Value Creation in Space for Digital Economy, Governance and Inclusion

Mobilizing Space Data, Services and Infrastructure In the Philippines

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Philippine Space Agency (PhilSA)

UNISEC-Global Meeting
12 December 2020

The Philippine Space Agency (PhilSA)

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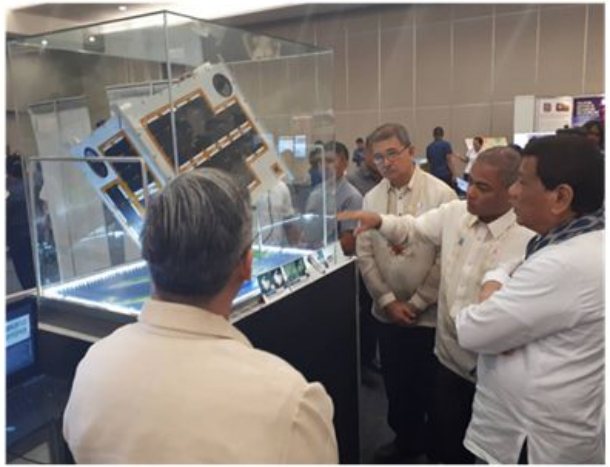
Philippine Republic Act 11363 enacted on 08 August 2019, *"An Act Establishing the Philippine Space Development and Utilization Policy and Creating the Philippine Space Agency, and for other Purposes"*



Mandate

The PhilSA shall be the primary policy, planning, coordinating, implementing, and administrative entity of the Executive Branch of the government that will plan, develop, and promote the national space program in line with the Philippine Space Policy.

Mission and Vision

The PhilSA envisions a Filipino nation bridged, uplifted, and empowered through the peaceful uses of outer space.

We will promote and sustain a robust Philippine space ecosystem that adds and creates value in space for and from Filipinos and for the world.

Office of the President

↑

Philippine Space Agency (PhilSA)
(Director General)

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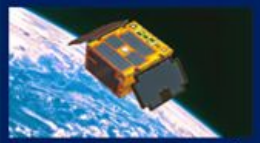
Philippine Space Council
Cabinet Secretaries / Advisory Body & President's Cabinet

Cooperation among National Government Agencies

Key Development Areas

National Security & Development

Hazard Management and Climate Studies



Space Research and Development

Space Industry Capacity Building

Education and Awareness

International Cooperation

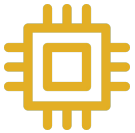
Key Development Areas

National Security & Development

Hazard Management & Climate Studies

Space Research & Development

Education & Awareness



Space Industry Capacity Building

International Cooperation

Building Upon Past Gains in Space R&D investments

Development of Philippine Scientific Earth Observation Microsatellites

Space Technology and Applications Mastery, Innovation and Advancement

Digital Imaging for Monitoring and Evaluation

Computing and Archiving Research Environment

Philippine Earth Data Resource & Observation

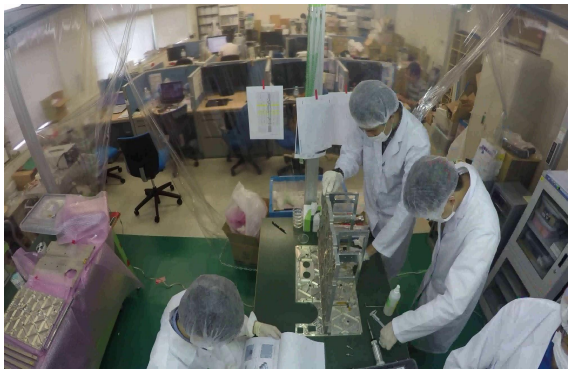
Remote Sensing and Data Science Help Desk

Understanding Lightning and Thunderstorms

Growing and enhancing capacity in SSTA by developing

People + Capabilities + Infrastructure



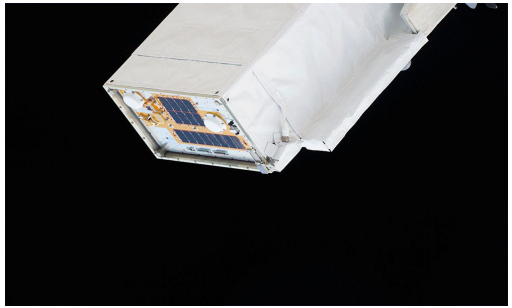




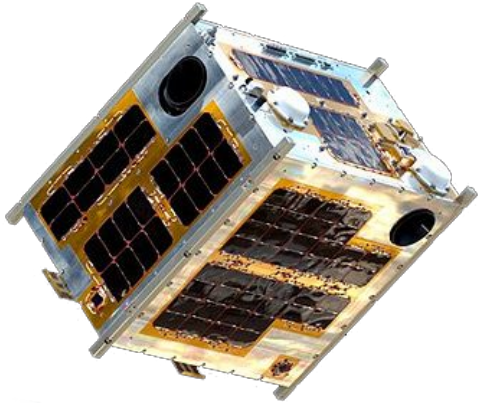






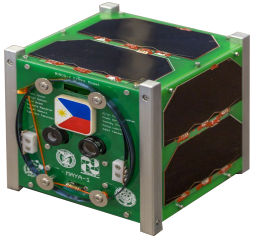
Small satellites



Diwata-1 (2016)

53 kg low earth orbit microsatellite

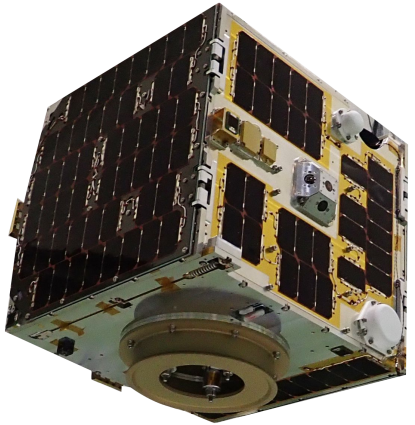
(Re-entered Earth's atmosphere on 06 April 2020)



Maya-1 (2018)

1 kg nanosatellite

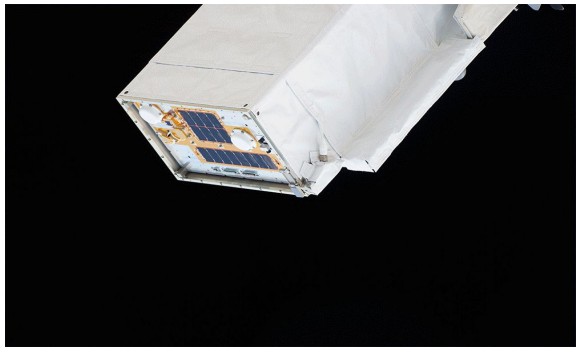
(Re-entered Earth's atmosphere on 23 November 2020)



Diwata-2 (2018)

57.4 kg low earth orbit microsatellite

Small satellites



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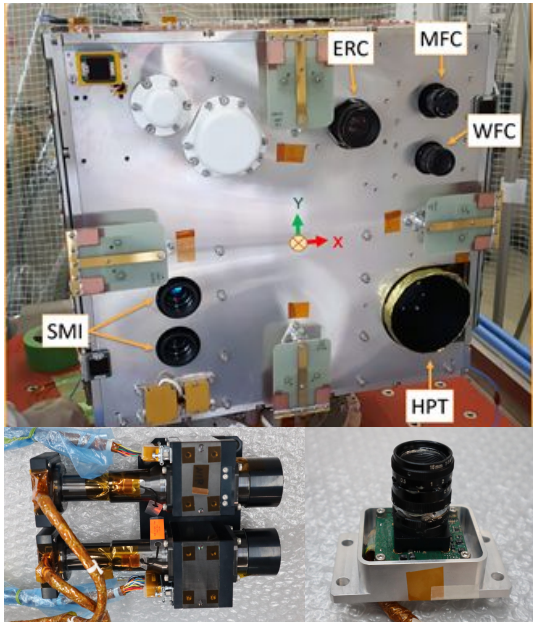
Satellite Technologies

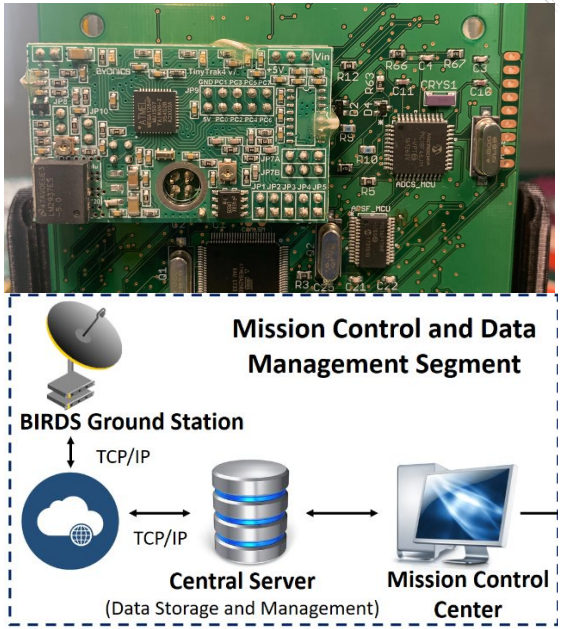


Optical Payloads

- High Precision Telescope
- Spaceborne Multispectral Imager
- Wide Field Camera

Amateur Radio Payload

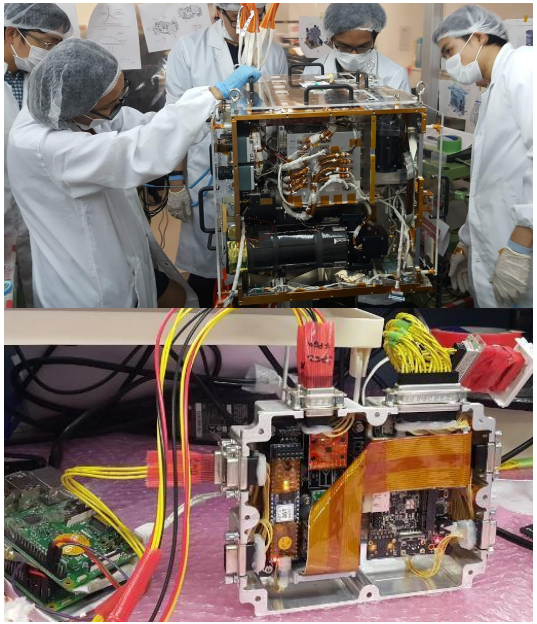
- Amateur Radio Unit (ARU)
- Ham radio for emergency communication

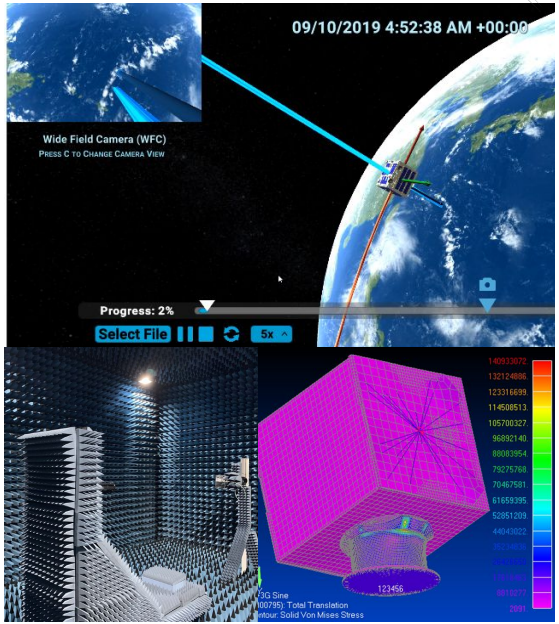


Store & Forward Payload

- Store: Remote data collection
- Forward: Ground data download

Satellite Technologies





Assembly

- Satellite Bus Design
- Payload Design & Assembly
- Fabrication and Inspection

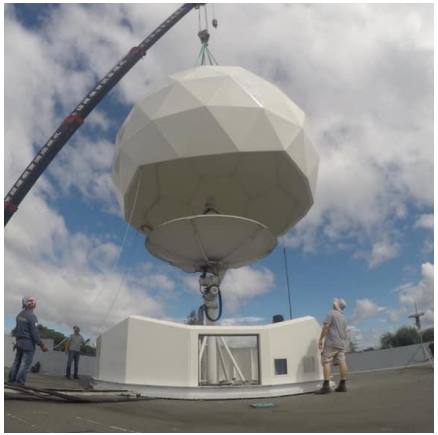
Integration

- Electronic Functionality Test
- Component and System Checks
- System Integration

Testing

- Orbital Simulations
- Structural & Thermal Analysis & Testing
- Radiation Pattern Testing

Ground Infrastructure



Luzon

PEDRO Center
Quezon City (DOST-ASTI)

Visayas

Iloilo Ground Receiving Station (Coming Soon)

Mindanao

Davao Ground Receiving Station (DGRS)

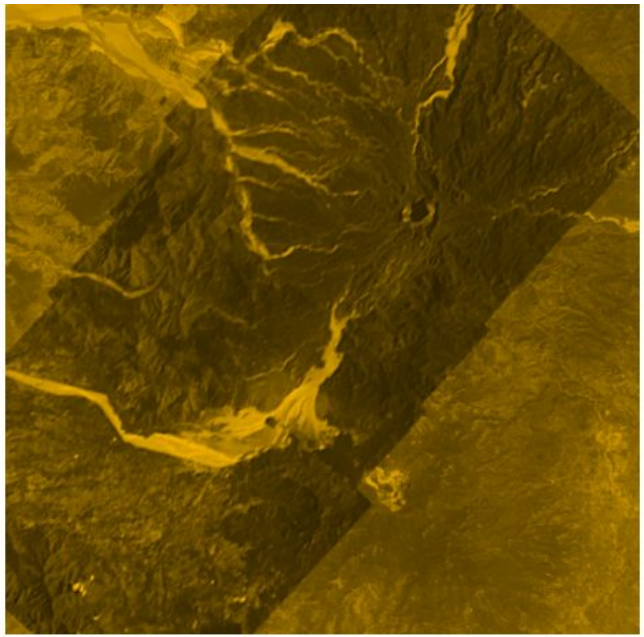
COMPUTING AND ARCHIVING RESEARCH ENVIRONMENT

Data Archiving

High-Performance Computing (HPC)

Science Cloud

Our Place in Space



Vol. 1: Space Data Mobilization

Vol. 2: Space Technology

Vol. 3: Capacity-building, outreach and sustainability

Philippine Space Agency

Mapping Land Cover Classes

Butuan City, Agusan del Norte

With the increasing availability of Earth observation data such as those in the form of satellite images, deep learning methods (e.g. AI & Convolutional Neural Networks) have shown promising results in identifying the physical aspect of the earth's surface (land cover). Through these methods and automated systems developed by the DATOS Project, updating of land cover classifications can now be expedited.

In partnership with NAMRIA, different models were created for each class and were later merged to create a land cover map.

Legend

- Roads
- Bare soil
- Water
- Built-up
- Vegetation

N

Cartographic Information

Coordinate System: WGS 84/ UTM

0 0.35 0.7 1.05 1.4 km

Satellite: Planetscope Image
Accessed via: DOST-ASTI PEDRO Center
Capture date: August 25, 2017
Payload: Optical
Resolution: 3m
Basemap: OpenStreetMap

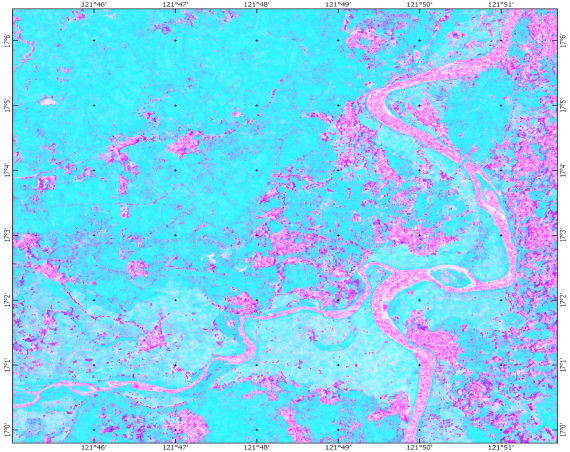
Mapping Agricultural Crops

Sugar Cane, Rice, and Corn Mapping

Research on remote sensing (RS) techniques allows for faster methods in mapping agricultural resources.
In cooperation with the Department of Agriculture and Sugar Regulatory Administration, mapping these high-value crops using advanced RS methods would help streamline and hasten activities in inventory, yield projection, monitoring, data analysis, and assessment.

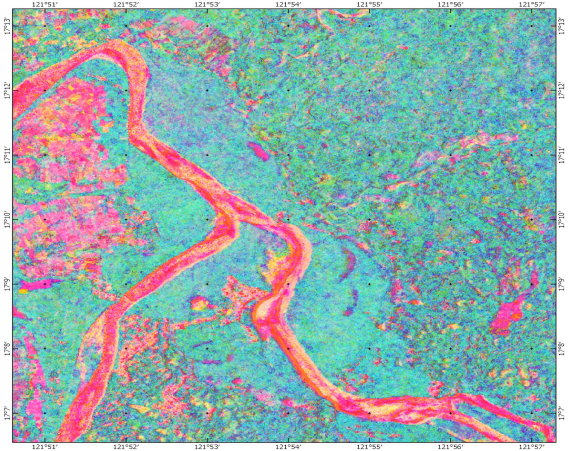
Sugarcane

Multi-temporal SAR Imagery
Satellite: Sentinel-1A, 1B
Location: Tarlac Mill District
Accessed via: DOST-ASTI PEDRO Center
Capture period: November 1, 2016 to March 8, 2018
Payload: SAR
Resolution: 15 m
Basemap: OpenStreetMap (inset)



Rice

Multi-temporal SAR Imagery
Location: Isabela
Satellite: Sentinel-1A, 1B
Accessed via: DOST-ASTI PEDRO Center
Capture period: April 6, 2017 to June 12, 2018
Payload: SAR
Resolution: 15 m
Basemap: OpenStreetMap (inset)



Corn

Multi-temporal SAR Imagery
Location: Isabela
Satellite: Sentinel-1A, 1B
Accessed via: DOST-ASTI PEDRO Center
Capture period: April 6, 2017 to June 12, 2018
Payload: SAR
Resolution: 15 m
Basemap: OpenStreetMap (inset)

Cyan areas indicate plantations of high-value seasonal crops, such as sugarcane, rice, and corn. These can be identified through satellite images (temporal SAR) using automated remote sensing methods like time series analysis.

Detecting Road Network Changes

Road Networks in Biñan and Santa Rosa, Laguna

Through machine learning—a component of Artificial Intelligence (AI)—road features that are continuous, long, and with homogenous hue throughout their length are digitized and used as training data to detect road network changes.

AI is able to simulate human vision to detect features, and can also see beyond what is visible to the naked eye. This allows it to detect and isolate these features more accurately.

Legend

Roads

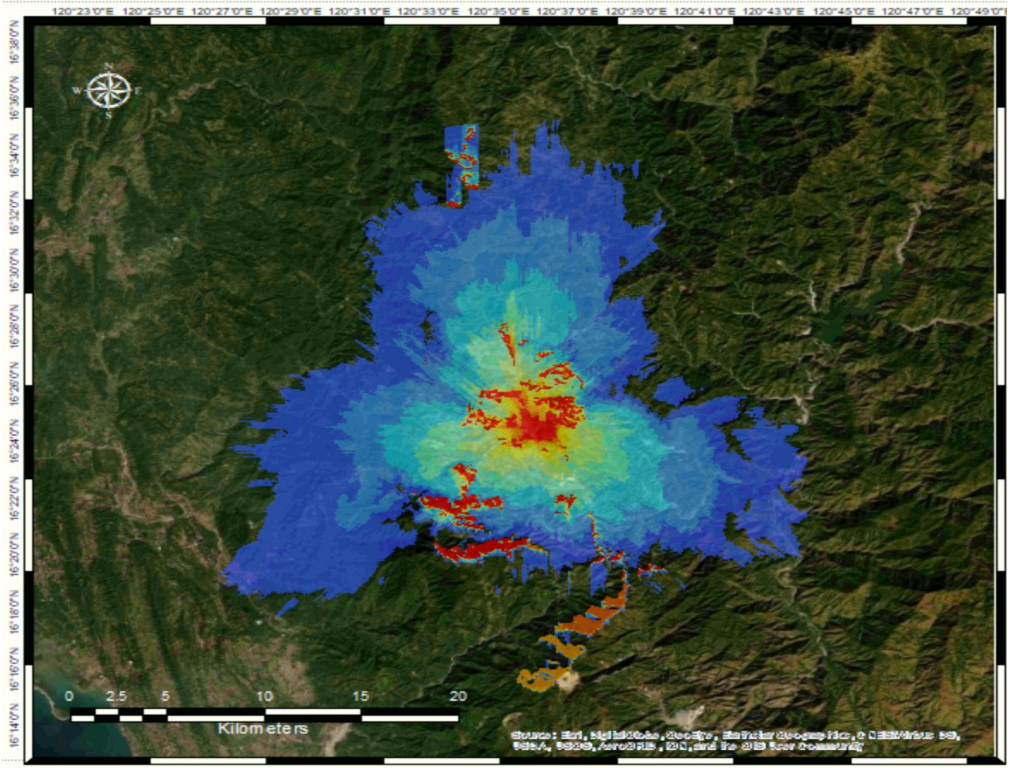
N

Satellite: Planetscope (visualization background from Google)
Accessed via: DOST-ASTI PEDRO Center
Capture date: April 30, 2018
Payload: Optical
Resolution: 3m

Mapping Connectivity

Signal Assessment using Geospatial Analysis Project (SAGAP)

Currently, DOST-ASTI is conducting data collection and processing to examine the potential of radio frequency modelling and planning in assessing signal propagation. The study will use satellite images from the PEDRO Center, Diwata microsatellites, open source satellite data, and elevation data from the PHL-Lidar project and NAMRIA. The information generated from these assessments can be used by the Department of Information and Communications Technology (DICT), telecommunication companies, TV and radio operators, and other stakeholders operating wireless sensor networks and rural networks to strategically place their transmitters while considering radio parameters, geographical conditions, and possible obstructions.

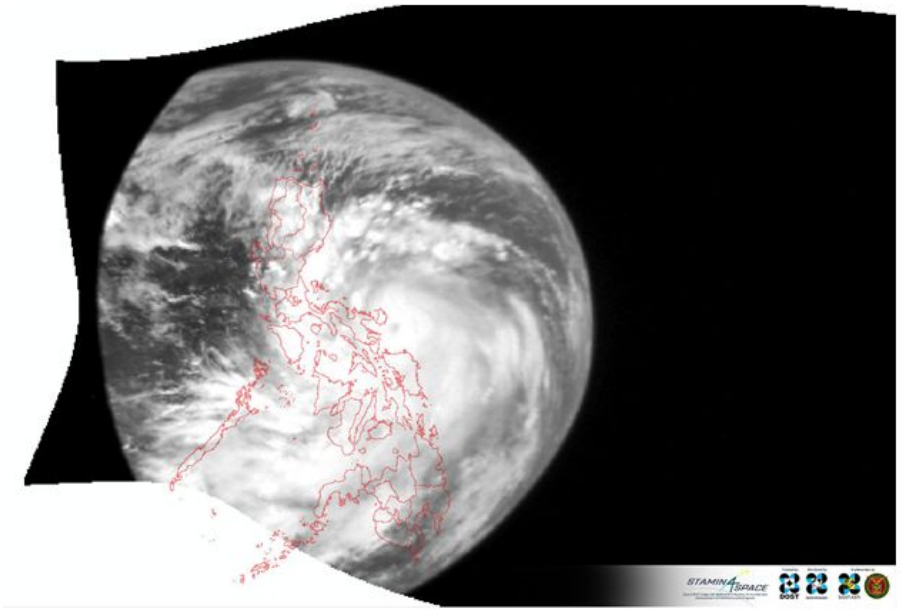


Legend:
Received Power (dBm)

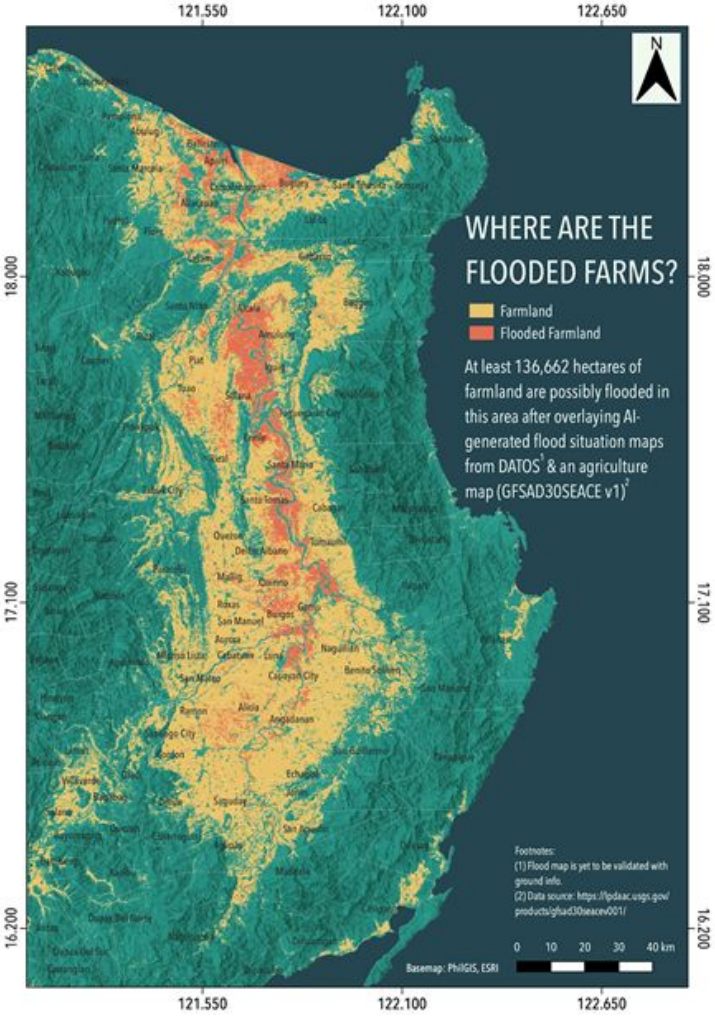
- <-110
- -109 - -105
- -104 - -100
- -99 - -95
- -94 - -90
- -89 - -85
- -84 - -80
- -79 - -75
- -74 - -70
- -69 - -65
- -64 - -100

Satellite: Advanced Land Observing Satellite "DAICHI" (ALOS)
Accessed via: JAXA EORC
Capture date and time: 2016 (release of global DSM)
Payload: Panchromatic Remote-sensing Instrument for Stereo Mapping (PRISM)
Resolution: 30m (Digital Surface Model) :
Basemap source: ESRI

Data Mobilization



Typhoon Vamco (Ulysses), November 2020

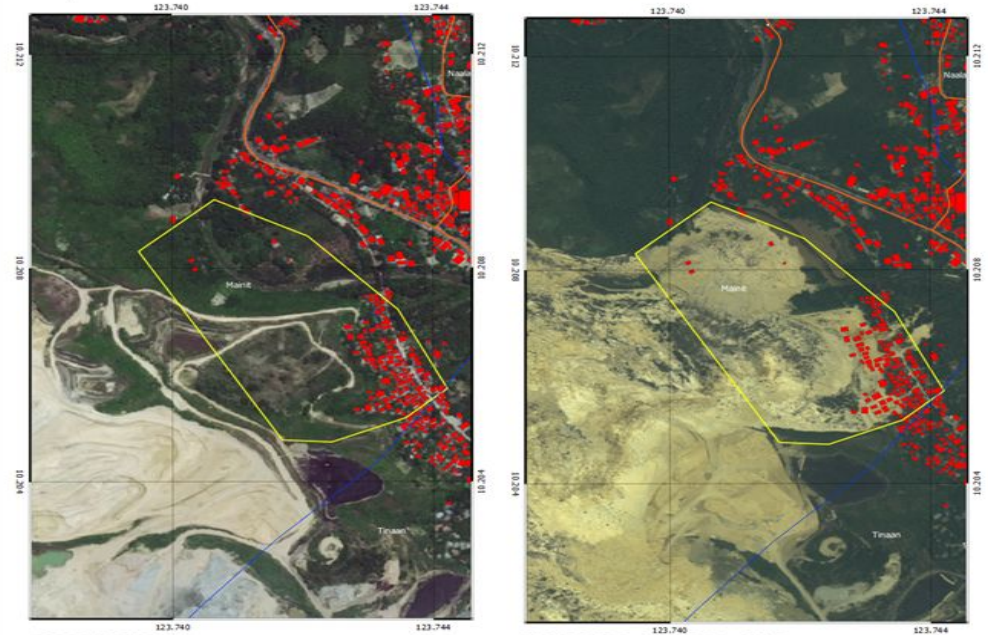


Enabling Timely Disaster Response

Rapid disaster response in Naga, Cebu landslide

The image shows the areas before and after the landslide event in Naga, Cebu. The map layout was immediately sent a team on the ground. Techniques like machine learning and AI helped enhance rapid disaster response in this situation. The ability to generate this [map] information in a timely manner was crucial.

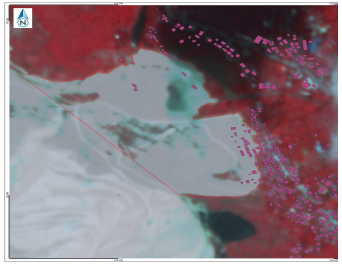
Identifying building footprints was critical to overlay the extent of the landslide event, enabling rescuers to prioritize areas for search and rescue.



Satellite: KOMPSAT-3
Accessed via: DOST-ASTI PEDRO Center
Capture date: September 21, 2018
Payload: Optical
Resolution: 0.5 m
Basemap: ESRI (Pre-landslide)

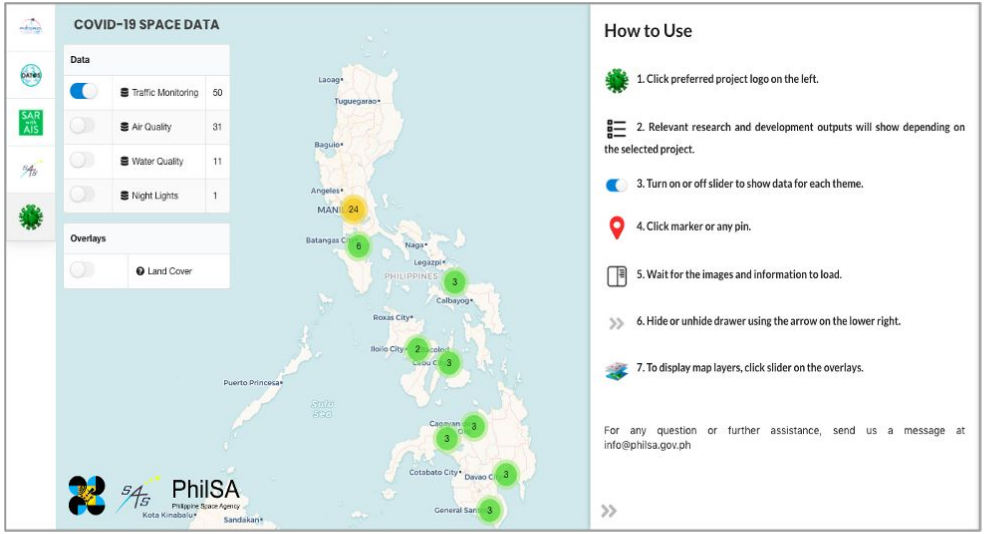
Legend

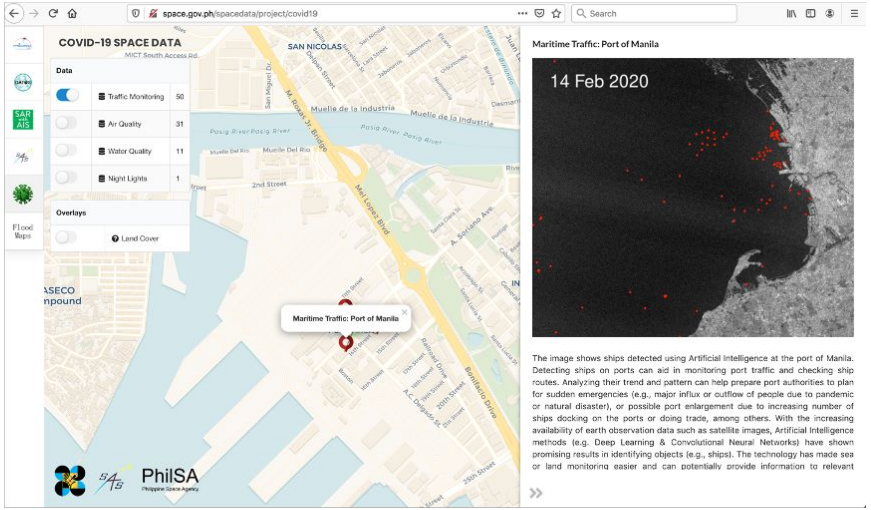
- Barangays
- Roads
- Building Footprint
- Landslide Affected Area



Data Mobilization — COVID-19 Space Data Dashboard

How can space and satellites be useful for COVID-19 response?





The COVID-19 space data dashboard is publicly accessible at:
http://space.gov.ph/spacedata/

Our Vision

The PhilSA envisions a Filipino nation bridged, uplifted, and empowered through the peaceful uses of outer space.

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Our Mission

We will promote and sustain a robust Philippine space ecosystem that adds and creates value in space for and from Filipinos and for the world.

Thank you very much.

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