



# Mindoro Oil Spill Response Using Space Data

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PhilSA



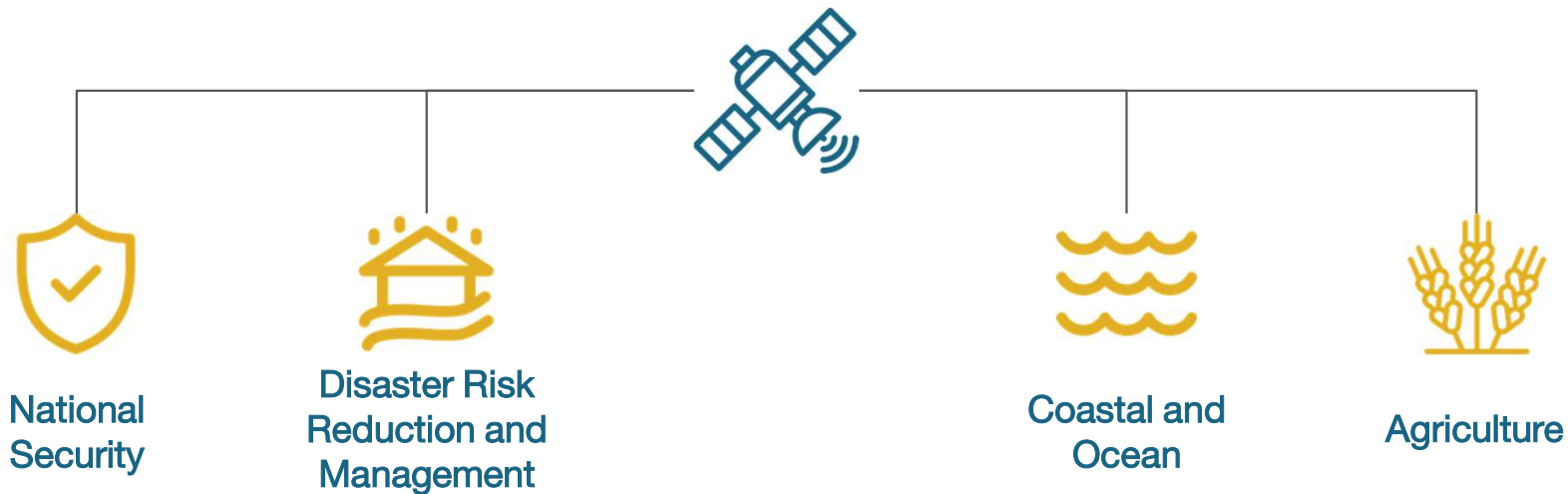
# The Philippine Space Agency

Building an integrated and sustainable national space program



# Data Analytics Technologies and Operations Systems for Space Data (DATOS)

The PhilSA aims to further the development and application of remote sensing, artificial intelligence (AI), machine learning (ML), data science and other methodologies in producing space-enabled information to support the operations of various government agencies.



## PhilSA joins Sentinel-Asia (2023/01/24)

Sentinel Asia representatives hand over the official approval letter that accepts the Philippine Space Agency (PhilSA) as a member of Sentinel Asia. (L-R) Mr. Takehiro Nakamura, JAXA Bangkok Office Director; Dr. Shinichi Sobue, ALOS-2 Mission Manager, Space Technology Directorate I; Dr. Shiro Kawakita, Sentinel Asia Acting Executive Secretariat; Dr. Joel Joseph Marciano, Jr. PhilSA Director General; Dr. Gay Jane Perez; and Dr. Ariel Blanco.



# Sentinel Asia Activations by the Philippine Space Agency

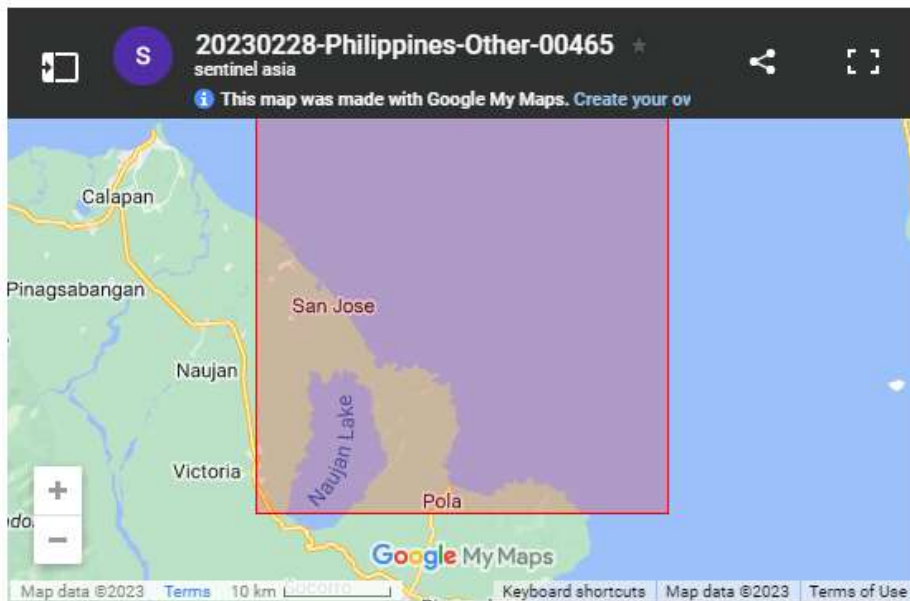


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2023-02-28

## Oil spill in Philippines on 28 February, 2023

### Emergency Obs. Request Information



Disaster Type: Oil spill

Country: Philippines

Occurrence Date (UTC): 28 February, 2023

SA activation Date(UTC): 01 March, 2023

Requester: Philippine Space Agency (PhilSA)

Escalation to the International Charter: Yes

GLIDE Number:

### Disaster Situation

A cargo ship carrying oil sunk near the vicinity of Mindoro Island, Philippines. According to initial assessment by government authorities, initial extent is around 5 kilometers by 500 meters.

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

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

<https://mb.com.ph/2023/02/28/motor-tanker-carrying-800k-liters-of-oil-sinks-off-mindoro/>

2023-07-25

## Typhoon Doksuri in Philippines on 25 July, 2023

### Emergency Obs. Request Information



Disaster Type: Flood and Landslide

Country: Philippines

Occurrence Date (UTC): 25 July, 2023

SA activation Date(UTC): 28 July, 2023

Requester: Philippine Space Agency (PhilSA)

Escalation to the International Charter: No

GLIDE Number: TC-2023-000121-PHL

### Disaster Situation

Typhoon Doksuri devastated the northern part of the Philippines last July 25-26, 2023. Widespread flooding and landslides trapped residents. As of writing, there are 13 deaths and 115 flooding incidents reported.

<https://www.rappler.com/nation/typhoon-egay-updates-forecast-track-wind-signals-news-southwest-monsoon-philippines/?next=2>

<https://edition.cnn.com/2023/07/25/asia/philippines-typhoon-doksuri-egay-landfall-intl-hnk/index.html>

# Mindoro Oil Spill Response



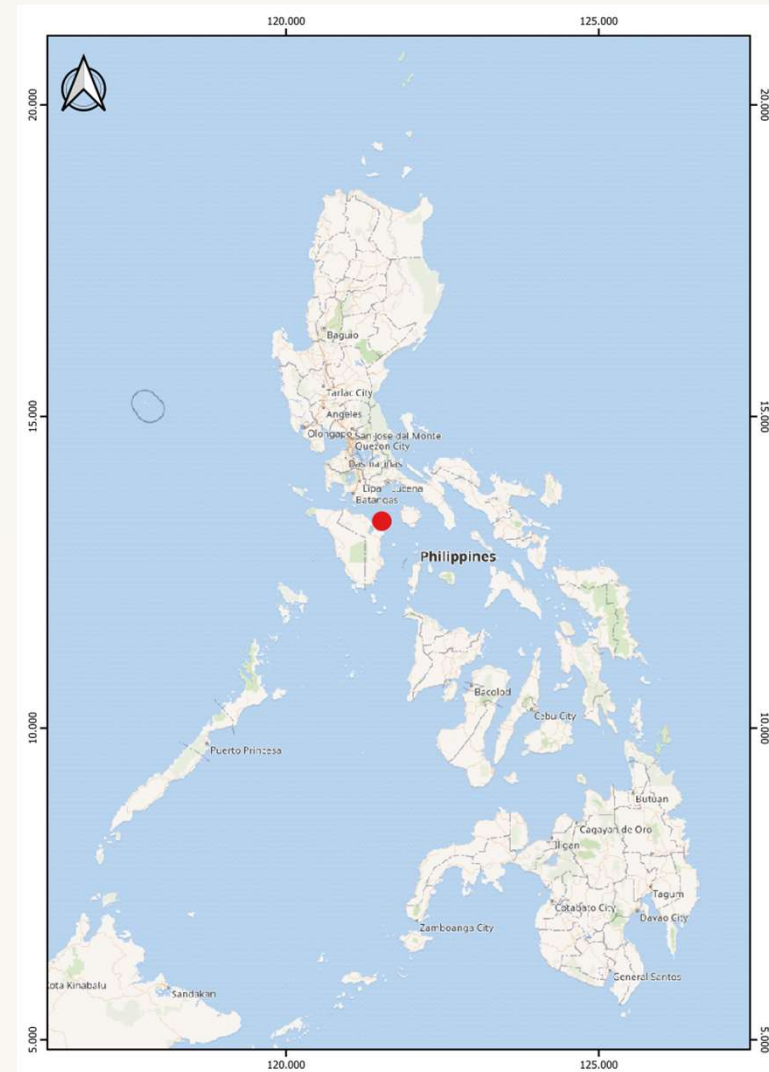
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# Introduction

MT Princess Empress sunk on February 28, 2023 Carrying **800,000 liters of Industrial Fuel** near the island of Mindoro in the Philippines

Caused an estimated 126 million USD in damage to mangroves, seagrass, and corals



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# Timeline of Events

Feb.28, 2023: Oil Spill



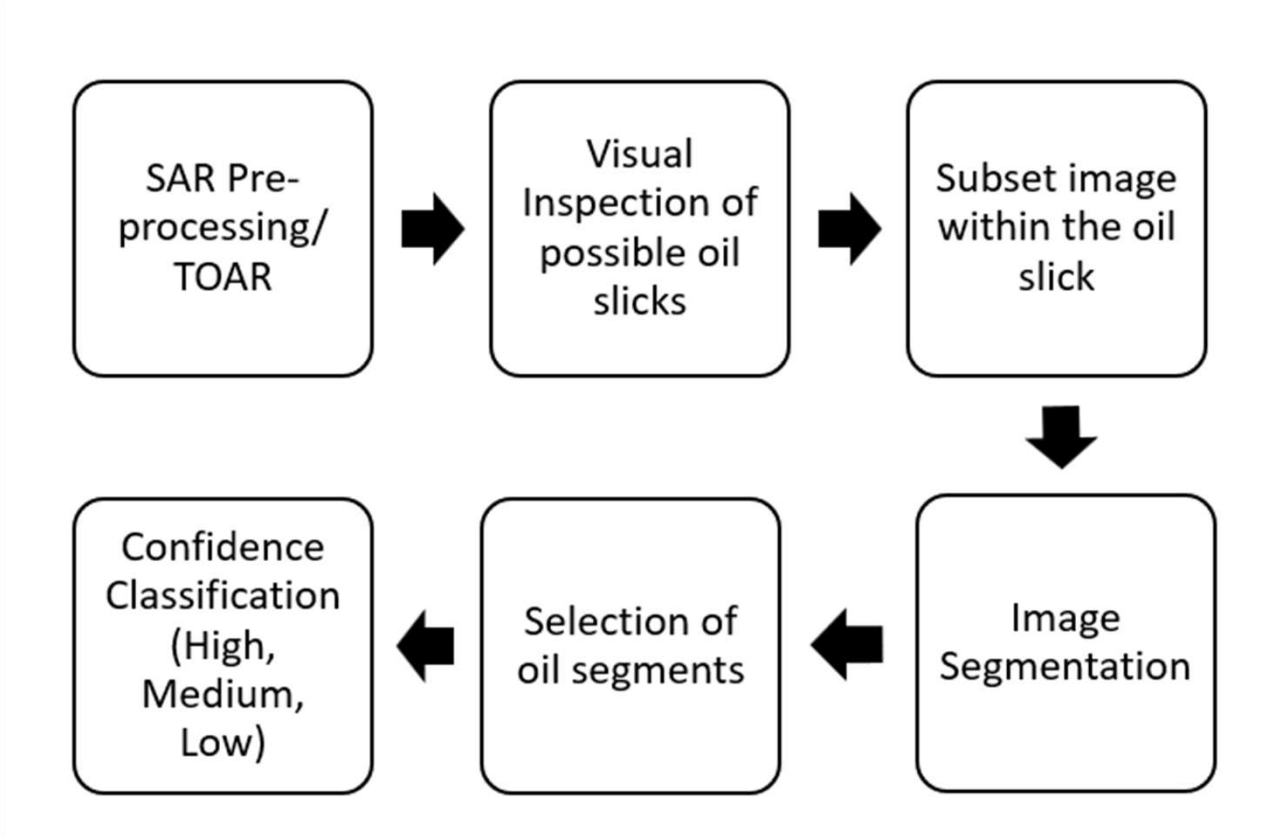
Mar. 1, 2023: Activation of the Sentinel Asia

# Data Providers for the Mindoro Oil Spill

The image displays a collection of logos for data providers, organized into two main sections separated by a dashed line. The top section contains logos for JAXA, ISRO, TASA (Taiwan Space Agency), GISTDA, USGS (science for a changing world), CNSA, ESA, DLR (Deutsches Zentrum für Luft- und Raumfahrt), INPE (UNIDADE DE PESQUISA DO MCTI), KARI (Korea Aerospace Research Institute), and CONAE. The bottom section contains logos for SATELLOGIC, dmc (International Imaging), and ICEYE. Small globe icons are placed at the corners of the dashed-line sections.



# Processing Workflow

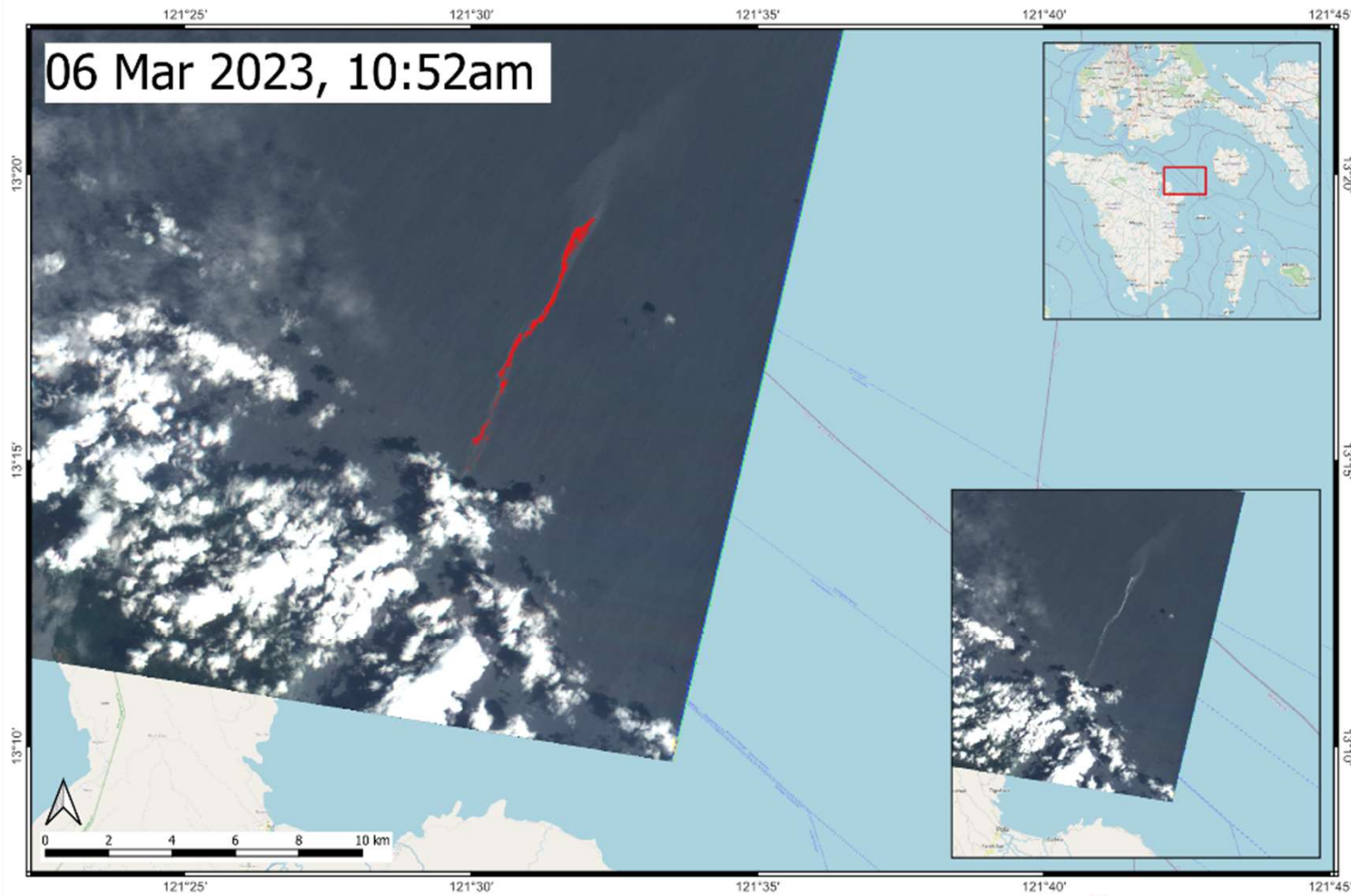


# PhilSA-Generated Oil Spill Maps from Sentinel Asia Datasets



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# ASSESSMENT OF OIL SPILL EXTENT



**FormoSat-5**  
**06 March 2023**  
**10:52 AM**



*~ 1 km<sup>2</sup>*



**PhilSA**

Marine Pollution Due to Oil Spillage in Oriental Mindoro, Philippines

Data Source: FormoSat-5 optical image. Retrieved from Sentinel Asia.

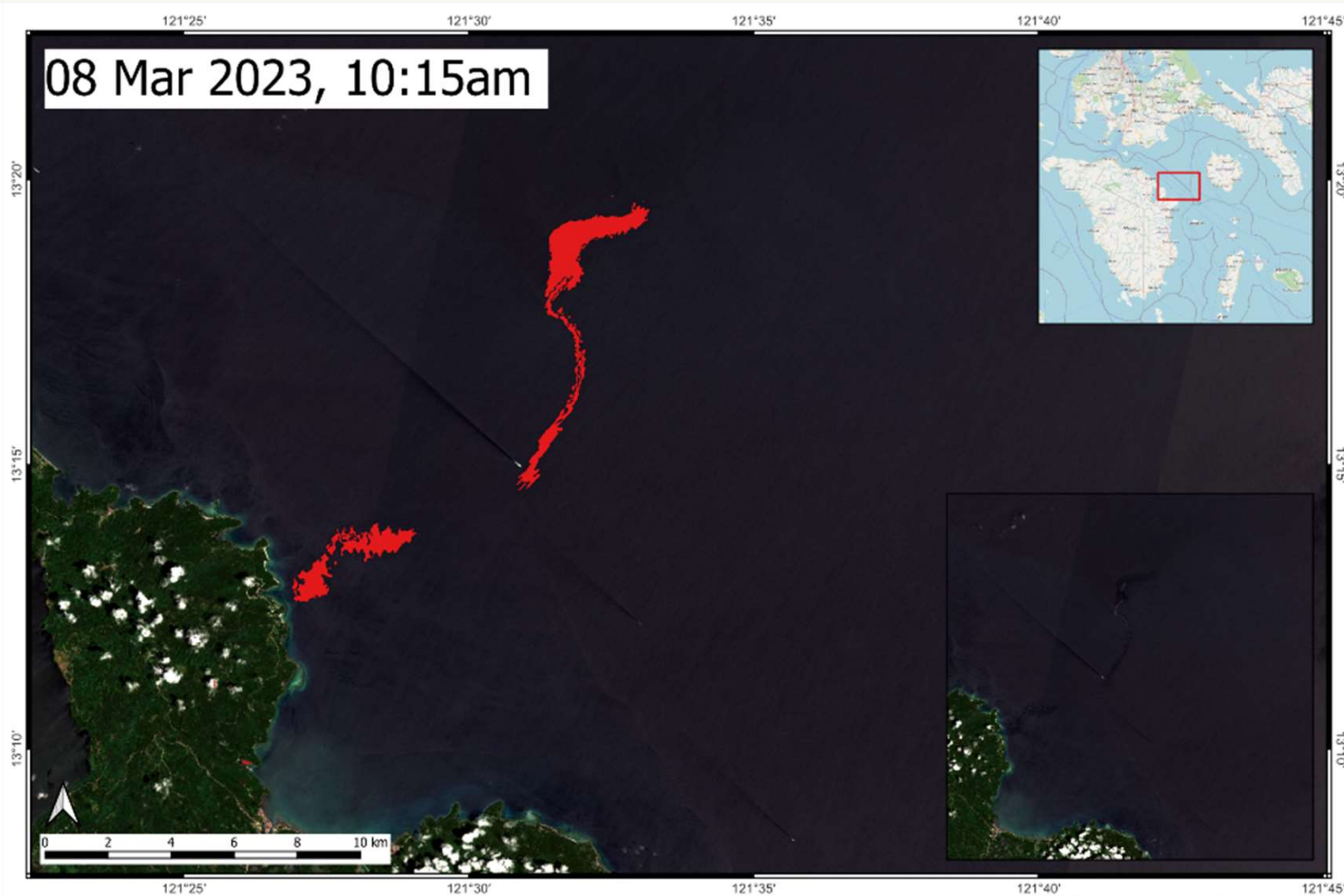


SENTINEL  
**ASIA**



**TASA**

# ASSESSMENT OF OIL SPILL EXTENT



Sentinel-2  
08 March 2023  
10:15 AM

~ 7 km<sup>2</sup>

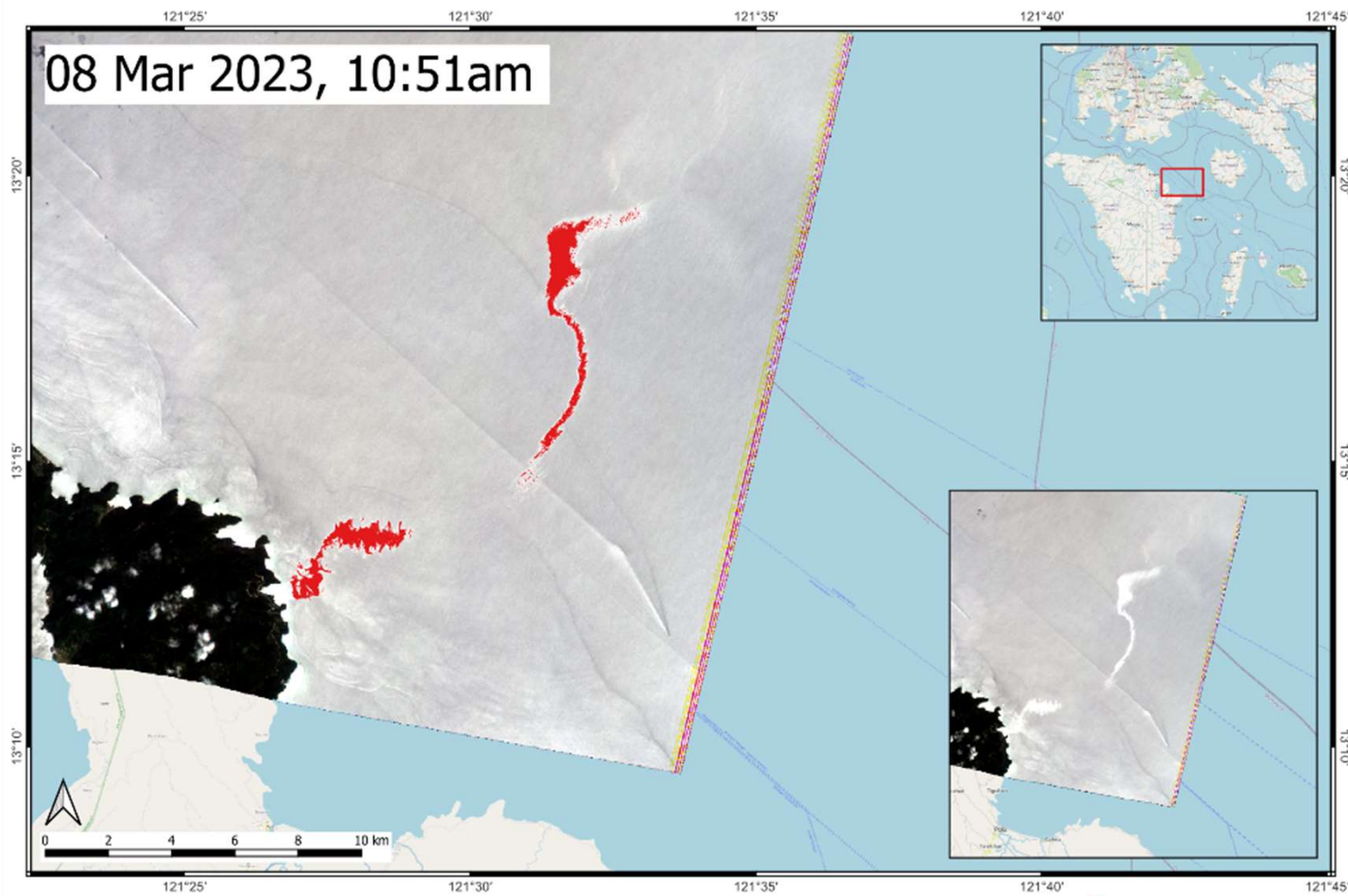


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Marine Pollution Due to Oil Spillage in Oriental Mindoro, Philippines  
Data Source: Contains modified Copernicus Sentinel data [2023]. Retrieved from Sentinel Asia.



# ASSESSMENT OF OIL SPILL EXTENT



FormoSat-5  
08 March 2023  
10:51 AM

~ 5 km<sup>2</sup>



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Marine Pollution Due to Oil Spillage in Oriental Mindoro, Philippines

Data Source: FormoSat-5 optical image. Retrieved from Sentinel Asia.

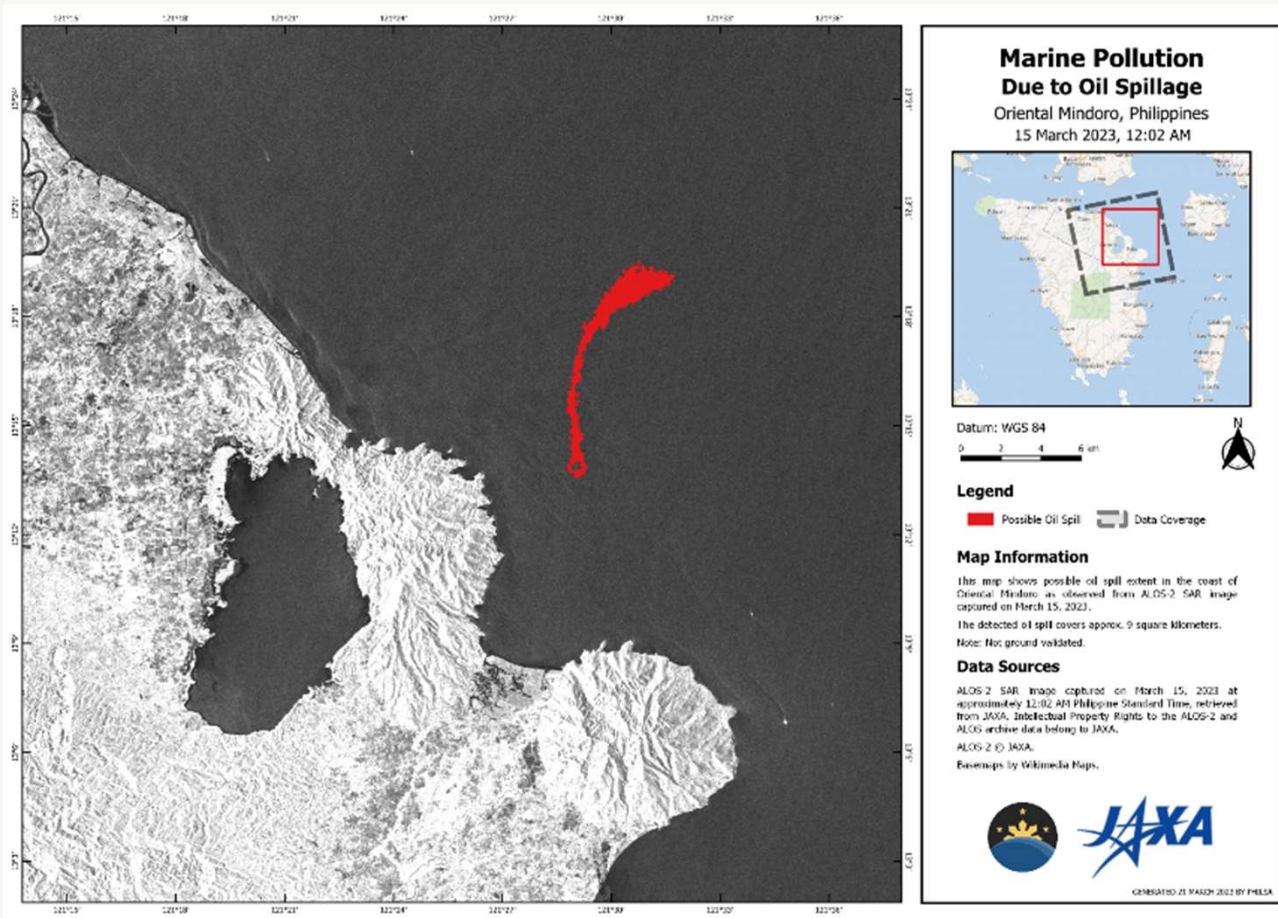


SENTINEL  
ASIA

TASA



# ASSESSMENT OF OIL SPILL EXTENT



**ALOS 2**  
**15 March 2023**  
**12:02 AM**

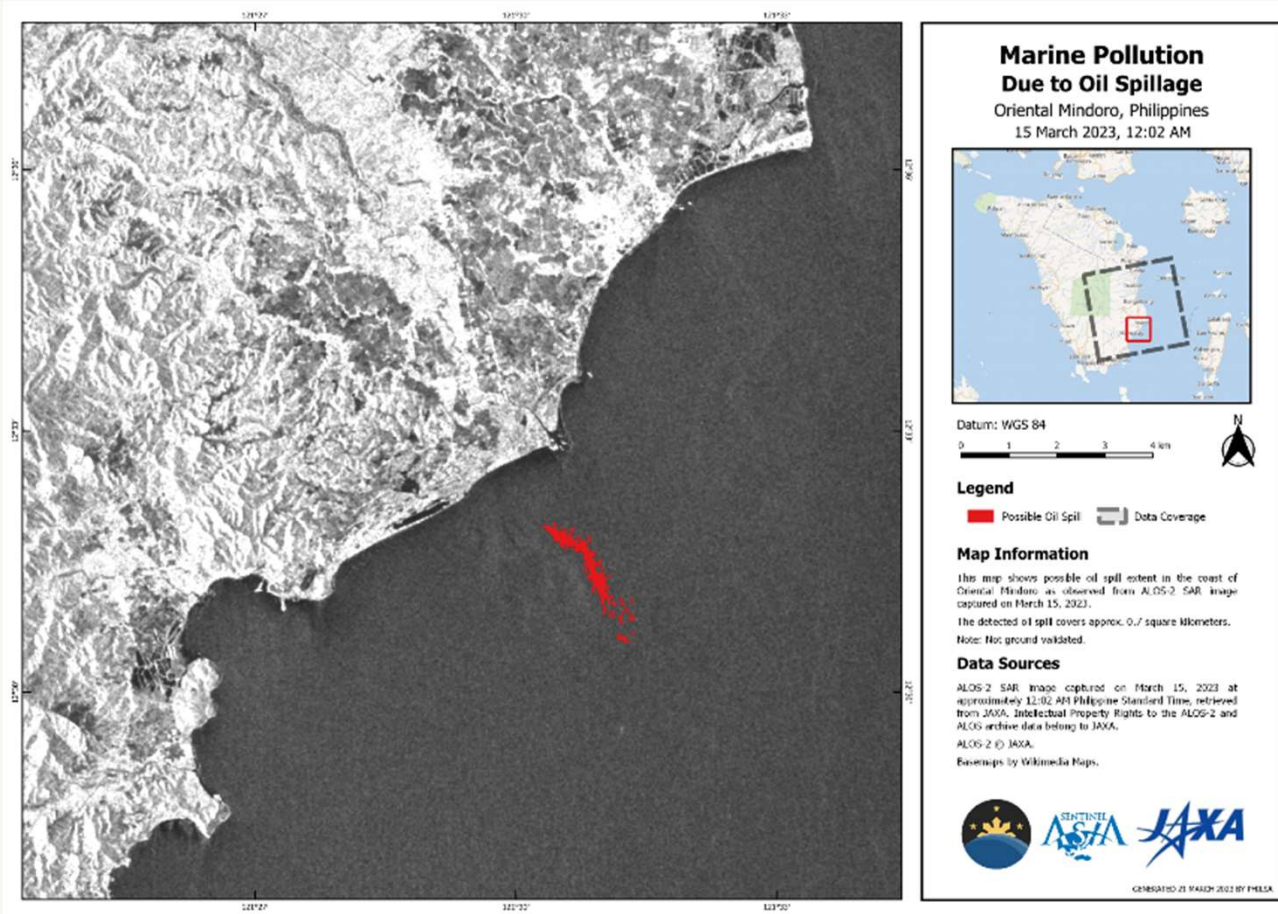


**~ 9 km<sup>2</sup>**



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# ASSESSMENT OF OIL SPILL EXTENT



**ALOS 2**  
**15 March 2023**  
**12:02 AM**



**~ 0.7 km<sup>2</sup>**



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# Recipients:

- DENR
- MSI
- PCG
- DILG
- DSWD
- DOST (Main, Region 4b and 6)
- NEDA (Main, Region 4b and 6)
- OCD (NDRRMOC, Post-Disaster Evaluation and Management Division (PDEMD), Region 4b and 6)

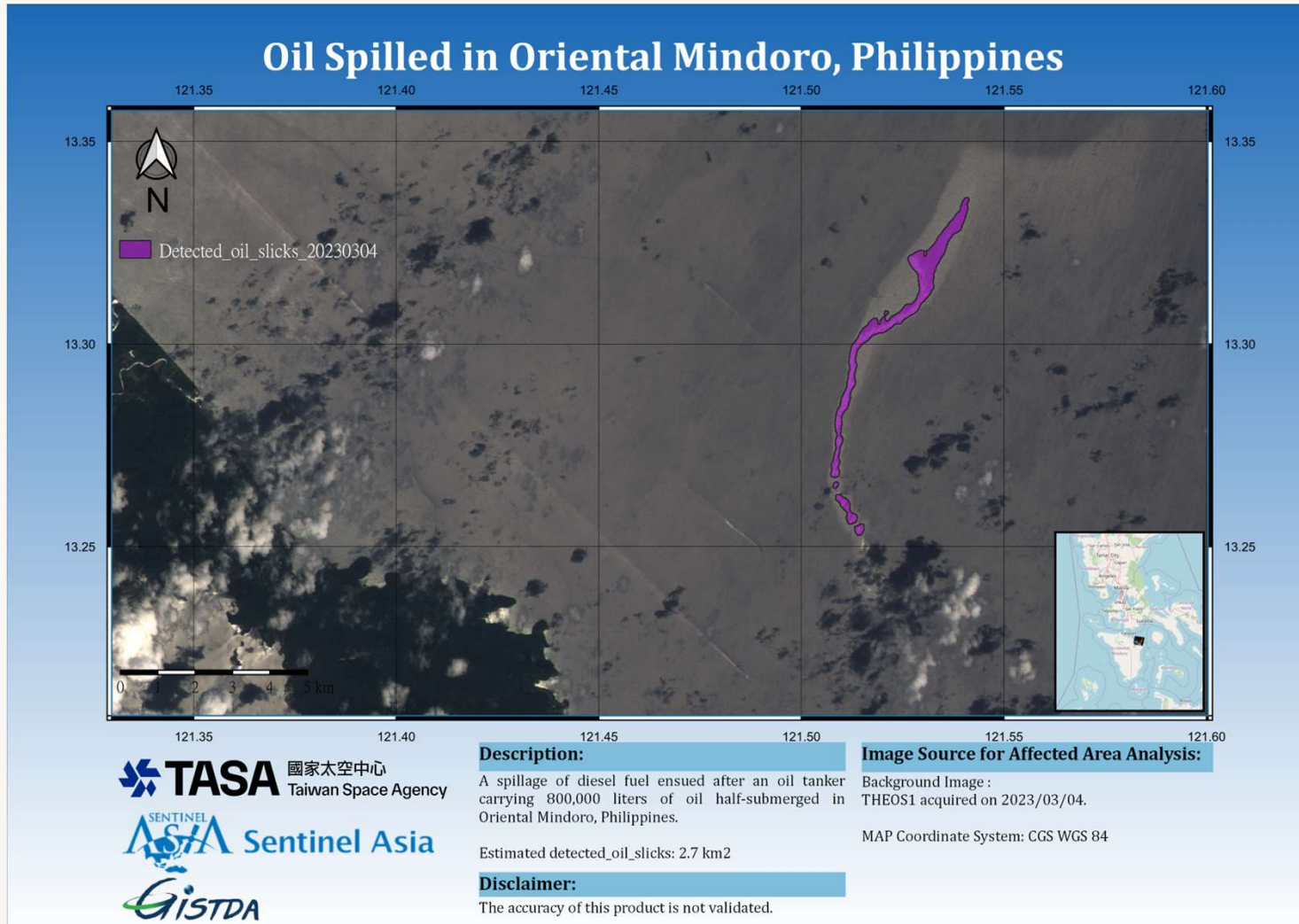


# Sentinel Asia-Provided Oil Spill Maps

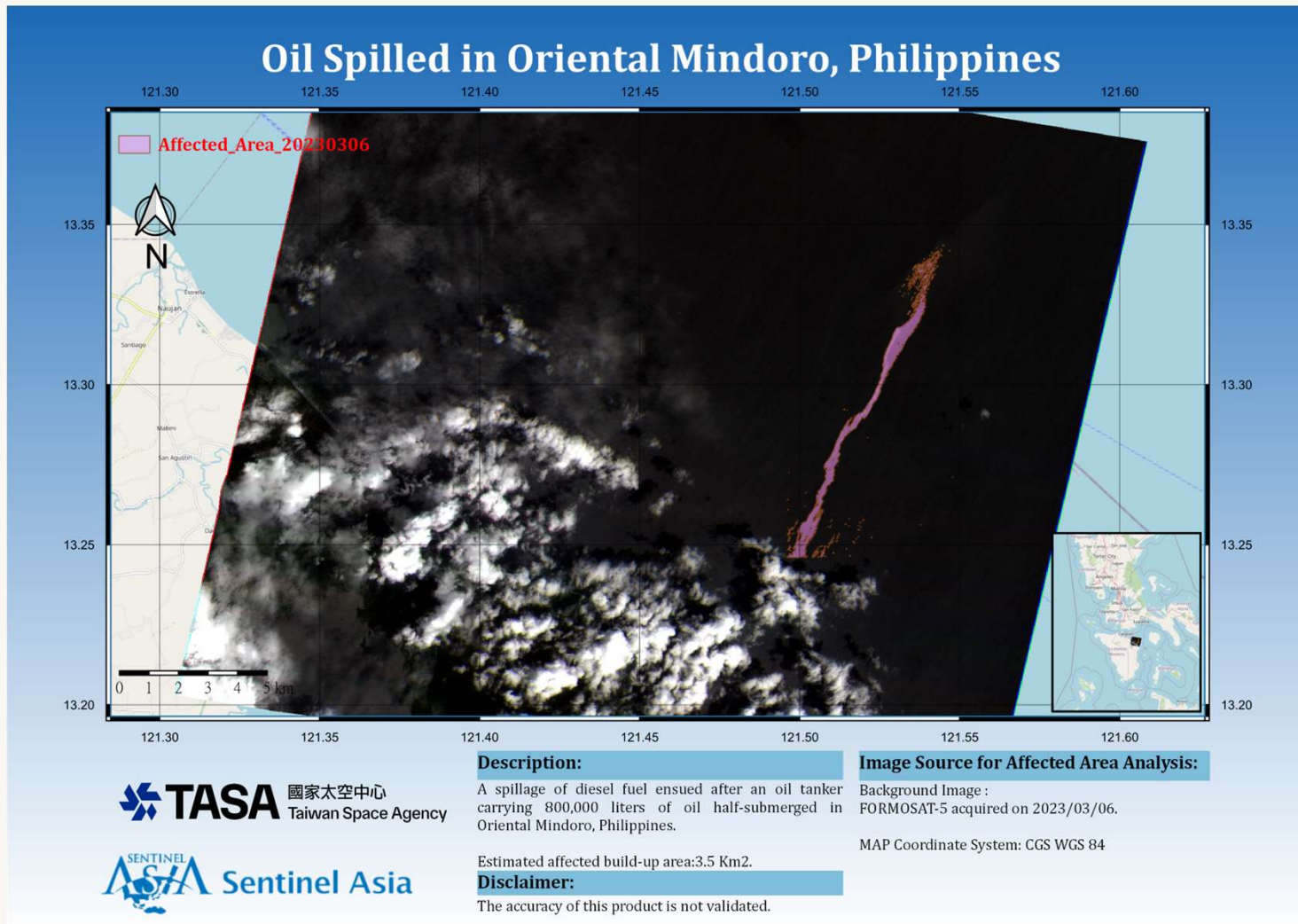


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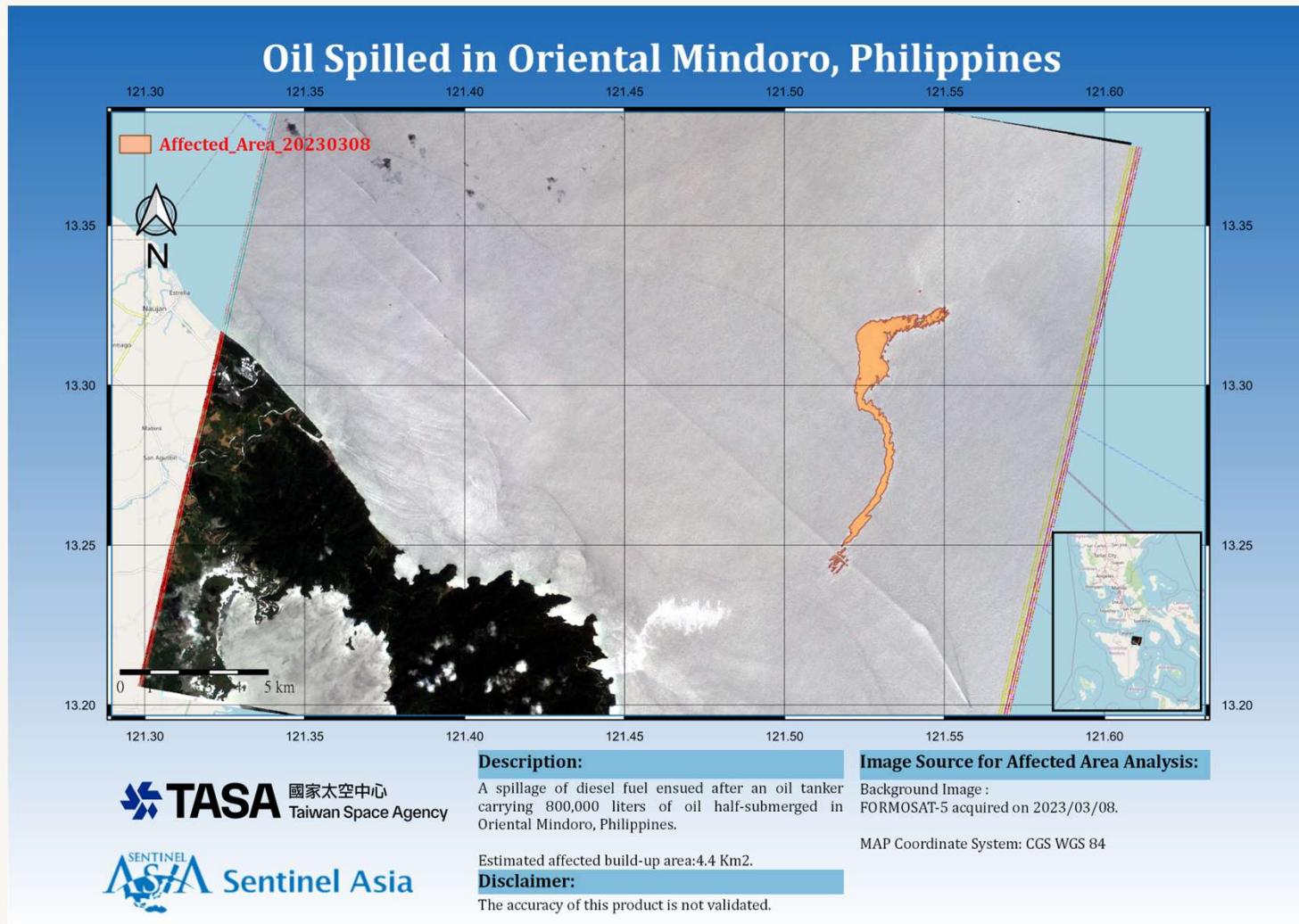
# THEOS1 (2023/03/04)



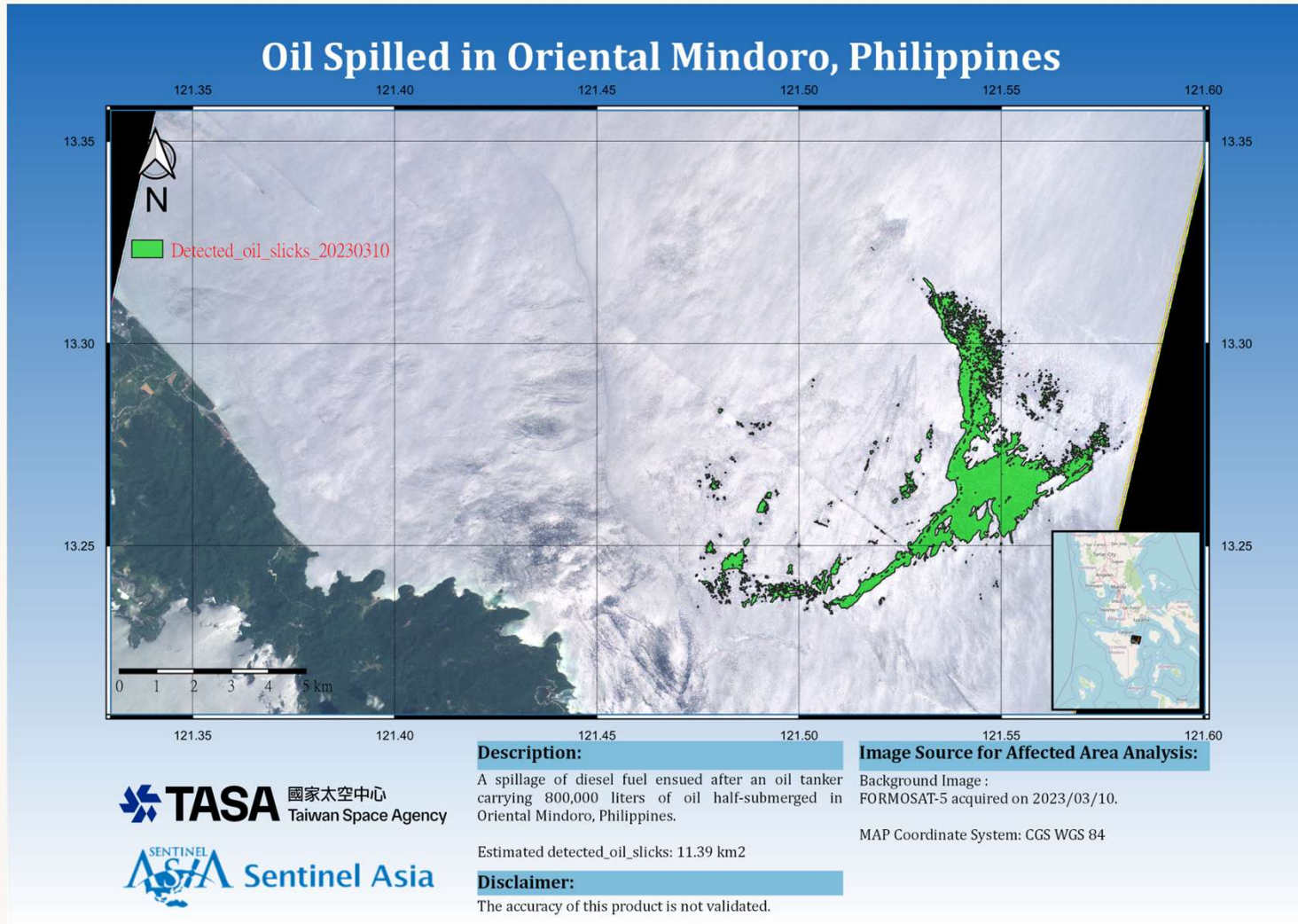
# FORMOSAT-5 (2023/03/06)



# FORMOSAT-5 (2023/03/08)

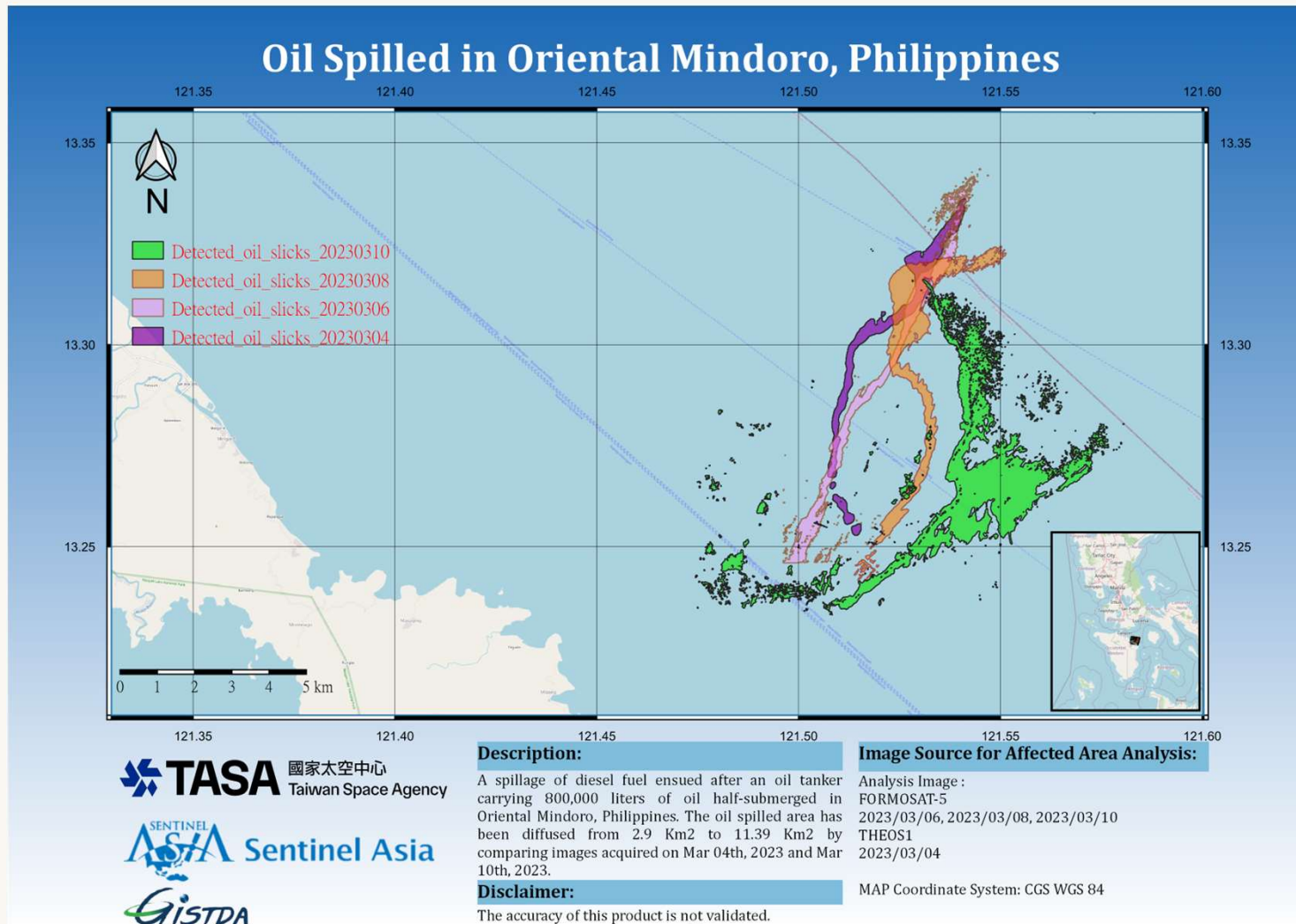


# FORMOSAT-5 (2023/03/10)





# FORMOSAT-5 (2023/03/08)



# Scientific paper/research

- Geospatial Week 2023



## MONITORING OIL SPILL PROGRESSION AND OIL SPILL VOLUME USING SATELLITE IMAGES

Roel de la Cruz, Paul Leonard Atchong Hilario

Philippine Space Agency, Philippines



# What we can offer



PhilSA

# Diwata-2

## Fast Facts

<b>Class</b>	Microsatellite (Microsat)
<b>Mass</b>	57.36 kg
<b>Type</b>	Earth Observation
<b>Dimensions</b>	50cm x 50 cm x 50 cm (Stowed State)
<b>Orbit</b>	Low Earth, Sun-Synchronous
<b>Payloads</b>	High Precision Telescope (HPT), Spaceborne Multispectral Imager with Liquid Crystal Tunable Filter (SMI w/ LCTF), Middle Field Camera (MFC), Wide Field Camera (WFC), Enhanced Resolution Camera (ERC), Deployable Solar Array Panels (DSAP), an Amateur Radio Unit (ARU), Zenith Sun Sensor Module (SAS-Z), and an Extended Attitude Control Unit (ACU-Ex)
<b>Launch</b>	29 October 2018
<b>Release</b>	Direct release to space via rocket
<b>Mission/s</b>	(1) Multi-spectral Earth Observation for remote sensing applications; (2) Data Collection by Store-and-Forward Mechanism; (3) Provide Satellite data to agriculture, fisheries, forestry, and other sectors; (4) Assess damages caused by natural disasters by taking pre and post disaster images in the area; (5) Provide means of communication for emergency responders through amateur radio; (6) Automatic Packet Reporting System (APRS) Message Digipeater
<b>Image acquisition</b>	Approximately 80% or 245,063 km sq. of Philippine land area covered (as of June 2020)
<b>Status</b>	In orbit (since 29 October 2018)

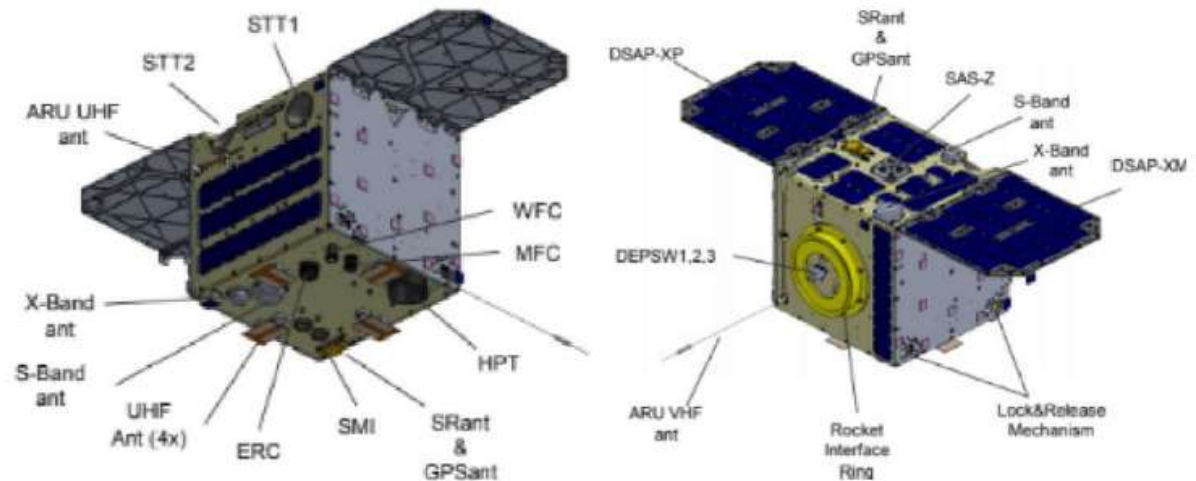


Actual Image of Diwata-2

## Trivia

Diwata-2 is the successor of Diwata-1 that is also built through PHL-Microsat, with satellite operations continued under the STAMINA4Space Program. Significant enhancements were made to Diwata-2, such as its deployment to a Sun-Synchronous Orbit, the addition of deployable solar arrays for additional power provision, and the inclusion of an Enhanced Resolution Imager camera and an Amateur Radio Unit (ARU) which can be used as an alternative means of communication during disasters on the ground.

Diwata-2 Modules Diagram



# NovaSAR-1

## Fast Facts

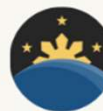
<b>Country</b>	United Kingdom (commercial)
<b>Class</b>	Synthetic Aperture Radar minisatellite
<b>Mass</b>	430 kg
<b>Type</b>	Earth Observation
<b>Orbit</b>	Low Earth
<b>Payloads</b>	S-band Synthetic Aperture Radar (SAR), Automatic Identification System (AIS)
<b>Launch</b>	16 September 2018 from ISRO (Sriharikota, India)
<b>Mission</b>	<p><i>Disaster Management and Environmental Monitoring</i> Assess an area by taking SAR images. This is especially helpful when cloud cover is an issue</p> <p><i>Maritime Monitoring</i> Through AIS, detect ships and track their movements.</p>
<b>Modes of Operation</b>	<p><i>ScanSAR</i>: 20m resolution, 100 km swath</p> <p><i>Maritime mode</i>: 30m, 400-750 km swath</p> <p><i>Stripmap</i>: 6m resolution, 20 km swath</p> <p><i>ScanSAR wide</i>: 30m resolution, 140 km swath</p>
<b>Status</b>	In orbit (since September 2018)



Computer generated image of NovaSAR-1 in orbit.  
Retrieved from [research.csiro.au](http://research.csiro.au)

## Trivia

The PEDRO Center's ground receiving stations have access to 10% of NovaSAR-1's capacity for the satellite's lifetime. Other mission partners include UK Space Agency, Australia's Commonwealth Scientific and Industrial research Organization and Indian Space Research Organization.



# MULA

## Fast Facts

<b>Class</b>	Small Satellite (SmallSat)
<b>Mass</b>	~130 kg
<b>Type</b>	Earth Observation
<b>Dimensions</b>	76 cm x 84.1 cm x 102.8 cm
<b>Spatial Resolution</b>	5 meter at 120 km swath width
<b>Payloads</b>	<ol style="list-style-type: none"> <li>1. Wide-swath multispectral imager with 9 spectral bands</li> <li>2. AIS (Ship Detection)</li> <li>3. ADS-B (Aircraft Detection)</li> </ol>

**Launch** Q1 2025 (target)

**Mission/s**

1. Capture images of the country for agriculture, disaster management, coastal monitoring & ocean studies, and national security through the primary payload.
2. Augment the country's capability for ship and aircraft detection through the secondary payloads.
3. Perform near real-time capture and download of images over the Philippines.

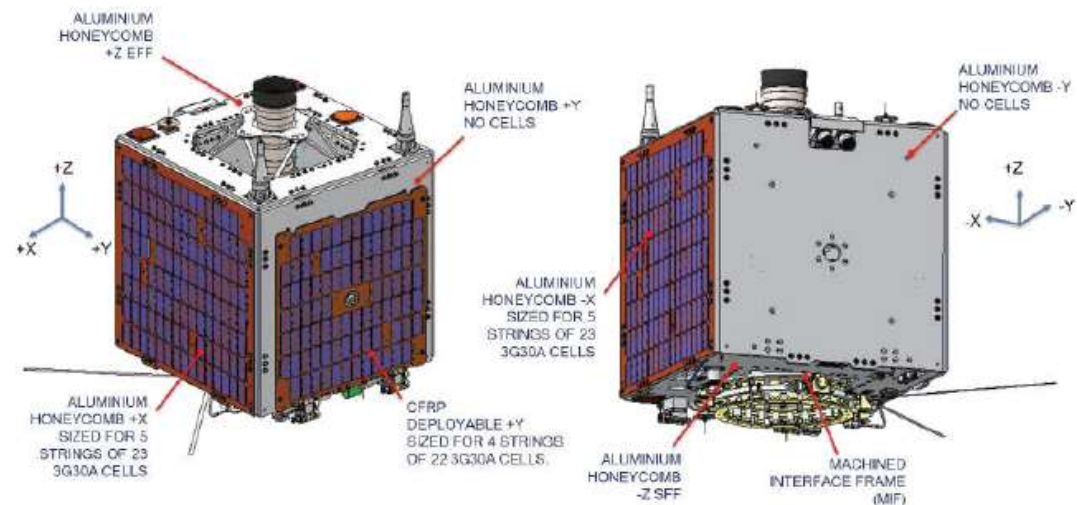
**Status** Under development



## Trivia

In December 2020, the Philippines kicked off the Multispectral Unit for Land Assessment or MULA satellite project. MULA will carry a TrueColor camera that can capture higher resolution images covering around seventy-three thousand (73,000) square kilometers of our country in one day. Sixteen (16) Filipino engineers, who underwent a know-how training and transfer program in the U.K., are involved in building the satellite and are now part of PhilSA.

“Mula,” in Ilokano, means “plant” - pointing to the satellite’s mission on food security. In Tagalog, it means “point of origin or beginning” - which symbolically signals the Philippine’s foray into a new era in satellite development.



(Top) Render of MULA satellite and (bottom) external mechanisms of the satellite.



# Contact the Philippine Space Agency



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<https://www.linkedin.com/company/philspaceagency/>



<https://philisa.gov.ph/>



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