, China Earthquake Administration (IGCEA) made an EOR to Sentinel Asia on 19 December. Among DPNs, JAXA, and TASA provided data. Information on the latest response by Sentinel Asia is available at the link below.

https://sentinel-asia.org/EO/2023/article20231218CN.html



Post-disaster satellite image (ALOS-2) provided by JAXA



Post-disaster satellite image (FORMOSAT-5) provided by TASA

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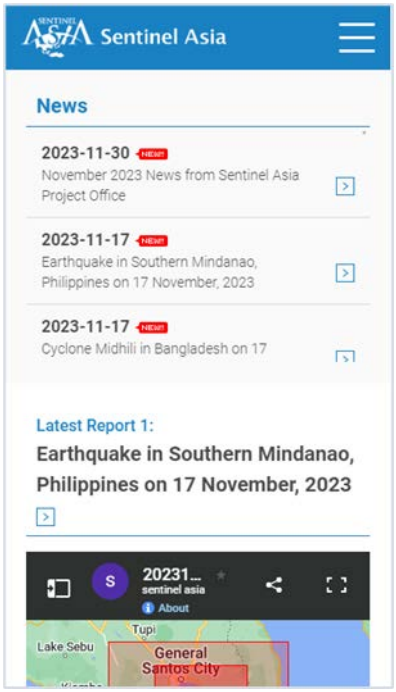
2. [News] Announcement of Website Renewal

The Sentinel Asia Secretariat is pleased to inform you that we have renewed our website to make it more accessible and comfortable to see web content on your smartphone. Due to this renewal, some pages may not be displayed correctly. In that case, please refresh the screen or clear the cache. We appreciate your continuous support.

【Mobile view】



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EOR Order Desk:
Asian Disaster Reduction Center (ADRC)
HP: http://www.adrc.asia/
E-mail: sarequest@adrc.asia
FAX: +81-78-262-5546,
TEL: +81-78-262-5540

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Sentinel Asia Project Office
Satellite Applications and Operations Center (SAOC)
Japan Aerospace Exploration Agency (JAXA)
Ochanomizu Sola City, 4-6 Kandasurugadai, Chiyoda-ku, Tokyo 101-8008 Japan
E-mail: Z-SENTINEL.ASIA@ml.jaxa.jp

List of JPT Members *as of Dec 2023*

114 JPT members (97 organizations from 29 countries/regions and 17 international organizations)

No.	Country / Region	No.	Organization	Data Provider Node (DPN)	Data Analysis Node (DAN)
1	Armenia	1	Ministry of Emergency Situation (MES)		
2	Australia	2	CSIRO Office of Space Science and Applications (COSSA)		
		3	Geoscience Australia (GA)		
		4	Bureau of Meteorology (BOM)		
3	Bangladesh	5	Bangladesh Space Research and remote Sensing Organization (SPARRSO)		
		6	Bangladesh Water Development Board (BWDB)		
4	Bhutan	7	Department of Disaster Management, Ministry of Home and Cultural Affairs		
		8	National Land Commission		
		9	Sherubtse College, Royal University of Bhutan		
		10	Department of Geology and Mines (DGM)		
		11	Ministry of Works and Human Settlement (MoWHS)		
5	Brunei	12	Survey Department (SD), Ministry of Development		✔
6	Cambodia	13	Ministry of Land Management, Urban Planning and Construction		
		14	National Committee for Disaster Management (NCDM)		
7	China	15	National Disaster Reduction Center of China (NDRCC), Ministry of Civil Affair		
		16	College of Disaster and Emergency Management, Beijing Normal University (BNU)		
		17	Institute of Geology, China Earthquake Administration (CEA)		✔
		18	Sichuan University		✔
		19	The Chinese University of Hong Kong (CUHK)		✔
		20	Institute of Mountain Hazards and Environment (IMHE), Chinese Academy of Sciences (CAS)		✔
8	Fiji	21	National Disaster Management Office, FIJI (NDMO)		
9	India	22	Indian Space Research Organization (ISRO)	✔	✔
		23	University of Kashmir		
		24	Gauhati University		
		25	Symbiosis Institute of Geoinformatics (SIG) , Symbiosis International University (SIU)		✔
10	Indonesia	26	National Disaster Management Agency (BNPB)		
		27	National Research and Innovation Agency (BRIN)		✔
		28	Institute of Technology Bandung (ITB)		
		29	Universitas Jenderal Achmad Yani (UNJANI)		
		30	Center for Remote Sensing and Ocean Sciences (CReSOS) Udayana University		✔
		31	Ministry of Marine Affairs and Fisheries		✔

11	Japan	32	Keio University		
		33	Japan Aerospace Exploration Agency (JAXA)	✔	✔
		34	Infrastructure Development Institute (IDI) Japan (IFNet)		
		35	Hokkaido University		
		36	Yamaguchi University		✔
		37	Chubu University		✔
		38	Chiba University		✔
		39	Hiroshima Institute of Technology		✔
		40	Tokyo Institute of Technology (TIT)		✔
		41	International Research Institute of Disaster Science, Tohoku University		✔
		42	University of Tokyo		✔
		43	National Research Institute for Earth Science and Disaster Resilience (NIED)		✔
		44	Japan International Cooperation Agency (JICA)		
		45	RIKEN		✔
		46	Kobe University		✔
12	Kazakhstan	47	National Center of Space Researches and Technologies (NCSRT)		✔
13	Korea	48	Korea Aerospace Research Institute (KARI)	✔	✔
		49	National Disaster Management Research Institute (NDMI)		✔
14	Kyrgyz	50	Central Asian Institute of Applied Geosciences (CAIAG)		✔
15	Lao P.D.R.	51	Ministry of Labor and Social Welfare		
		52	Natural Resources and Environment Institute (NREI), Ministry of Natural Resources and Environment (MONRE)		
16	Malaysia	53	National Security Division, Prime Minister's Department		
		54	Malaysian National Space Agency (ANGKASA)		✔
17	Mongolia	55	Information And Research Institute Of Meteorology, Hydrology And Environment (IRIMHE)		
18	Myanmar	56	Department of Meteorology and Hydrology (DMH)		
		57	Relief and Resettlement Department (RRD)		
		58	Myanmar Earthquake Committee (MEC) , Myanmar Engineering Society (MES)		
19	Nepal	59	Survey Department (SD)		
		60	Department of Water Induced Disaster Management (DWIDM), Ministry of Irrigation		
		61	Land Management Training Centre		
		62	Department of Hydrology and Meteorology (DHM), Ministry of Population & Environment		

20	Pakistan	63	Pakistan Space & Upper Atmosphere Research Commission (SUPARCO)		✔
21	Papua New Guinea	64	National Disaster Centre (NDC)		
22	Philippines	65	Office of Civil Defense (OCD), National Disaster Risk Reduction and Management Council (NDRRMC)		
		66	National Mapping and Resource Information Authority (NAMRIA)		✔
		67	Bureau of Soils and Water Management (BSWM), Department of Agriculture		
		68	Mines and Geoscience Bureau (MGB), Department of Environment and Natural Resources		
		69	Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)		✔
		70	Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD)		
		71	Philippine Institute of Volcanology and Seismology (PHIVOLCS)		✔
		72	Manila Observatory (MO)		✔
		73	NOAH Center of the University of the Philippines Resilience Institute		✔
		74	Philippine Space Agency (PhilSA)	✔	✔
23	Singapore	75	Centre for Remote Imaging, Sensing and Processing (CRISP)	✔	✔
		76	Earth Observatory of Singapore (EOS)		✔
24	Sri Lanka	77	Survey Department of Sri Lanka		✔
		78	Ministry of Disaster Management		✔
25	Taiwan	79	Taiwan Space Agency (TASA)	✔	✔
		80	National Applied Research Laboratories (NARL)		✔
		81	Center for Space and Remote Sensing Research, National Central University (CSRSR, NCU)		✔
26	Thailand	82	Geo-Informatics and Space Technology Development Agency (GISTDA)	✔	✔
		83	Department of Disaster Prevention and Mitigation (DDPM)		
		84	Department of Water Resources (DWR)		
		85	Royal Forest Department (RFD)		
		86	National Park, Wildlife and Plant Conservation Department		
		87	Royal Irrigation Department (RID)		
		88	Land Development Department (LDD)		
		89	Andaman Environment and Natural Disaster Research Center, Prince of Songkla University (ANED, PSU)		✔
27	Turkiye	90	Disaster and Emergency Management Presidency (AFAD)		

28	United Arab Emirates	91	Mohammed Bin Rashid Space Centre (MBRSC)	✔	✔
29	Vietnam	92	Vietnamese Academy of Science and Technology (VAST)	✔	✔
		93	Ministry of Agriculture and Rural Development (MARD)		
		94	Ministry of Natural Resources and Environment (MONRE)		✔
		95	Cartography Department, Ministry of Defense (MOD)		
		96	Ministry of Science and Technology (MOST)		
		97	Vietnam Institute of Geosciences and Mineral Resources (VIGMR)		
30	International Organization	98	Asian Institute of Technology (AIT)		✔
		99	The ASEAN Secretariat		
		100	United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)		
		101	United Nations Office for Outer Space Affairs (UNOOSA)		
		102	International Center for Integrated Mountain Development (ICIMOD)		✔
		103	Coordinating Committee for Geoscience Programmes In East and South East Asia (CCOP)		
		104	International Centre for Water Hazard and Risk Management (ICHARM)		
		105	Asian Disaster Reduction Center (ADRC)		✔
		106	Secretariat of the Pacific Community (SPC/SOPAC)		✔
		107	The World Bank (WB)		
		108	International Water Management Institute (IWMI)		✔
		109	Asian Development Bank (ADB)		✔
		110	ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre)		
		111	World Wide Fund for Nature (WWF) - Pakistan		
		112	Asian Disaster Preparedness Center (ADPC)		✔
		113	Myanmar Information Management Unit (MIMU)		✔
		114	UN World Food Programme (WFP)		✔
				9	54

Emergency Observation Requests (2007 – 2023)

					Number of requested EOR (by year)																	Number of requested EOR (by each disaster)																	
	Request	Activation	Rejection	Percentage of Activation	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total	Flood		Earthquake		Landslide		Typhoon		Forest fire		Volcanic Eruption		Cyclone		Oil Spill		others	
					Num.	Num.	Num.	Num.	Num.	Num.	Num.	Num.	Num.	Num.	Num.	Num.	Num.	Num.	Num.	Num.	Num.		Num.	(%)	Num.	(%)	Num.	(%)	Num.	(%)	Num.	(%)	Num.	(%)	Num.	(%)	Num.	(%)	Num.	(%)
Vietnam	66	60	6	90.9	2	2	4	7	2	1	2		2	3	12	6	4	5	4	2	8	66	50	75.8	0	0.0	2	3.0	10	15.2	1	1.5					2	3.0	1	1.5
Indonesia	65	58	7	89.2	7	2	5	9	2	4	2	4	2	7	3	4	2	4	3	3	2	65	23	35.4	15	23.1	5	7.7			2	3.1	15	23.1					5	7.7
Philippine	62	60	2	96.8	1	1	6	1	4	4	3	1	2	4	4	2	5	4	8	7	5	62	21	33.9	12	19.4			16	25.8	1	1.6	5	8.1	2	3.2	1	1.6	4	6.5
India	40	36	4	90.0			1	4	3	1	2	2	1	2	1	3	3	5	4	6	2	40	25	62.5	1	2.5			3	7.5	1	2.5			7	17.5			3	7.5
Japan	26	26	0	100.0		2		1	4	1	3	3	2	1		2	3	2	2			26	12	46.2	5	19.2	3	11.5	2	7.7			4	15.4						
Nepal	24	23	1	95.8	1	2	2	1	2	1	1	1	4	2	2		2		1	1	1	24	14	58.3	3	12.5	3	12.5	1	4.2	1	4.2							2	8.3
Thailand	18	16	2	88.9	2	3		1	2	1	1				1	2	1		1	3		18	15	83.3	1	5.6											2	11.1		
Sri Lanka	16	15	1	93.8			1	2	2	1		1	1	1	1	2		1	3			16	12	75.0			1	6.3							2	12.5	1	6.3		
Taiwan	16	16	0	100.0				2	1				2	5	3	2				1		16	4	25.0	3	18.8	1	6.3	6	37.5							1	6.3	1	6.3
Myanmar	16	14	2	87.5		1			2		1		2	4		3	1		1		1	16	9	56.3	4	25.0	1	6.3	1	6.3					1	6.3				
Pakistan	13	9	4	69.2	1	2		3	1		1		2	2						1		13	6	46.2	2	15.4	4	30.8											1	7.7
China	13	11	2	84.6		2		1	1	2	1	1			2		1			1	1	13	2	15.4	7	53.8	3	23.1			1	7.7								
Bangladesh	13	13	0	100.0	3			1					1	2	2			1		1	2	13	6	46.2			2	15.4	1	7.7					4	30.8				
Tajikistan	10	10	0	100.0	1			2	1	1		1	1						2		1	10	4	40.0	2	20.0	3	30.0											1	10.0
Kyrgyzstan	8	5	3	62.5				1	3	1							1		2			8	3	37.5	1	12.5	2	25.0											2	25.0
Bhutan	8	6	2	75.0				2		1			2	1			1				1	8	5	62.5							3	37.5								
Kazakhstan	7	5	2	71.4				1	2	3											1	7	3	42.9							3	42.9							1	14.3
Mongolia	6	0	6	0.0	1		2	2	1													6	2	33.3							3	50.0							1	16.7
Australia	5	5	0	100.0		1	3		1													5	3	60.0					1	20.0	1	20.0								
Brunei	5	3	2	60.0					3	1		1										5	4	80.0													1	20.0		
Turkey	5	5	0	100.0													1	2	1		1	5	1	20.0	3	60.0	1	20.0												
Cambodia	4	4	0	100.0				2	1									1				4	4	100.0																
Lao PDR	4	4	0	100.0		1								1		1	1					4	3	75.0															1	25.0
Afghanistan	3	2	1	66.7								1								1	1	3	1	33.3	2	66.7														
Solomon	3	3	0	100.0	1						1	1										3	1	33.3	1	33.3													1	33.3
Malaysia	3	3	0	100.0							2	1										3	2	66.7							1	33.3								
Korea	3	3	0	100.0											1	1	1					3			2	66.7					1	33.3								
Fiji	3	3	0	100.0						1				1			1					3	1	33.3					1	33.3					1	33.3				
Tonga	3	3	0	100.0								1				1				1		3											1	33.3	2	66.7				
PNG	2	2	0	100.0						1						1						2					1	50.0					1	50.0						
Vanuatu	2	2	0	100.0									1					1				2													2	100.0				
New Zealand	1	1	0	100.0					1													1			1	100.0														
Iran	1	1	0	100.0														1				1	1	100.0																
Lebanon	1	1	0	100.0														1				1																	1	100.0
United Arab Emirates	1	1	0	100.0												1						1													1	100.0				
Timor-Leste	1	1	0	100.0															1			1	1	100.0																0.0
Uzbekistan	1	1	0	100.0															1			1	1	100.0																0.0
Total	478	431	47	-	20	19	24	43	39	25	20	19	25	36	32	31	28	28	34	28	27	478	239	-	65	-	32	-	42	-	19	-	26	-	22	-	8	-	25	-

JPT member report “Sentinel Asia Activity in 2023”

1	ADRC	Conference and meeting in 2023
2	AHA Center	Emergency Response Operation for Tropical Cyclone MOCHA
3	BRIN	Summary of the Analysis of the Major Disaster Events in Indonesia in 2023
4	BWDB	1st Coordination Meeting among the Sentinel Asia Members
5	CAIAG	Requested 2 EORs (2023)
6	Chiba University	EMERGENCY RESPONSE OF THE 2023 TURKEY EARTHQUAKE
7	DHM	Participation in the workshop/ meeting
8	DMC	Participating for PM training (Virtual Mode)
9	EOS	Rapid Response Efforts to Sentinel Asia EORs
10	GIC/AIT	GIC-AIT activities carried out as Principal Data Analysis Node (P-DAN) for Sentinel Asia
11	GISTDA	GISTDA continues to support Disaster Management
12	ICIMOD	EOR: Earthquake in Afghanistan
13	ISRO	Support to Sentinel Asia
14	JAXA	Automatic analysis of flood extent using ALOS-2 data
15	MBRSC	Date support for EOR (2023)
16	MO	Tropical Cyclone Mawar (Betty) 2023 Activation through Sentinel Asia
17	MONRE	Summary of 2023 results through SA system activation
18	RIKEN	Building change detection
19	TASA	✓ Satellite Imagery Support to Sentinel Asia ✓ Sentinel Asia JPT-3 Cloud Services ✓ Satellite Imagery Support to Sentinel Asia ✓ APRSAF-29 Side Event: Space-Based Solutions: Leveraging Taiwan's Satellite Data for Effective Risk Management and Economic Loss Reduction ✓ Triton meteorological satellite launch
20	Yamaguchi University	Contribution VAPs for EOR activities Capacity Building

Organization	**Asian Disaster Reduction Center (ADRC)**
Title	**Participation for the meeting and conference**
Type of Activity	**Conference, Meeting**
Date	**2023**

The 8th Joint Project Team Meeting and 29th Session of the Asia-Pacific Regional Space Agency Forum

The 8th Joint Project Team Meeting (JPTM) was held from 17 to 18 September in Jakarta, Indonesia. And the 29th Session of the Asia-Pacific Regional Space Agency Forum (APRSAF-29) was held from 19 to 22 September 2023 as back-to-back of JPTM. APRSAF was co-organized by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), the Japan Aerospace Exploration Agency (JAXA), and the National Research and Innovation Agency (BRIN). ADRC participated in both conferences and reported on Sentinel Asia's activities. As the first presentation on the JPTM, ADRC participated in a panel discussion which was held on the 17 September. ADRC reported on the status of Sentinel Asia's EOR and end-user feedback on the various provided data in case of disaster. Next presentation was held in the session which was held on 18 September. This presentation introduced the Standard Operation Procedure (SOP) which is a manual for EOR that are being developed in member countries and region of Sentinel Asia. ADRC will continue to actively participate in activities related to the utilization of space technology in the field of disaster prevention.

Presentation

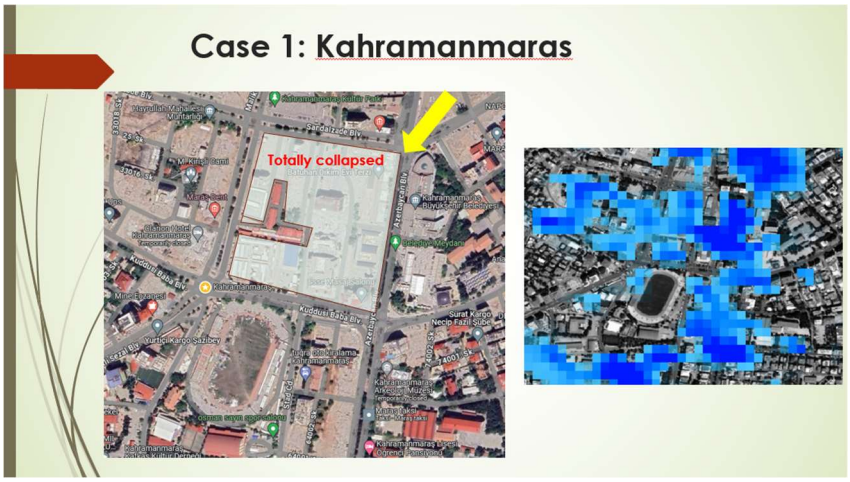
22nd Steering Committee Meeting of Sentinel Asia

ADRC attended the meeting of the 22nd Sentinel Asia Steering Committee held at TASA (Taiwan Space Agency) in Taiwan, on 30-31 January 2024. The meeting was attended by JAXA, which serves as the secretariat of the

Sentinel Asia Joint Project Team, other space agencies in Asia, and image analysis organizations. ADRC participated to facilitate between these organizations.

At the meeting, JAXA started out by explaining the purpose of the meeting and the current status of Sentinel Asia operations and issues. In addition, the space agencies reported on their current status of operations. The Asian Institute of Technology (AIT) and Yamaguchi University had a presentation on the topics related to image analysis. ADRC reported on the status of cooperation with the UNDRR and other organizations, as well as on the activities of the Sentinel Asia workshops held in Türkiye and Nepal in 2023. Finally, a discussion was held on the revision of the Sentinel Asia Strategic Plan based on the presentations by each organization.

Group Photo



Report of an accuracy of “Analyzed map and affected area”

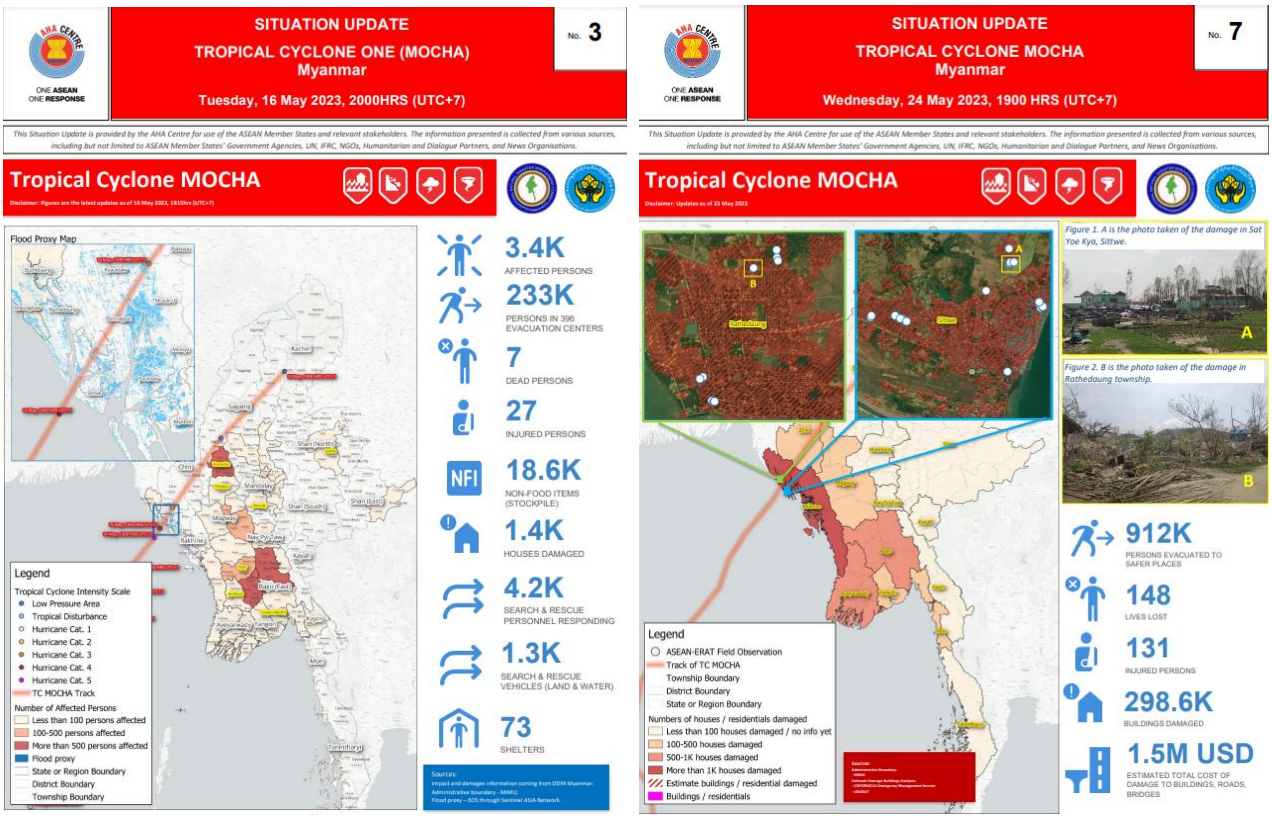
Organization	**The ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre)**
Title	**Emergency Response Operation for Tropical Cyclone MOCHA**
Type of Activity	**Utilisation of satellite products from Sentinel ASIA for disaster emergency situations**
Date	**12/05/2023 – 30/05/2023**

The ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre) is an inter-governmental organisation dedicated to facilitating cooperation and coordination among ASEAN Member States, the United Nations, and international organisations for disaster management and emergency response in the ASEAN region. In the event of a significant disaster in one or more ASEAN Member States, and upon request or acceptance of assistance from the affected member state(s), the AHA Centre may conduct emergency response operations in accordance with the Standard Operating Procedure for Regional Standby Arrangements and Coordination of Joint Disaster Relief and Emergency Response Operations (SASOP).

In early May 2023, an area of convection developed over Bay of Bengal and further intensified into a significant tropical cyclone and was named Tropical Cyclone MOCHA. Tropical Cyclone MOCHA, equivalent to a Category 4 hurricane on the Saffir-Simpson hurricane scale, made its landfall on the afternoon of 14 May 2023 over Rakhine Coast in Myanmar with maximum sustained winds of 250 km/h and wind gusts of up to 305 km/h. Given the significant forecasted impacts, the Department of Disaster Management (DDM) Myanmar requested the AHA Centre's support prior to its landfall over Myanmar. Tropical Cyclone MOCHA caused widespread damage along its path throughout Myanmar.

The AHA Centre's In-Country Liaison Team, in close coordination with DDM Myanmar, communicated with the Sentinel Asia secretariat for Emergency Observation Requests (EOR). As DDM Myanmar also requested the deployment of the ASEAN-Emergency Response and Assessment Team (ASEAN-ERAT) to conduct rapid assessments in the affected areas, the planning of assessment areas was necessary. One of the sources utilised by the AHA Centre, DDM Myanmar, and ASEAN-ERAT was satellite imagery analysis, including data from the Sentinel Asia Network. This dataset included flood proxies and damage extent, which were overlaid with other datasets to determine the most suitable areas for assessment. ASEAN-ERAT was deployed to four townships in Rakhine: Sittwe, Rathedaung, Ponnagyun, and Kyauktaw. During these assessments, ASEAN-ERAT validated damage information identified from satellite imagery analysis.

Detailed information about the emergency response operations for Tropical Cyclone MOCHA in Myanmar, including assessment activities carried out by ASEAN-ERAT, can be found in the AHA Centre Situation Updates for Tropical Cyclone MOCHA 2023.



Situation Update #3 (left) and #7 (right) of Tropical Cyclone MOCHA showing the result of satellite imagery analysis overlayed with other dataset.

Organization	**National Research and Innovation Agency (BRIN), Indonesia**
Title	**Summary of the Analysis of the Major Disaster Events in Indonesia in 2023**
Type of Activity	**EOR**
Date	**January– December 2023**

In 2023, the Indonesia Regional Support Office (RSO) of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER), coordinated by the Secretariat of the Indonesian Space Agency (INASA) under BRIN, responded to two major disaster events. The first occurred on March 6th when a landslide struck Serasan Island, Natuna. The Regional Disaster Management Agency (BPBD) attributed the landslide to heavy rainfall and unstable terrain. Initial reports indicated that around 50 people were missing, with 10 confirmed casualties. On the same day, BRIN activated an Emergency Observation Request (EOR) to Sentinel Asia, which was later escalated to the International Disaster Charter. BRIN provided detailed information on the affected areas, including estimates of damaged buildings and disrupted infrastructure (Figure 1). Using very high-resolution imagery, BRIN also identified ten additional landslide sites, many of which were in remote, hard-to-reach locations, making the imagery critical for assessment (Figure 2).

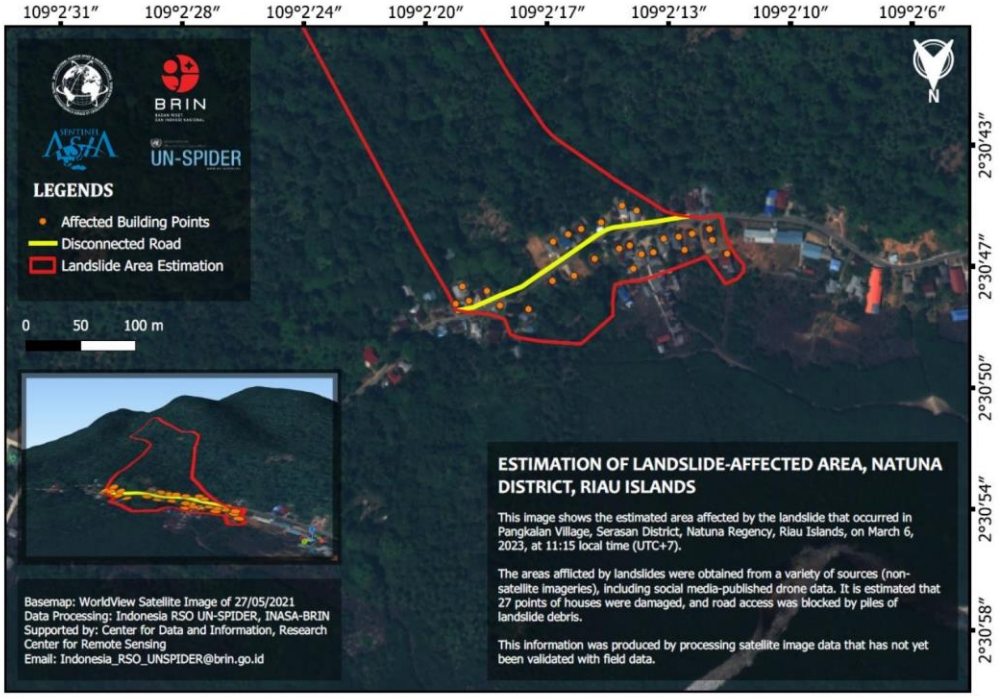


Figure 1. The landslide-affected area was estimated on March 6, 2023, in Natuna District, Riau Islands.

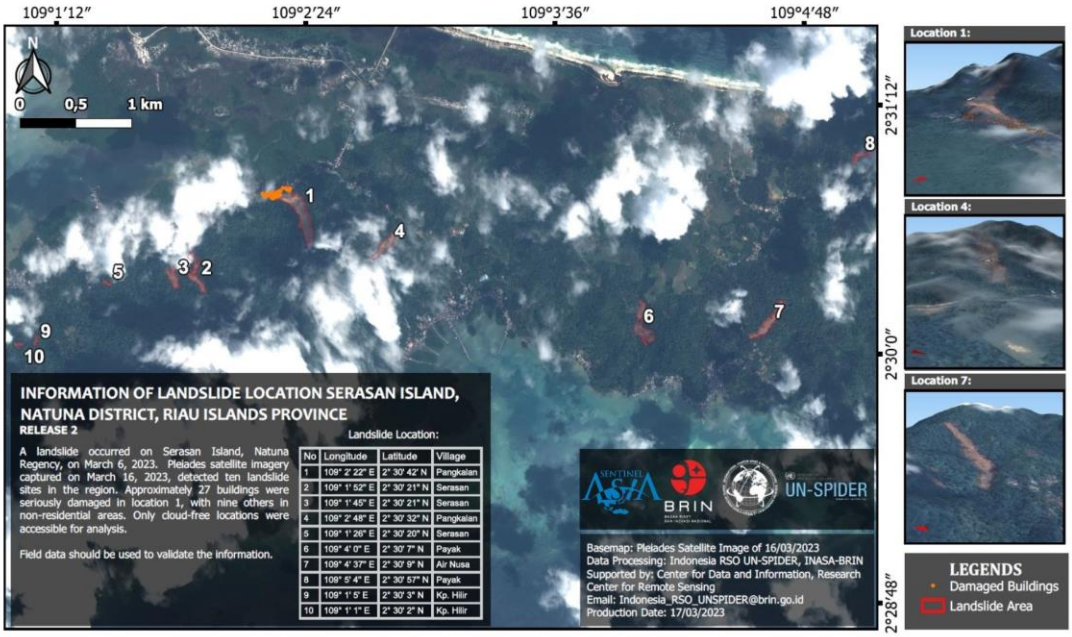


Figure 2. Assessment of the area affected by the landslide on Serasan Island, Natuna District, Riau Islands, Indonesia. BRIN used very high-resolution imagery to identify 10 additional landslide sites in remote areas.

The second event was the eruption of Mount Marapi, one of Indonesia's active volcanoes, on December 3, 2023. The eruption in Sumatra sent ash 3 km into the sky, covering nearby areas and reducing visibility, which hampered search and rescue operations. Of the 75 hikers present during the eruption, 22 were confirmed dead, while many others were evacuated. Additional eruptions on December 5 further delayed rescue efforts due to safety concerns. Authorities raised the alert level and established a 3 km exclusion zone around the crater. In response, BRIN activated an Emergency Observation Request (EOR) to Sentinel Asia, later escalating it to the International Disaster Charter. BRIN obtained clear satellite imagery to track the volcanic ash plume and assess the regions affected.

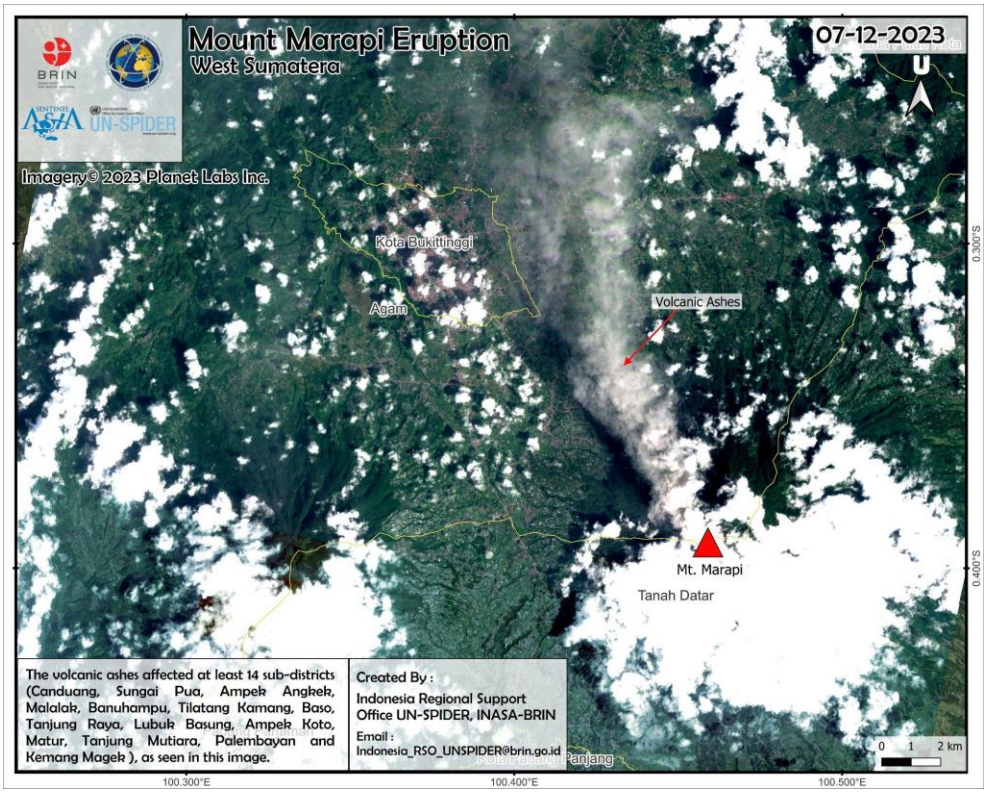


Figure 3. PlaneScope image detected volcanic ashes during the Mount Marapi eruption in 2023

First Coordination Meeting Among Sentinel Asia Members

Organization	**Bangladesh Water Development Board (BWDB)**
Title	**1st Coordination Meeting among the Sentinel Asia Members**
Type of Activity	**Meeting**
Date	**19-07-2023**

The first coordination meeting among Sentinel Asia members took place at JICA Bangladesh office on July 19th, 2023. Representatives from JICA, Bangladesh Water Development Board (BWDB), Department of Disaster Management (DDM), and Space Research and Remote Sensing Organization (SPARSO) were in attendance.

The Participants of the meeting were Mr. Netai Dey Sarker (Director, DDM), Mr. A M Mustofa Sorwar (Superintending Engineer, BWDB), Mr. Mohammad Imrul Islam (Senior Research Officer, SPARRSO, Mr. Ito Daisuke (Representative, JICA), Mr. Morimasa Tsuda (JICA Advisor). Masudur Rashied (Program Officer)

Figure 1: 1st Coordination Meeting among the Sentinel Asia Members

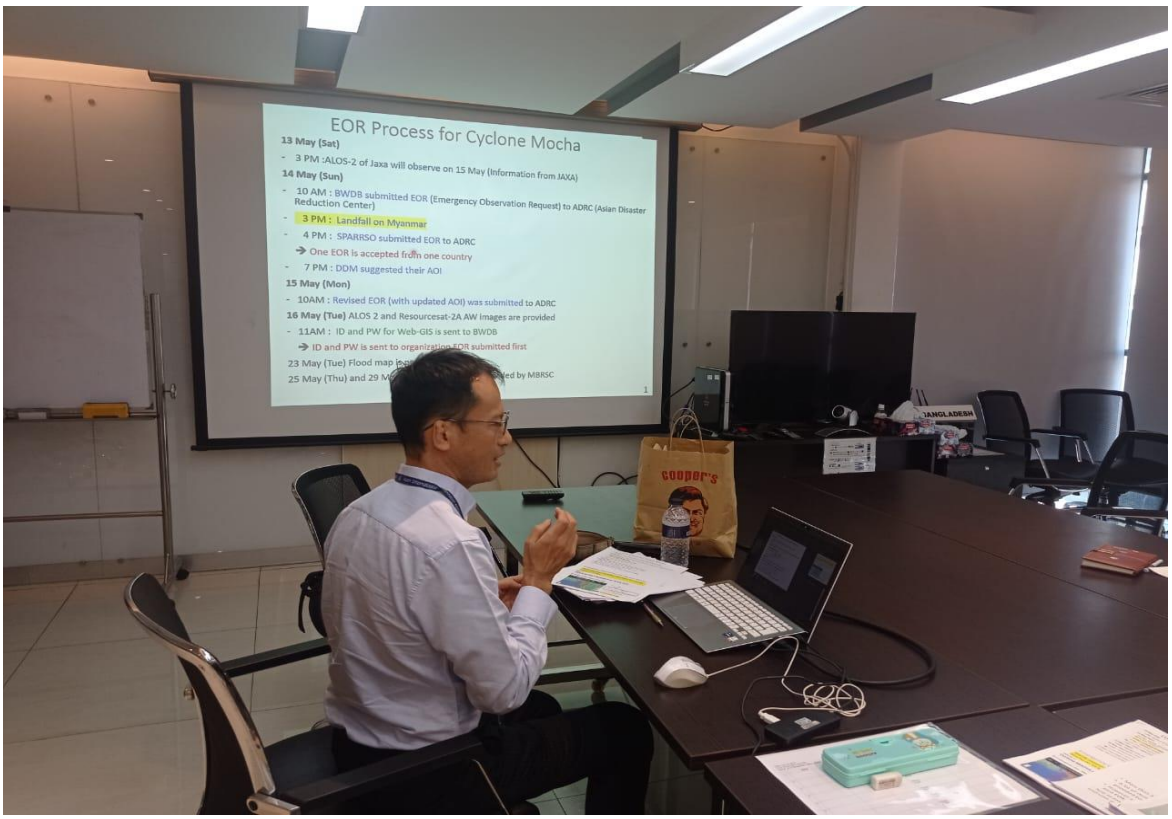


Figure 2: Mr. Morimasa Tsuda (JICA Advisor) is presenting on 1st Coordination Meeting among the Sentinel Asia Members

Attending JPTM2023 for Sentinel Asia STEP-3

As a new member of Sentinel Asia, representatives from Bangladesh Water Development Board (BWDB) attended the 8th Joint Project Team Meeting for Sentinel Asia STEP-3 (JPTM2023) held at BRIN Headquarters in Jakarta, Indonesia on September 17th, 2023.

In the session of Sentinel Asia's new membership presentation, Mr. A M Mustofa Sorwar, Superintending Engineer of Central GIS Directorate, BWDB, presented comprehensive overview of BWDB titled "Bangladesh Water Development Board: New Member of Sentinel Asia."

In his presentation, Mr. Sorwar introduced the organization as well as its history, mission, vision, organogram and activities. He also highlighted the proactive measures taken by BWDB to address water-related disasters in Bangladesh, particularly in flood, riverbank protection and catchment areas of Ganges-Brahmaputra-Meghna (GBM) Basin.
Additionally, he outlined the major structural and non-structural interventions implemented by BWDB showcasing the organization's extensive efforts in disaster management and water resources development in Bangladesh.

Organization	**Bangladesh Water Development Board (BWDB)**
Title	**8th Joint Project Team Meeting for Sentinel Asia STEP-3 (JPTM2023)**
Type of Activity	**Conference, Workshop, Meeting** (e.g., Conference, Workshop, Meeting, Training, EOR, Providing satellite data or VAP)
Date	**17-09-2023 to 18-09-2023**

He then pointed out the functions of Central GIS Directorate, which serves as the focal point of BWDB in facilitating communication and collaboration with the Sentinel Asia.

Figure 3:Mr. Mustofa is presenting comprehensive overview of BWDB titled "Bangladesh Water Development Board: New Member of Sentinel Asia."

Figure 4: Group Photo of 8th JPTM of Sentinel Asia STEP-3

Second Coordination Meeting Among Sentinel Asia Members

On October 18th, Sentinel Asia members held their second coordination meeting at JICA Bangladesh office, attended by representatives from the Bangladesh Water Development Board (BWDB), the Department of Disaster Management (DDM), and the Space Research and Remote Sensing Organization (SPARRSO).
The Participants of the meeting were Mr. Md. Nur Hossain Sharifee (Chief Scientific Officer, SPARRSO), Mr. A M Mustofa Sorwar (Superintendent Engineer, BWDB), Mr. Mohammad Imrul Islam (Senior Research Officer, SPARRSO), Mr. Mohammad Hafizur Rahman (Assistant Director GIS, DDM), Mr. Morimasa Tsuda (JICA Advisor), Masudur Rashied (Program Officer).

The primary agenda of this meeting was to present the draft Standard Operating Procedure (SOP) and gather feedback from the participating organizations. The JICA Advisor distributed the draft SOP and provided a brief overview.

Organization	**Bangladesh Water Development Board (BWDB)**
Title	**2nd Coordination Meeting among the Sentinel Asia Members**
Type of Activity	**Meeting**
Date	**18-10-2023**

Emergency Observation Request (EOR) for Cyclone Midhili

An Emergency Observation Request (EOR) was submitted by Central GIS Directorate during the occurrence of Cyclone Midhili in November, 2023 through the Sentinel Asia platform using the Optemis system (https://optemis.sentinel-asia.org) for assessing the impact of the cyclone.

Organization	**Bangladesh Water Development Board (BWDB)**
Title	**Emergency Observation Request (EOR) for Cyclone Midhili**
Type of Activity	**Emergency Observation Request (EOR)**
Date	**17-11-2023**

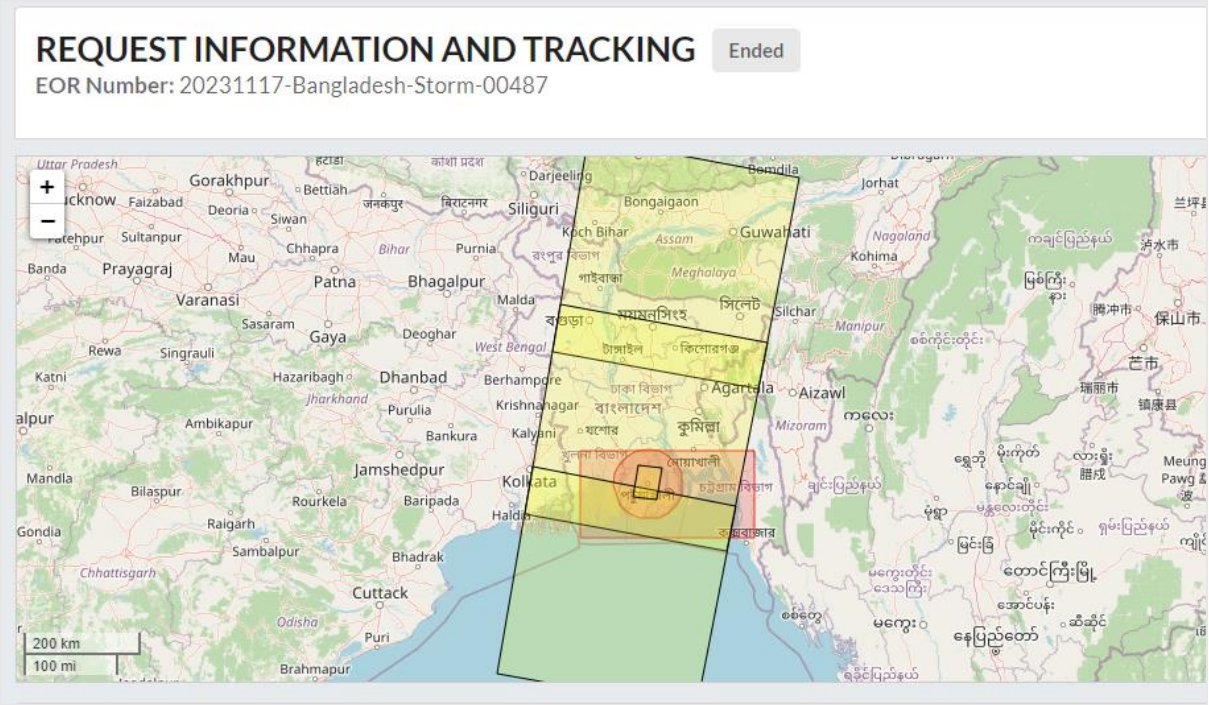
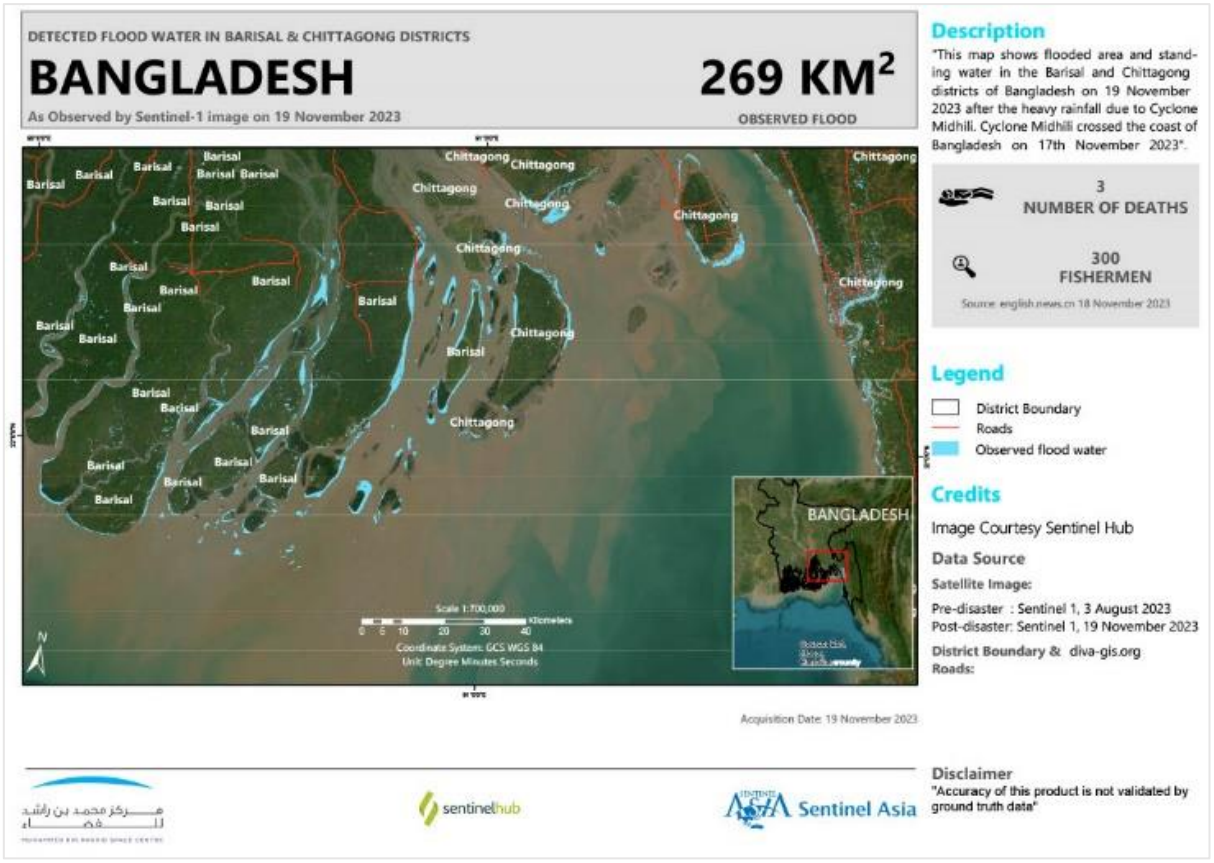


Figure 5: EOR for Cyclone Midhili in November, 2023

Following the submission of the EOR, satellite data was received from various Data Provider Nodes (DPNs) of Sentinel Asia. Besides, various Data Analysis Nodes (DANs) of Sentinel Asia provided some Value Added Products (VAPs) of analyzed imagery from SAR satellites.



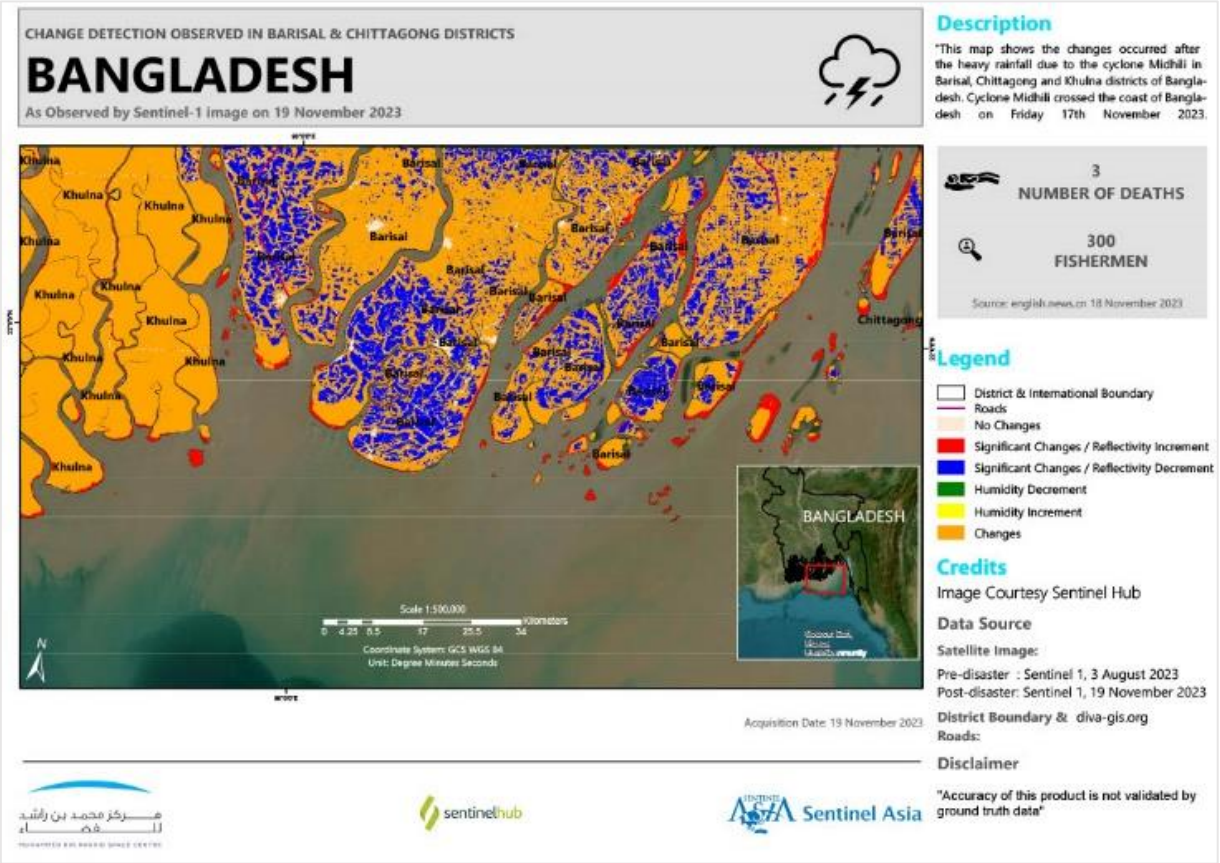
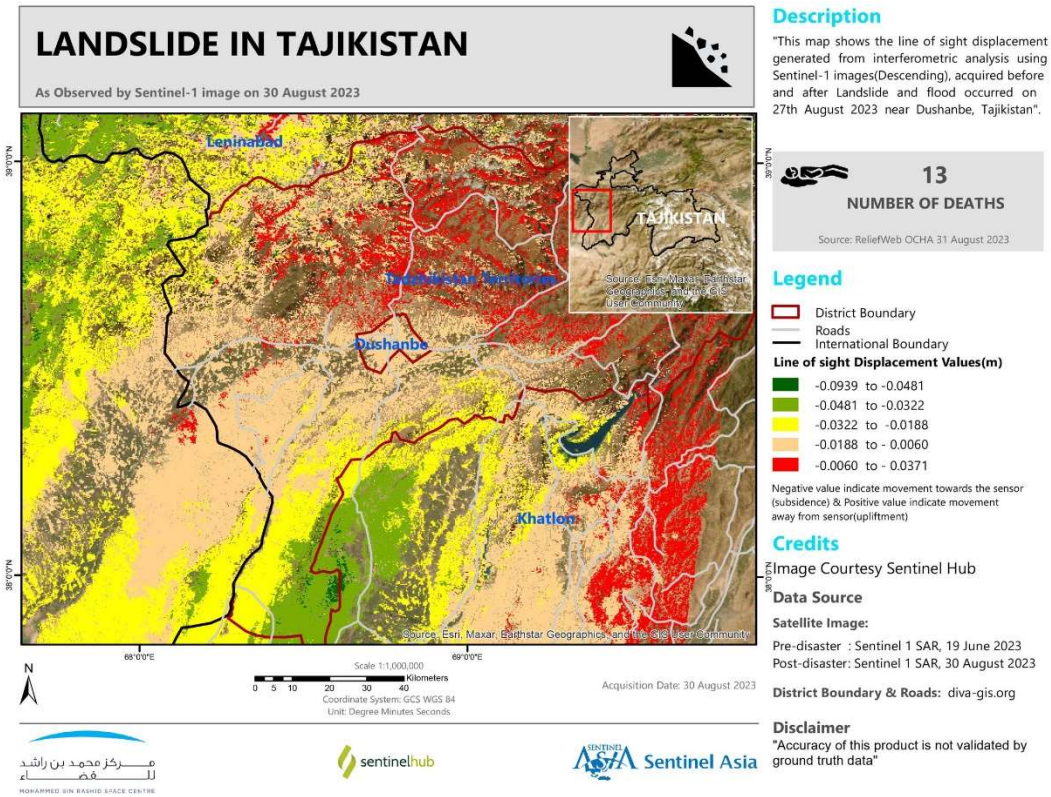


Figure 6: Some VAPs in responses to EOR from Sentinel Asia for Cyclone Midhili

Organization	**Central-Asian Institute for Applied Geosciences (CAIAG)**
Title	**Requested 2 EORs (2023)**
Type of Activity	**Requested 2 EORs (2023)**
Date	**In 2023**

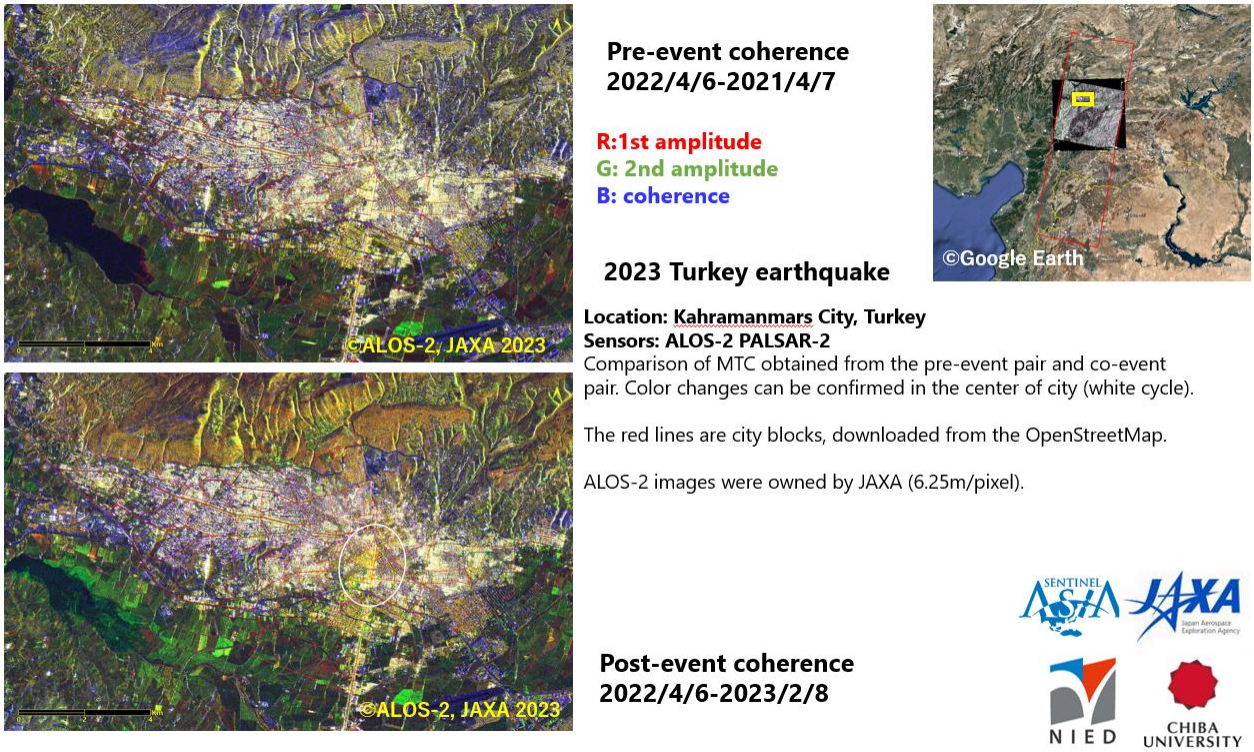
The Central Asian Institute for Applied Geosciences (CAIAG) is a non-profit organization that conducts scientific research and promotes sustainable development in Central Asia and globally. CAIAG is one of the Sentinel Asia member and we are requesting an EOR when disaster occurs in CAC. We requested 2 EORs in 2023. One is regarding forest fire which hit in Kazakhstan, and the other one is related to landslide which hit in Tajikistan. CAIAG used provided satellite images and VAPs to making internal report and shared disaster management organization in affected countries.



MBRSC's VAP

Organization	**Chiba University, Japan**
Title	**EMERGENCY RESPONSE OF THE 2023 TURKEY EARTHQUAKE**
Type of Activity	**EOR** (e.g., Conference, Workshop, Meeting, Training, EOR, Providing satellite data or VAP)
Date	**7/10/2024**

A magnitude 7.8 (Mw) earthquake occurred in Pazarcık, Kahramanmaraş Province, Turkey, on February 6, 2023, at 4:17 AM local time. It was centered about 35 km to the northwest of Gaziantep City. On the same day at 1:24 PM, another earthquake of Mw 7.5 struck Elbistan in the same province on another fault line. Due to the strong shaking and over 3 m of crustal movement, significant damage occurred in a total of 11 provinces in Turkey. The most extensive damage to buildings and infrastructure occurred in Hatay, Kahramanmaraş, Gaziantep, Malatya and Adıyaman provinces. In response to the Turkish government's request, Sentinel Asia (SA) was activated on February 6 and commenced disaster response efforts. The authors extracted the possible damaged regions using the dual polarization ALOS-2 images. Color composite of the pre- and post-event ALOS-2 intensity images around Gaziantep City, Kilis City and Kahramanmars City were produced and submitted to the website of SA. In addition, the possible damaged area in these cities were obtained by the intensity differences.



One product submitted to the website of Sentinel Asia

Organization	**Department of Hydrology and Meteorology (DHM), Nepal**
Title	**Participation in the workshop/ meeting**
Type of Activity	**Workshop/ meeting**
Date	**06/11/2023**

Workshop on Utilization of space technology for DRR-Sentinel Asia

Asian Disaster Reduction Center (ADRC) organized a one-day workshop on "Utilization of space technology for DRR-Sentinel Asia" which was held on 6th November 2023 at National Disaster Risk Reduction and Management Authority (NDRRMA), Nepal. Numbers of stakeholders related to various types of disaster were present in the meeting. Representatives from ADRC provided insights on the process for activation of Emergency Observation Request (EOR). Satellite images from Sentinel Asia, Sentinel Asia activities and few samples of EORs and analyzed images after the EOR from Nepal and other countries were also shown.

No EORs were requested from DHM in 2023. The workshop session was very much informative which has helped us to request quite a few EORs in the current year (2024)

Organization	**Department of Hydrology and Meteorology (DHM), Nepal**
Title	**Participation in the workshop/ meeting**
Type of Activity	**Workshop/ meeting**
Date	**06/11/2023**

Workshop on Utilization of space technology for DRR-Sentinel Asia

Asian Disaster Reduction Center (ADRC) organized a one-day workshop on "Utilization of space technology for DRR-Sentinel Asia" which was held on 6th November 2023 at National Disaster Risk Reduction and Management Authority (NDRRMA), Nepal. Numbers of stakeholders related to various types of disaster were present in the meeting. Representatives from ADRC provided insights on the process for activation of Emergency Observation Request (EOR). Satellite images from Sentinel Asia, Sentinel Asia activities and few samples of EORs and analyzed images after the EOR from Nepal and other countries were also shown.

Previously, the DHM requested through personal emails to Sentinel Asia Secretariat and many EORs were requested in 2021 and 2022. But there seem to be no requests in 2023. However, since the OPTEMIS portal was introduced in April 2024, it has frequently been used for sending activations which will be presented in the JPTA meeting in Phillipines as well as next year's report.

Organization	**Disaster Management Centre (Sri Lanka)**
Title	**Participating for PM training (Virtual Mode)**
Type of Activity	**Training**
Date	**14/02/2023**

ESA Charter Mapper training for PM/VA

In the context of the international Charter Space and Major Disaster, the European Space Agency conducted an online training session for Charter Project Managers (PMs) and Value Addings (VAs) on 14th February 2023 on virtual mode. The ESA Charter Mapper was deployed in COS-2 for operations for PMs, VAs and Charter members in July 2021 (Figure 01).

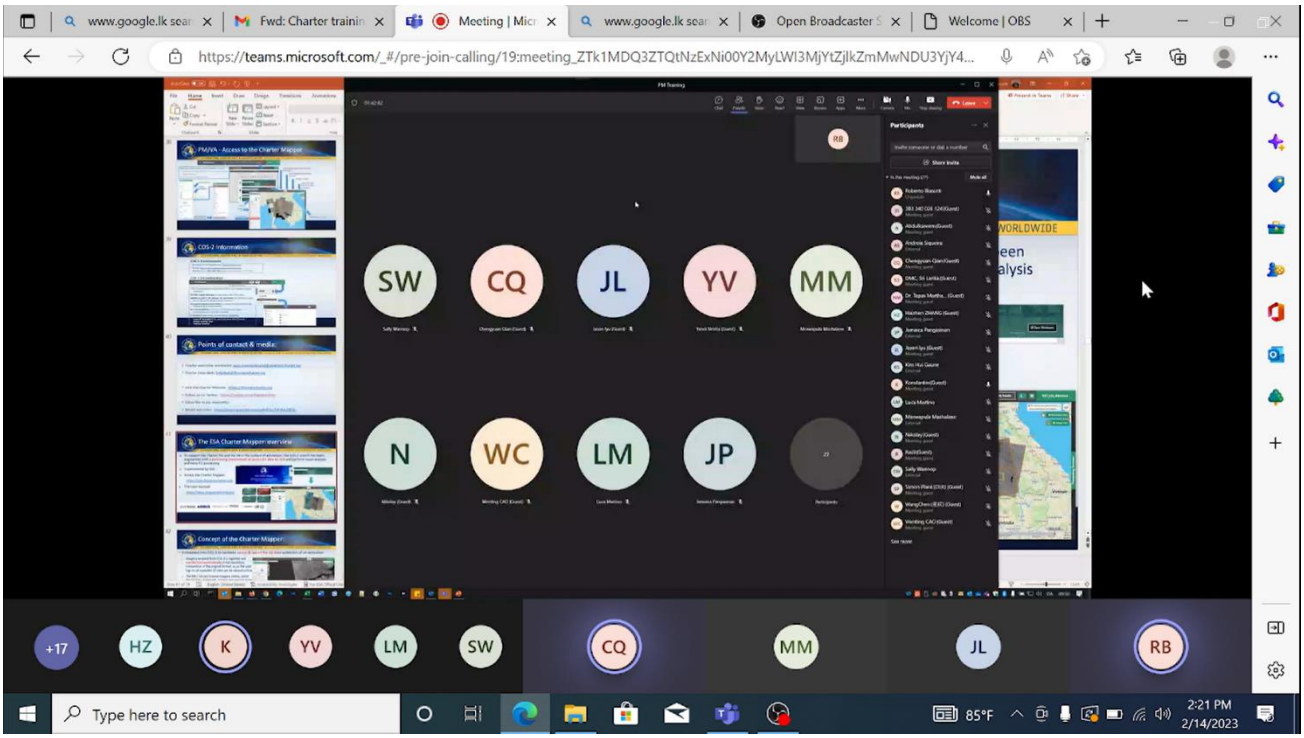


Figure 01: Virtual mode Charter Mapper training in 2023

The ESA Charter Mapper is intended to provide the PMs and VAs of an activation with easy access to the available collection of Earth Observation (EO) Data and allows them to perform basic EO processing without downloading Software. The key benefits include the systematic ingestion and transformation of imagery in full resolution, regardless of the original format. Upon logging in users can view all EO data online related to their activation.

The PMs and VAs can browse imagery, select relevant EO data, and analyze it directly on the platform to generate geospatial information outputs. To support this, list of EO services is available on demand, along with basic GIS tools (Processing Services) integrated into the platform, such as COMBI-Plus, Burned Area Severity (BAS), Change Detection Analysis – IRIS Service, Change Vector Analysis (CVA), and Flood Extent Mapping – HASARD service etc.

Additionally, the training was organized into multiple sessions, each focused on key aspects of platform access. Participants learned how to obtain technical support from the charter technical team, navigate the activation workspace, and utilize its Graphical User Interface (GUI). The sessions covered using various filtering criteria to find Earth Observation (EO) data from all acquisitions, visualizing EO data at full resolution, and combining sensor bands to compare pre- and post-event images.

Moreover, the training program extensively covered the ESA Charter Mapper web portal, including the landing page, PM/VA home page, and Geobrowser. The Geobrowser is a map-based web application that enables users to explore, visualize, analyze and process spatial data (Figure 02).

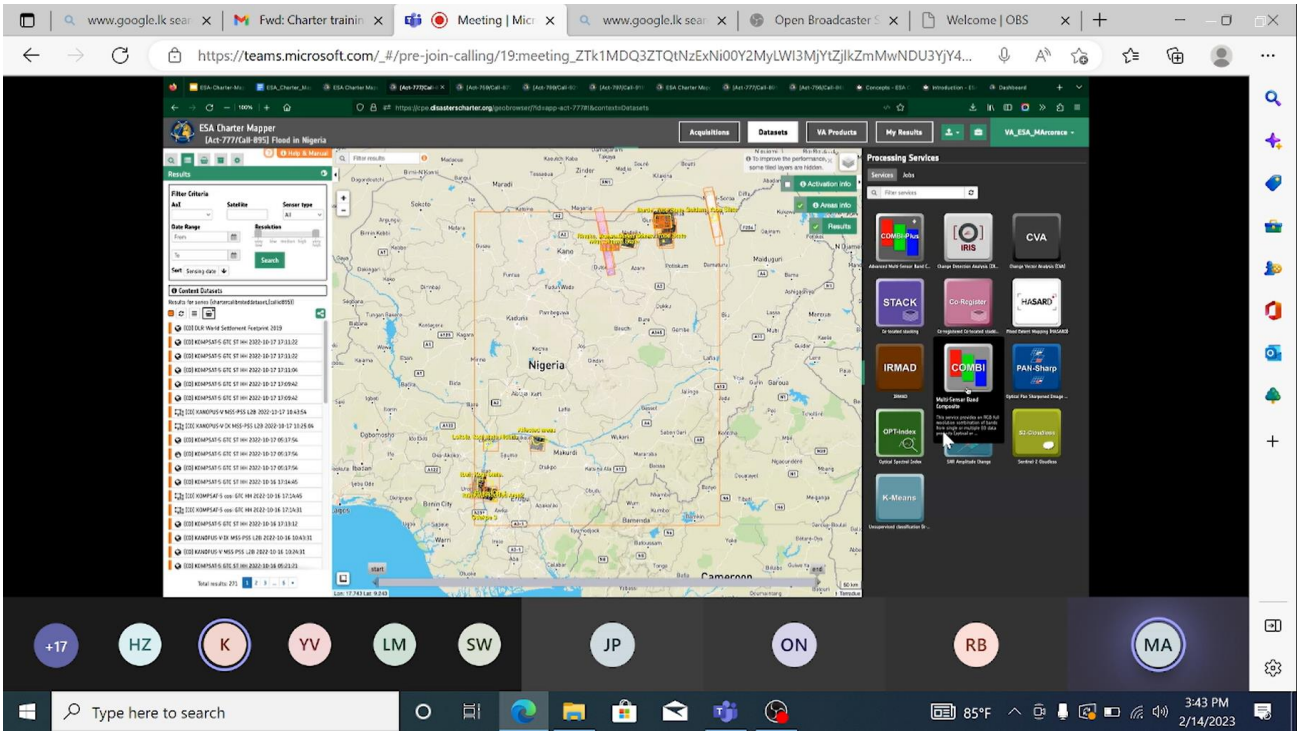


Figure 02: Introduction Geobrowser

The portal menu, data services panel, processing services panel, map area, map toolbars, widgets, basemap switcher, and various other tools were introduced under the introduction to the Geobrowser. It also demonstrated the most commonly used service tools, including SAR Amplitude Change (Figures 03 and 04) and Flood Extent Mapping (HASARD) tools (Figures 05 and 06). This section

covered service tool and its capabilities, Satellite filter criteria (Satellites, Sensors, satellite Path and Row etc), and methods for identifying flooded areas using Sentinel images.

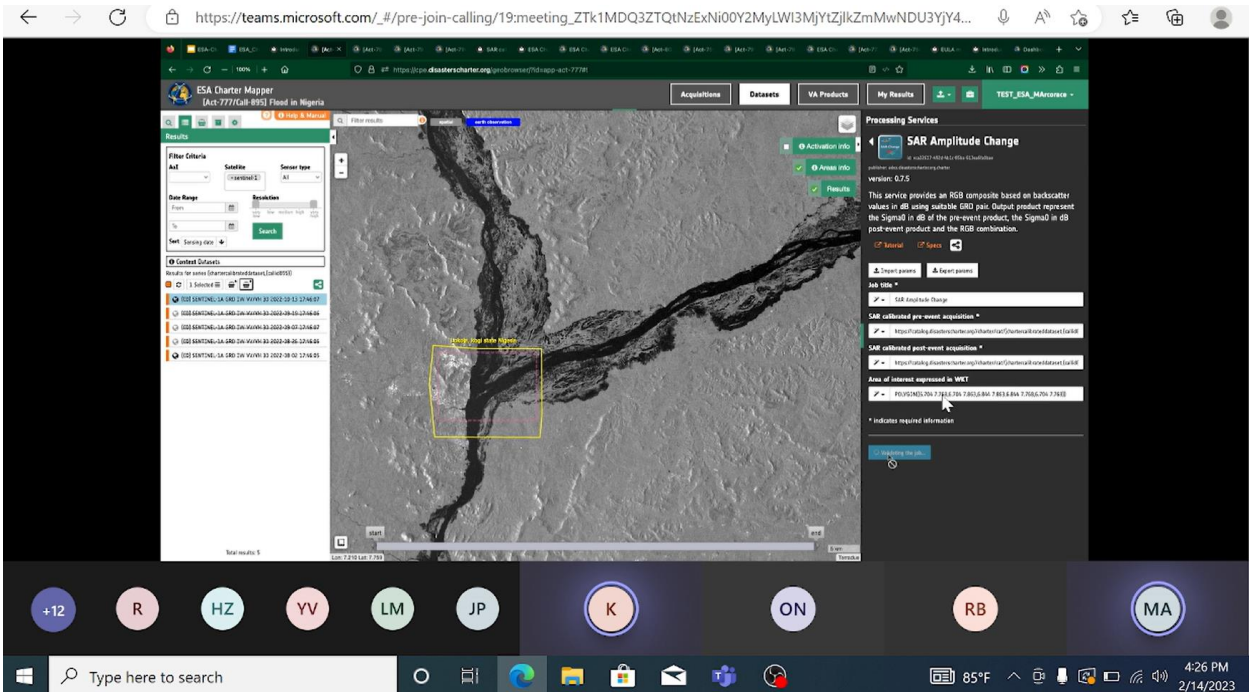


Figure 03: Introduction of SAR Amplitude Change service tool

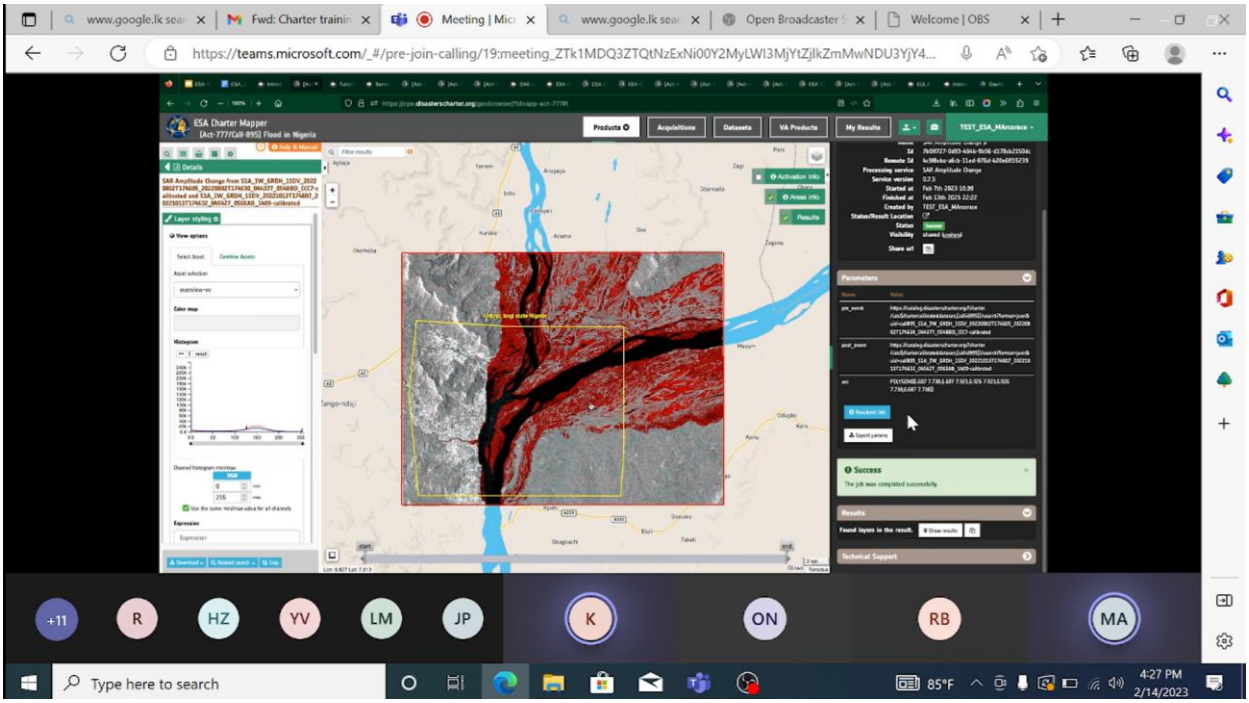


Figure 04: Processed SAR image and sensor details.

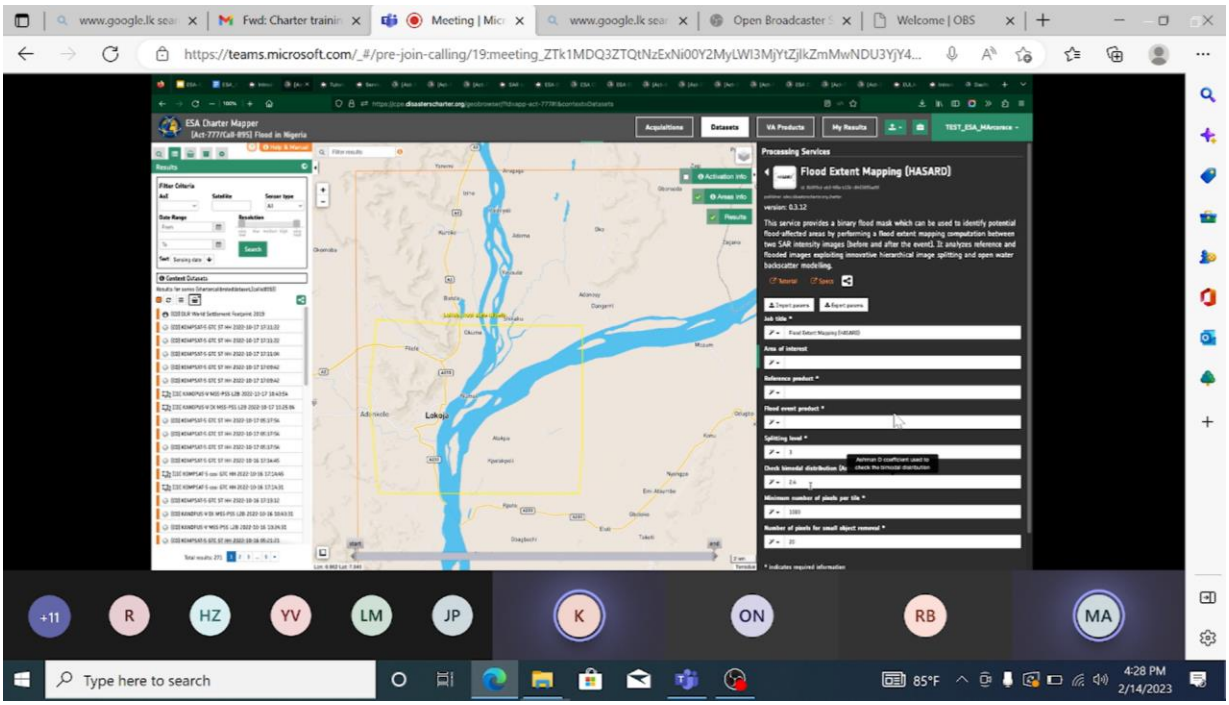


Figure 05 : Introduction of Flood Extent Mapping (HASARD) service tool and parameters

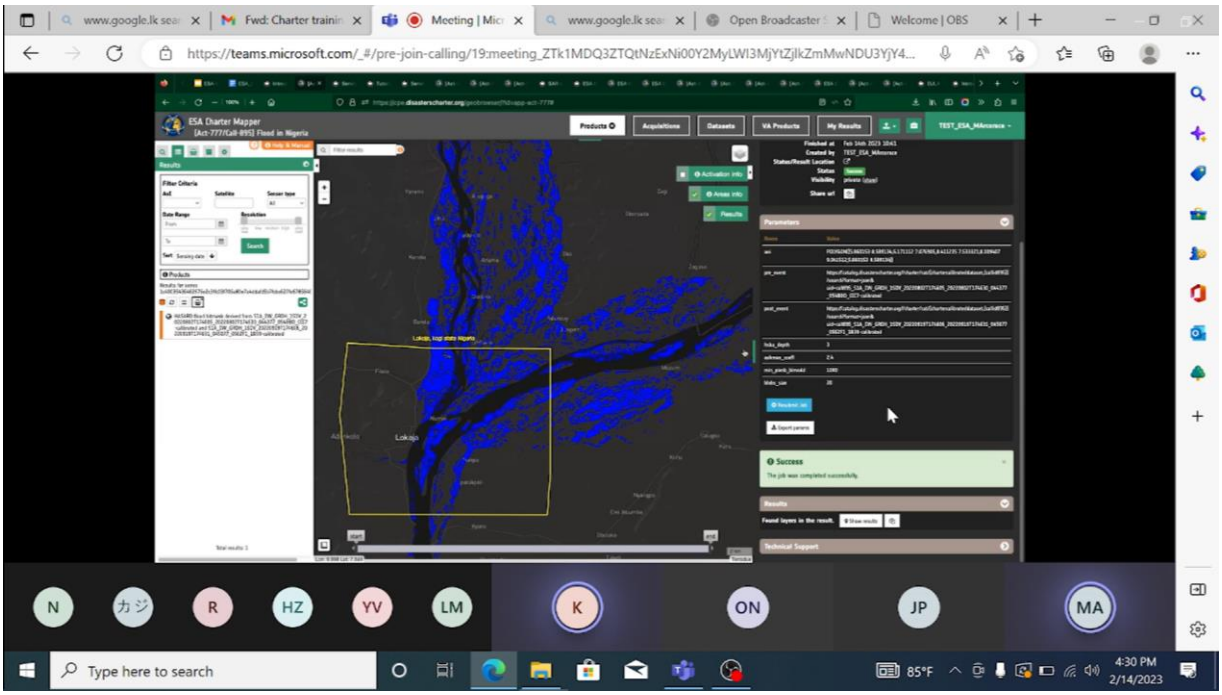
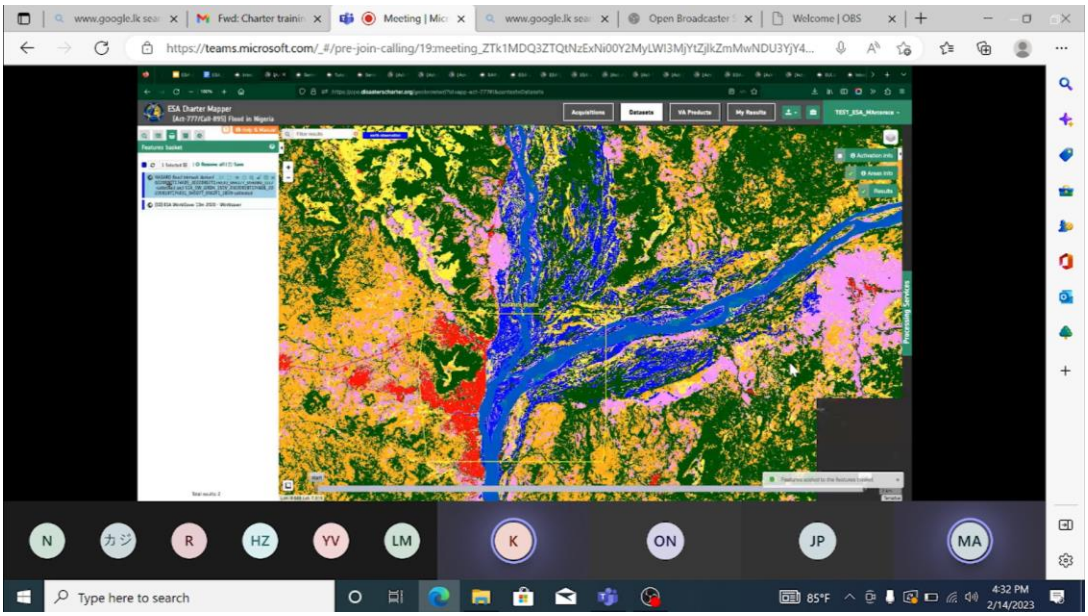


Figure 06: Pixel based flooded area visualization after running HASARD Service tool.

Next, the programme focused on how to work with features basket and overlay in axillary data. Figure 07 illustrates the working interface for the features basket and the overlaid auxiliary data that highlights the previously calculated flooded areas. Moreover, the cases used very recently also discussed.



Feature 07: Introducing of working environment of features basket

Additionally, the specialized tool for co-located stacking (Figure 08) was explored. This tool provides a multi-mission and multi-temporal image stack of multiple co-located single band assets against a reference asset. This advanced service tool performs resampling and warping of the secondary assets and the stacking of each secondary with the reference. The image or axillary data resampling and overlapping process performed based on pixel coordinates.

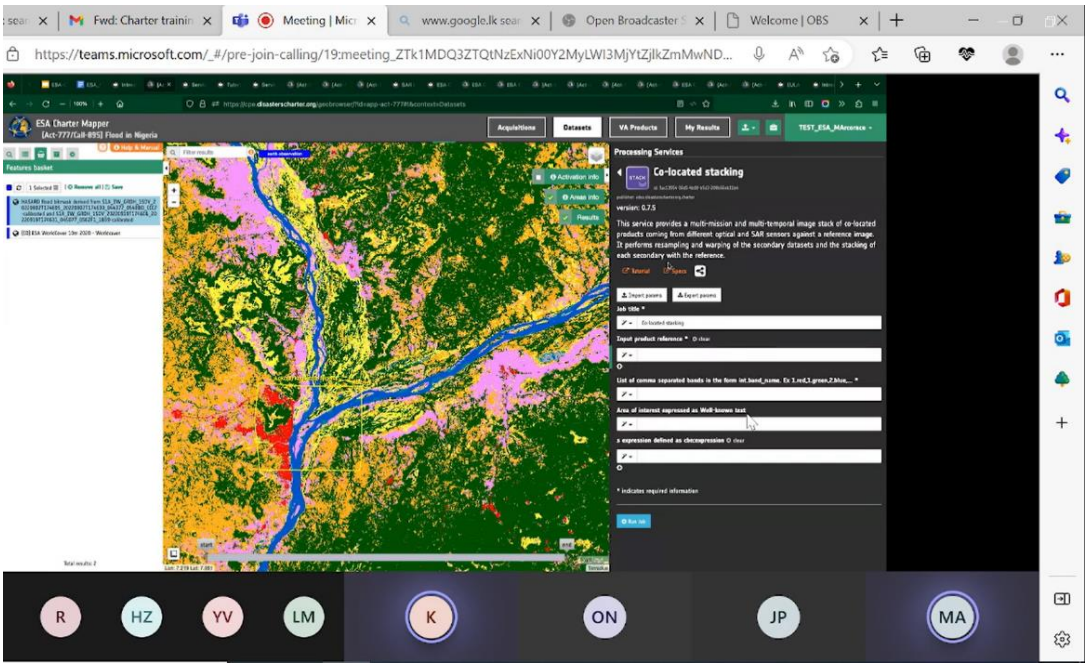


Figure 08: Introducing of Co-located stacking service tool.

In conclusion, ESA Charter training for Project Managers (PMs) and Value Analysts (VAs) provided an overview of access, visualization, processing, and analysis within the PM window, utilizing various service tools.

Organization	**Earth Observatory of Singapore (EOS)**
Title	**Rapid Response Efforts to Sentinel Asia EORs**
Type of Activity	**Emergency Observation Requests (EORs)**
Date	**2023**

Contributions of the Earth Observatory of Singapore as a Data Analysis Node

The Earth Observatory of Singapore Remote Sensing Lab (EOS-RS) has been continually contributing to the ongoing humanitarian assistance and disaster relief (HADR) efforts of Sentinel Asia as a Data Analysis Node (DAN) in over 40 disaster events since 2019. EOS-RS primarily achieves this through the rapid generation of damage and flood proxy maps at low latencies using synthetic aperture radar (SAR) data. Prior to product delivery, these proxy maps from EOS-RS are rigorously validated with available ground-truth data to ensure high accuracy and product quality.

In 2023, EOS-RS responded to 11 calls for Emergency Observation Requests (EORs) from Sentinel Asia through the Optemis Dashboard. The nature of EORs that EOS-RS has responded to in 2023 are as follows:

- 5 Earthquakes
- 3 Floods
- 2 Tropical Cyclones
- 1 Landslide

Of these EORs, EOS-RS saw one of the most significant humanitarian impacts in its responses to the Türkiye-Syria earthquakes of February 2023.

The Türkiye-Syria Earthquakes & EOS-RS's Response

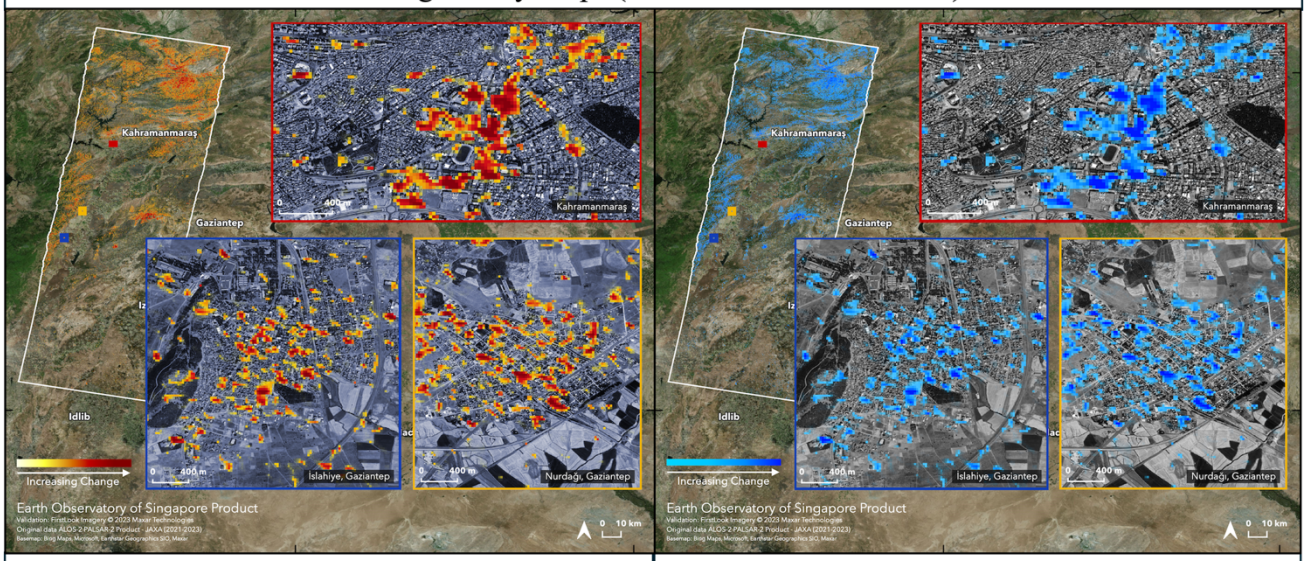
On 6 February 2023, a M7.8 earthquake struck close to the Türkiye-Syria border at 4:17 a.m. local time, which was closely followed by a strong M7.5 aftershock 95km further north just nine hours later at 1:24 p.m. local time. Collectively, the series of major earthquakes and aftershocks resulted in the loss of over 60 000 lives and caused widespread damage across Türkiye and Syria. Amongst the worst hit regions included the provinces of Kahramanmaraş, Gaziantep, Hatay, Adıyaman, and Şanlıurfa in Türkiye, and the governorates of Aleppo, Idlib, and Hama in Syria.

Immediately following the devastating earthquakes, EOS-RS reached out to JAXA for the acquisition of satellite radar data through its ALOS-2 PALSAR-2 sensor, which was delivered promptly within two days on 8 February 2023. EOS-RS was then able to generate and disseminate the first variant of damage proxy maps using ALOS-2 PALSAR-2 data on the same day. The accuracy of the damage proxy maps was further enhanced over the following days with the inclusion of Copernicus Sentinel-1 data in the analysis of the earthquake damage. By 16 February 2023, EOS-RS had successfully generated eight damage proxy maps with high resolution (approximately 30m x 30m pixel spacing) to provide full coverage of the affected areas. By leveraging the advantages of spaceborne SAR data from the ALOS-2 PALSAR-2 and Copernicus Sentinel-1 sensors, EOS-RS could rapidly map the affected areas in Turkiye and Syria with high accuracy.

To expand the outreach of the damage proxy maps, EOS-RS had disseminated and shared the maps across various media platforms, as well as with Sentinel Asia via the Optemis Dashboard for the event's EOR. The maps were also made more accessible by using two colour schemes – regular (from yellow to red) and colour vision deficiency (CVD; from light blue to dark blue).

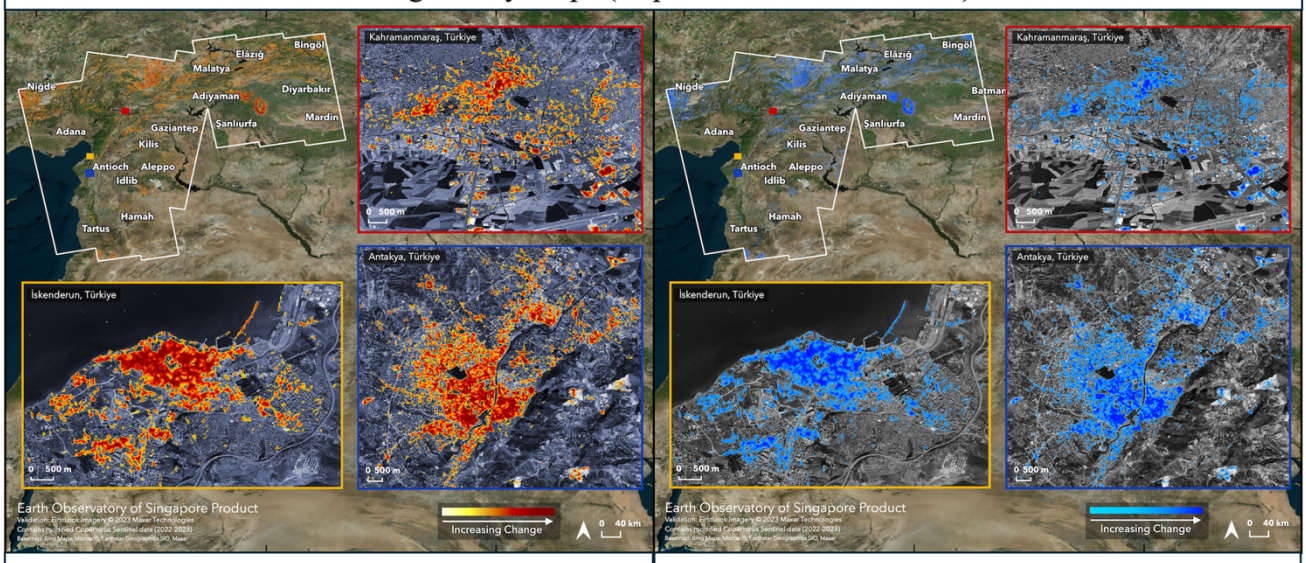
The relevant EOS-RS damage proxy maps and materials may be accessed at the following link:
https://eos-rs-products.earthobservatory.sg/EOS-RS_202302_Turkiye_Syria_Earthquake/

Damage Proxy Maps (ALOS-2 PALSAR-2 Data)



Regular Colour Scheme | CVD Colour Scheme

Damage Proxy Maps (Copernicus Sentinel-1 Data)



Regular Colour Scheme | CVD Colour Scheme

Organization	**Geoinformatics Center, Asian Institute of Technology**
Title	**GIC-AIT activities carried out as Principal Data Analysis Node (P-DAN) for Sentinel Asia.**
Type of Activity	**Value-Added Product Generation for Disaster Activations, Meetings**
Date	**01/01/2023-31/12/2023**

1. Sentinel Asia

1.1 Activation and Value-Added Products Generation

As the Principal Data Analyses Node (P-DAN) of Sentinel Asia, the Geoinformatics Center of the Asian Institute of Technology (GIC-AIT) produces Value Added Products (VAP) immediately after disaster occurrences to support disaster response activities of the Sentinel Asia Community.

In 2023, there were 27 emergency observation requests from 13 countries, mostly coming from Vietnam (8 activations; 29.63%), the Philippines (5 activations; 18.52%), Bangladesh, Indonesia, and India (each with 2 activations, 7.41%), while other countries requested for one activation each (3.70%) including Afghanistan, Bhutan, China, Kazakhstan, Myanmar (Burma), Tajikistan, Nepal, and Turkey.

Out of these activations, we have created 33 VAPs from 15 activations (*Table 1*) including 18 VAPs for Sentinel Asia and 15 for the International Disaster Charter (IDC). Most products were made for flood events, followed by flood and landslide, forest fire, landslide, and earthquake (*Figure 1*). *Figure 2* shows the number of VAPs created for each of the countries. Maps of the VAPs are provided in the *Appendix*.

Table 1: List of Sentinel Asia activations from 1st of January 2023 to 31st of December 2023, including the date of first created products and the number of VAPs for each activation.

No.	Activation ID	Occurrence Date	Activation Date	Country	Disaster Type	First Data Availability (SA)	First VAP Generation	No. of Product
1	463	6-Feb-23	6-Feb-23	Turkey	Earthquake	7-Feb-23	-	-
2	464	16-Feb-23	17-Feb-23	Philippines	Earthquake	21-Feb-23	-	-
3	465	28-Feb-23	1-Mar-23	Philippines	Other	2-Mar-23	-	-
4	467**	6-Mar-23	7-Mar-23	Indonesia	Landslide	16-Mar-23	16-Mar-23	1 (IDC)
5	468**	14-May-23	11-May-23	Myanmar (Burma)	Flood	15-May-23	16-May-23	1 (SA), 13 (IDC)
6	469	14-May-23	14-May-23	Bangladesh	Flood	15-May-23	23-May-23	1 (SA)
7	470	27-May-23	25-May-23	Philippines	Flood, Landslide	2-Jun-23	2-Jun-23	1 (SA)
8	471	15-Jun-23	14-Jun-23	India	Flood	16-Jun-23	17-Jun-23	1 (SA)
9	472	8-Jun-23	14-Jun-23	Kazakhstan	Forest Fire	19-Jun-23	28-Jun-23	1 (SA)
10	473	13-Jul-23	13-Jul-23	India	Flood	19-Jul-23	20-Jul-23	1 (SA)
11	474	18-Jul-23	17-Jul-23	Vietnam	Flood	21-Jul-23	22-Jul-23	2 (SA)
12	475	20-Jul-23	26-Jul-23	Bhutan	Flood	31-Jul-23	-	-
13	476	25-Jul-23	28-Jul-23	Philippines	Flood	31-Jul-23	31-Jul-23	1(SA)
14	477	5-Aug-23	8-Aug-23	Vietnam	Flood	10-Aug-23	-	-
15	478*	4-Aug-23	16-Aug-23	Vietnam	Landslide	21-Aug-23	-	-
16	479	27-Aug-23	30-Aug-23	Tajikistan	Landslide	4-Sep-23	-	-
17	480	12-Sep-23	14-Sep-23	Vietnam	Flood, Landslide	19-Sep-23	-	-
18	481	26-Sep-23	27-Sep-23	Vietnam	Flood, Landslide	29-Sep-23	30-Sep-23	4 (SA)
19	482	7-Oct-23	9-Oct-23	Afghanistan	Earthquake	16-Oct-23	16-Oct-23	1 (SA)
20	483	13-Oct-23	14-Oct-23	Vietnam	Flood, Landslide	18-Oct-23	18-Oct-23	1 (SA)
21	484	30-Oct-23	311/10/2023	Vietnam	Flood, Landslide	13-Oct-23	13-Oct-23	2 (SA)
22	485	3-Nov-23	5-Nov-23	Nepal	Earthquake	10-Nov-23	-	-
23	486	15-Nov-23	15-Nov-23	Vietnam	Flood, Landslide	20-Nov-23	20-Nov-23	1 (SA)
24	487	17-Nov-23	17-Nov-23	Bangladesh	Storm	20-Nov-23	-	-
25	488*	17-Nov-23	17-Nov-23	Philippines	Landslide, Earthquake	21-Nov-23	-	-
26	489**	3-Dec-23	8-Dec-23	Indonesia	Volcano	8-Dec-23	5-Dec-23	1 (IDC)
27	490	18-Dec-23	19-Dec-23	China	Landslide,Earthquake	13-Dec-23	-	-

* Escalated to International Disaster Charter (IDC)

** Escalated to International Disaster Charter (IDC) and project management by GIC-AIT

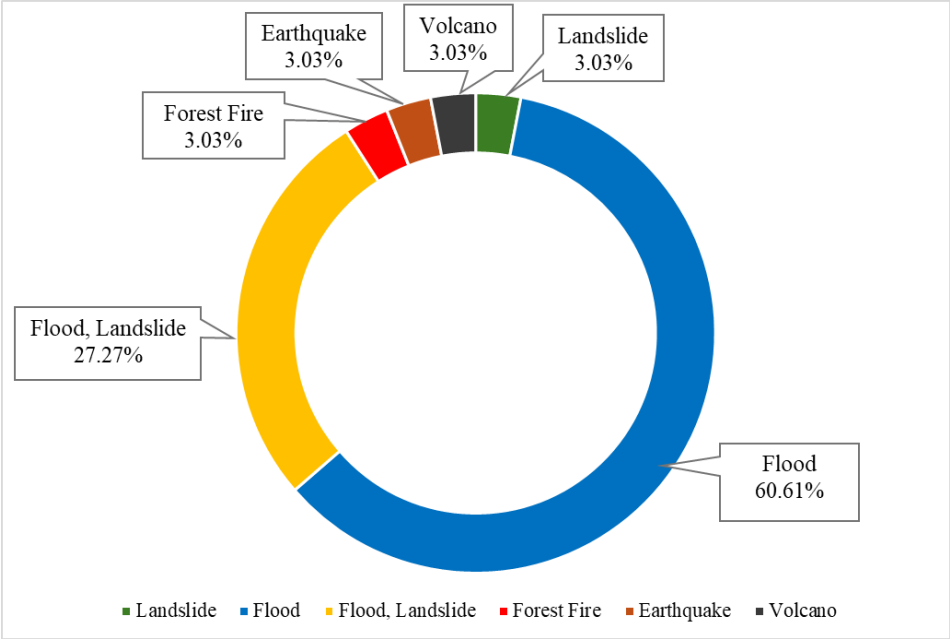


Figure 1: Disaster-wise VAPs created by GIC-AIT (2023/01/01-2023/12/31)

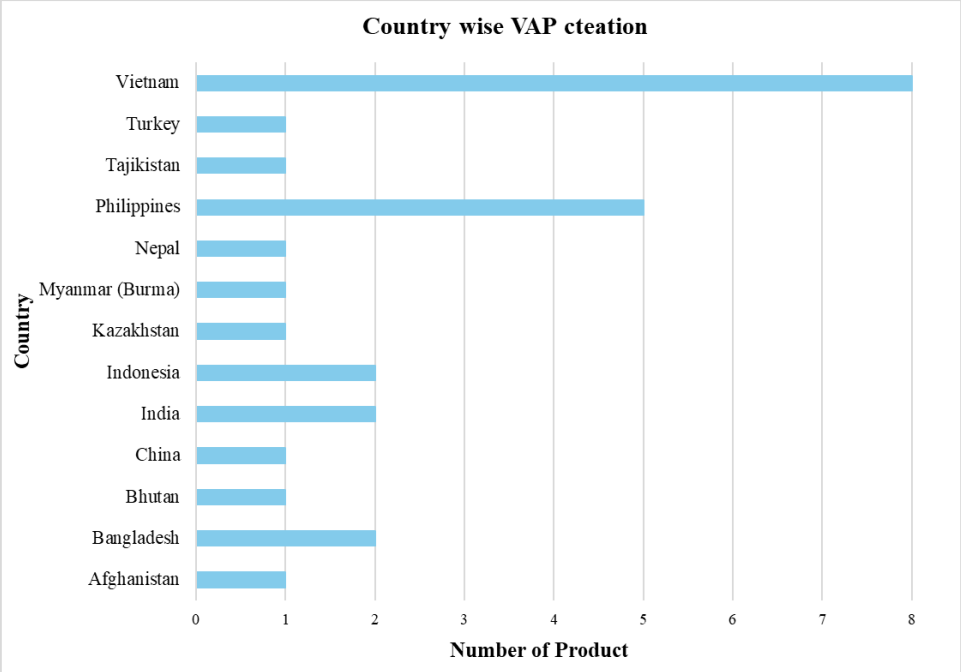


Figure 2: Country-wise VAPs created by GIC-AIT (2023/01/01-2023/12/31)

1.2 Sentinel Asia Meetings

1.2.1 Interaction with Disaster Management Organizations in Vietnam

On 6–7 November 2023, the Sentinel Asia delegates, including Mr. Takei Goro from the Secretariat, Mr. Syams Nashrrullah, and Ms. Angsana Chaksan from AIT, met with several Disaster Management Organizations (DMOs) in Vietnam. A meeting with the National Remote Sensing Department (NRSD) on 6 November discussed several issues, such as flood modeling and mapping, challenges in data accuracy, and data sharing. On 7 November, the meeting with the Space Technology Institute (STI-VAST) highlighted issues on accessing satellite imagery during disasters, proposed a collaborative landslide analysis project, and suggested improving the validation frameworks. In another meeting with the Disaster Management Policy and Technology Centre (DMPTC-MARD), they raised concerns about staffing and funding shortages affecting training programs while discussing the role of the Vietnam Disasters Monitoring System (VNDMS) in disaster management in the country.

Figure 3: Meeting with Disaster Management Organizations in Vietnam

1.2.2 Interaction with Disaster Management Organizations in Indonesia

During the mid-week of December 2023, GIC-AIT representatives Dr. Manzul Hazarika and Mr. Syams Nashrrullah met with several Disaster Management Organizations (DMOs) in Indonesia. The meeting with BRIN on 12 December discussed its reorganization, which has shifted focus toward research, and expressed interest in multi-hazard risk assessment training. In another meeting, BIG mentioned limited recent collaboration with Sentinel Asia and challenges in processing satellite data. At the meeting on 13 December, the Ministry of Public Works and Housing (MPWH) discussed historical flood mapping with Sentinel-1 data and their interest in monitoring infrastructure using satellite data. On 14 December, the meeting with BNPB highlighted the need for training to enhance the use of their InaRISK platform. Meanwhile, the AHA Centre shared its active use of Sentinel Asia products and its role in disaster response via the Disaster Monitoring & Response System (DMRS). Finally, on 18 December, the Geological Agency expressed interest in pilot projects using Sentinel Asia's Value-Added Products (VAPs) to improve geological disaster response.

Figure 4: Meeting with Disaster Management Organizations in Indonesia

1.2.3 Participation in the 8th Joint Project Team Meeting for Sentinel Asia (JPTM 2023)

GIC-AIT participated in the 8th Joint Project Team Meeting for Sentinel Asia (JPTM 2023) in BRIN Headquarters in Jakarta, Indonesia, from 17 to 18 September 2023. The meeting was held back-to-back with the 29th session of the Asia-Pacific Regional Space Agency Forum (APRSAF-29) and it was attended by 85 participants from 35 member organizations in the Asia-Pacific Region. In this meeting, the participants shared their initiatives and solutions related to disaster management activities. GIC's research specialist, Mr. Syams Nashrrullah, presented their activities on the response to Sentinel Asia Emergency Observation Requests (EORs) from 2022 to 2023. He mainly discussed SAR data analysis and mobile app development for emergency response.

2. International Disaster Charter

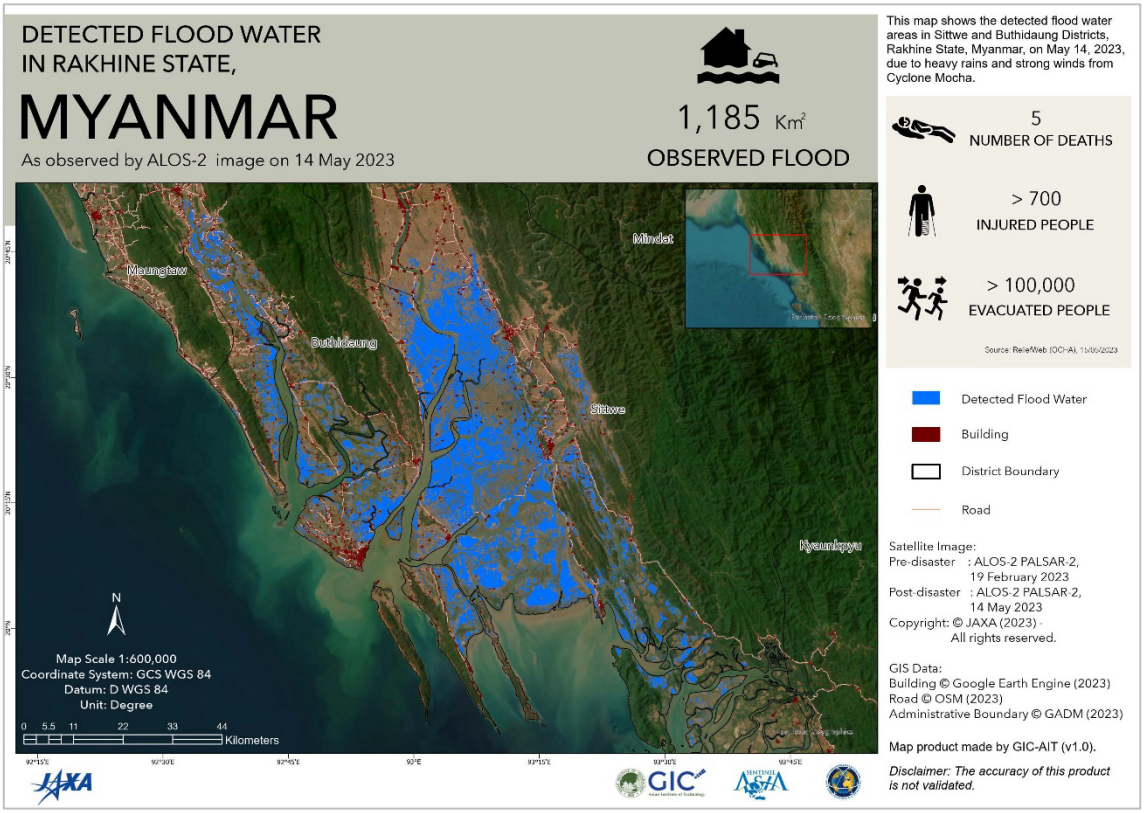
2.1 Project Manager (PM)

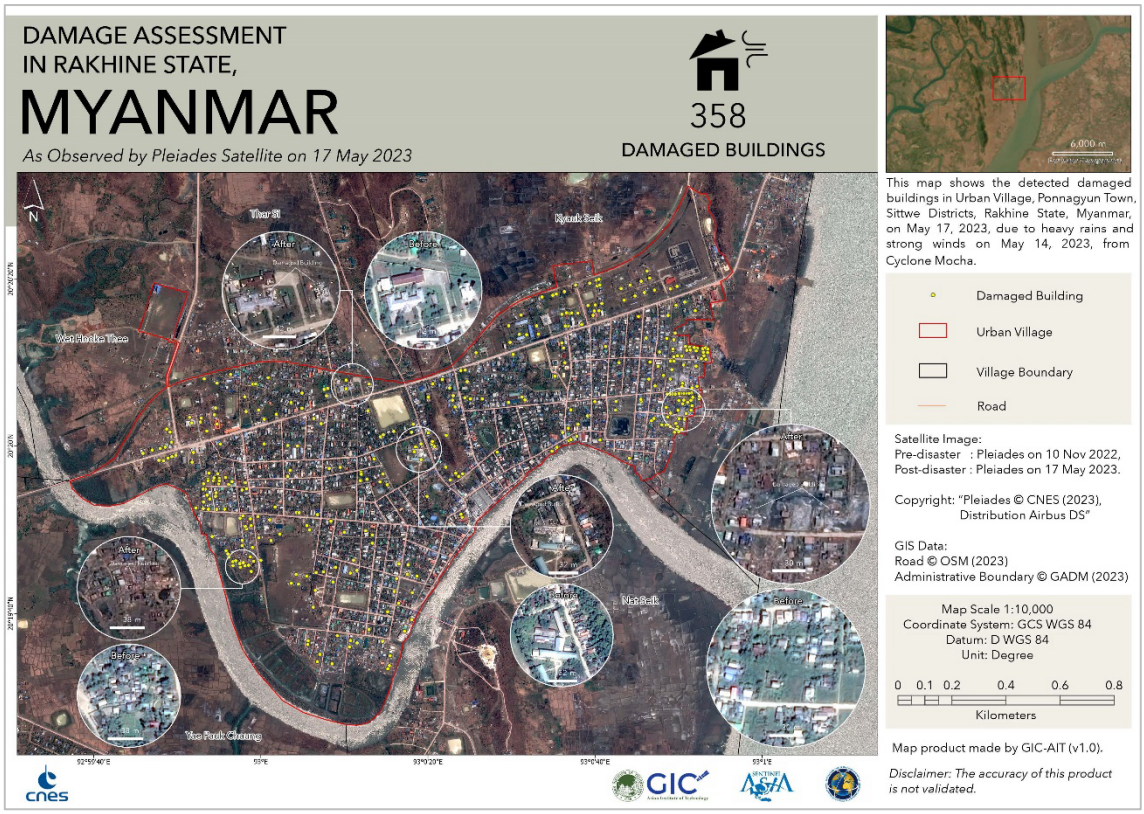
When a major disaster occurs, Sentinel Asia can be escalated to the International Disaster Charter. In 2023, we were nominated by JAXA as the Project Manager (PM) for three such activations. For the landslide in Indonesia (6 March 2023), we uploaded four products, including one from GIC-AIT and three from ICube-SERTIT, BRIN, and the Indonesian RSO (UN-SPIDER and INASA-BRIN). For the flood in Myanmar (14 May 2023), GIC-AIT produced 13 products, with two more from AIR, CAS, and NDRCC. For the Mount Merapi volcanic eruption in Indonesia (5 December 2023), GIC-AIT contributed one product, and UN-SPIDER, along with INASA-BRIN, provided several others. Maps of the products created are provided in the *Appendix*.

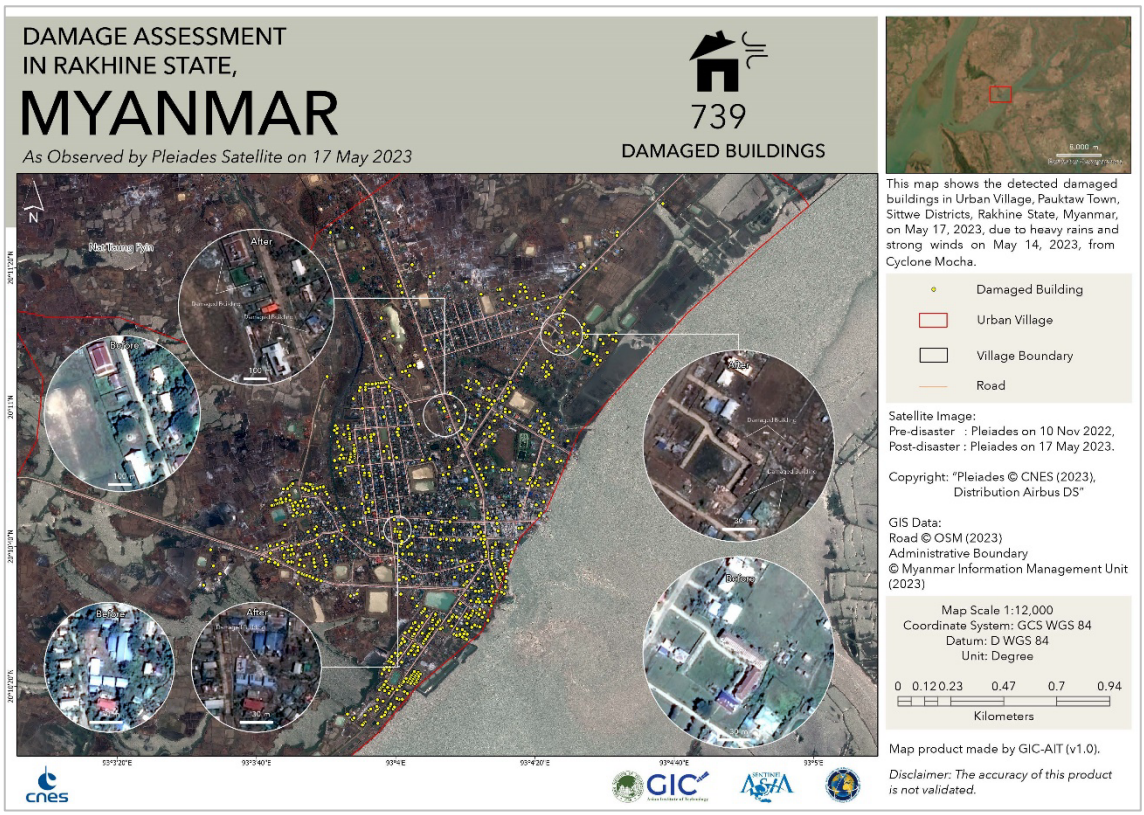
APPENDIX

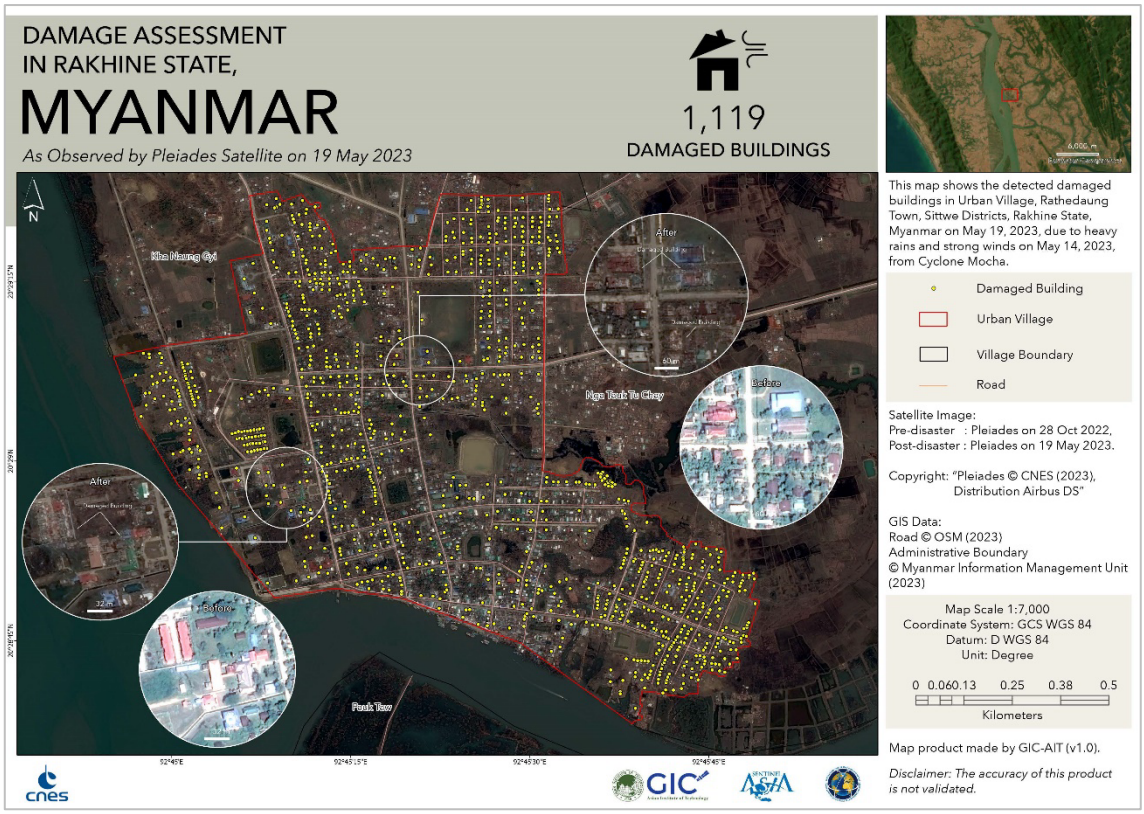
1. **Landslide in Indonesia on 06 March 2023 (SA was escalated to the International Disaster Charter)**

2. **Flood in Myanmar on 14 May 2023 (SA was escalated to the International Disaster Charter)**




DAMAGE ASSESSMENT
IN RAKHINE STATE,
MYANMAR
As Observed by Pleiades Satellite on 17 May 2023
358
DAMAGED BUILDINGS
This map shows the detected damaged buildings in Urban Village, Ponnagyun Town, Sittwe Districts, Rakhine State, Myanmar, on May 17, 2023, due to heavy rains and strong winds on May 14, 2023, from Cyclone Mocha.
Damaged Building
Urban Village
Village Boundary
Road
Satellite Image:
Pre-disaster : Pleiades on 10 Nov 2022,
Post-disaster : Pleiades on 17 May 2023.
Copyright: "Pleiades © CNES (2023), Distribution Airbus DS"
GIS Data:
Road © OSM (2023)
Administrative Boundary © GADM (2023)
Map Scale 1:10,000
Coordinate System: GCS WGS 84
Datum: D WGS 84
Unit: Degree
0 0.1 0.2 0.4 0.6 0.8
Kilometers
Map product made by GIC-AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.
cnes
GIC


DAMAGE ASSESSMENT
IN RAKHINE STATE,
MYANMAR
As Observed by Pleiades Satellite on 17 May 2023
739
DAMAGED BUILDINGS
This map shows the detected damaged buildings in Urban Village, Pauktaw Town, Sittwe Districts, Rakhine State, Myanmar, on May 17, 2023, due to heavy rains and strong winds on May 14, 2023, from Cyclone Mocha.
Damaged Building
Urban Village
Village Boundary
Road
Satellite Image:
Pre-disaster : Pleiades on 10 Nov 2022,
Post-disaster : Pleiades on 17 May 2023.
Copyright: "Pleiades © CNES (2023), Distribution Airbus DS"
GIS Data:
Road © OSM (2023)
Administrative Boundary
© Myanmar Information Management Unit (2023)
Map Scale 1:12,000
Coordinate System: GCS WGS 84
Datum: D WGS 84
Unit: Degree
0 0.12 0.23 0.47 0.7 0.94
Kilometers
Map product made by GIC-AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.
cnes
GIC


DAMAGE ASSESSMENT
IN RAKHINE STATE,
MYANMAR
As Observed by Pleiades Satellite on 19 May 2023
1,119
DAMAGED BUILDINGS
Nha Maung Gyi
Nga Tauk Tu Chay
Funk Taw
After
Before
This map shows the detected damaged buildings in Urban Village, Rathedaung Town, Sittwe Districts, Rakhine State, Myanmar on May 19, 2023, due to heavy rains and strong winds on May 14, 2023, from Cyclone Mocha.
Damaged Building
Urban Village
Village Boundary
Road
Satellite Image:
Pre-disaster : Pleiades on 28 Oct 2022,
Post-disaster : Pleiades on 19 May 2023.
Copyright: "Pleiades © CNES (2023), Distribution Airbus DS"
GIS Data:
Road © OSM (2023)
Administrative Boundary
© Myanmar Information Management Unit (2023)
Map Scale 1:7,000
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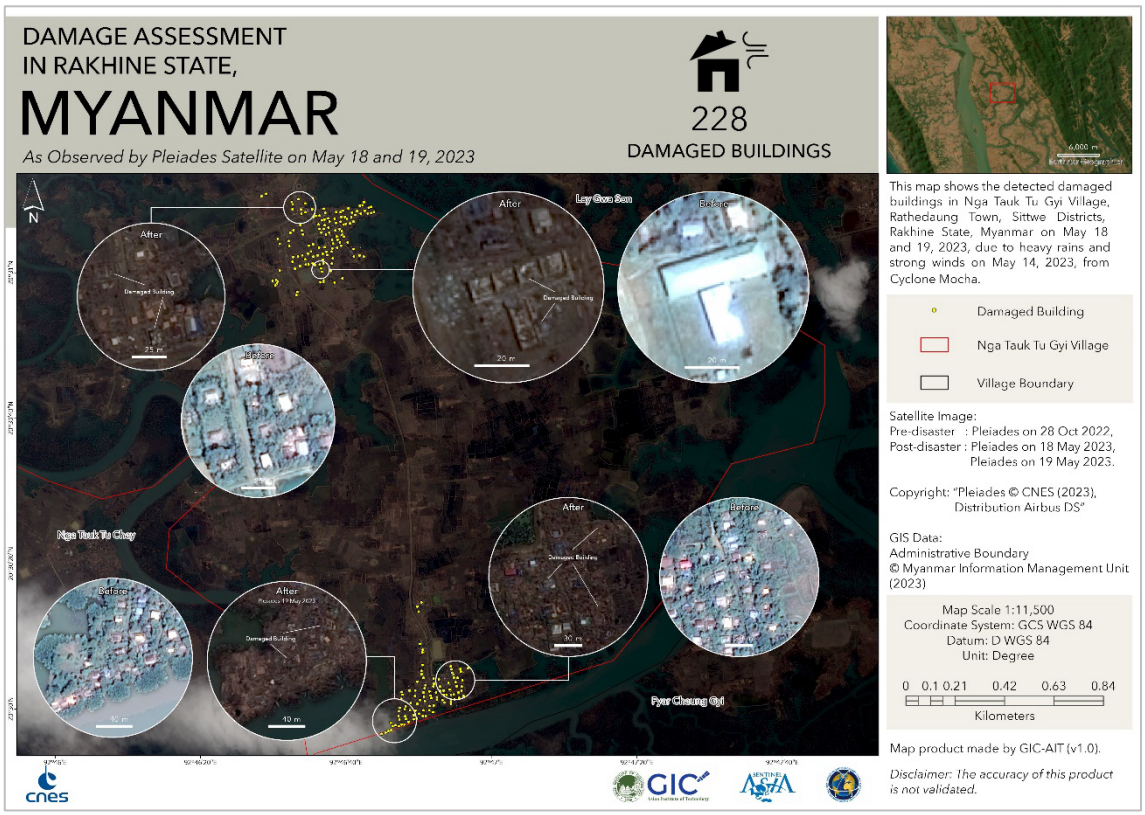
Kilometers
Map product made by GIC-AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.


DAMAGE ASSESSMENT
IN RAKHINE STATE,
MYANMAR
As Observed by Pleiades Satellite on May 18 and 19, 2023
228
DAMAGED BUILDINGS
Lay Gwa Son
Nga Tauk Tu Chay
Fyar Chaung Gyi
After
Before
This map shows the detected damaged buildings in Nga Tauk Tu Gyi Village, Rathedaung Town, Sittwe Districts, Rakhine State, Myanmar on May 18 and 19, 2023, due to heavy rains and strong winds on May 14, 2023, from Cyclone Mocha.
Damaged Building
Nga Tauk Tu Gyi Village
Village Boundary
Satellite Image:
Pre-disaster : Pleiades on 28 Oct 2022,
Post-disaster : Pleiades on 18 May 2023,
Pleiades on 19 May 2023.
Copyright: "Pleiades © CNES (2023), Distribution Airbus DS"
GIS Data:
Administrative Boundary
© Myanmar Information Management Unit (2023)
Map Scale 1:11,500
Coordinate System: GCS WGS 84
Datum: D WGS 84
Unit: Degree
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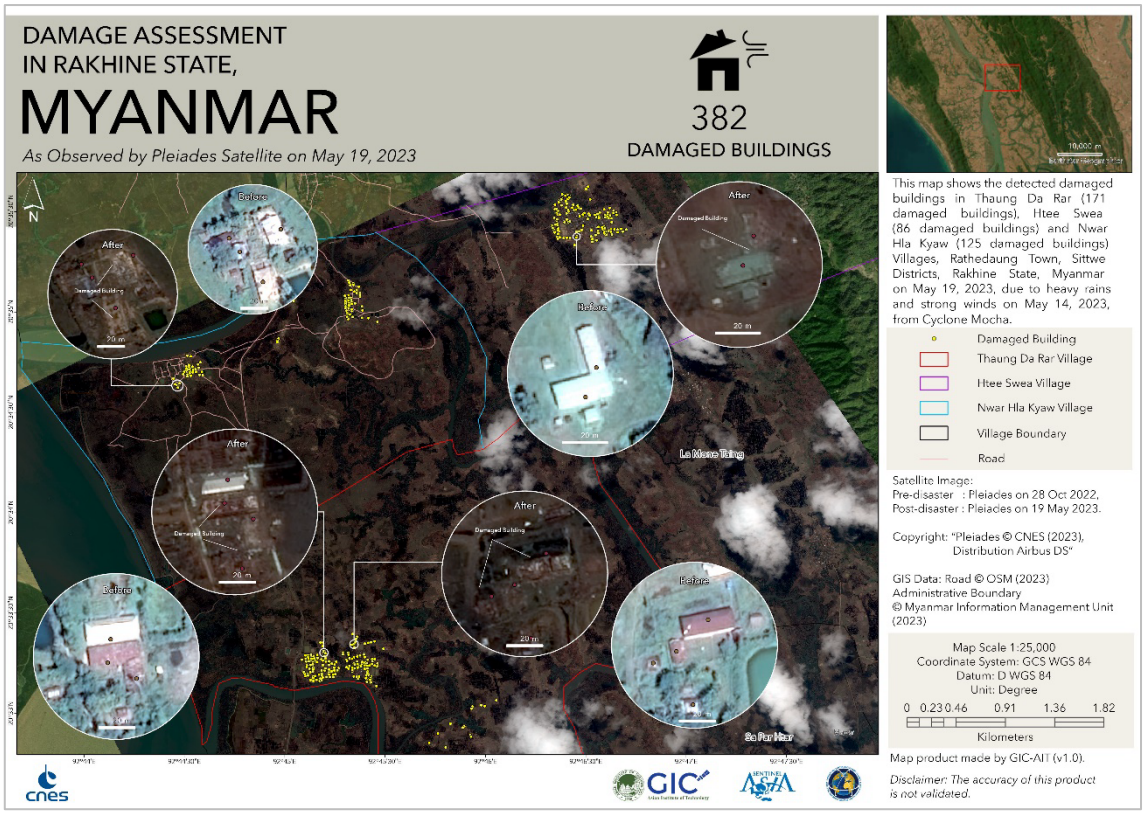
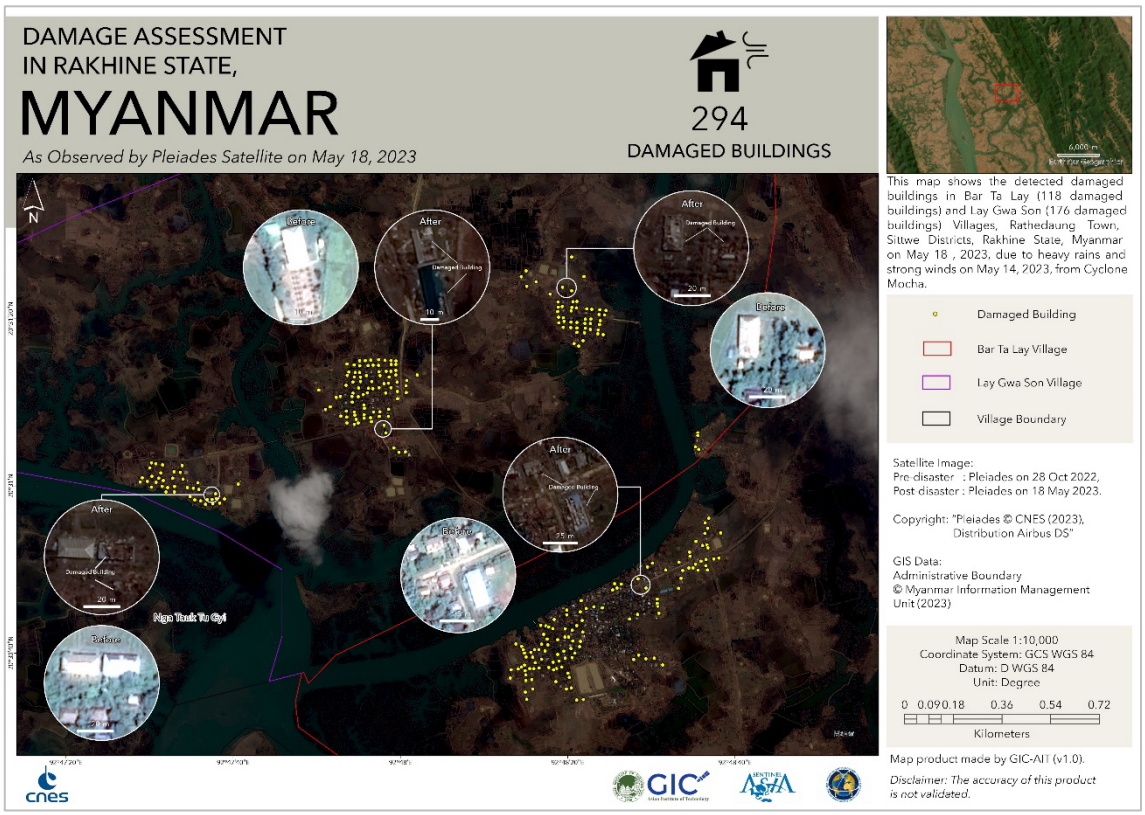
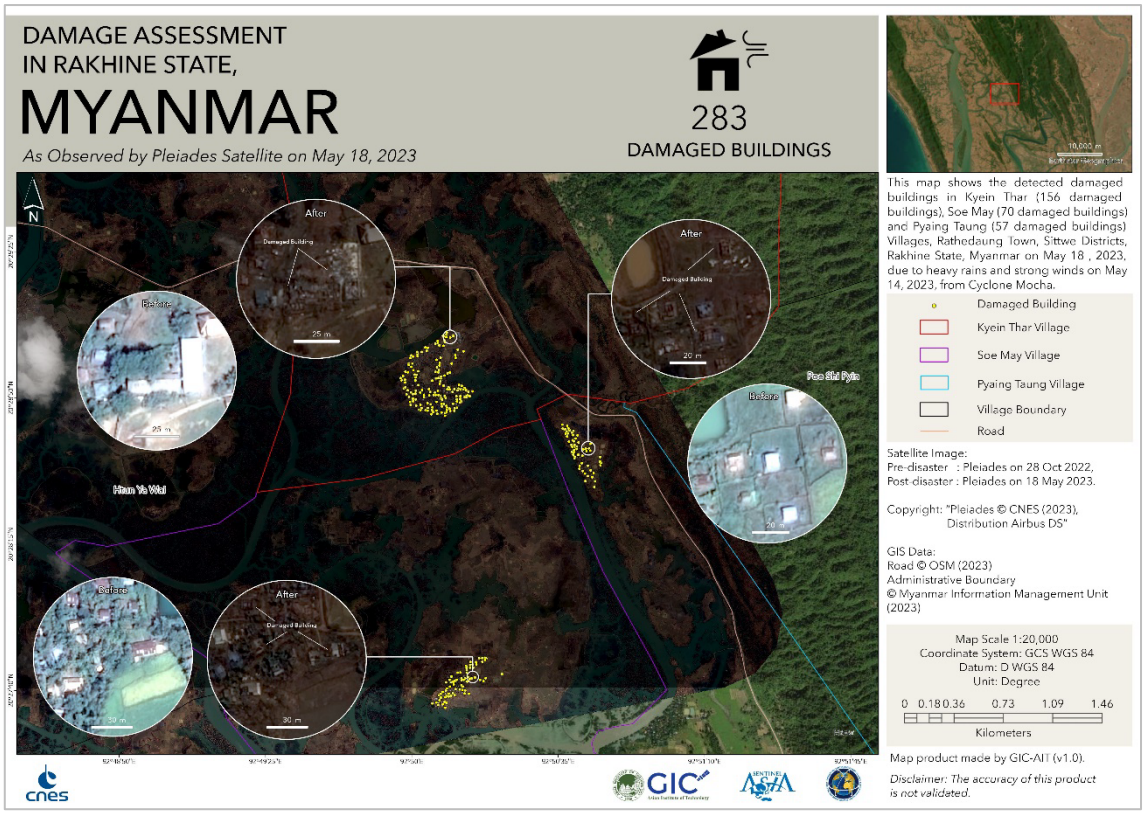
Kilometers
Map product made by GIC-AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.


DAMAGE ASSESSMENT
IN RAKHINE STATE,
MYANMAR
As Observed by Pleiades Satellite on May 19, 2023
382
DAMAGED BUILDINGS
This map shows the detected damaged buildings in Thaung Da Rar (171 damaged buildings), Htee Swea (86 damaged buildings) and Nwar Hla Kyaw (125 damaged buildings) Villages, Rathedaung Town, Sittwe Districts, Rakhine State, Myanmar on May 19, 2023, due to heavy rains and strong winds on May 14, 2023, from Cyclone Mocha.
Damaged Building
Thaung Da Rar Village
Htee Swea Village
Nwar Hla Kyaw Village
Village Boundary
Road
Satellite Image:
Pre-disaster : Pleiades on 28 Oct 2022,
Post-disaster : Pleiades on 19 May 2023.
Copyright: "Pleiades © CNES (2023), Distribution Airbus DS"
GIS Data: Road © OSM (2023)
Administrative Boundary
© Myanmar Information Management Unit (2023)
Map Scale 1:25,000
Coordinate System: GCS WGS 84
Datum: D WGS 84
Unit: Degree
0 0.23 0.46 0.91 1.36 1.82
Kilometers
Map product made by GIC-AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.
Before
After
La Khone Taing
Sa Par Nar
cnes
GIC


DAMAGE ASSESSMENT
IN RAKHINE STATE,
MYANMAR
As Observed by Pleiades Satellite on May 18, 2023
294
DAMAGED BUILDINGS
This map shows the detected damaged buildings in Bar Ta Lay (118 damaged buildings) and Lay Gwa Son (176 damaged buildings) Villages, Rathedaung Town, Sittwe Districts, Rakhine State, Myanmar on May 18 , 2023, due to heavy rains and strong winds on May 14, 2023, from Cyclone Mocha.
Damaged Building
Bar Ta Lay Village
Lay Gwa Son Village
Village Boundary
Satellite Image:
Pre-disaster : Pleiades on 28 Oct 2022,
Post-disaster : Pleiades on 18 May 2023.
Copyright: "Pleiades © CNES (2023), Distribution Airbus DS"
GIS Data:
Administrative Boundary
© Myanmar Information Management Unit (2023)
Map Scale 1:10,000
Coordinate System: GCS WGS 84
Datum: D WGS 84
Unit: Degree
0 0.09 0.18 0.36 0.54 0.72
Kilometers
Map product made by GIC-AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.
Before
After
Nga Thauk Tu Gyi
cnes
GIC


DAMAGE ASSESSMENT
IN RAKHINE STATE,
MYANMAR
As Observed by Pleiades Satellite on May 18, 2023
283
DAMAGED BUILDINGS
This map shows the detected damaged buildings in Kyein Thar (156 damaged buildings), Soe May (70 damaged buildings) and Pyaing Taung (57 damaged buildings) Villages, Rathedaung Town, Sittwe Districts, Rakhine State, Myanmar on May 18 , 2023, due to heavy rains and strong winds on May 14, 2023, from Cyclone Mocha.
Damaged Building
Kyein Thar Village
Soe May Village
Pyaing Taung Village
Village Boundary
Road
Satellite Image:
Pre-disaster : Pleiades on 28 Oct 2022,
Post-disaster : Pleiades on 18 May 2023.
Copyright: "Pleiades © CNES (2023), Distribution Airbus DS"
GIS Data:
Road © OSM (2023)
Administrative Boundary
© Myanmar Information Management Unit (2023)
Map Scale 1:20,000
Coordinate System: GCS WGS 84
Datum: D WGS 84
Unit: Degree
0 0.18 0.36 0.73 1.09 1.46
Kilometers
Map product made by GIC-AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.
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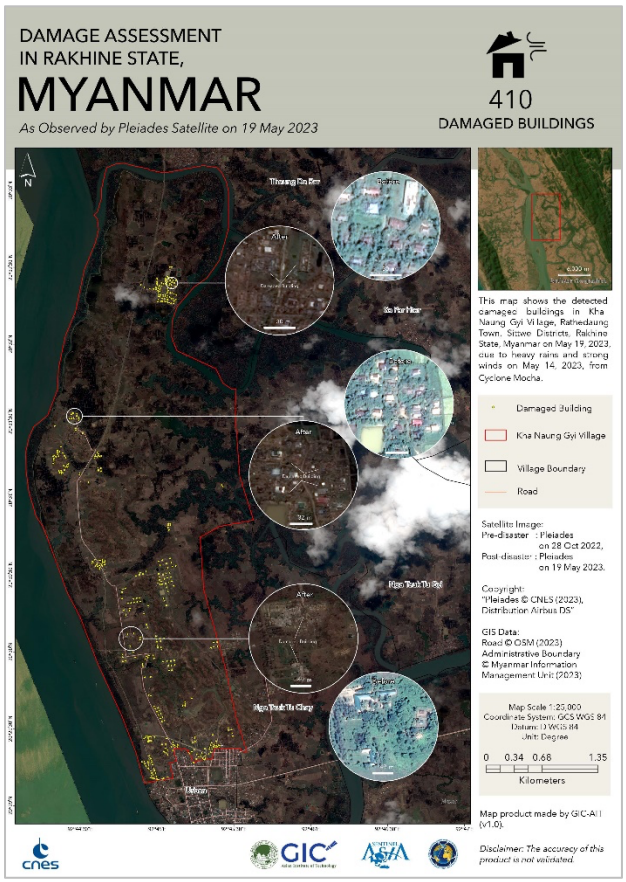
GIC
AIT


DAMAGE ASSESSMENT
IN RAKHINE STATE,
MYANMAR
As Observed by Pleiades Satellite on 19 May 2023
410
DAMAGED BUILDINGS
This map shows the detected damaged buildings in Kha Naung Gyi Village, Rathedaung Town, Sittwe Districts, Rakhine State, Myanmar on May 19, 2023, due to heavy rains and strong winds on May 14, 2023, from Cyclone Mocha.
Damaged Building
Kha Naung Gyi Village
Village Boundary
Road
Satellite Image:
Pre-disaster : Pleiades on 28 Oct 2022,
Post-disaster : Pleiades on 19 May 2023.
Copyright: "Pleiades © CNES (2023), Distribution Airbus DS"
GIS Data:
Road © OSM (2023)
Administrative Boundary
© Myanmar Information Management Unit (2023)
Map Scale 1:25,000
Coordinate System: GCS WGS 84
Datum: D WGS 84
Unit: Degree
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Kilometers
Map product made by GIC-AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.
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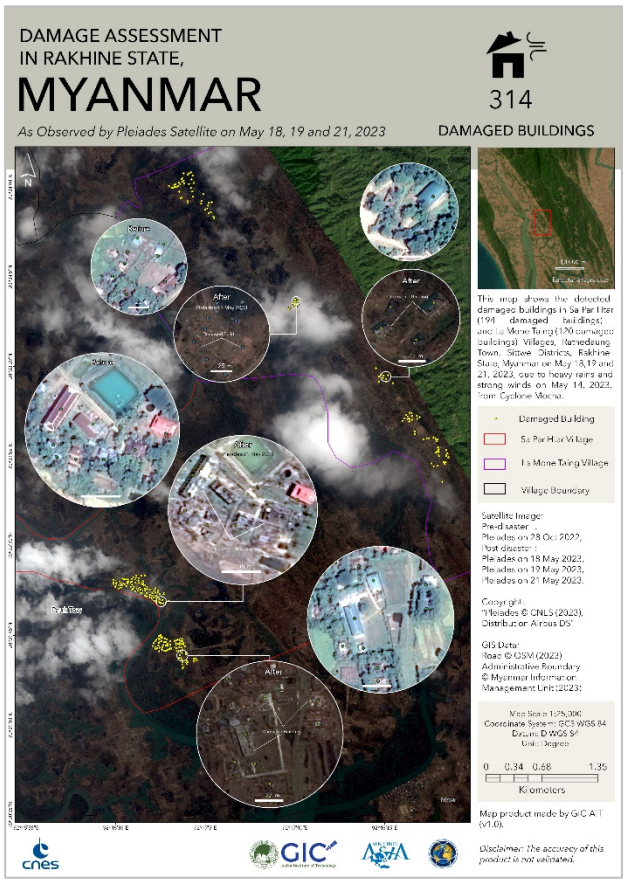
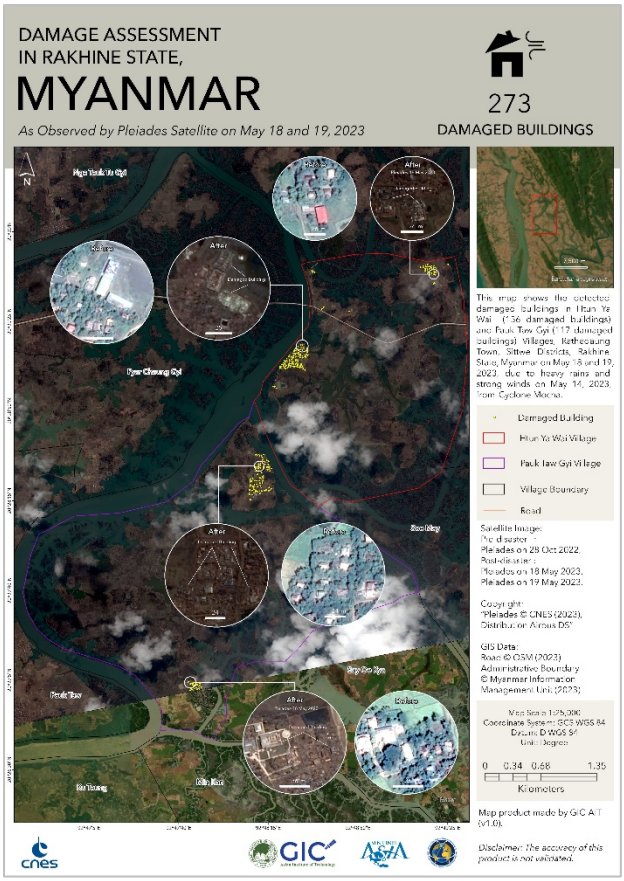
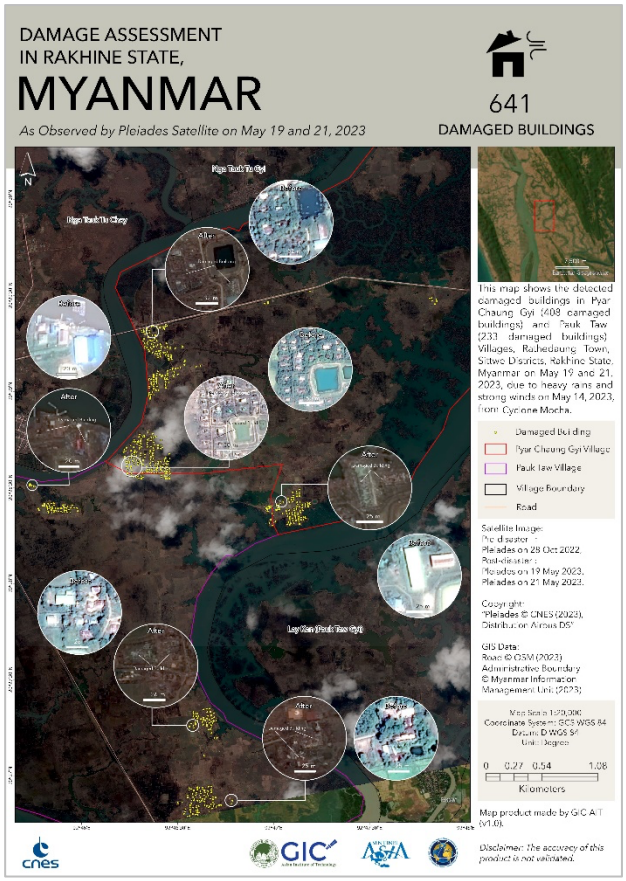
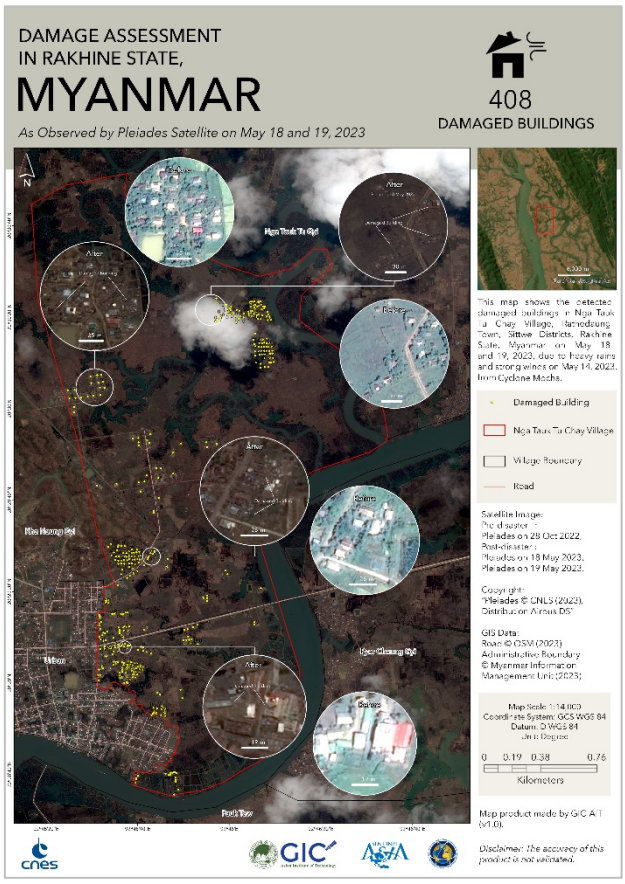
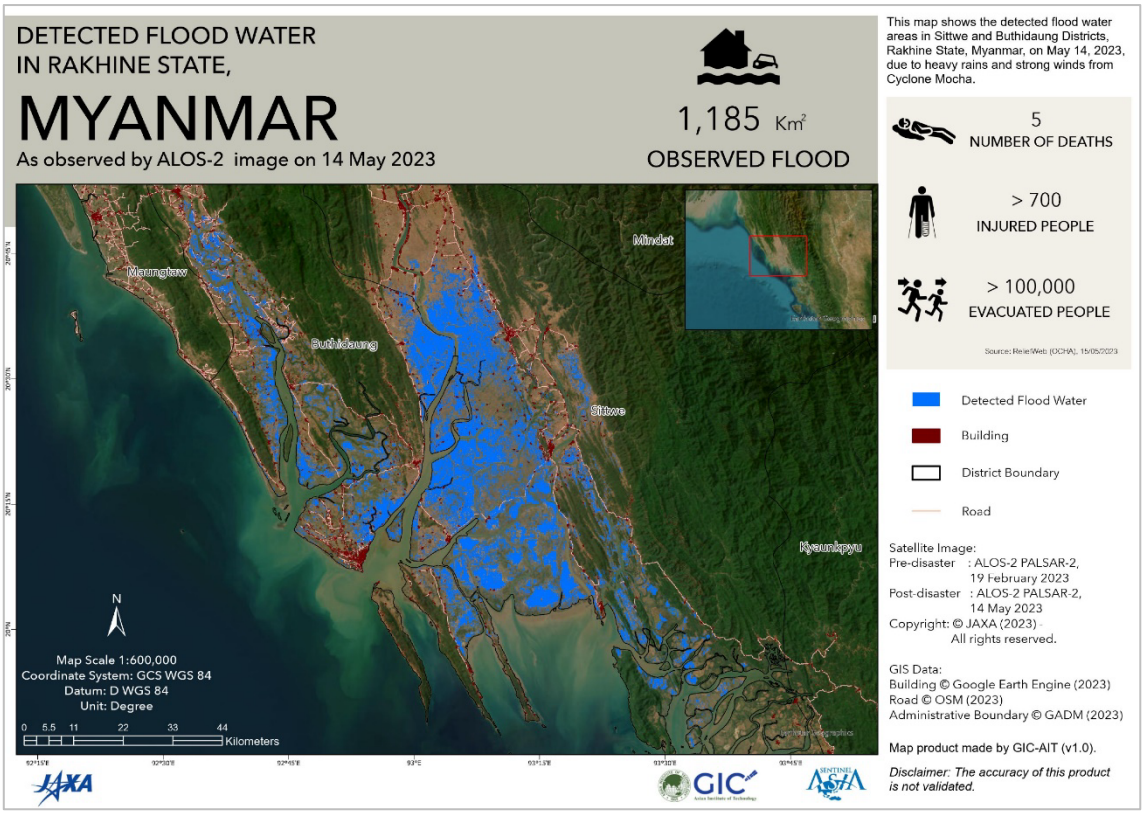
AIT


DAMAGE ASSESSMENT
IN RAKHINE STATE,
MYANMAR
As Observed by Pleiades Satellite on May 18, 19 and 21, 2023
314
DAMAGED BUILDINGS
This map shows the detected damaged buildings in Sa Par Htar (194 damaged buildings) and Ta Mone Taung (120 damaged buildings) Villages, Rathedaung Town, Sittwe Districts, Rakhine State, Myanmar on May 18,19 and 21, 2023, due to heavy rains and strong winds on May 14, 2023, from Cyclone Mocha.
Damaged Building
Sa Par Htar Village
Ta Mone Taing Village
Village Boundary
Satellite Image:
Pre-disaster :
Pleiades on 28 Oct 2022,
Post disaster :
Pleiades on 18 May 2023,
Pleiades on 19 May 2023,
Pleiades on 21 May 2023.
Copyright:
"Pleiades © CNES (2023), Distribution Airbus DS"
GIS Data:
Road © OSM (2023)
Administrative Boundary
© Myanmar Information Management Unit (2023)
0 0.34 0.68 1.35
Kilometers
Map product made by GIC AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.
cnes
GIC
AIT

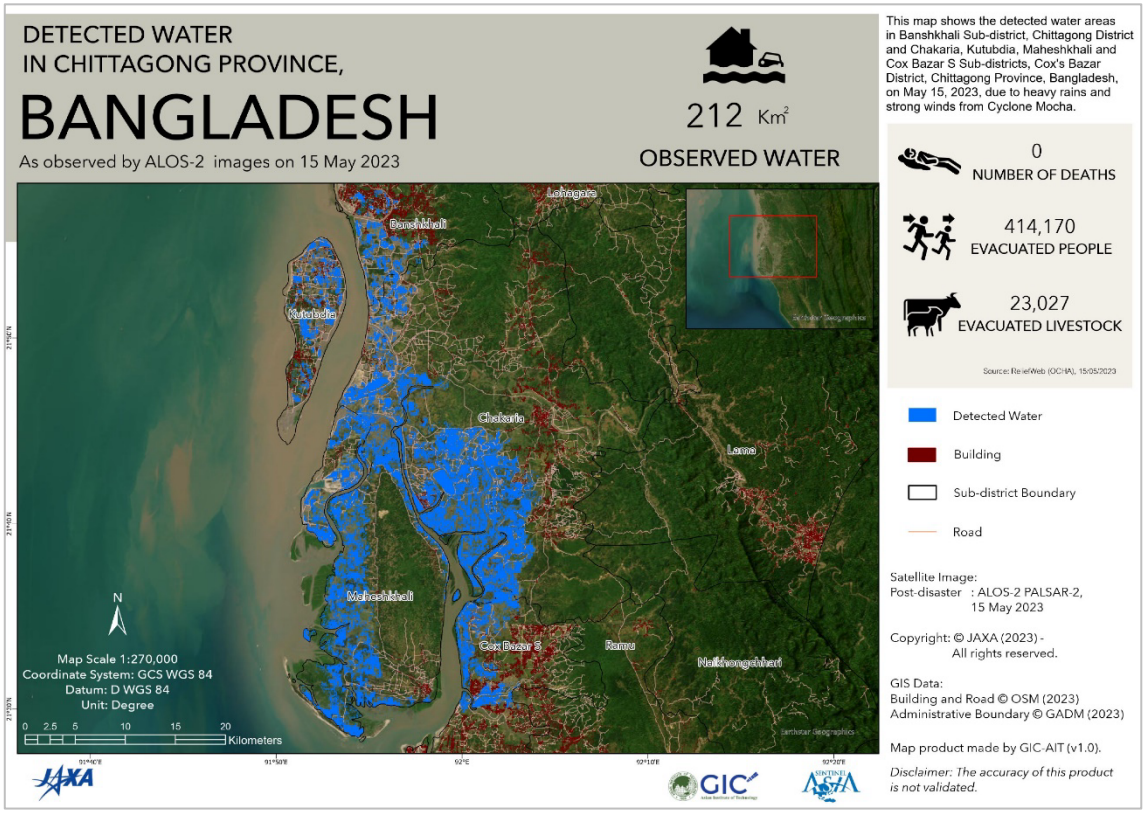

DAMAGE ASSESSMENT
IN RAKHINE STATE,
MYANMAR
As Observed by Pleiades Satellite on May 18 and 19, 2023
273
DAMAGED BUILDINGS
Damaged Building
Htun Ya Wai Village
Pauk Taw Gyi Village
Village Boundary
Road
Kilometers
GIC


DAMAGE ASSESSMENT
IN RAKHINE STATE,
MYANMAR
As Observed by Pleiades Satellite on May 19 and 21, 2023
641
DAMAGED BUILDINGS
Damaged Building
Pyar Chaung Gyi Village
Pauk Taw Village
Village Boundary
Road
Kilometers
GIC

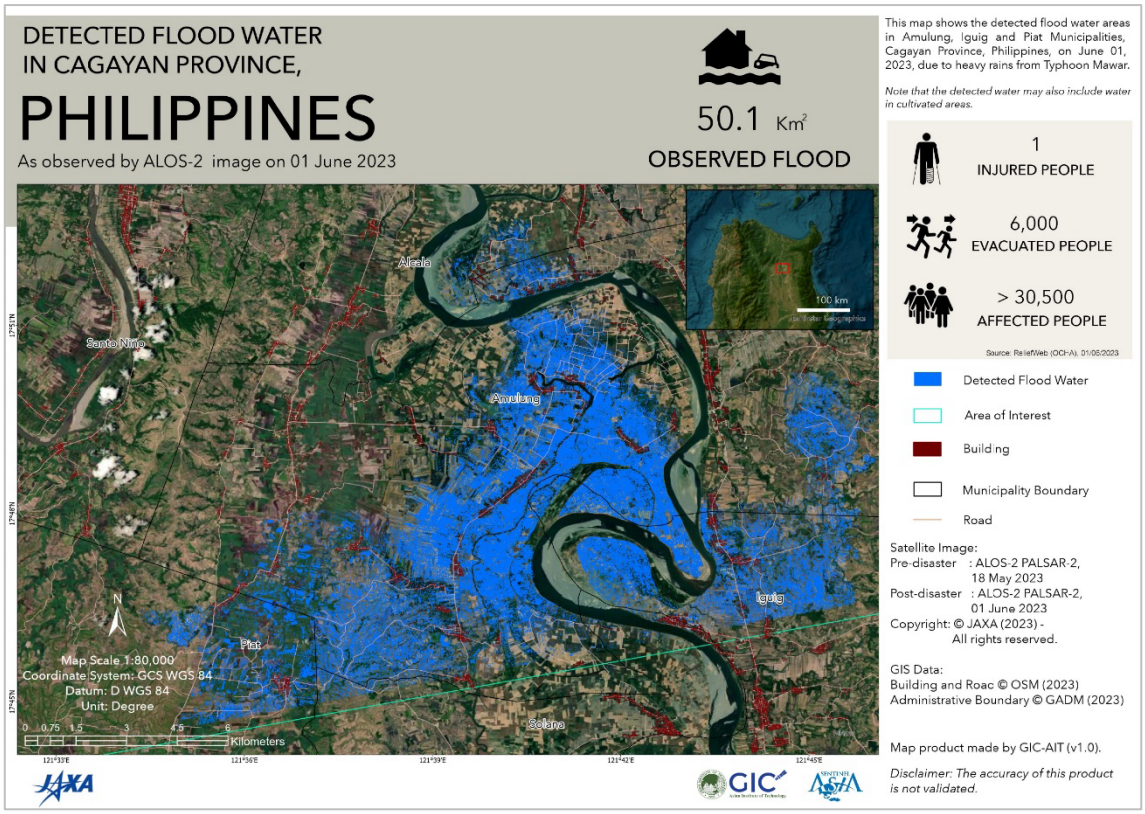

DAMAGE ASSESSMENT
IN RAKHINE STATE,
MYANMAR
As Observed by Pleiades Satellite on May 18 and 19, 2023
408
DAMAGED BUILDINGS
Damaged Building
Nga Taung Ta Chay Village
Village Boundary
Road
Kilometers
GIC



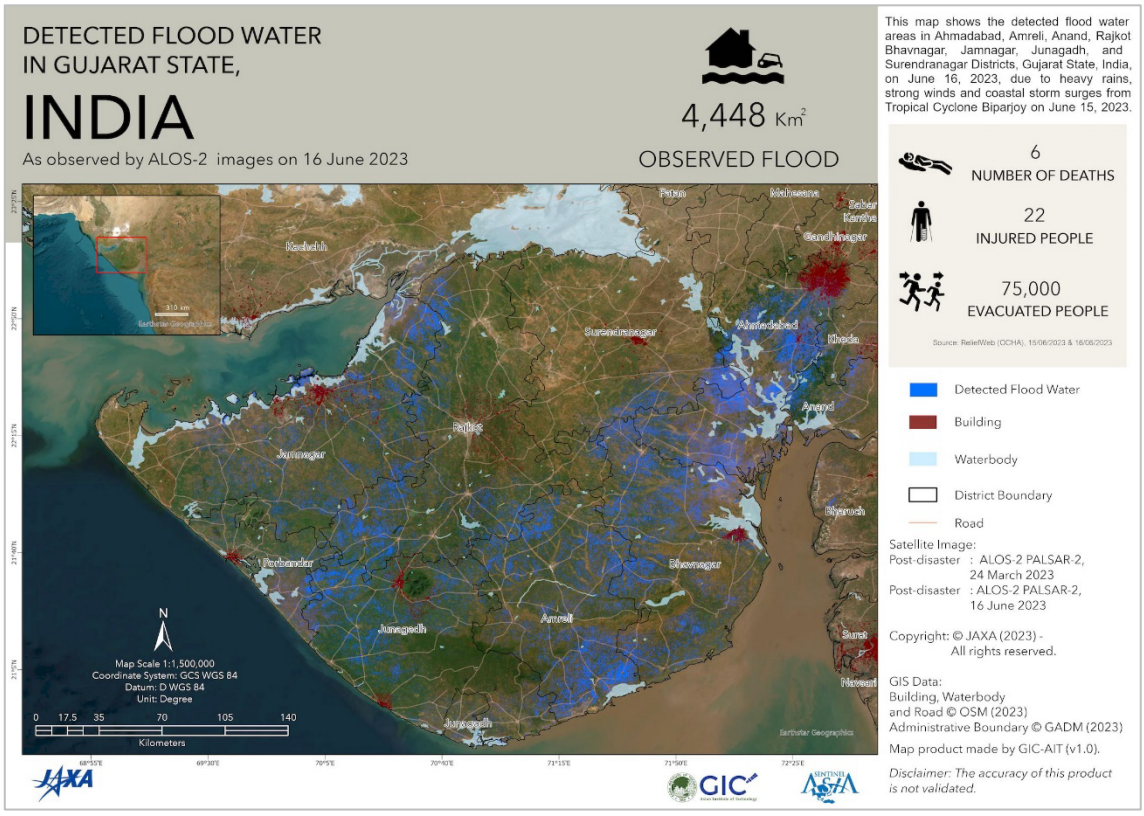
3. Flood in Bangladesh on 14 May 2023



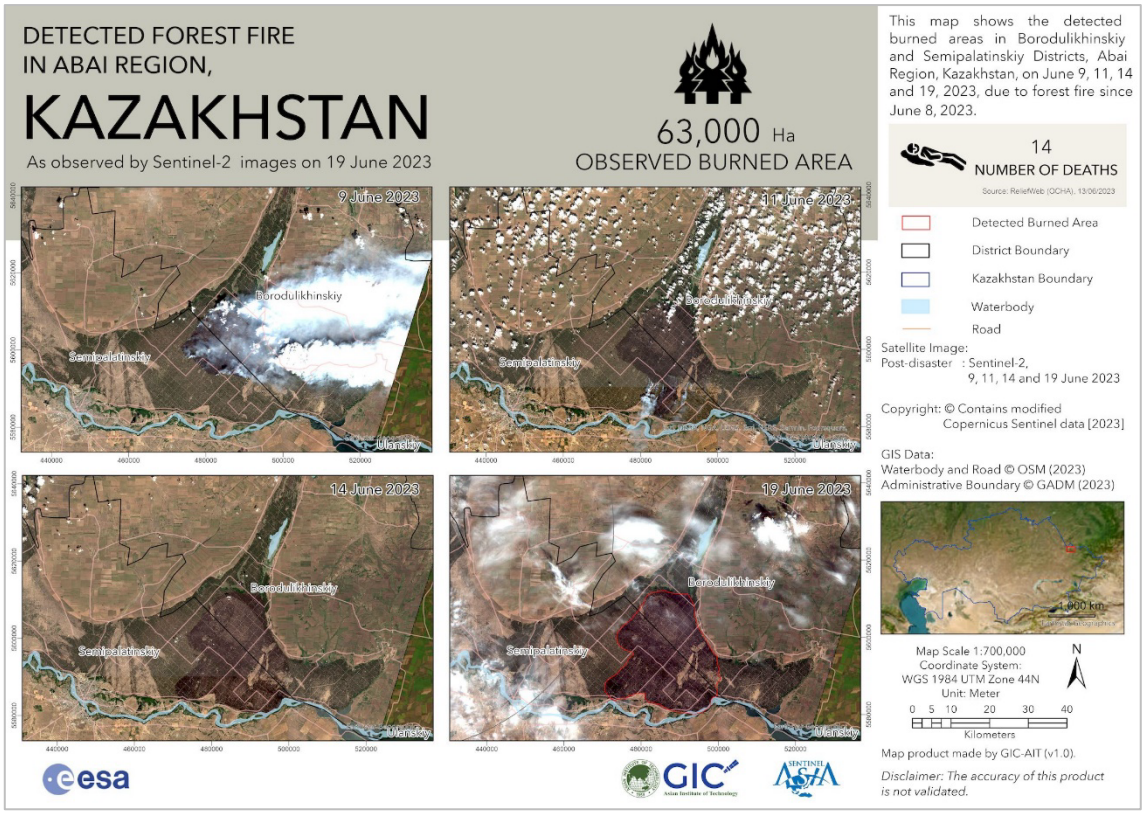
4. Flood in Philippines on 27 May 2023



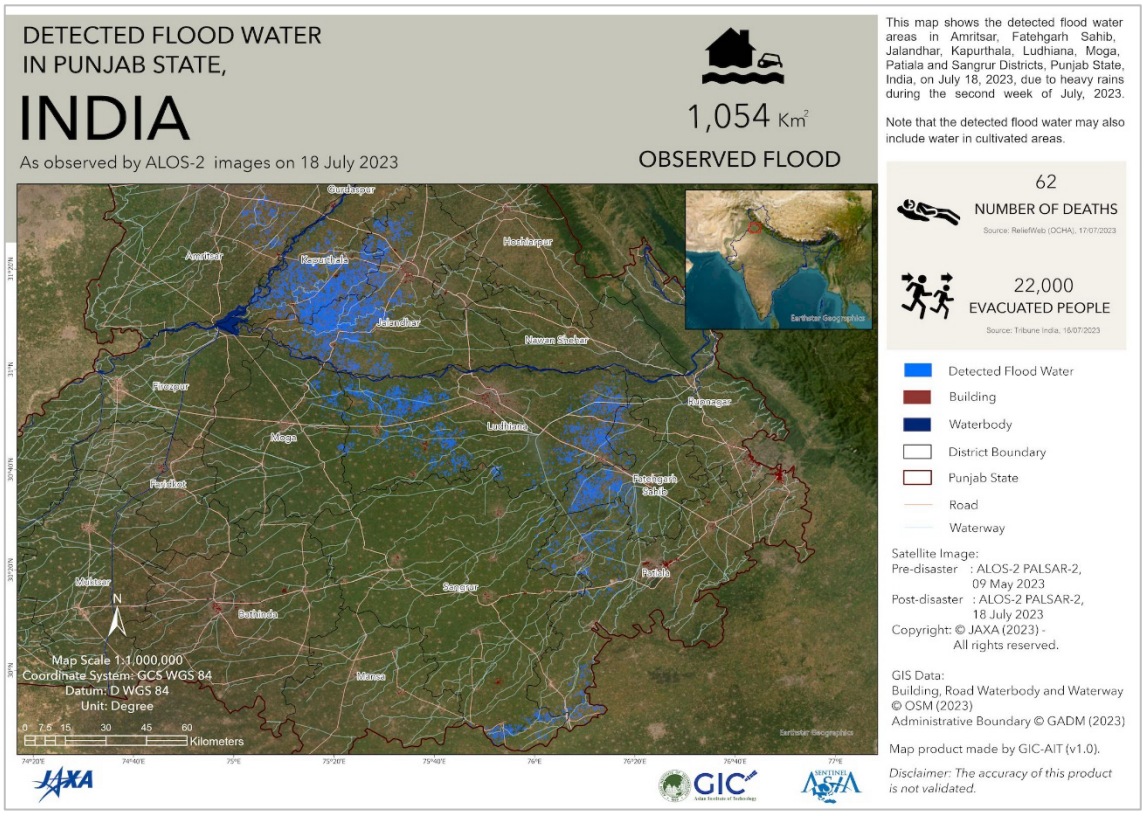
5. Flood in India on 15 June 2023



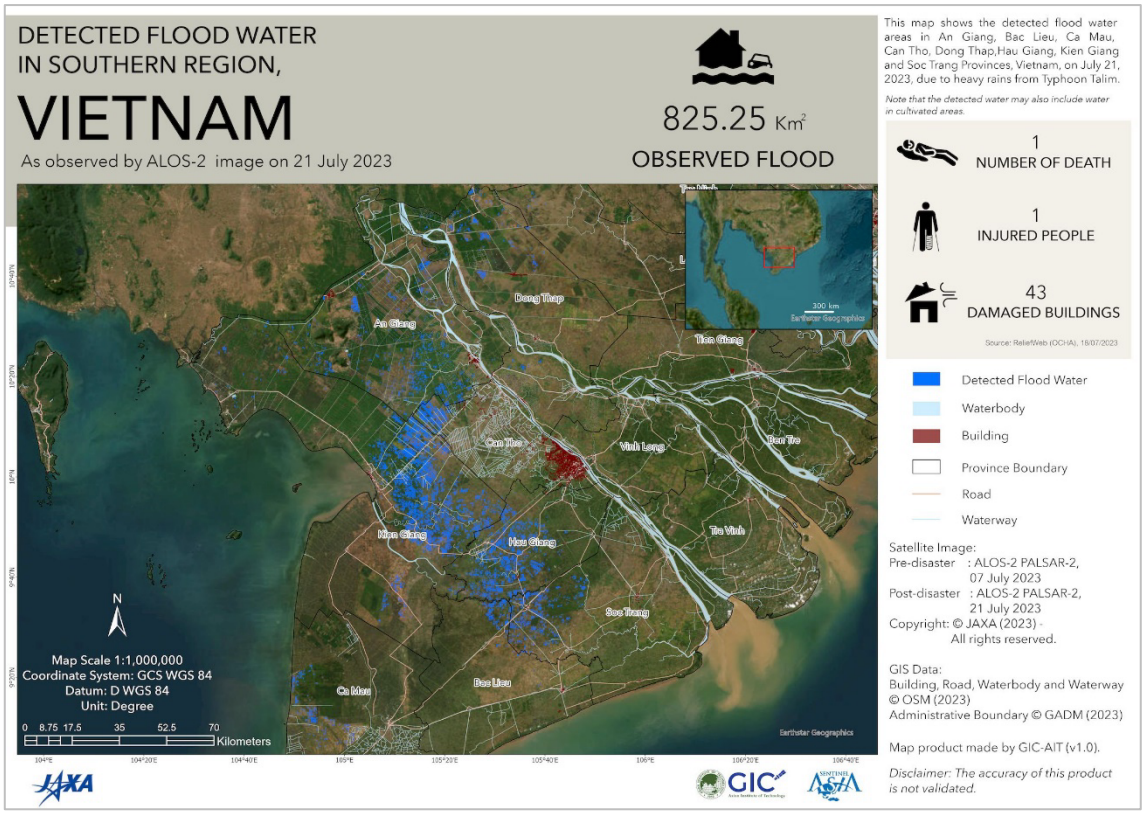
6. Forest Fire in Kazakhstan on 08 June 2023

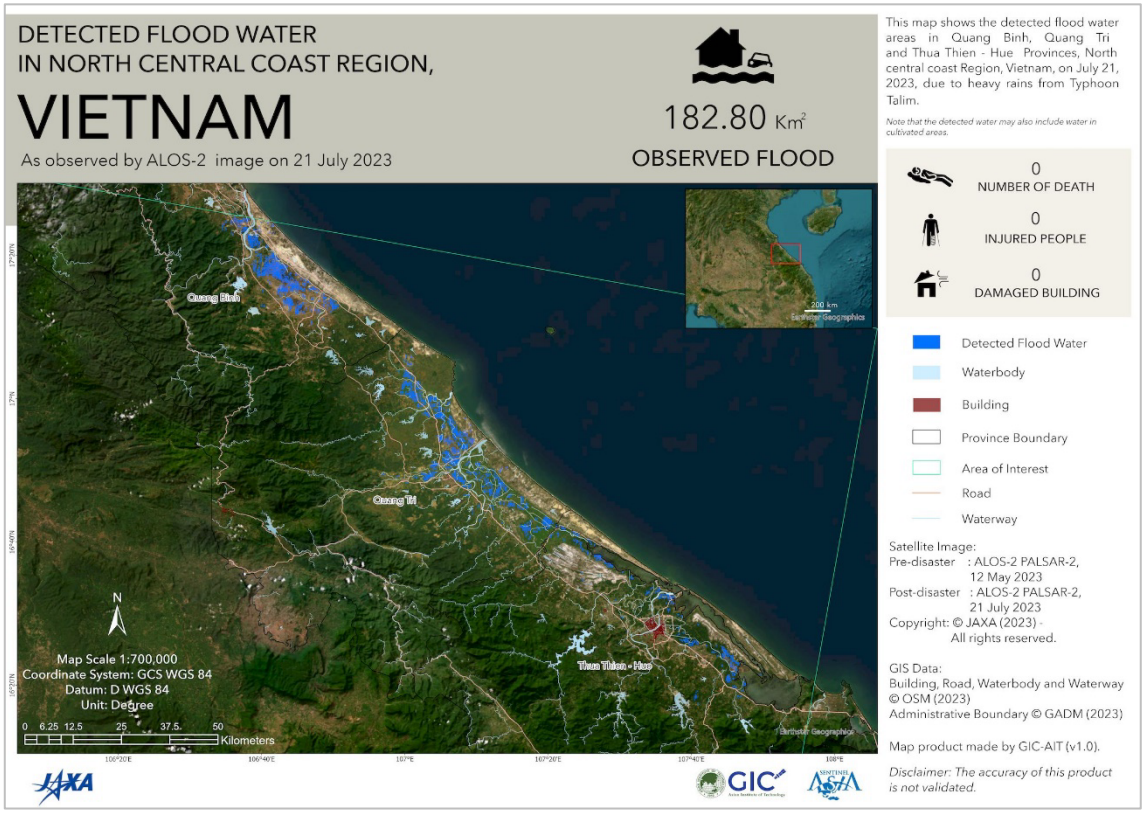


7. Flood in India on 13 July 2023

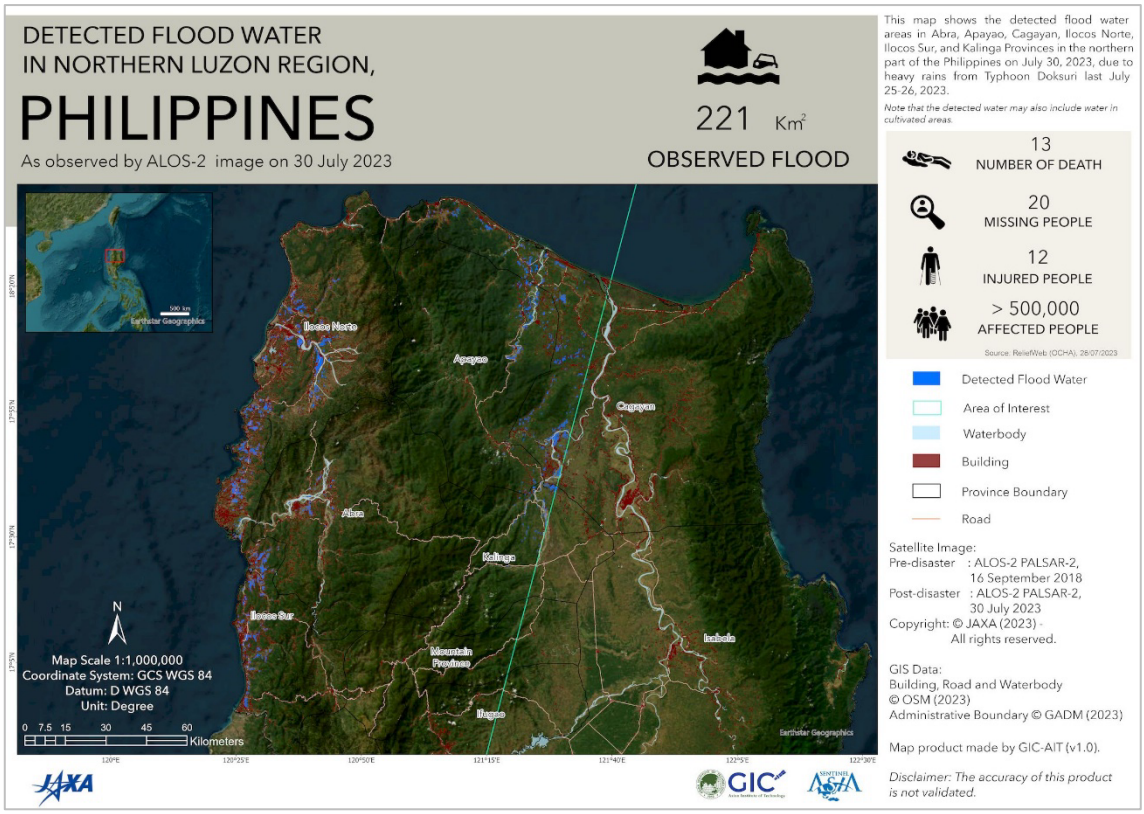


8. Flood in Vietnam on 18 July 2023

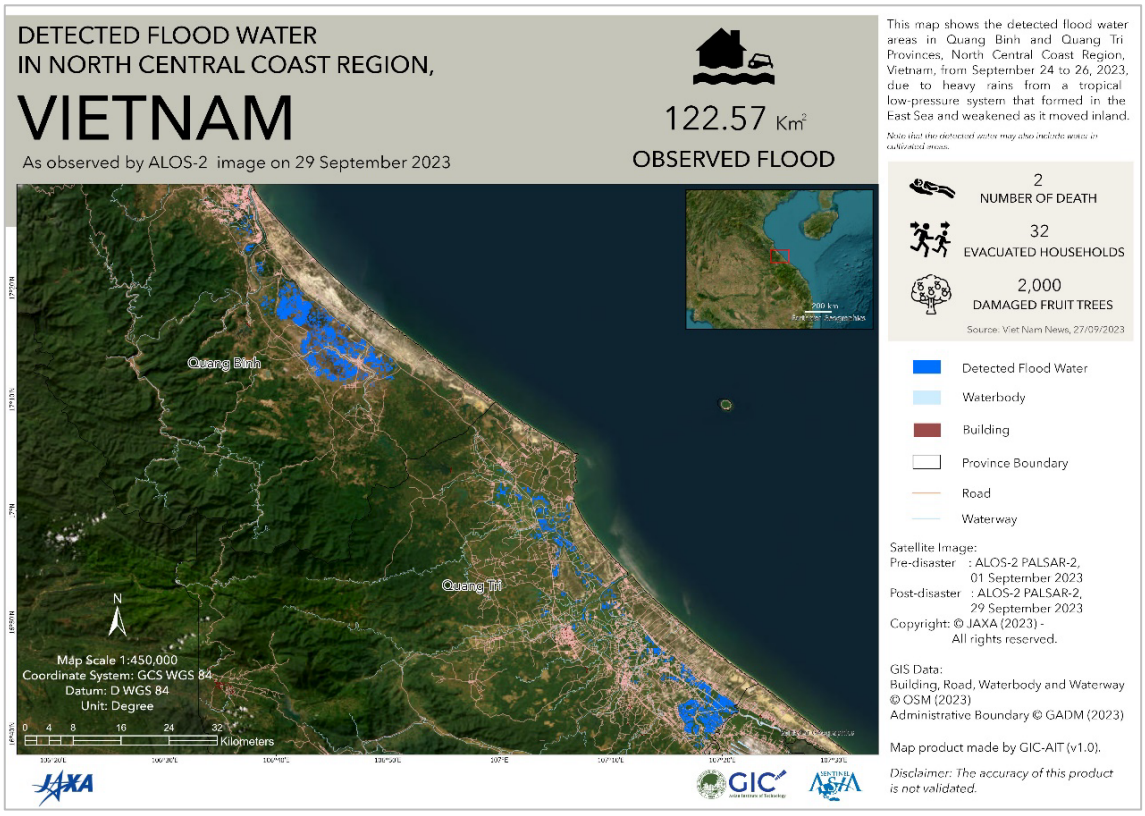


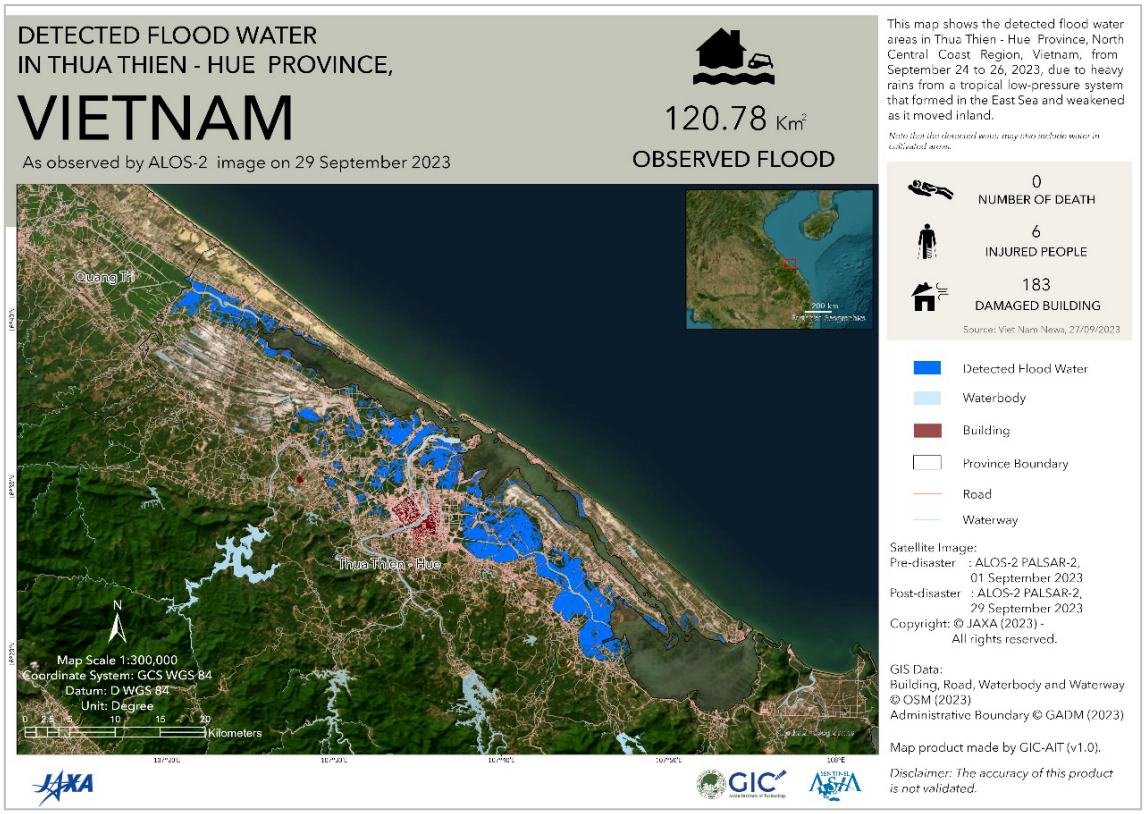


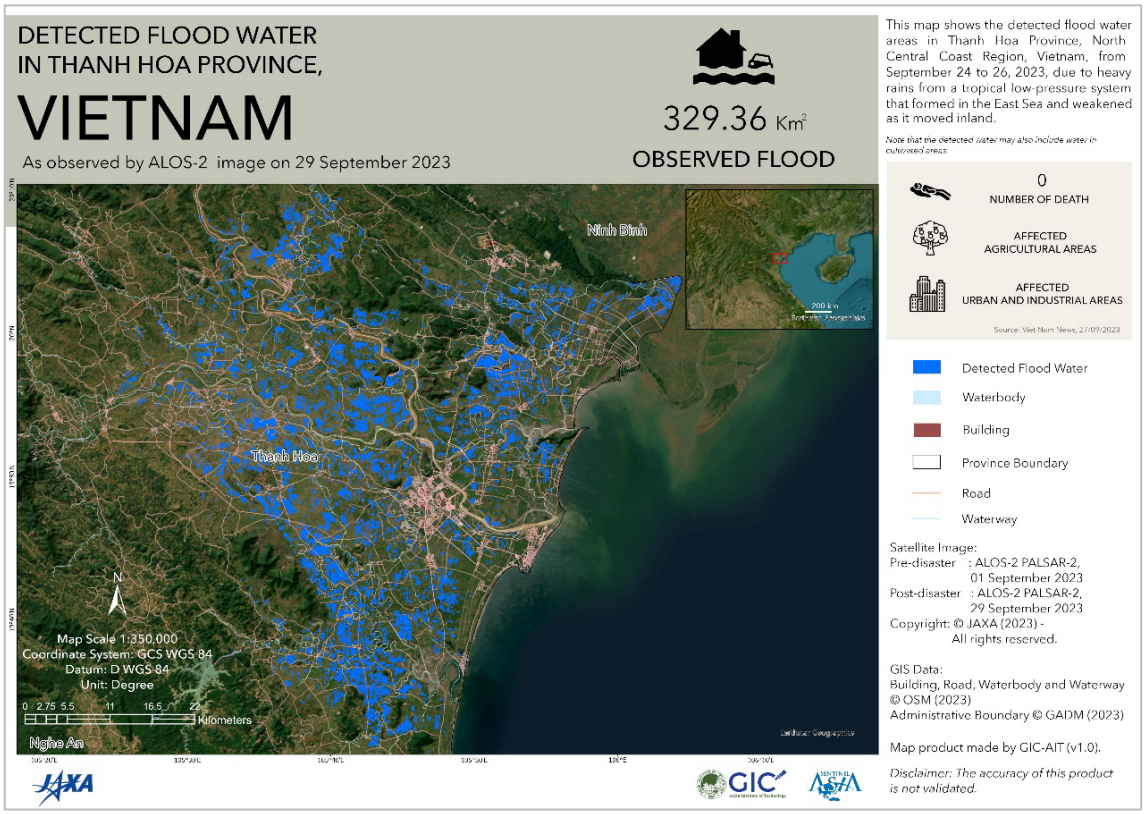
9. Flood in Philippines on 25 July 2023

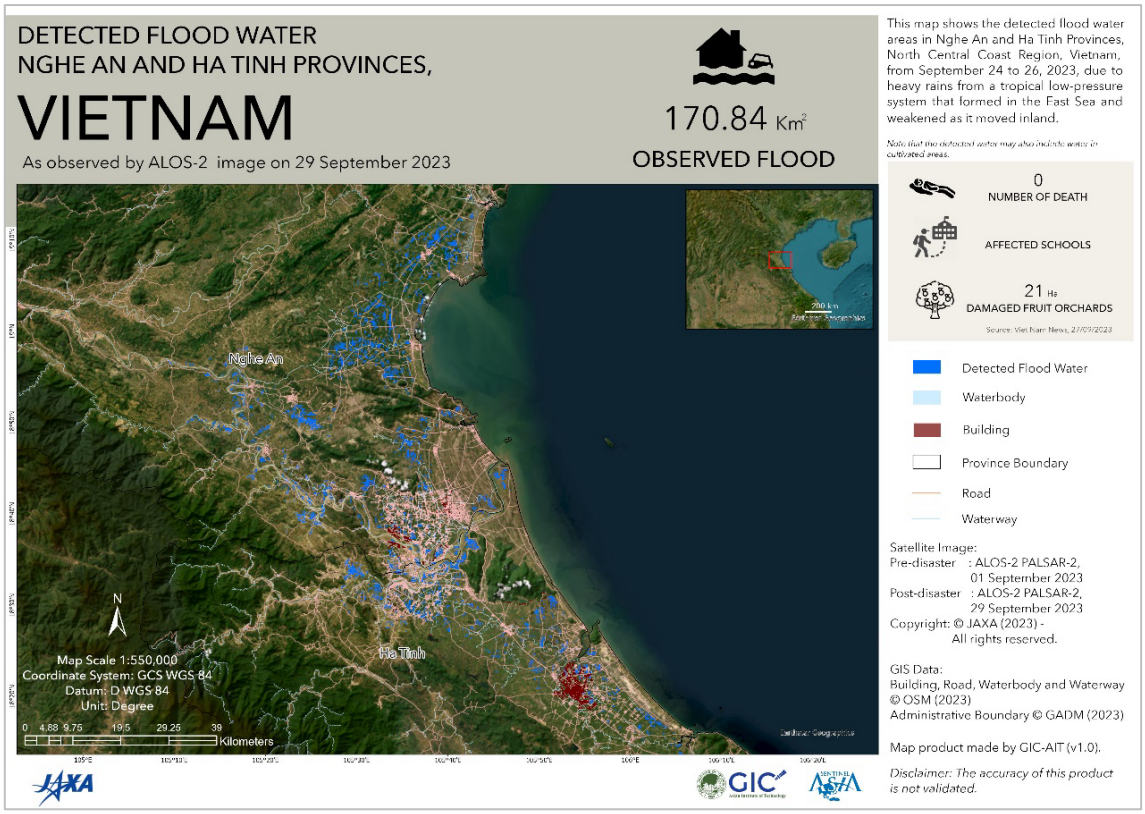


10. Flood in Central Vietnam on 26 September 2023

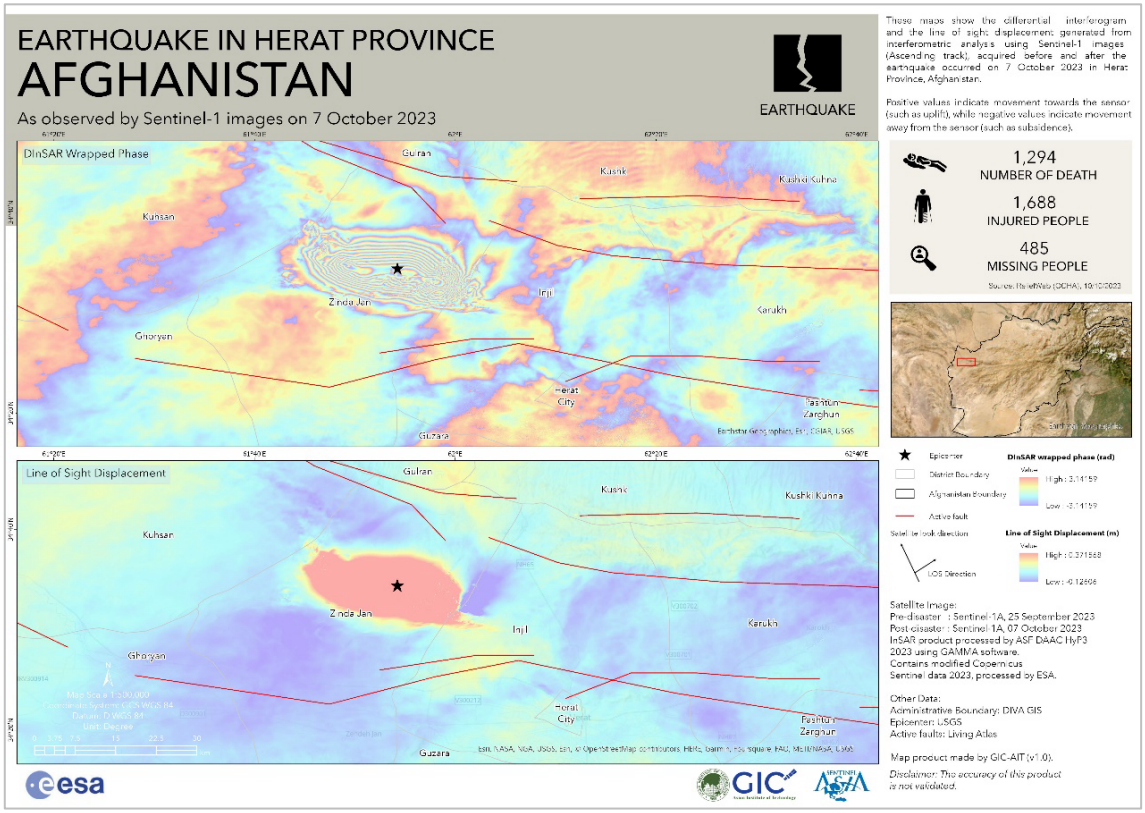



DETECTED FLOOD WATER
IN THUA THIEN - HUE PROVINCE,
VIETNAM
As observed by ALOS-2 image on 29 September 2023
120.78 Km²
OBSERVED FLOOD
This map shows the detected flood water areas in Thua Thien - Hue Province, North Central Coast Region, Vietnam, from September 24 to 26, 2023, due to heavy rains from a tropical low-pressure system that formed in the East Sea and weakened as it moved inland.
Note that the detected water may also include water in cultivated areas.
0
NUMBER OF DEATH
6
INJURED PEOPLE
183
DAMAGED BUILDING
Source: Viet Nam News, 27/09/2023
Quang Tri
Thua Thien - Hue
Detected Flood Water
Waterbody
Building
Province Boundary
Road
Waterway
Satellite Image:
Pre-disaster : ALOS-2 PALSAR-2, 01 September 2023
Post-disaster : ALOS-2 PALSAR-2, 29 September 2023
Copyright: © JAXA (2023) - All rights reserved.
GIS Data:
Building, Road, Waterbody and Waterway © OSM (2023)
Administrative Boundary © GADM (2023)
Map product made by GIC-AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.
N
Map Scale 1:300,000
Coordinate System: GCS WGS 84
Datum: D WGS 84
Unit: Degree
0 2.5 5 10 15 20
Kilometers
JAXA
GIC

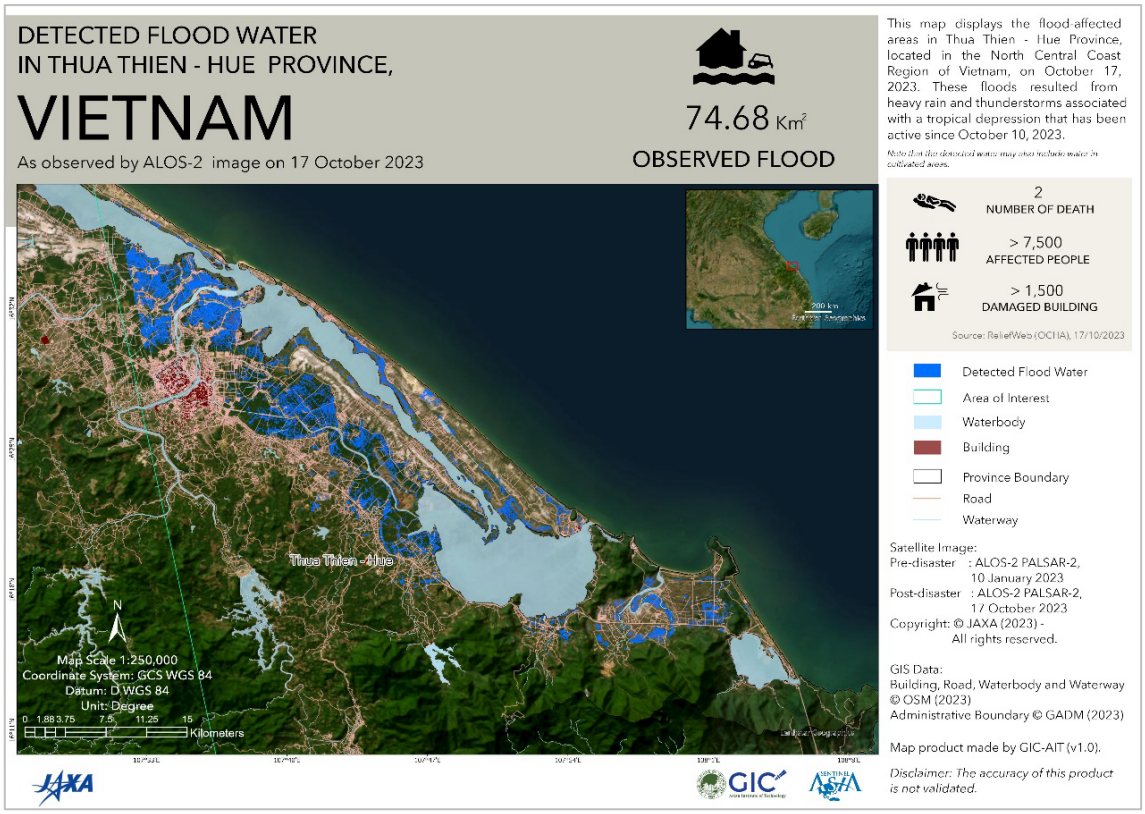

DETECTED FLOOD WATER
IN THANH HOA PROVINCE,
VIETNAM
As observed by ALOS-2 image on 29 September 2023
329.36 Km²
OBSERVED FLOOD
This map shows the detected flood water areas in Thanh Hoa Province, North Central Coast Region, Vietnam, from September 24 to 26, 2023, due to heavy rains from a tropical low-pressure system that formed in the East Sea and weakened as it moved inland.
Note that the detected water may also include water in cultivated areas.
0
NUMBER OF DEATH
AFFECTED AGRICULTURAL AREAS
AFFECTED URBAN AND INDUSTRIAL AREAS
Source: Viet Nam News, 27/09/2023
Ninh Binh
Thanh Hoa
Nghe An
Detected Flood Water
Waterbody
Building
Province Boundary
Road
Waterway
Satellite Image:
Pre-disaster : ALOS-2 PALSAR-2, 01 September 2023
Post-disaster : ALOS-2 PALSAR-2, 29 September 2023
Copyright: © JAXA (2023) - All rights reserved.
GIS Data:
Building, Road, Waterbody and Waterway © OSM (2023)
Administrative Boundary © GADM (2023)
Map product made by GIC-AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.
N
Map Scale 1:350,000
Coordinate System: GCS WGS 84
Datum: D WGS 84
Unit: Degree
0 2.75 5.5 11 16.5 22
Kilometers
JAXA
GIC



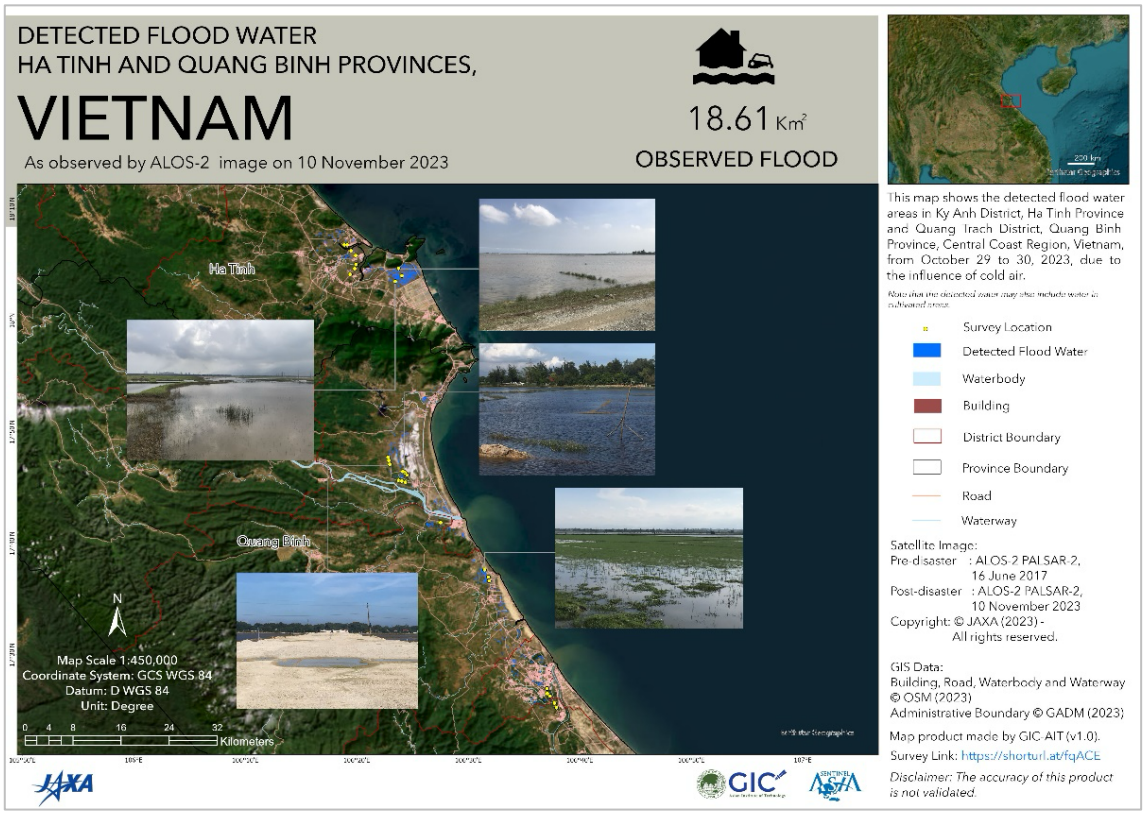
11. Earthquake in Afghanistan on 07 October 2023

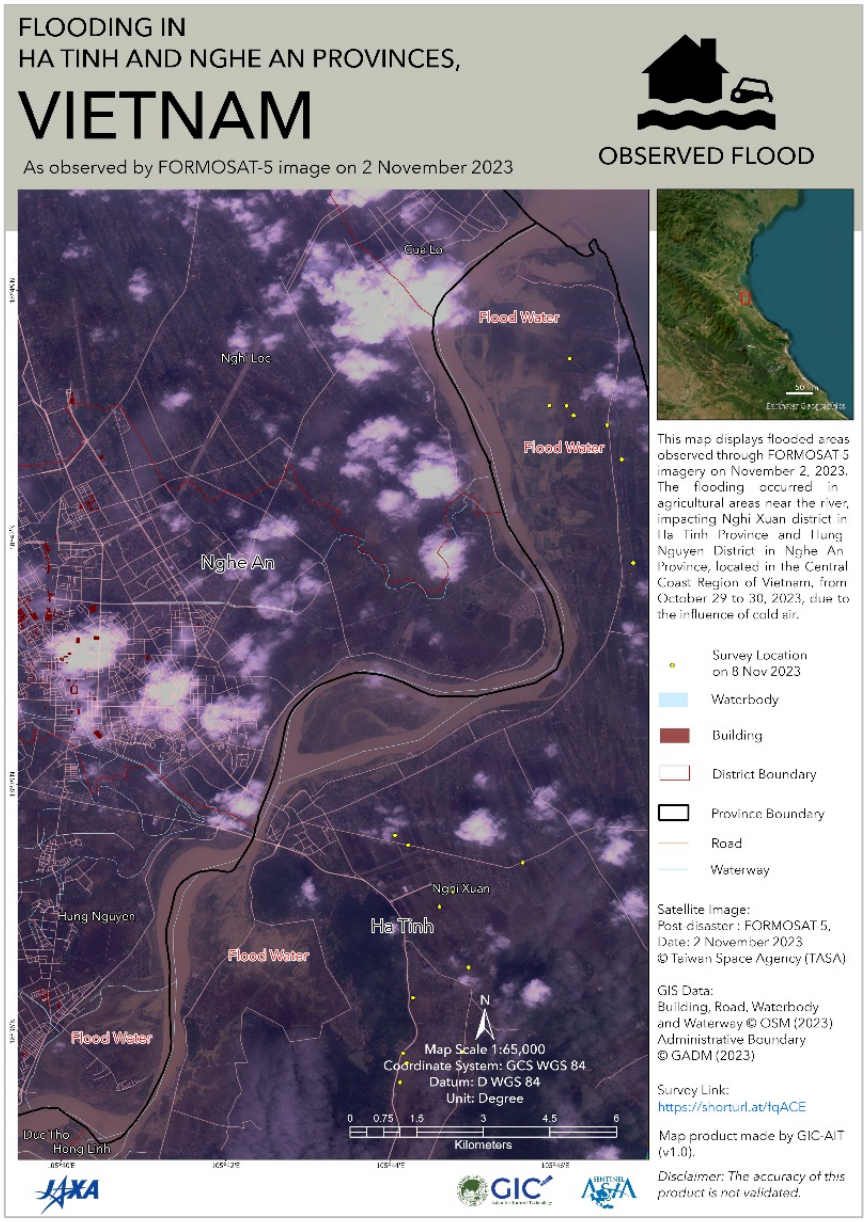


12. Flood in Central Vietnam on 13 October 2023

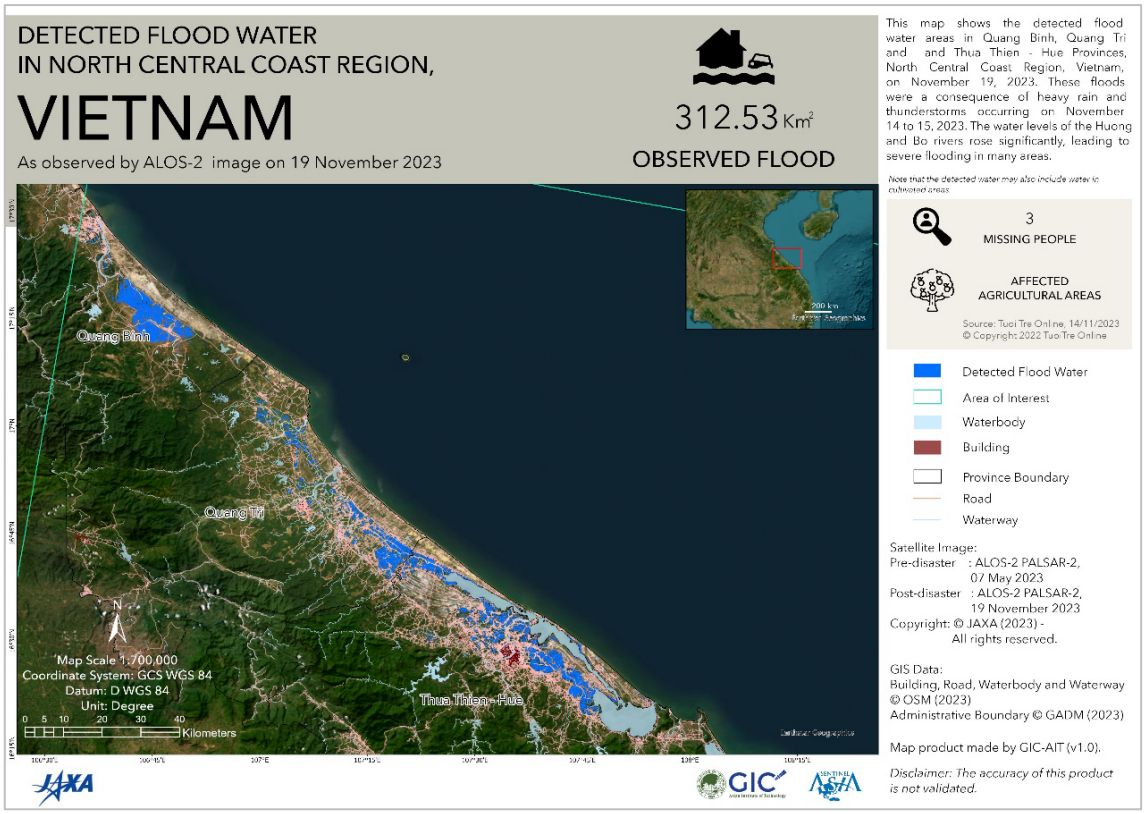


13. Flood in Ha Tinh province, Vietnam on 30 October 2023

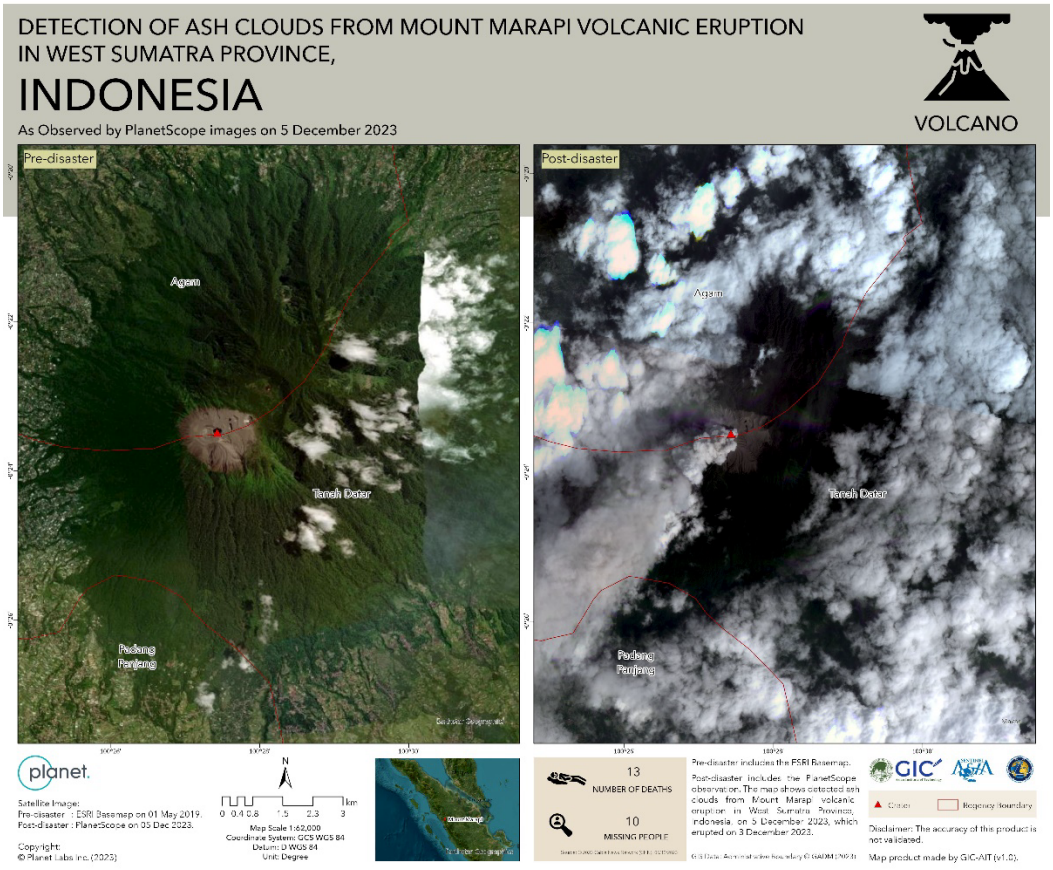



FLOODING IN
HA TINH AND NGHE AN PROVINCES,
VIETNAM
As observed by FORMOSAT-5 image on 2 November 2023
OBSERVED FLOOD
Cua Lo
Flood Water
Nghi Loc
Flood Water
Nghe An
Ngoi Xuan
Hung Nguyen
Ha Tinh
Flood Water
Flood Water
N
Map Scale 1:65,000
Coordinate System: GCS WGS 84
Datum: D WGS 84
Unit: Degree
0 0.75 1.5 3 4.5 6
Kilometers
Duc Tho
Hong Linh
This map displays flooded areas observed through FORMOSAT-5 imagery on November 2, 2023. The flooding occurred in agricultural areas near the river, impacting Nghi Xuan district in Ha Tinh Province and Hung Nguyen District in Nghe An Province, located in the Central Coast Region of Vietnam, from October 29 to 30, 2023, due to the influence of cold air.
Survey Location on 8 Nov 2023
Waterbody
Building
District Boundary
Province Boundary
Road
Waterway
Satellite Image:
Post disaster : FORMOSAT-5,
Date: 2 November 2023
© Taiwan Space Agency (TASA)
GIS Data:
Building, Road, Waterbody and Waterway © OSM (2023)
Administrative Boundary © GADM (2023)
Survey Link:
https://shorturl.at/fqACE
Map product made by GIC-AIT (v1.0).
Disclaimer: The accuracy of this product is not validated.

14. Flood in Thua Thien Hue province, Vietnam on 15 November 2023



15. Volcano eruption in Indonesia on 03 December 2023



Organization	**Geo-Informatics and Space Technology Development Agency (GISTDA)**
Title	**GISTDA continues to support Disaster Management**
Type of Activity	**Providing satellite data**
Date	**2023**

GISTDA as a DPN has continuously supported many emergency observation requests for the disaster management activities by provide satellite images in total of 322 images (70 Multispectral images, 198 Panchromatic images, and 54 Pan Sharpened image) as shown in the Table below;

Summary of cooperation SA-GISTDA to contribute Thaichote 1 Satellite

No	ACQ date	Country	Disaster Type	MS	PAN	PS	Mosaic	Note	No. of images
1	11/10/2022	Nepal	Snow	1	4	0			5
2	12/10/2022	Nepal	Snow	2	4	0			6
3	16/10/2022	India	Flood	5	17	0			22
4	20/10/2022	India	Flood	5	7	0			12
5	31/10/2022	Philippines	Flood	2	6	0			8
6	01/11/2022	Philippines	Flood	2	4	0			6
7	07/12/2022	Indonesia	Vacano	2	5	0			7
8	11/12/2022	Indonesia	Vacano	2	5	0			7
9	07/02/2023	Türkiye	Earthquake	2	2	0			4
10	08/02/2023	Türkiye	Earthquake	4	12	12			28
11	09/02/2023	Türkiye	Earthquake	4	13	13			30
12	10/02/2023	Türkiye	Earthquake	3	3	3			9
13	11/02/2023	Türkiye	Earthquake	3	9	9			21
14	14/02/2023	Türkiye	Earthquake	3	8	8			19
15	15/02/2023	Türkiye	Earthquake	3	9	9			21
16	15/05/2023	Myanmar	Flood	1	5	0			6
17	19/05/2023	Bangladesh	Flood	2	5	0			7
18	18/06/2023	Kazakhstan	Fire	1	6	0			7
19	20/06/2023	Kazakhstan	Fire	1	7	0			8
20	21/06/2023	Kazakhstan	Fire	1	6	0			7
21	22/06/2023	Kazakhstan	Fire	1	7	0			8
22	18/07/2023	India		4	9	0			13
23	19/07/2023	Vietnam		2	5	0			7
24	21/07/2023	Vietnam		2	5	0			7
25	31/07/2023	Bhutan		2	5	0			7
26	01/08/2023	Bhutan		2	5	0			7
27	02/08/2023	Philippines		2	4	0			6
28	03/08/2023	Philippines		2	6	0			8
29	21/08/2023	Vietnam		2	5	0			7
30	01/09/2023	Tajikistan		2	10	0			12
			Total	**70**	**198**	**54**	**0**		**322**

Organization	**Geo-Informatics and Space Technology Development Agency (GISTDA)**
Title	**GISTDA as a Co-Chair of Sentinel Asia Steering Committee**
Type of Activity	**collaboration between Sentinel Asia and International Bodies**
Date	**2023**

GISTDA Deputy Executive Director is currently participating the Steering Committee as a Co-Chair from 2022 to 2024.

GISTDA also gives some comments and collaborates with Sentinel Asia for the new actions that can help promote Step 3 activities in the Strategic Plan such as;

1. Support to facilitate the cooperation between Sentinel Asia and UNESCAP, UNITAR/UNOSAT. GISTDA and Sentinel Asia Secretariat had a meeting with UNITAR on May 2024 to discuss about collaboration between Sentinel Asia and UNITAR.

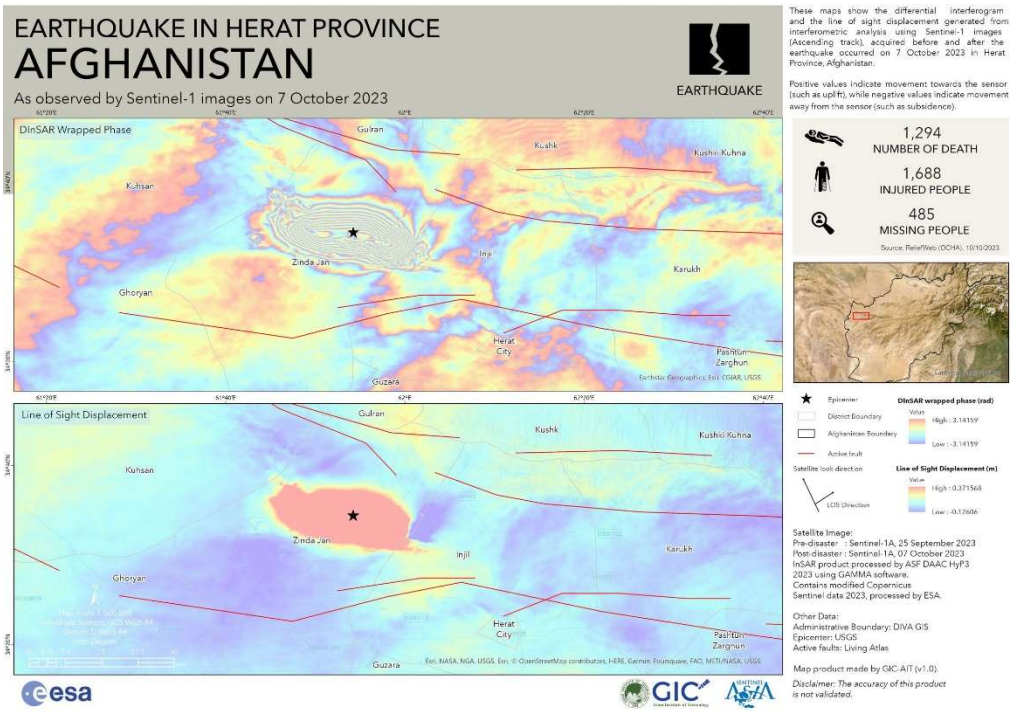
Organization	**Geo-Informatics and Space Technology Development Agency (GISTDA)**
Title	**OPTEMIS system**
Type of Activity	**Sentinel Asia STEP-3 Contribution**
Date	**-**

GISTDA has deployed OPTEMIS (Operation Planning Tool for Earth-observation Mission) which is an in-house developed tool of GISTDA to Sentinel Asia system. The system remains fully operational in supporting Emergency Observation Request.

Organization	**International Centre for Integrated Mountain Development (ICIMOD)**
Title	**EOR: Earthquake in Afghanistan**
Type of Activity	**EOR activity**
Date	**October 2023**

ICIMOD is an intergovernmental knowledge and learning centre that develops and shares research, information, and innovations to empower people in the eight regional member countries of the HKH – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan. We serve the region through information and knowledge generation and sharing to find innovative solutions to critical mountain problems. We bridge science with policies and on-the-ground practices. We provide a regional platform where experts, planners, policy makers, and practitioners can exchange ideas and perspectives towards the achievement of sustainable mountain development. We facilitate knowledge exchange across the region, help customize international knowledge and tailor it to the region's needs, and bring regional issues to the global stage.

In October 2023, we requested for the earthquake which hit in Afghanistan. ICIMOD shared provided satellite images and VAPs to the branch office of ICIMOD and DRR international organizations. These data were helped to an emergency response activity at affected area.



VAP/AITGIC [Earthquake hit in Afghanistan]

Organization	**INDIAN SPACE RESEARCH ORGANISATION (ISRO)**
Title	**Support to Sentinel Asia**
Type of Activity	• Providing Satellite data as DPN and attended all SA-SC meetings • Strategic Action Planner role in Sentinel Asia • Capacity building activities lead role
Date	**31/12/2023**

During 2023, ISRO has contributed in the Sentinel Asia activities as Data Provider Node, contributed significantly in strategic action plan, and took lead role in capacity building activities. ISRO has participated in all the meetings held during the tenure. ISRO has successfully responded to 20 disaster events spread across 12 countries with the help of 54 Indian Remote Sensing (IRS) satellite datasets comprising of EOS-4 RISAT-1A SAR, Resourcesat – 2/2A and Cartosat series. In 2023, ISRO has started providing the RISAT-1A SAR datasets to all the disaster events which has been beneficially been utilized in addressing the floods/ cyclones which were a limitation with optical datasets.

ISRO has activated sentinel Asia towards assessment of damages due to flood/cyclone inundation for the events corresponding to Gujarat & Uttar Pradesh floods during this period. As part of it, ISRO has received satellite data support from JAXA (ALOS PALSAR-2), and GISTDA (THEOS-1) satellite datasets.

ISRO Support to Sentinel Asia EOR's during 2023

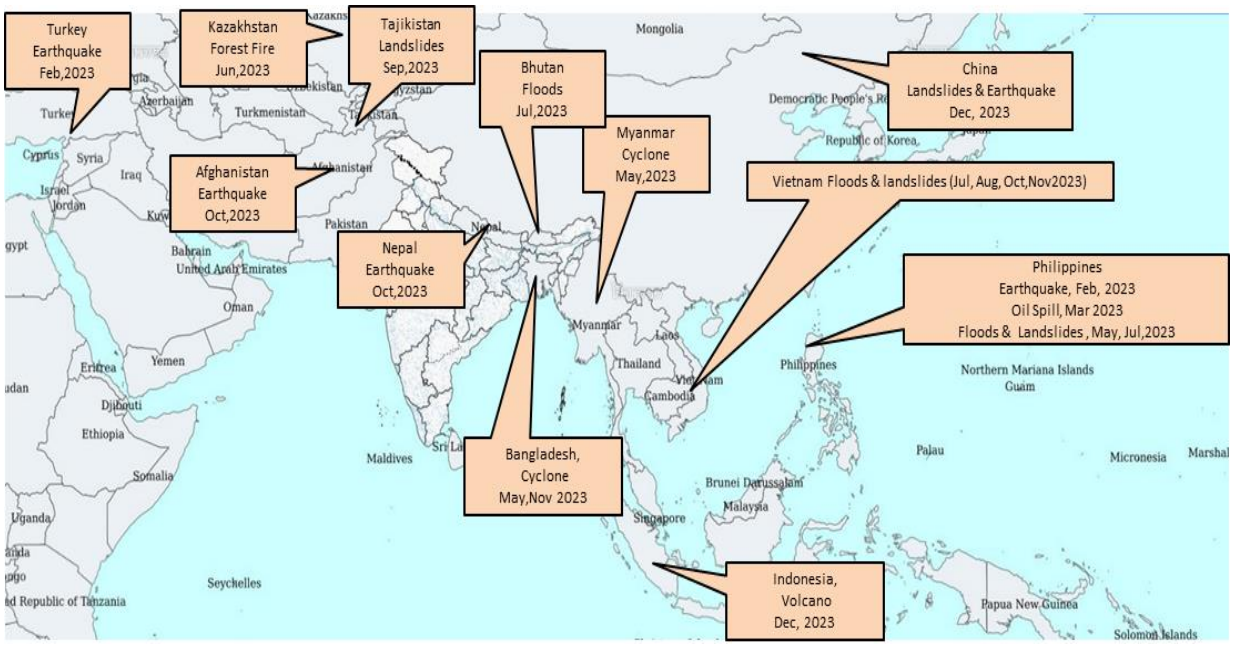


Fig 1: EOR's responded during 2023

- Dr Prakash Chauhan, Director, NRSC has become the Co-Chair for the Sentinel Asia forum.
- ISRO has participated in various Steering Committee meetings and participated in the discussions.

ISRO has delivered two presentations on Spatial flood early warning and on National Database for Emergency Management during JPTM 2023 and SA-SC web meetings respectively. The details are;

Spatial Flood Inundation Simulation for Godavari and Tapi River Basins

ISRO has delivered a lecture on the Spatial Flood Early Warning System for the Godavari and Tapi River Basin, developed by NRSC/ISRO at the Sentinel Asia 8th Joint Project Team Meeting on September 18th, 2023. Speaker has provided a detailed overview of the development of the flood forecast model and the spatial flood inundation model, emphasizing the use of space-based inputs and a very high-resolution digital terrain model. The crucial role of the high-resolution DTM in spatial flood early warning models was highlighted. Additionally, the integration of the flood forecast and flood inundation modeling framework was described, and the real-time operation of the flood early warning model for 2023 was demonstrated.

National Database for Emergency Management (NDEM)

ISRO has demonstrated the NDEM V4.1 dashboard to the SA-SC participants during web-meeting. The details are;

National Database for Emergency Management NDEM) is a unique Geo-portal to disseminate space based inputs along with services of forecasting organizations addressing all natural disasters in all phases at PAN India level with the amalgamation of multi-scale geospatial database coupled with decision support system tools. At the behest of Ministry of Home Affairs (MHA), Government of India, National Remote Sensing Centre (NRSC), ISRO has established the state-of-art facility at NRSC, Hyderabad with structured framework with multi-institutional participation to assist the decision makers, disaster management officials of all States/UTs, NDRF/SDRF for preparedness, hazard/risk zonation, damage assessment, and emergency response. NDEM comprises of Decision Support tools, Incident reporting system, India Disaster Resource Network, Post Disaster Needs Assessment tools and along with this a separate geoportal for National Disaster Response Force (NDRF) portal for assisting rescue workers to aid in informed relief & rehabilitation activities.

Organization	**Japan Aerospace Exploration Agency (JAXA)**
Title	**Automatic analysis of flood extent using ALOS-2 data**
Type of Activity	**Providing satellite data or VAP**
Date	**01/06/2023**

JAXA has developed a fully automated analysis system to extract flood extents using JAXA's ALOS-2 data for Sentinel Asia in 2022. Since its launch, we provided the estimated flood extent using ALOS-2 data to EOR requesters in a timely manner; this information is available within 2 hours after ALOS-2 observation.

Figure 1 shows a flowchart of the algorithm for automatic flood extent estimation. This algorithm is very simple and primitive, and it requires three types of data: (1) SAR images of pre- and post-disaster, (2) land use and land cover data (LULC), and (3) a digital elevation model (DEM). JAXA's ALOS-2 is a SAR satellite, which emits microwaves and receives microwaves scattered or reflected by the ground. In flooded areas, microwaves are specularly reflected and hardly return to the SAR satellite, resulting in smaller signal values. Therefore, it can be basically estimated that areas with small SAR signals are flooded areas. Our algorithm estimates the flood extent by automatically determining the water threshold based on the backscatter intensity of the SAR image.

In 2023, JAXA provided estimated flood extent maps analyzed by this system to Sentinel Asia for 6 cases as shown on Figure 2 to Figure 7. Currently, JAXA is working on the implementation of a more accurate algorithm and will continue to promptly provide ALOS-2 data and useful VAPs created using ALOS-2 data in the future.

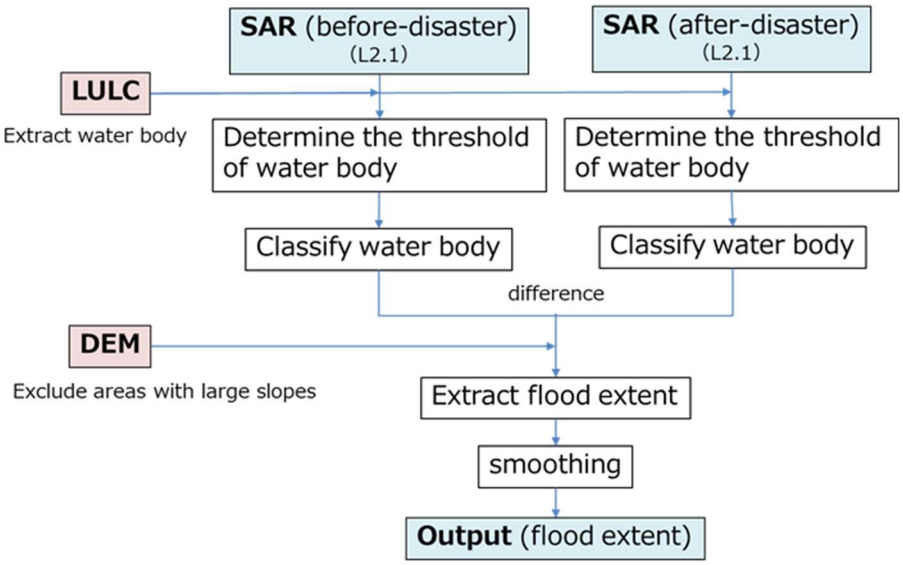


Figure 1. Flowchart of JAXA's algorithm

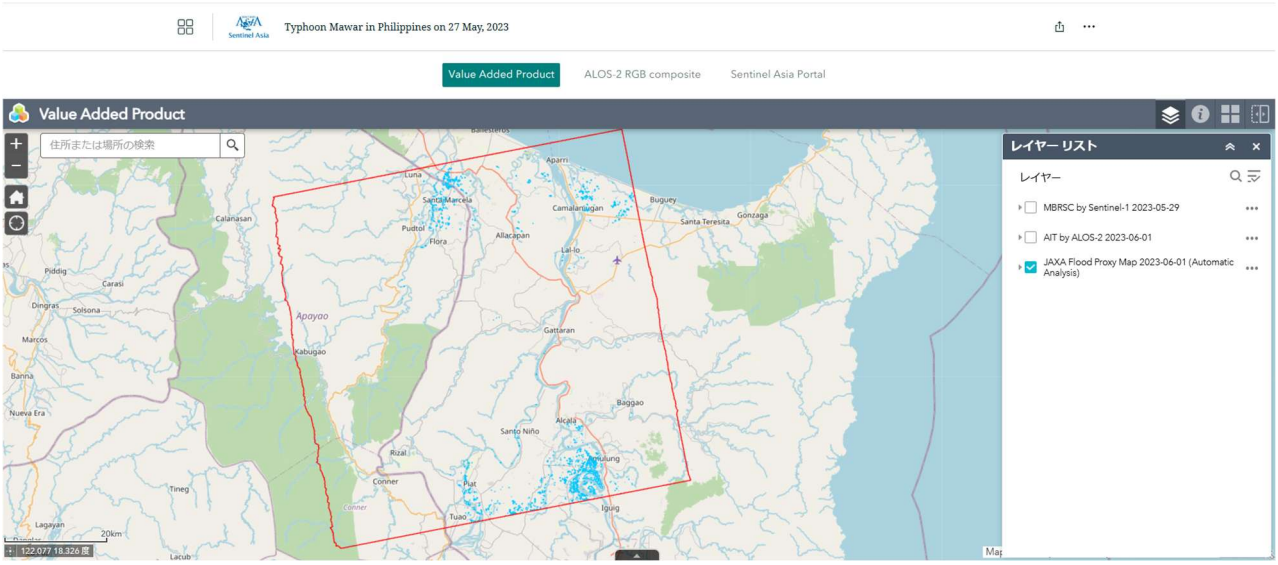


Figure 2. Case of Flood in the Philippine on 1 June 2023

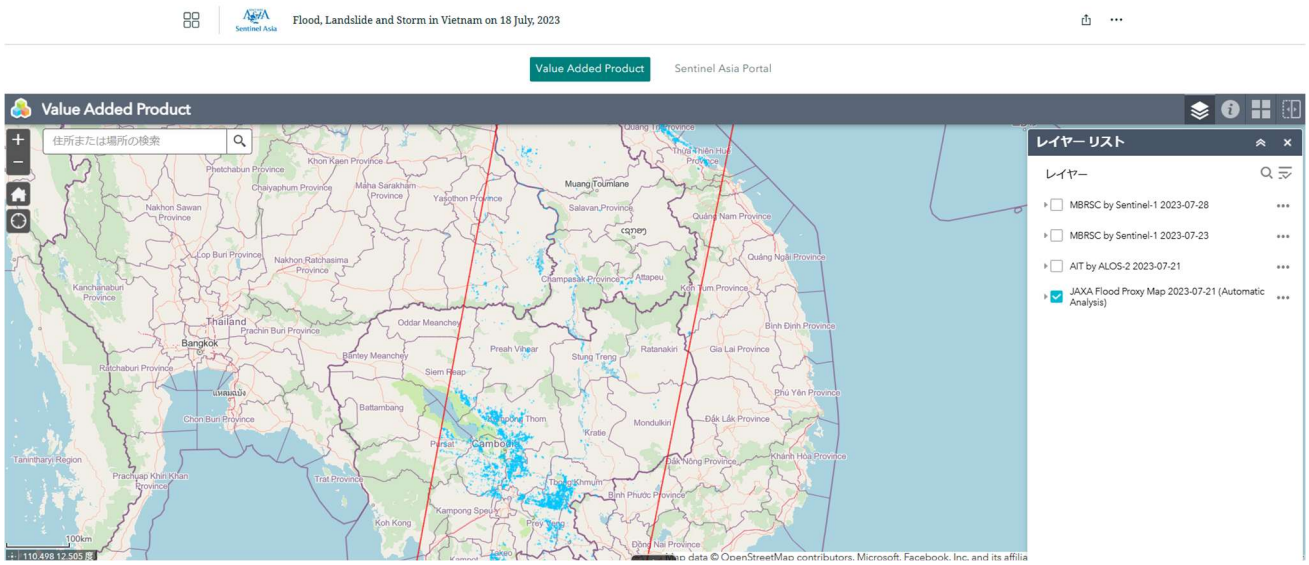


Figure 3. Case of Flood in Vietnam on 21 July 2023

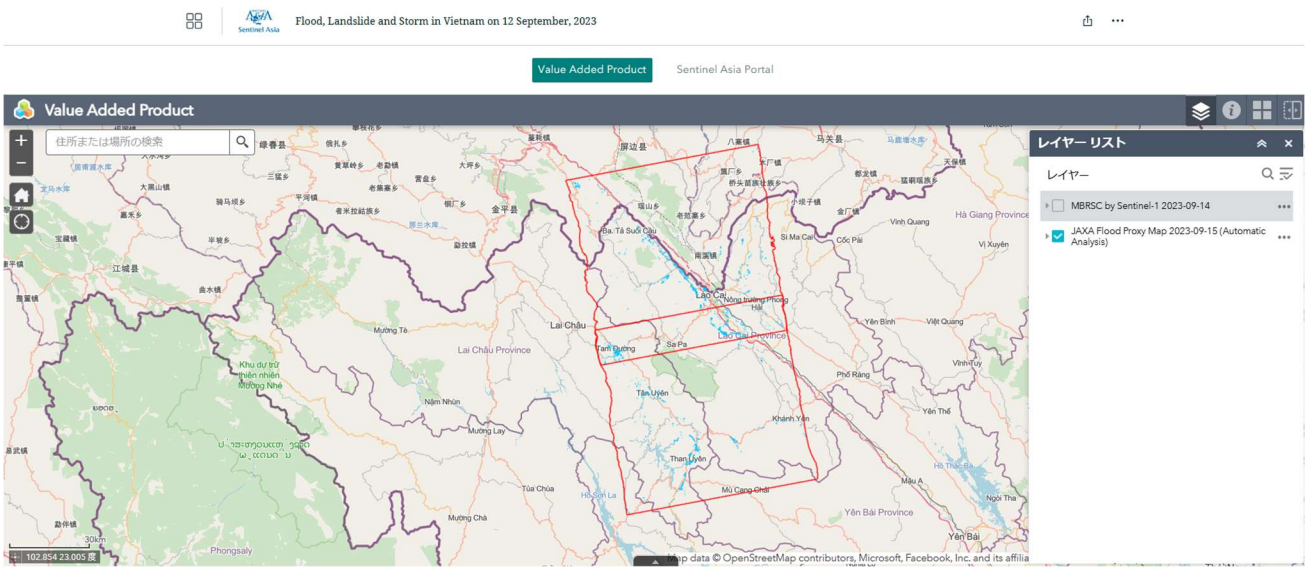


Figure 4. Case of Flood in Vietnam on 15 September 2023

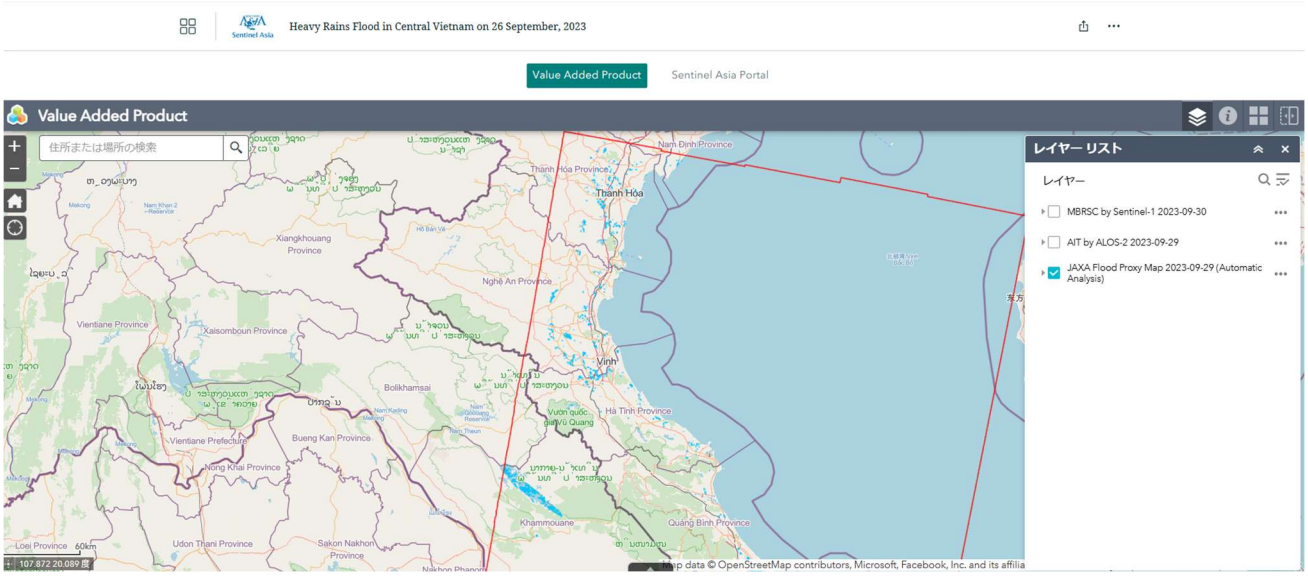


Figure 5. Case of Flood in Vietnam on 29 September 2023

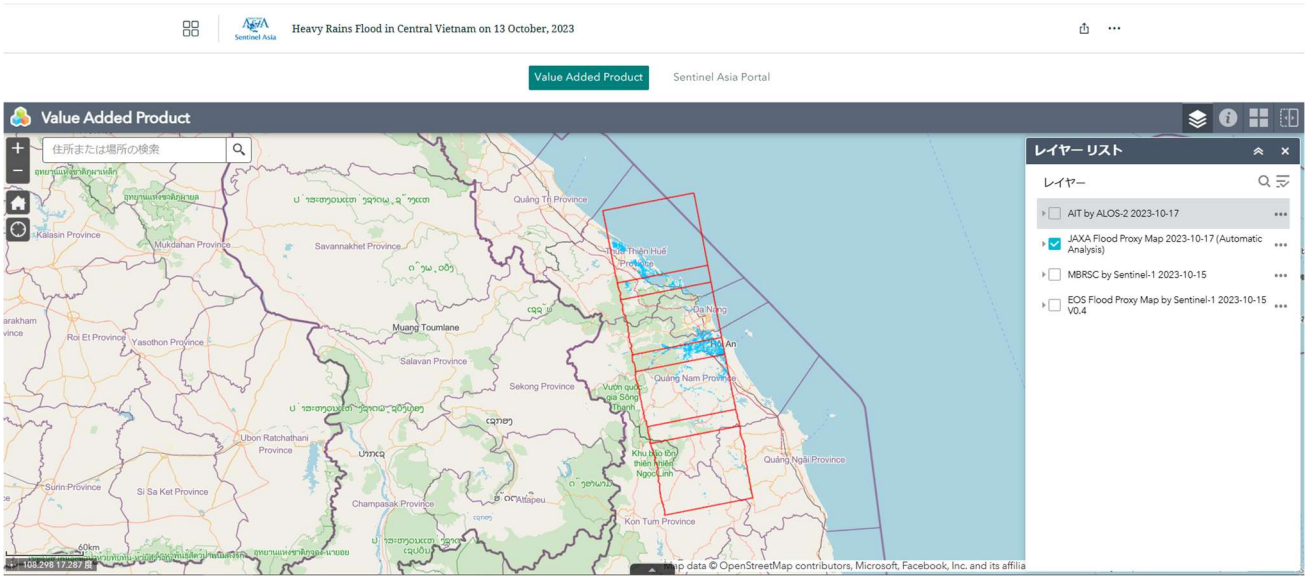


Figure 6. Case of Flood in Vietnam on 17 October 2023

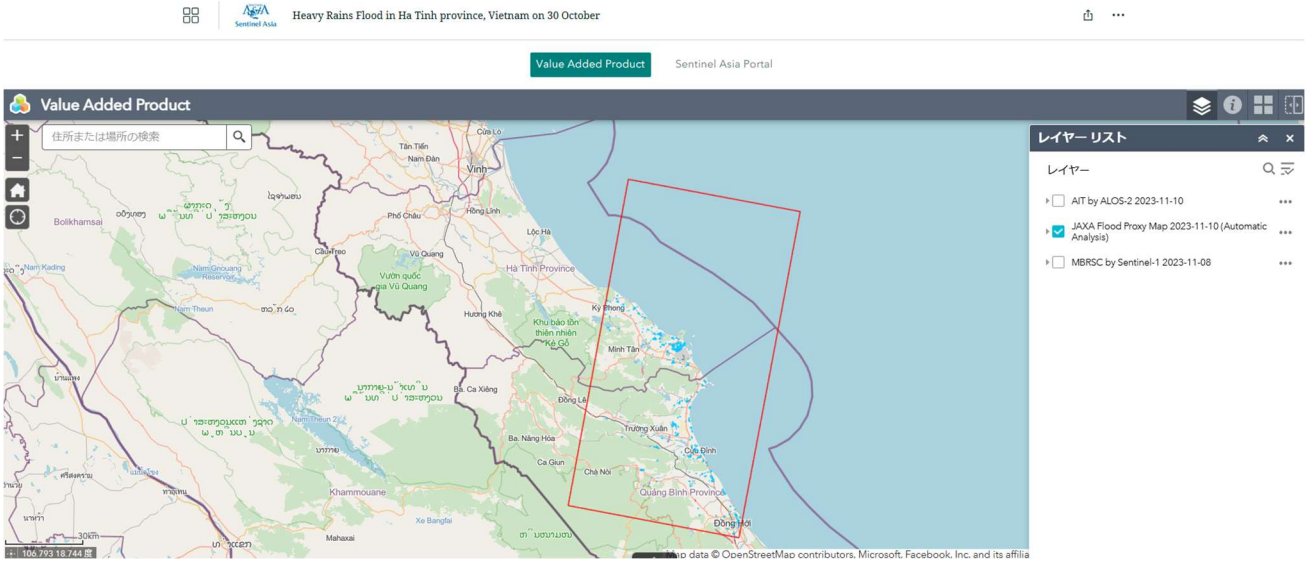


Figure 7. Case of Flood in Vietnam on 10 November 2023

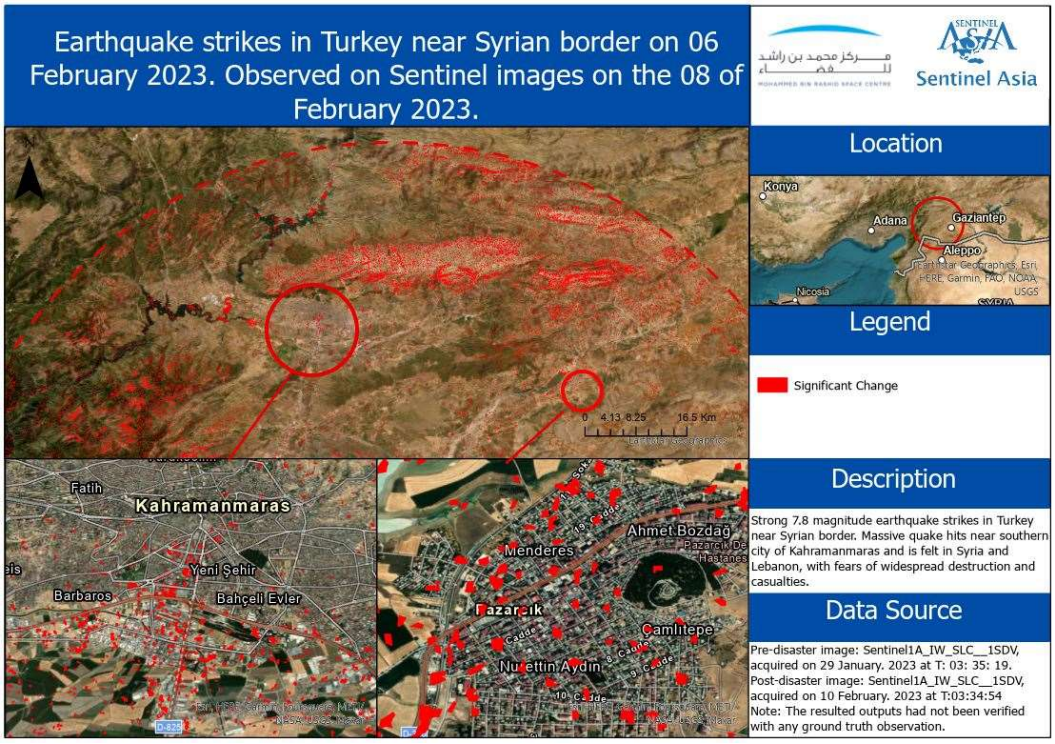
Organization	**Mohammed Bin Rashid Space Centre (MBRSC)**
Title	**Date support for EOR (2023)**
Type of Activity	**Sharing satellite images for EOR**
Date	**2023**

The Mohammed Bin Rashid Space Centre (MBRSC), is a Dubai government organization working on the UAE National Space Programme, which includes various earth observation satellite projects, the Emirates Mars Mission, the Emirates Lunar Mission, and the UAE Astronaut Programme. MBRSC launched a new earth observation satellite, named "KHALIFSAT", in October 2018. KHALIFSAT is one of the world's most technologically advanced remote sensing observation satellite – and the first 100% designed and manufactured in the UAE. MBRSC supported to provide satellite images and VAP as following EORs in 2023.

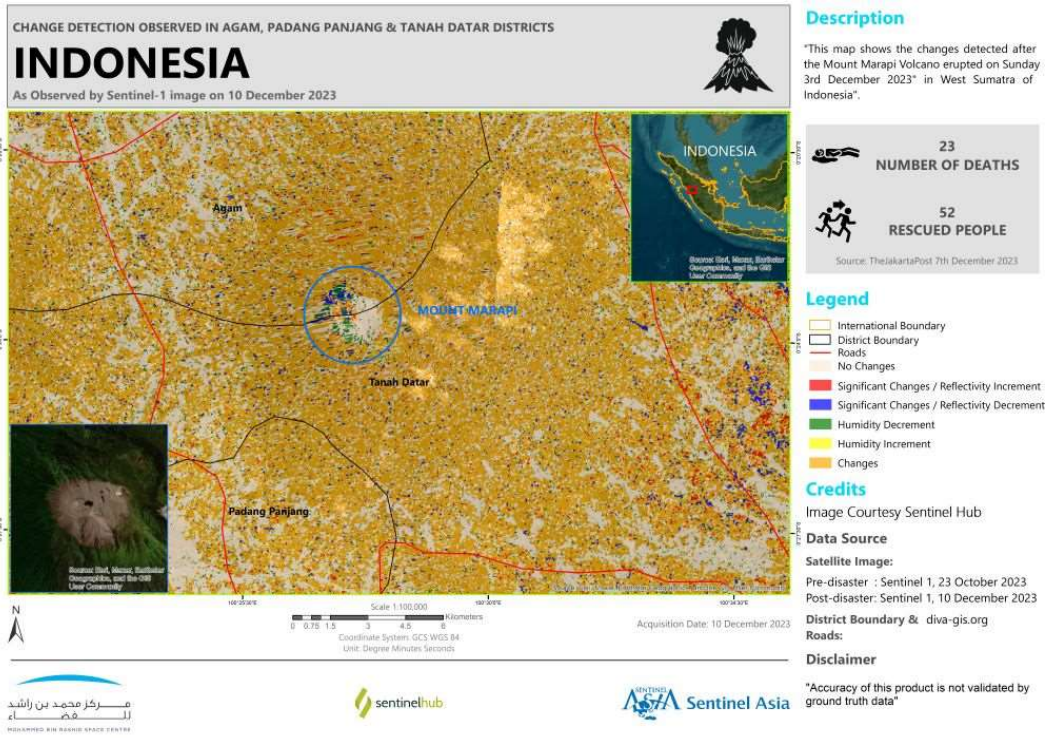
MBRSC shared satellite images and VAPS as following disaster events;

- ✓ 2023-12-18: Earthquake in China on 18 December, 2023
- ✓ 2023-12-03: Volcano eruption in Indonesia on 03 December, 2023
- ✓ 2023-11-17: Earthquake in Southern Mindanao, Philippines on 17 November, 2023
- ✓ 2023-11-17: Cyclone Midhili in Bangladesh on 17 November, 2023
- ✓ 2023-11-15: Flood in Thua Thien Hue province, Vietnam on 15 November, 2023
- ✓ 2023-11-03: Earthquake in Nepal on 03 November, 2023
- ✓ 2023-10-30: Heavy Rains Flood in Ha Tinh province, Vietnam on 30 October, 2023
- ✓ 2023-10-13: Heavy Rains Flood in Central Vietnam on 13 October, 2023
- ✓ 2023-10-07: Earthquake in Afghanistan on 07 October, 2023
- ✓ 2023-09-26: Heavy Rains Flood in Central Vietnam on 26 September, 2023
- ✓ 2023-09-12: Flood, Landslide and Storm in Vietnam on 12 September, 2023
- ✓ 2023-08-27: Landslide in Tajikistan on 27 August, 2023
- ✓ 2023-08-16: Landslide in Vietnam on 16 August, 2023
- ✓ 2023-08-05: Flood, Landslide and Storm in Vietnam on 05 August, 2023
- ✓ 2023-07-25: Typhoon Doksuri in Philippines on 25 July, 2023
- ✓ 2023-07-20: Flood in Bhutan on 20 July, 2023
- ✓ 2023-07-18: Flood, Landslide and Storm in Vietnam on 18 July, 2023
- ✓ 2023-07-13: Flood, Landslide and Storm in India on 13 July, 2023
- ✓ 2023-06-08: Forest Fire in Kazakhstan on 08 June, 2023
- ✓ 2023-06-15: Cyclone Biparjoy in India on 15 June, 2023
- ✓ 2023-05-27: Typhoon Mawar in Philippines on 27 May, 2023
- ✓ 2023-05-14: Cyclone MOCHA in Bangladesh on 14 May, 2023

- ✓ 2023-05-14: Cyclone MOCHA in Myanmar on 14 May, 2023
- ✓ 2023-02-06: Earthquake in Turkey on 06 February, 2023



VAP [Earthquake in Turkey]



VAP [Volcanic eruption in Indonesia]

Organization	**Manila Observatory**
Title	**Tropical Cyclone Mawar (Betty) 2023 Activation through Sentinel Asia**
Type of Activity	**EOR**
Date	**25/05/2023**

Tropical cyclone Mawar (with the local name Betty), was a Super Typhoon from the Pacific Ocean that traversed the extreme northeastern portion of Luzon from May 27 to 31, 2023. An Emergency Observation Request (EOR) was initiated on the Sentinel Asia OPTEMIS dashboard with areas of interest in Cagayan Valley, the Ilocos Region, and western Mindoro. The Japan Aerospace Exploration Agency (JAXA) provided 11 scenes of ALOS2-PALSAR2 RADAR pre- and post-disaster satellite images. Meanwhile, the Indian Space Research Organization (ISRO) provided 2 scenes of RESOURCESAT optical satellite images. These satellite images were aimed at usage as an additional test case for the Manila Observatory's current project "Optimizing the Microsoft Planetary Computer for Emergency Observation and Mapping (EO/M)". One of the goals of this project is to automate satellite image processing by applying programming code. Through automation, impact assessment may be promptly made available to stakeholders. The initial results of this project will be presented at the 9th Joint Project Team Meeting for Sentinel Asia STEP-3 (JPTM2024) to be held on 5-7 November 2024 in Novotel, Quezon City, Philippines.

Organization	**Department of national remote sensing – VietNam Ministry of natural resources and environment**
Title	**Summary of 2023 results through SA system activation**
Type of Activity	**EOR**
Date	**(1) 18/07/2023: Monitoring flash floods and landslide in central coast region, Vietnam** **(2) 05/08/2023: Monitoring flash floods and landslide in Mu Cang Chai district, Yen Bai Province** **(3) 16/08/2023: Monitoring Landslide in Nghia Thanh Ward, Gia Nghia City, Dak Nong Province** **(4) 12/09/2023: Monitoring flash floods and landslide in Lao Cai province** **(5) 26/09/2023: Monitoring Flood cause by heavy rains in Central Vietnam** **(6) 13/10/2023: Monitoring floods and landslide in central Vietnam** **(7) 30/10/2023: Heavy Rains Flood in Ha Tinh province** **(8) 15/11/2023: Monitoring floods and landslide in Thua Thien Hue province**

18/07/2023: Monitoring flash floods and landslide in central coast region

Upon receiving information about the heavy rain may cause urban flooding; risk of flash floods and landslides from July 18 in the North, especially in the provinces of Quang Ninh, Lang Son, Cao Bang, Ha Giang, Lao Cai, and Yen Bai. The Center for Monitoring Natural Resources, Environment, and Climate Change (under the National Remote Sensing Department) activated the Sentinel Asia system to receive satellite images for flash flood monitoring.

After activation, the Sentinel Asia system provided the following types of satellite images:

- ✓ 13 scene of ALOS radar satellite images taken before the disaster and 08 scene taken after the disaster provided by Japan Aerospace Exploration Agency (JAXA).
- ✓ 07 scene of FORMOSAT-5 optical satellite images taken after the disaster, provided by the Taiwan Space Agency (TASA);
- ✓ 01 Resourcesat-2 scene of optical satellite image taken after the disaster, provided by the Indian Space Research Organization (ISRO);
- ✓ 07 THEOS1 scene of optical satellite image taken after the disaster, provided by the GISTDA

- ✓ 02 flood map products and digital data files (shp files) to extract flooded areas in the north coastal central region and the southern region of Vietnam provided by the AIT
- ✓ 02 flood map products and digital data files (shp files) to extract flooded areas the north coastal central region and the southern region of Vietnam provided by the MBRSC

After analyzing the available satellite image data, we hand over these flood analysis products and data to the Commanding Committee for Disaster Prevention and Search and Rescue, Ministry of Natural Resources and Environment and relevant agencies to serve management and support post-disaster recovery.

05/08/2023: Monitoring flash floods and landslide in Mu Cang Chai district, Yen Bai Province

Heavy rains caused flash floods in Mu Cang Chai district, Yen Bai Province, Vietnam on 8/5/2023. It caused the Mu Cang Chai district to suffer a serious loss of people and property.

After activation, the Sentinel Asia system provided the following types of satellite images and value add product:

- ✓ 03 scene of ALOS radar satellite images taken before the disaster and 03 scene taken after the disaster provided by Japan Aerospace Exploration Agency (JAXA)
- ✓ 01 Resourcesat-2 scene of optical satellite image taken after the disaster, provided by the Indian Space Research Organization (ISRO);
- ✓ 01 flood map products and digital data files (shp files) to extract flooded areas the north region of Vietnam provided by the MBRSC
- ✓ 02 flood map products and digital data files (shp files) to extract flooded areas in the north region of Vietnam provided by the EOS

16/08/2023: Monitoring Landslide in Nghia Thanh Ward, Gia Nghia City, Dak Nong Province

In Nghia Thanh Ward, Gia Nghia City, Dak Nong Province is a re-landslide on an ancient slip. We would like to have data from space to survey the surface displacement of the area.

After activation, the Sentinel Asia system provided the following types of satellite images and value add product:

- ✓ 01 scene of ALOS radar satellite images taken before the disaster and 01 scene taken after the disaster provided by Japan Aerospace Exploration Agency (JAXA)
- ✓ 01 scene of FORMOSAT-5 optical satellite images taken after the disaster, provided by the Taiwan Space Agency (TASA);
- ✓ 01 Landslide map products provided by the MBRSC

12/09/2023: Monitoring flash floods and landslide in Lao Cai province

The types of satellite image data and value-added products received from the system are as follows:

- ✓ 04 scene of ALOS radar satellite images taken before the disaster and 04 scene taken after the disaster provided by Japan Aerospace Exploration Agency (JAXA)
- ✓ 04 KhalifaSat scene of optical satellite image taken after the disaster, provided by MBRSC

- ✓ 01 Landslide map products and digital data files (shp files) to extract flooded areas in the north region of Vietnam provided by the MBRSC

26/09/2023: Monitoring Flood cause by heavy rains in Central Vietnam

The types of satellite image data and value-added products received from the system are as follows:

- ✓ 01 scene of ALOS radar satellite images taken before the disaster and 01 scene taken after the disaster provided by Japan Aerospace Exploration Agency (JAXA).
- ✓ 04 scene of FORMOSAT-5 optical satellite images taken after the disaster, provided by the Taiwan Space Agency (TASA);
- ✓ 15 THEOS1 scene of optical satellite image taken after the disaster, provided by the GISTDA
- ✓ 04 flood map products and digital data files (shp files) to extract flooded areas in the central region of Vietnam provided by the AIT
- ✓ 02 flood map products and digital data files (shp files) to extract flooded areas in the central region of Vietnam provided by the MBRSC.
- ✓ 01 digital data files (shp files) to extract flooded areas in the central region of Vietnam provided by JAXA

13/10/2023: Monitoring floods and landslide in central Vietnam

The types of satellite image data and value-added products received from the system are as follows:

- ✓ 04 scene of ALOS radar satellite images taken before the disaster and 04 scene taken after the disaster provided by Japan Aerospace Exploration Agency (JAXA).
- ✓ 01 Resourcesat-2 scene of optical satellite image taken after the disaster, provided by the Indian Space Research Organization (ISRO);
- ✓ 01 digital data files (shp files) to extract flooded areas in the central region of Vietnam provided by JAXA
- ✓ 01 flood map products and digital data files (shp files) to extract flooded areas provided by the MBRSC
- ✓ 01 flood map products and digital data files (shp files) to extract flooded areas provided by the EOS
- ✓ 01 flood map products and digital data files (shp files) to extract flooded areas provided by the AIT

30/10/2023: Heavy Rains Flood in Ha Tinh province

The types of satellite image data and value-added products received from the system are as follows:

- ✓ 04 scene of ALOS radar satellite images taken before the disaster and 02 scene taken after the disaster provided by Japan Aerospace Exploration Agency (JAXA).
- ✓ 02 Resourcesat-2 scene of optical satellite image taken after the disaster, provided by the Indian Space Research Organization (ISRO);
- ✓ 03 KhalifaSat scene of optical satellite image taken after the disaster, provided by MBRSC
- ✓ 06 THEOS1 scene of optical satellite image taken after the disaster, provided by the GISTDA
- ✓ 02 scene of FORMOSAT-5 optical satellite images taken after the disaster, provided by the Taiwan

Space Agency (TASA);

- ✓ 01 digital data files (shp files) to extract flooded areas in Ha Tinh province of Vietnam provided by JAXA
- ✓ 01 flood map products and digital data files (shp files) to extract flooded areas provided by the MBRSC
- ✓ 01 flood map products and digital data files (shp files) to extract flooded areas provided by the AIT

15/11/2023: Monitoring floods and landslide in Thua Thien Hue province

The types of satellite image data and value-added products received from the system are as follows:

- ✓ 01 scene of ALOS radar satellite images taken before the disaster and 01 scene taken after the disaster provided by Japan Aerospace Exploration Agency (JAXA).
- ✓ 01 Resourcesat-2 scene of optical satellite image taken after the disaster, provided by the Indian Space Research Organization (ISRO);
- ✓ 06 THEOS1 scene of optical satellite image taken after the disaster, provided by the GISTDA
- ✓ 02 scene of FORMOSAT-5 optical satellite images taken after the disaster, provided by the Taiwan Space Agency (TASA);
- ✓ 01 flood map products and digital data files (shp files) to extract flooded areas provided by the MBRSC
- ✓ 01 flood map products and digital data files (shp files) to extract flooded areas provided by the AIT

Figure 1. Quick monitoring map of flooding in Hoi An city, Quang Nam province on October 17, 2023 (inundated area information is extracted from satellite image ALOS PALSAR 2).

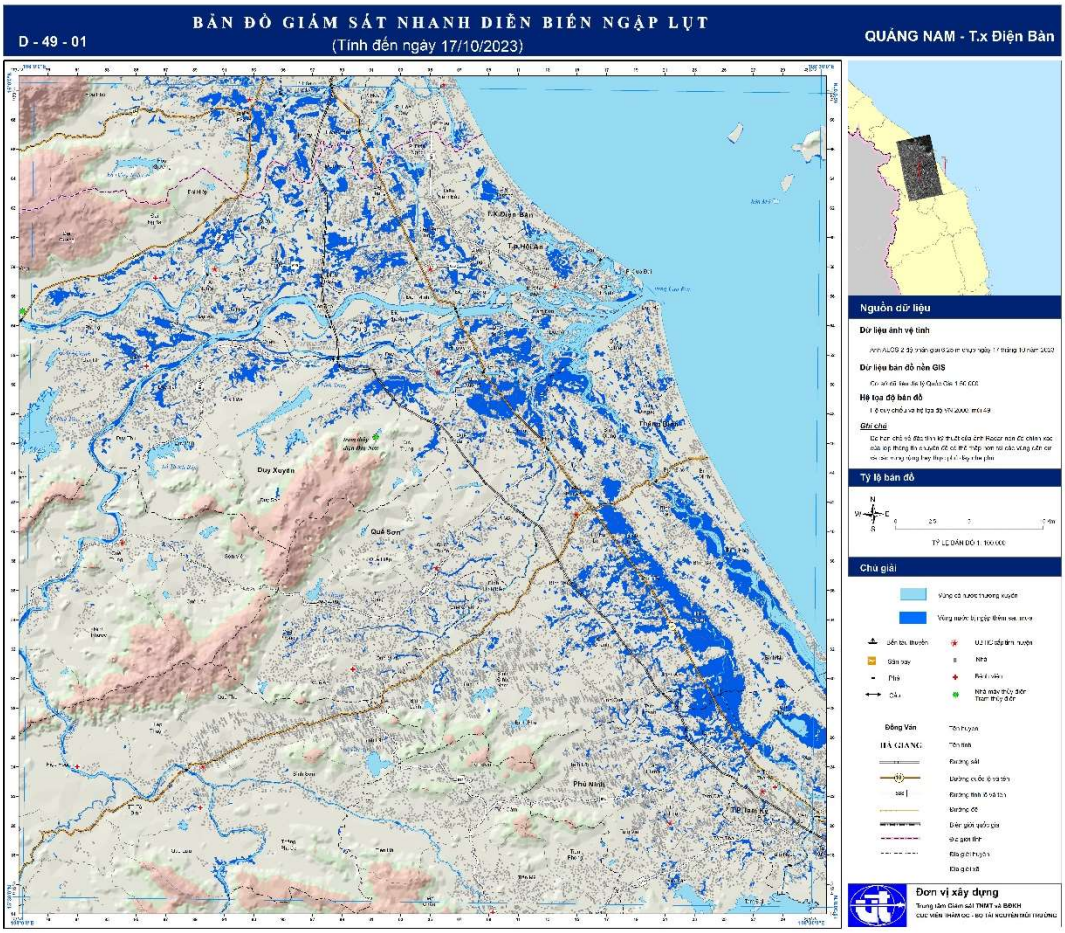
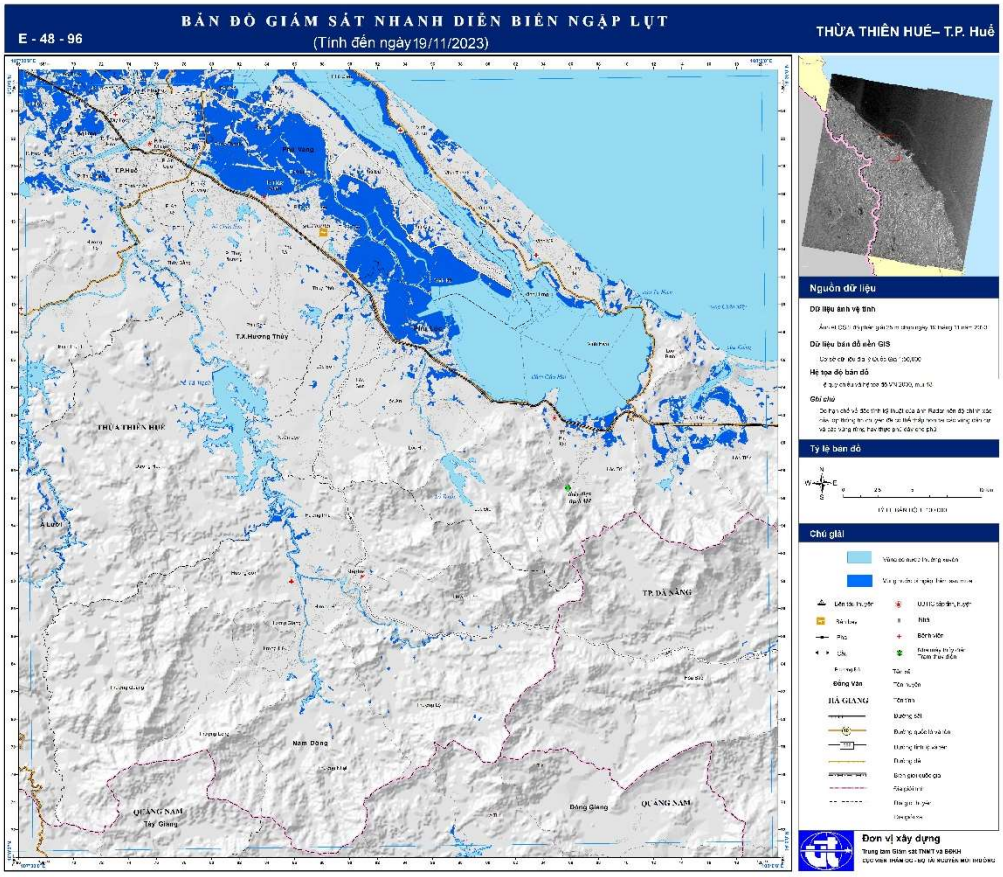
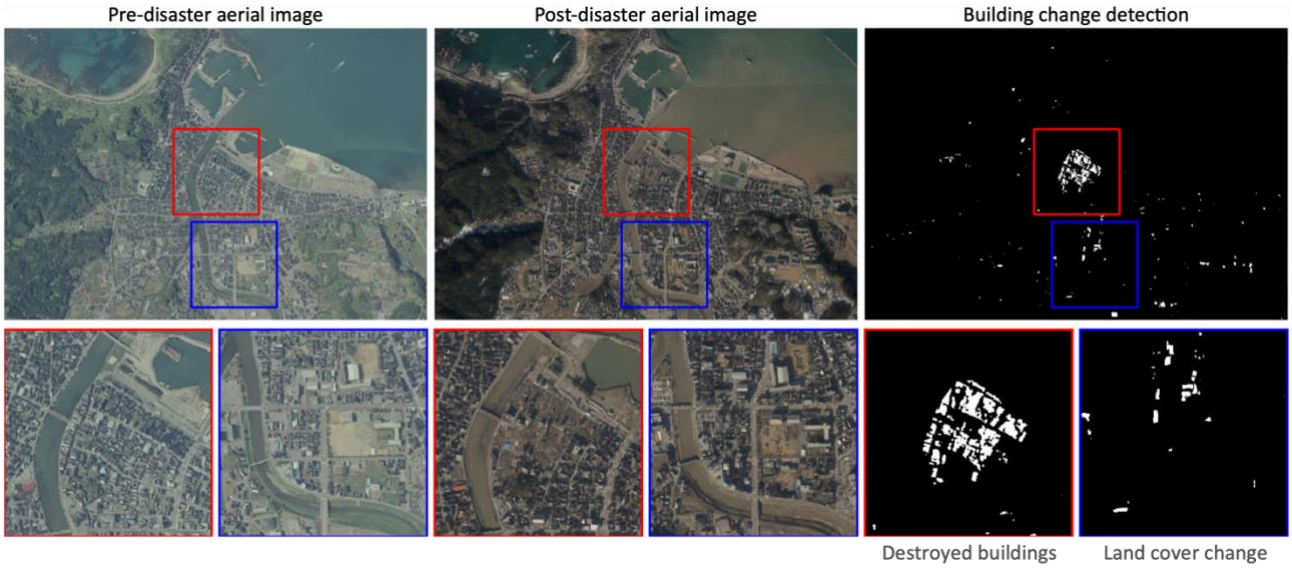


Figure 2. Quick monitoring map of flooding in Hue city, Thua Thien – Hue province on November 19, 2023.



Organization	**Geoinformatics Team, RIKEN Center for Advanced Intelligence Project (AIP)**
Title	**Building change detection**
Type of Activity	**Research and development for data preparedness** (e.g., Conference, Workshop, Meeting, Training, EOR, Providing satellite data or VAP)
Date	**Through the year in 2023**

The Geoinformatics Team at RIKEN AIP, in collaboration with the University of Tokyo, has contributed to the development of SyntheWorld (https://zenodo.org/records/8349019), a comprehensive synthetic dataset designed to support advanced research in remote sensing image processing and disaster response. SyntheWorld includes 40,000 submeter-resolution images with fine-grained land cover annotations across eight categories and 40,000 bitemporal image pairs annotated for building change detection. By providing high-quality synthetic data, SyntheWorld enables the development and validation of machine learning models for tasks such as rapid damage assessment and monitoring after natural disasters, addressing challenges of limited real-world data and high annotation costs. The following figure shows building change detection over Wajima City, Noto Peninsula, Japan, after the earthquakes in January 2024.



Building change detection over over Wajima City, Noto Peninsula, Japan, after the earthquakes in January 2024 obtained by a building change detection model trained on SyntheWorld. Aerial images were provided by the Geospatial Information Authority of Japan.

Organization	**Taiwan Space Agency (TASA)**
Title	**Satellite Imagery Support to Sentinel Asia**
Type of Activity	**Responses to EOR (Providing Satellite Data as Data Provider Node)**
Date	**Year of 2023**

During 2023, TASA has contributed to the Sentinel Asia activities as Data Provider Node. TASA has successfully responded to Emergency Observation Requests (EOR's) pertaining to 13 countries ranging from East Asia to South Asia in 22 events with FORMOSAT-5 satellite datasets comprising of pre- and post-disaster events. All these satellite image products were provided right after we acquired cloudless images. According to the statistics, FORMOSAT-5 satellite image products supported various types of applications such as flood and landslide relief. At the same time, it has also given disaster response assistance to Philippines, Vietnam and India for more than one event. It's worth noting that TASA also provided Value-Added Products to assist stakeholders in the rescue, which enabled decision makers to understand the extent and scope of the disaster in intuitive manner.

Fig. 1. TASA Support to Sentinel Asia Emergency Observation Requests during 2023

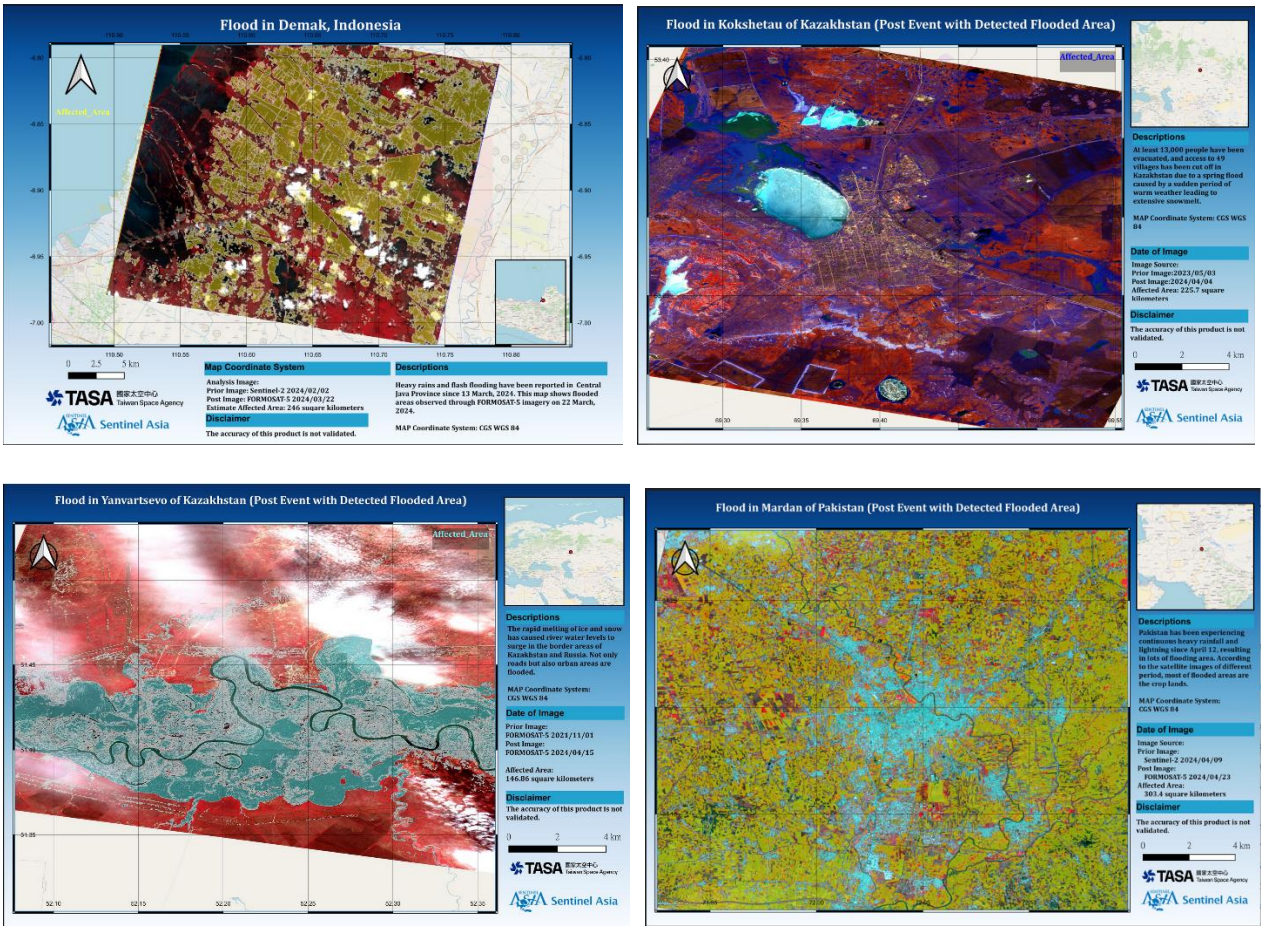


Fig. 2. A few of EO cases that TASA supported in 2023

Organization	**Academia Sinica Grid Computing Center (ASGC) and TASA**
Title	**Sentinel Asia JPT-3 Cloud Services**
Type of Activity	**Cloud Server Service**
Date	**Year of 2023**

The Sentinel Asia JPT-3 cloud system architecture is primarily established and maintained through collaboration between the Academia Sinica Grid Computing Center (ASGC), the Taiwan Space Agency (TASA), and Japan's JAXA. Since February 2020, it has played a core role in operational maintenance and system integration, providing a collaborative platform and services for satellite resource requests and sharing. As of November 27, 2023, the system has achieved an average stability of approximately 99% throughout the year, supporting 25 disaster cases across Asian countries, with a total of 31GB of data uploaded, 1,558GB downloaded, and over 2,297 data captures. On February 8, 2023, JAXA and the OPTEMIS team from Thailand visited the ASGC again to hold a technical meeting. A total of eleven participants from JAXA, TASA, GISTA, and ASGC attended (with one GISTA partner participating online). The meeting primarily focused on confirming that the current JPT-3 cloud system architecture is capable of supporting expansions and services over the next two years, discussing improvements and updates for OPTEMIS, and reaffirming the importance of ongoing collaboration and communication for international cooperation in Sentinel Asia.

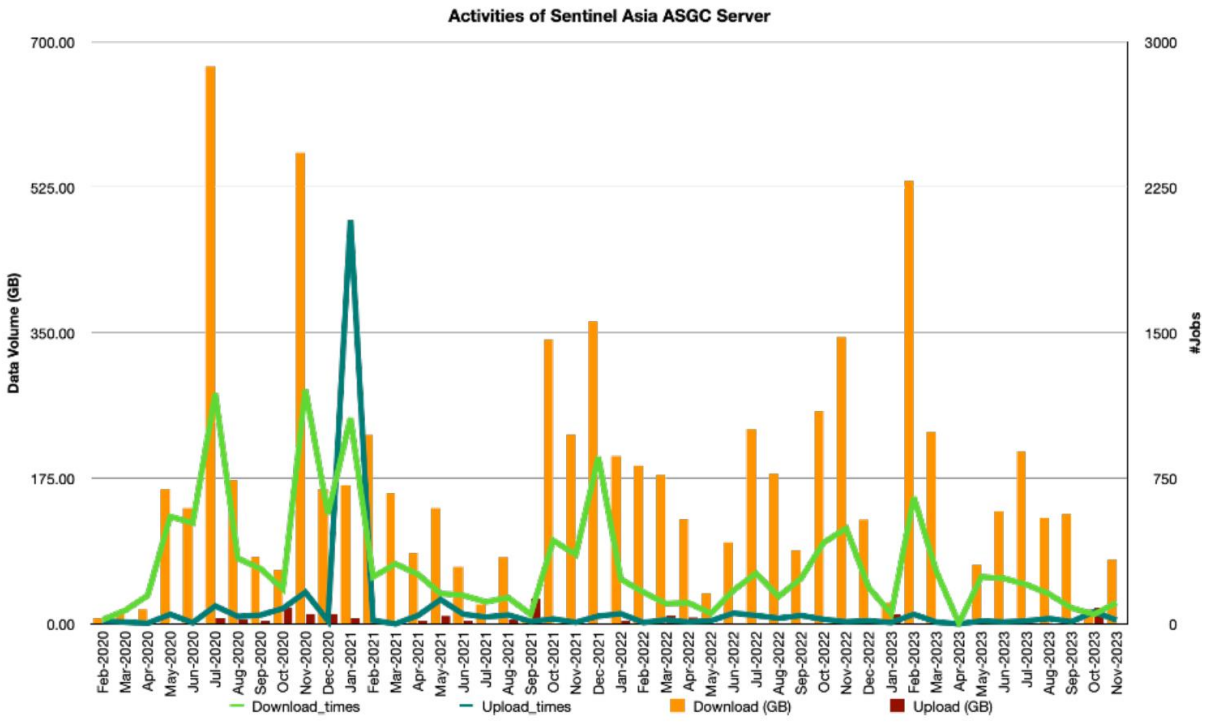


Fig. 3. Summary of Sentinel Asia JPT-3 Cloud Services during the period of 2023.

Organization	**Taiwan Space Agency (TASA)**
Title	**Satellite Imagery Support to Sentinel Asia**
Type of Activity	**8th Joint Project Team Meeting Training Workshop**
Date	**September 17-18th 2023**

In TASA (Taiwan Space Agency), an Emergent Value-Added Product (EVAP) is established to acquire satellite images and obtain the results corresponding to the disaster area. A workflow is defined as standard operation procedure to engage the needed workforce and deliver the final product. In order to improve the efficiency and conveniency of EVAP workflow, a graphical modeler under QGIS is developed including various indices including NDVI、NDWI are used to extract the spectral properties of ground objects with . During the processing process, change information are also derived by using change vector analysis approach for identifying affected areas. According the various case studies, satisfied results can be delivered with limited user training areas. However, in order to deliver quality results, manual editing is still needed for some complicated cases.

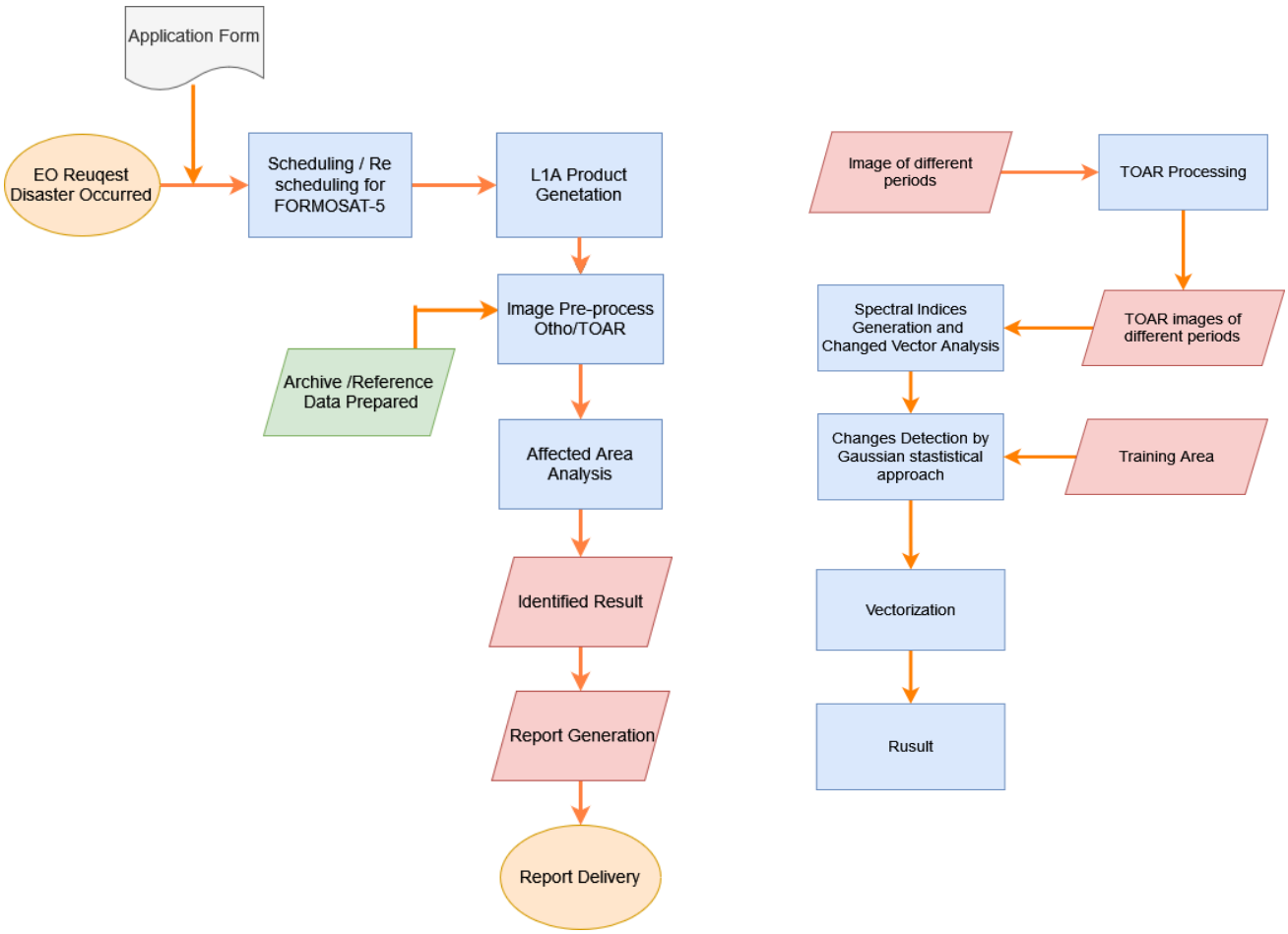
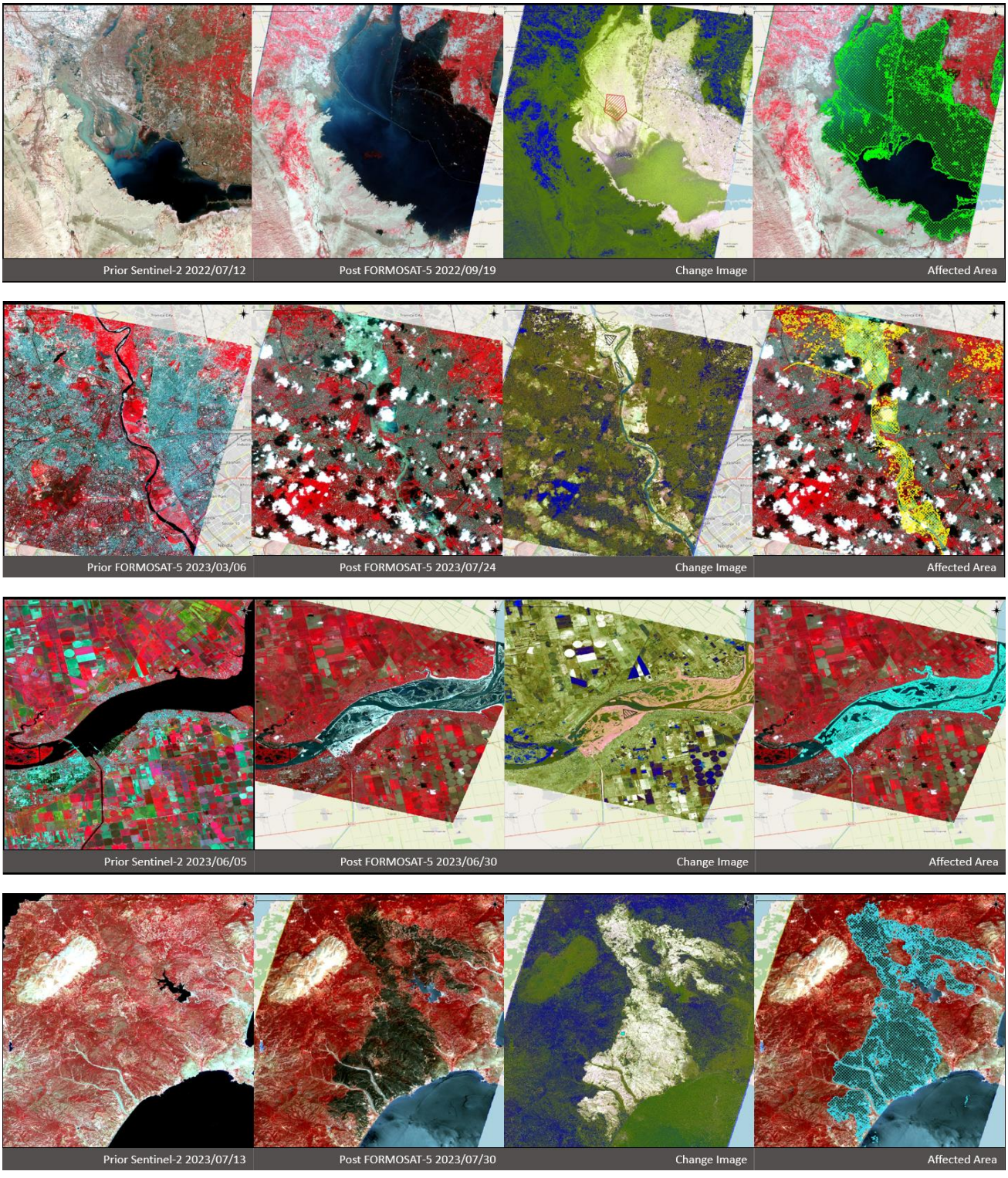


Fig. 4. Operation workflow and EVAP processing workflow



. Fig. 5. Case studies by using EVAP tool

Organization	**TASA and JAXA**
Title	**APRSAF-29 Side Event: Space-Based Solutions: Leveraging Taiwan's Satellite Data for Effective Risk Management and Economic Loss Reduction**
Type of Activity	**Workshop and Conference meeting**
Date	**September 26th 2023**

The event, "Space-Based Solutions: Leveraging Taiwan's Satellite Data for Effective Risk Management and Economic Loss Reduction," successfully showcased the potential of satellite data in enhancing societal resilience and economic stability. Emphasizing Taiwan's commitment to international collaboration, the event highlighted the Open Data Cube (ODC) initiative and the Taiwan Data Cube (TWDC), which provides Analysis Ready Data (ARD) for applications in disaster management and other critical areas. Collaboration with industry partners was a key focus, particularly in developing third-party applications utilizing AI classification models for earthquake detection and disaster response.

Additionally, the event introduced GNSS Radio Occultation (GNSS-RO) and GNSS-Reflectometry (GNSS-R) techniques, demonstrating the valuable data collected from the FORMOSAT-7 mission. With over 7 million atmospheric and 5 million ionospheric profiles, this data significantly improves weather forecasting and typhoon predictions. Through informative sessions and hands-on demonstrations, participants explored the practical applications of the ODC and discussed opportunities for regional collaboration, inviting Asia-Pacific countries to leverage Taiwan's satellite data for sustainable development initiatives.

Fig. 6. Banner of the Side Event

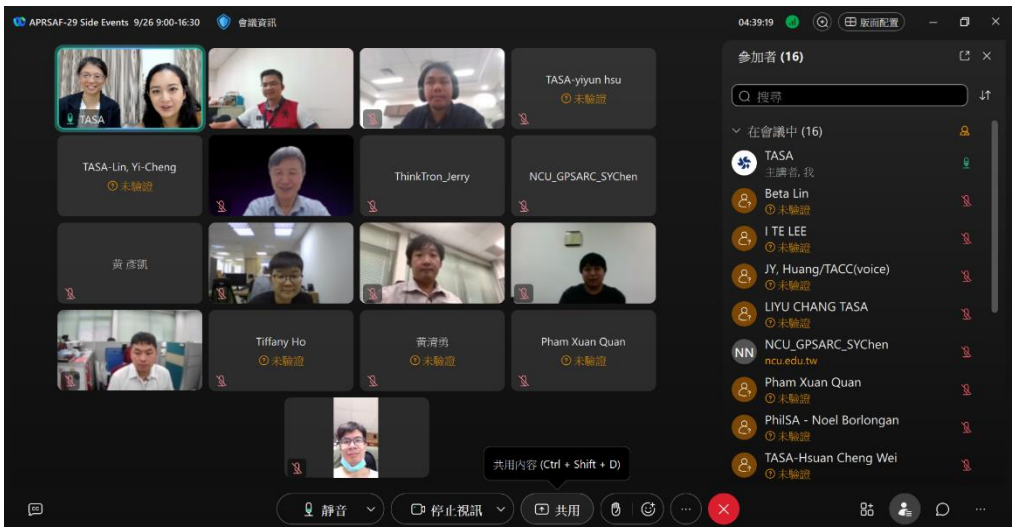


Fig. 7. Group photo of the Side Event

Organization	**Taiwan Space Agency (TASA)**
Title	**Triton meteorological satellite launch**
Type of Activity	**Ocean surface wind speed observation and data providing** (e.g., Conference, Workshop, Meeting, Training, EOR, Providing satellite data or VAP)
Date	**October 9th 2023**

The mission of Triton (Fig. 1.) is for ocean surface wind speed measurement. The mission payload of Triton, GNSS-Reflectometry receiver (GNSS-R), can receive the ocean surface reflected GPS signal for ocean surface wind speed retrieving. The observational area of Triton are west Pacific Ocean, Indian Ocean, and Atlantic Ocean (Fig. 2). Triton satellite was be launched in Oct. 9th, 2023. The mission payload GNSS-R was turned on for observation three days after launch. After the observation data calibration and empirical model development, the products including ocean surface wind speed, ocean surface roughness, and the metadata will be released in mid-2024. The products will be provided to Central Weather Administration (CWA) of Taiwan for weather prediction. The normal users can download Triton products freely from Taiwan Analysis Center for COSMIC (TACC) website (https://tacc.cwa.gov.tw/v2/).

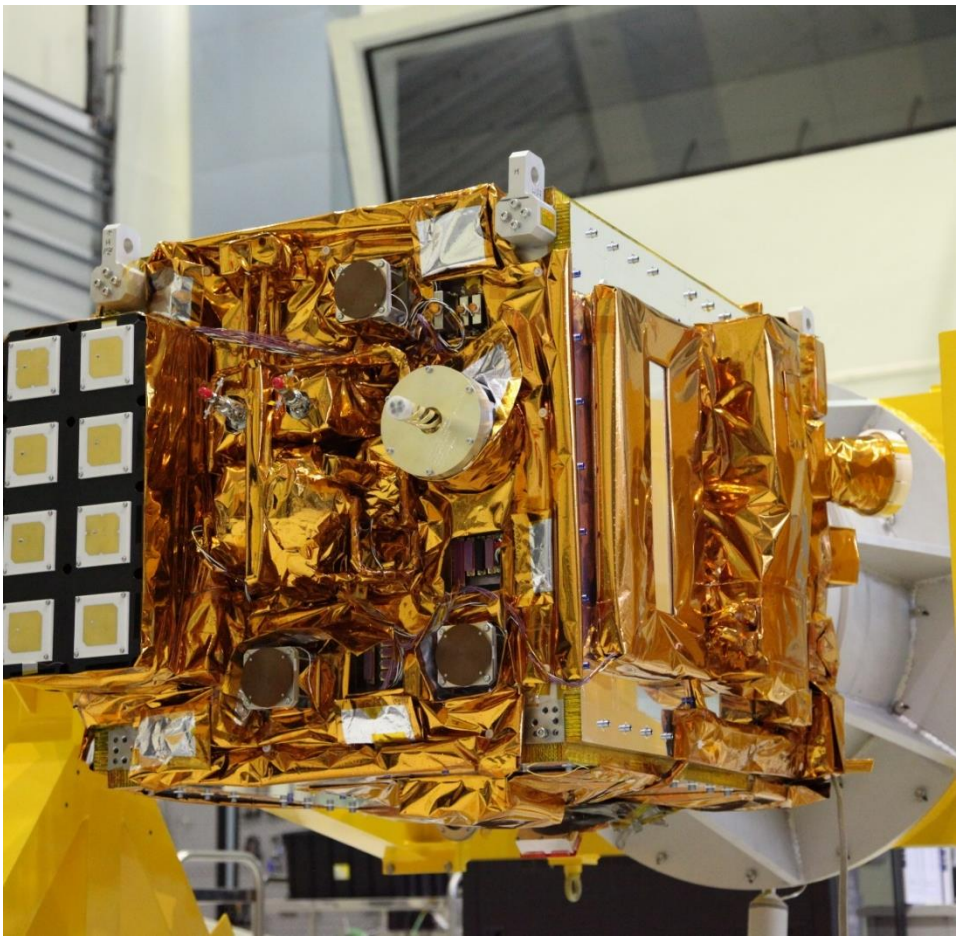


Fig. 8. Triton satellite

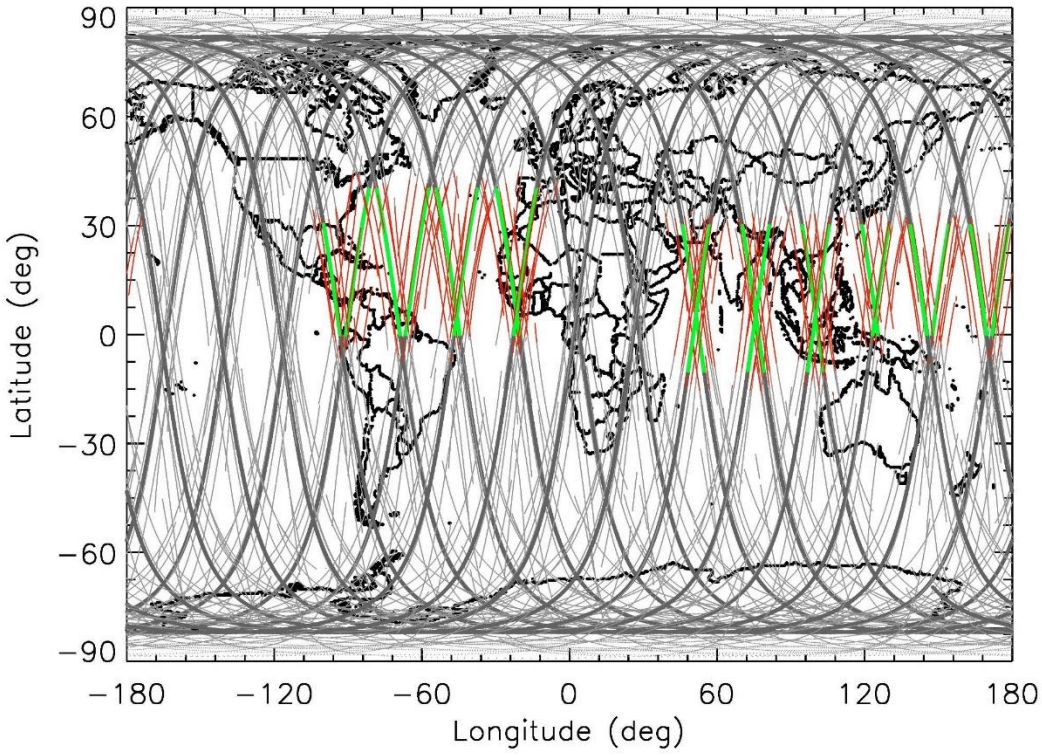


Fig. 9. The observation region (colored lines region), simulated satellite orbit (thick lines), and data distribution (thin lines) of Triton

Organization	**Center for Research and Application for Satellite Remote Sensing, Yamaguchi University**
Title	**Contribution VAPs for EOR activities** **Capacity Building**
Type of Activity	**Capacity Building**
Date	**January 2023**

Yamaguchi University, Center for Research and Application of Satellite Remote Sensing, was established in February 2017. There are 4 missions at this center; (1) to promote world-class research in satellite remote sensing, (2) to cultivate human resources capable of promoting a wide range of research in satellite remote sensing and space technology, (3) to contribute to disaster information analysis and improve public safety and security, and (4) to promote local industry and create new industry/business for space utilization technology. Yamaguchi university focuses on disaster analysis for domestic user in Japan and tries to apply new remote sensing technology for disaster management. In 2023, there is no massive disaster in Japan. Therefore, Yamaguchi university did not contribute VAPs for EOR activities, but Yamaguchi university continue update online training materials and introduce new calibration method for disaster application. Also, Yamaguchi university attended APRSAF-29 at Jakarta, Indonesia on 20 September 2023 and introduce about the calibration and harmonization method for disaster application.