The DHARMA Project:
Philippine Space Agency's contribution on the use of EO data for DRRM in the Philippines

Roel M. de la Cruz
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Space Data Mobilization and Applications Division (SDMAD)
Space Information Infrastructure Bureau (SIIB)

PhilSA

The Philippine Space Agency

Building an integrated and sustainable national space program

PhilSA

08 August 2019

Signed by the President

03 September 2019

Effectivity of Philippine Space Act
R.A. 11363

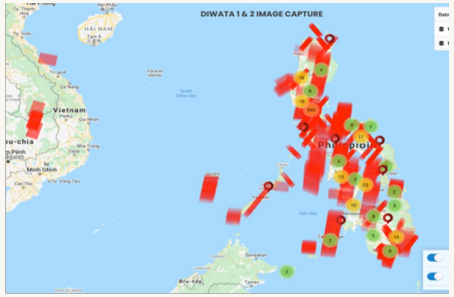
Flagship Projects

Space Science & Technology Applications (SSTA) Program

Build, Build, Build in Space (B3iS)

Philippine Satellites as Vital Component of National Information Infrastructure

Mobilizing Space Data



For Digital Inclusion, Economy, and Government

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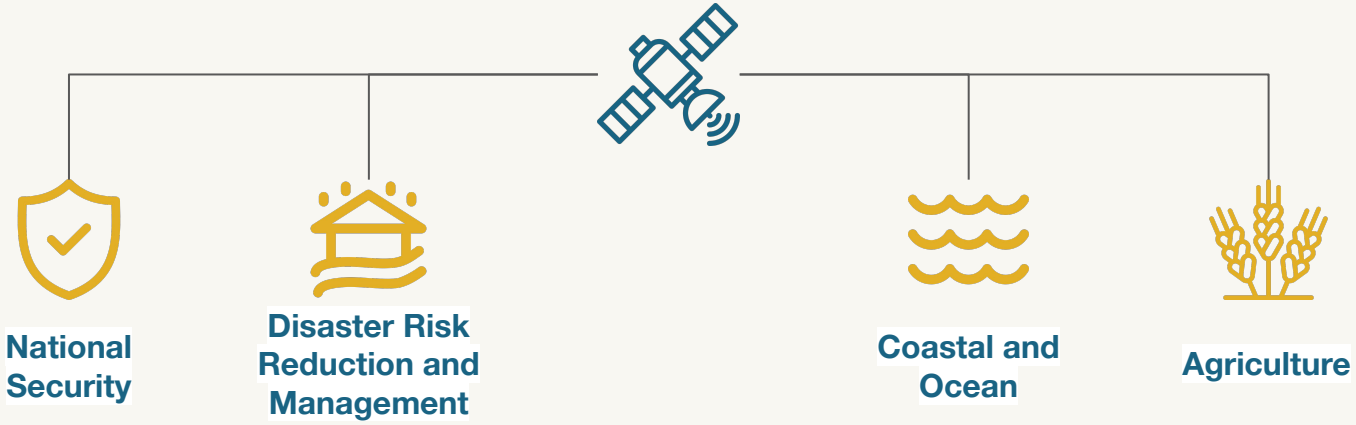
Mobilizing Space Data for Digital Inclusion, Economy and Government

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.



Philippine DRR Overview

Global

- Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030
- Paris Agreement/COP26
- UN SDGs
- New Urban Agenda

Regional

- Asia Regional Plan for Implementation of the SFDRR
- ASEAN Agreement on Disaster Management and Emergency Response (AADMER)
- APEC DRR Framework

National

- Ambisyon Natin 2040
- Philippine Development Plan (2017-2022)
- National Climate Change Action Plan
- National Framework Strategy on Climate Change 2010-2022
- Among others

DISASTER PREVENTION AND MITIGATION

Avoid hazards and mitigate their potential impacts by reducing vulnerabilities and exposure and enhancing capacities of communities

DISASTER PREPAREDNESS

Establish and strengthen capacities of communities to anticipate, cope, and recover from the negative impacts of emergency occurrences and disasters

DISASTER RESPONSE

Provide life preservation and meet the basic subsistence needs of affected population based on acceptable standards during or immediately after a disaster

DISASTER REHABILITATION AND RECOVERY

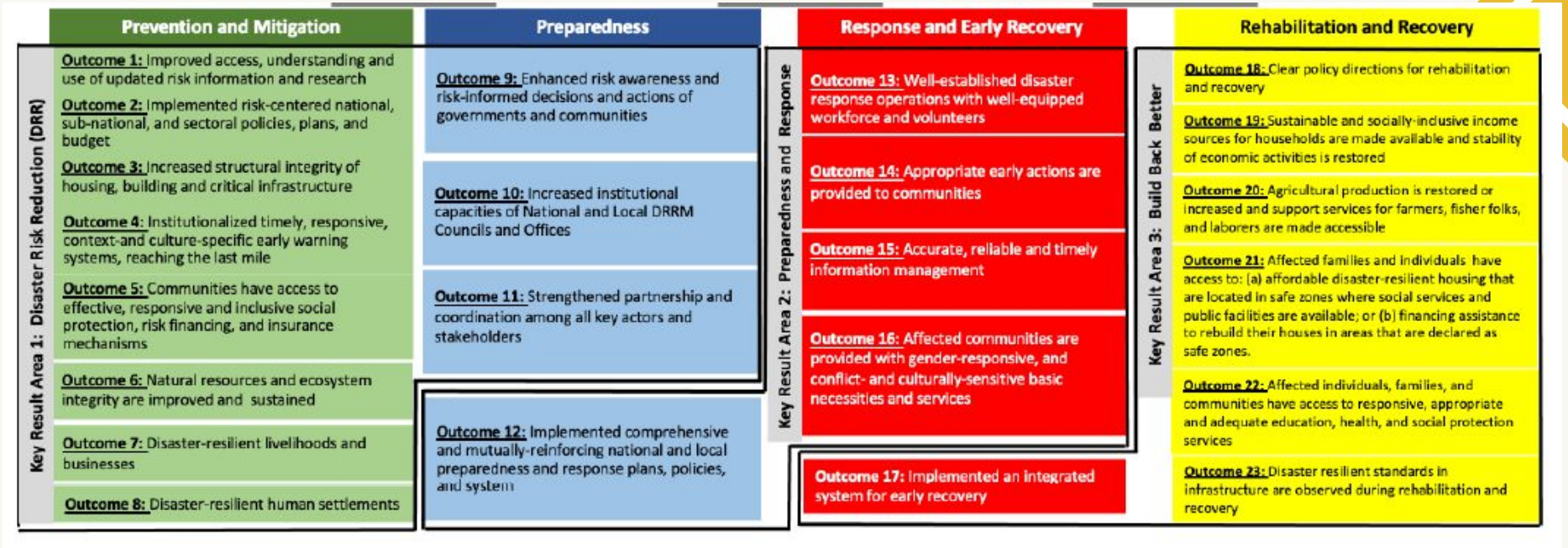
Restore and improve facilities and living conditions and capacities of addected communities, and reduce risks in accordance with the "building back better" principle

GOAL

For a safer, adaptive, and disaster resilient Filipino communities towards sustainable development

FOUR THEMATIC AREAS

The National Disaster Risk Reduction and Management Plan



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Disaster, Hazard, and Risk Mapping (DHARMA)

Objectives

1. On-demand geospatial support before, during, and after disaster events using space data.

2. Develop rapid assessment workflows for disaster events.

3. Support recovery efforts of the government

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Where does **DHARMA** fit?

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DISASTER PREVENTION AND MITIGATION

DOST

PHIVOLC's GeoriskPh
PAGASA

DISASTER PREPAREDNESS

DILG

Oplan Listo – Disaster Preparedness Manual for City and Municipal LGUs

DISASTER RESPONSE

DSWD

NDRP (Hydromet, EQ and Tsunami, Terrorism-related Incidents)

DISASTER REHABILITATION AND RECOVERY

NEDA

Disaster Rehabilitation and Recovery Planning Guide

BY THE NUMBERS

12/ 23 outcomes

19/ 50 outputs

38/ 206 activities

Thematic Area	Outcome	Output	Activities	DHARMA activities
Prevention and Mitigation	7	3	17	-Risk/exposure Mapping (Flood, Landslide, Built-up, Infra/building/houses, roads/bridges) -satellite data provision
Preparedness	1	2	5	-Damage Forecast -Mapping (critical infra)
Response and Early Recovery	3	5	9	-Rapid Damage Estimation (infra, houses, agriculture) -Rapid Mapping (Flood, Landslide, Built-up, Infra/building/houses, roads/bridges) -Crop damage forecast
Rehabilitation and Recovery	2	4	7	-KHTT -damage assessment change detection -satellite data provision

How Do We Do it?

The Case of Super Typhoon KardingPH

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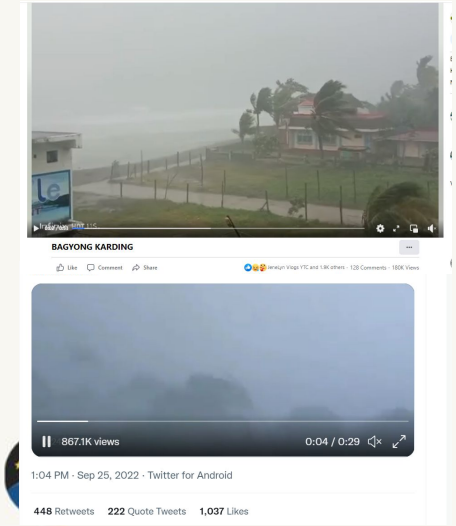
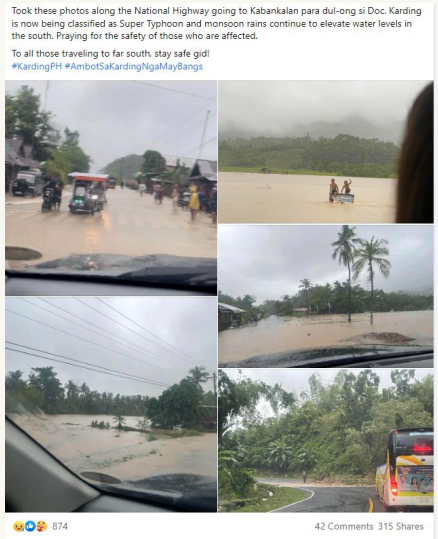
Date	Time	Location	Description	Lat	Long	News link	screenshot	Damage Type	COMMENTS
25/09/2022	2:00PM	Polillo Islands	Extreme winds and heavy rains in Polillo Islands (Signal No.5)	14.756595	121.942134	https://twitter.com/Carlos_Alfonso6/status/1573901131801141248 https://twitter.com/BenNollWeather/status/1573992707781177344 https://twitter.com/BeAwINQUIRER/status/1573939242996072448 https://twitter.com/seanpotestades/status/1573936618775322624 https://twitter.com/seanpotestades/status/1573926306680434688		Possible Infra Damage and Flooding	Location not exact
25/09/2022	2:00PM	Palayan City	Flooding	15.530102	121.099745	https://twitter.com/UglyStickkk/status/1573924424293548032		Flooding	Unverified, No Photos/Videos, Hearsay, Location not exact
25/09/2022	6:30PM	Infanta Quezon	Torrential rainfall	14.7222517	121.6576394	https://www.facebook.com/watch/?v=2325075592362638&ref=sharing https://twitter.com/MervinLopezMST/status/1573983057723342849		Possible Infra Damage and Flooding	General Location in infanta, video not geolocated
25/09/2022	4:36PM	Panukulan, Polillo Islands	Extreme winds and heavy rains in Polillo Islands (Signal No.5)	14.9756019	121.9104317	Facebook Inquirer https://www.youtube.com/shorts/kAn1bMIU-T0 https://twitter.com/ReynaHasmin/status/1573980055109148672		Possible Crop and Infra damage	
25/09/2022		National Highway to Kabankalan, Negros Occidental	Flooding	9.9589683	122.8391996	Facebook Post by SB Jason TEmbrevilla Tejero		Flooding, crop damage, fallen trees	
25/09/2022		Patnanongan Island	Torrential rainfall	14.7959509	122.1808021	https://twitter.com/ABSCBNNews/status/1573963338572173318		Possible Infra Damage and Flooding	General Location, video not geolocated
25/09/2022		Brgy. Bongliw, Panukulan, Quezon	Extreme winds and heavy rains in Polillo Islands (Signal No.5)	14.9929311	121.8829517	Bayan Mo, Ipatrol Mo Facebook Post		Possible Crop and Infra damage	Possibly taken from school which was used as an evacuation site
25/09/2022		Polillo Islands	Extreme winds and heavy rains in Polillo Islands (Signal No.5)	14.756595	121.942134	Facebook post by Reniel Mark Base		Crop Damage	Location not exact
25/09/2022		Sitio Campo, Inayawan cauayan, Negros Occidental	Flooding	9.90787192	122.4594152	Facebook post by Ksp blog		Flooding, Possible crop damage	
25/09/2022	5:50PM	Jomalig, Quezon	Fallen trees	14.6973449	122.3301512	Facebook post by Provincial Government of Quezon https://twitter.com/cebudailynews/status/1572983028971540480 https://www.facebook.com/photo/?fbid=434192182225076&set=pcb.434194222224872		Fallen trees	
25/09/2022			Extreme winds and			facebook https://twitter.com/rapplerdotcom/status/1574002575674068994 https://twitter.com/TheEduardoF/status/1		Possible Infra Damage, Flooding	Location not exact

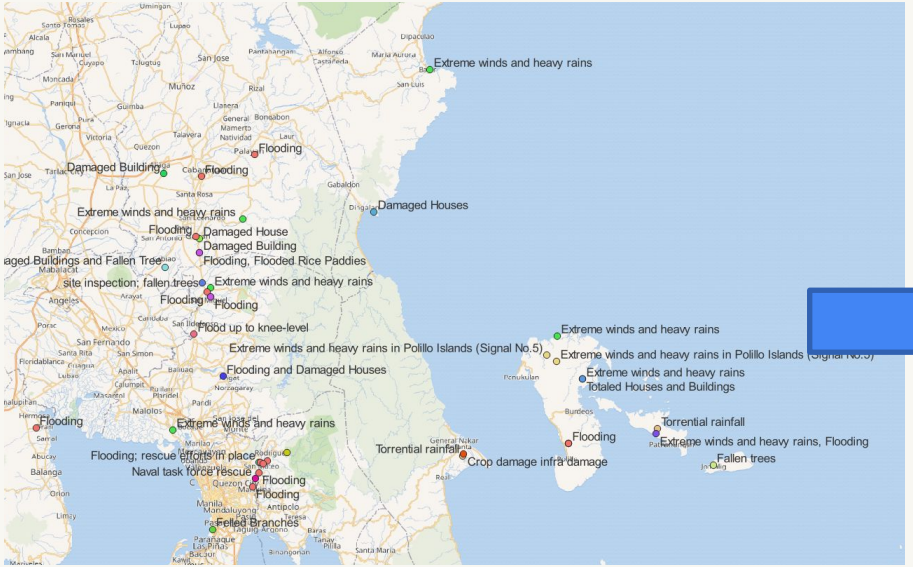


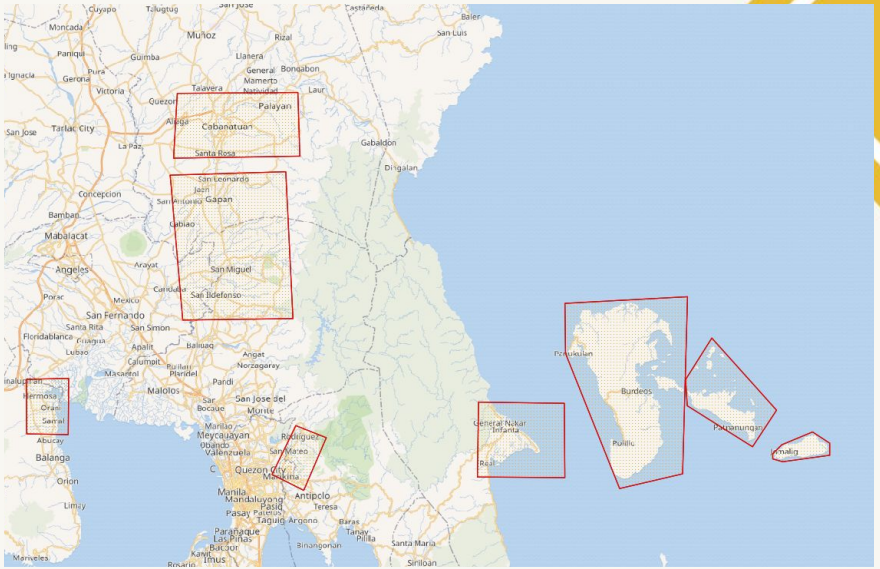


Gathered reported damage from reports from social media platforms (i.e., Facebook, Twitter, Youtube, and Instagram)

Shared to the disaster actors and volunteers, an excel file was distributed to consolidate social media reports, integrating validation links, description of the damage and/or incident, as well as map data (latitude, longitude) which was then integrated and compiled for map visualization.

The reports are plotted and used to create AOIs





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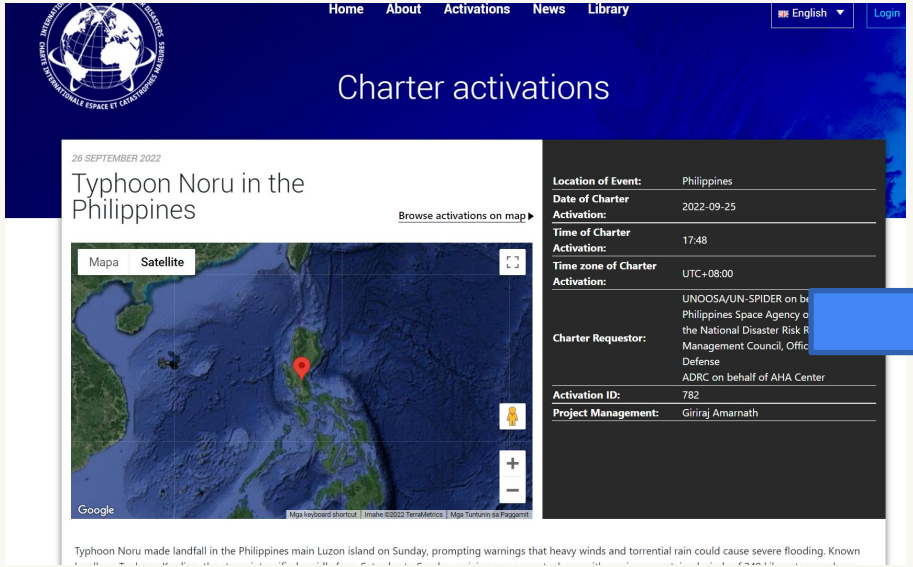
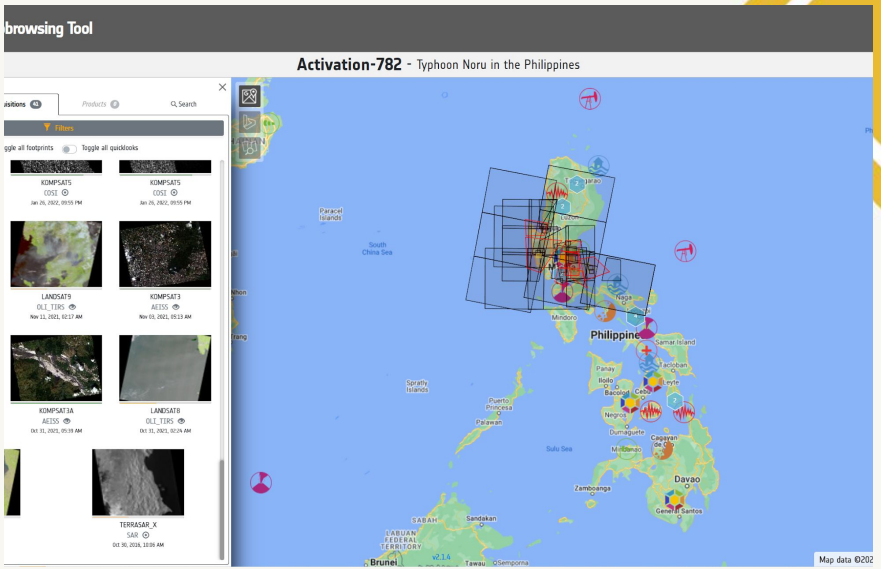
AOIs were submitted to the Disaster Charter for activation





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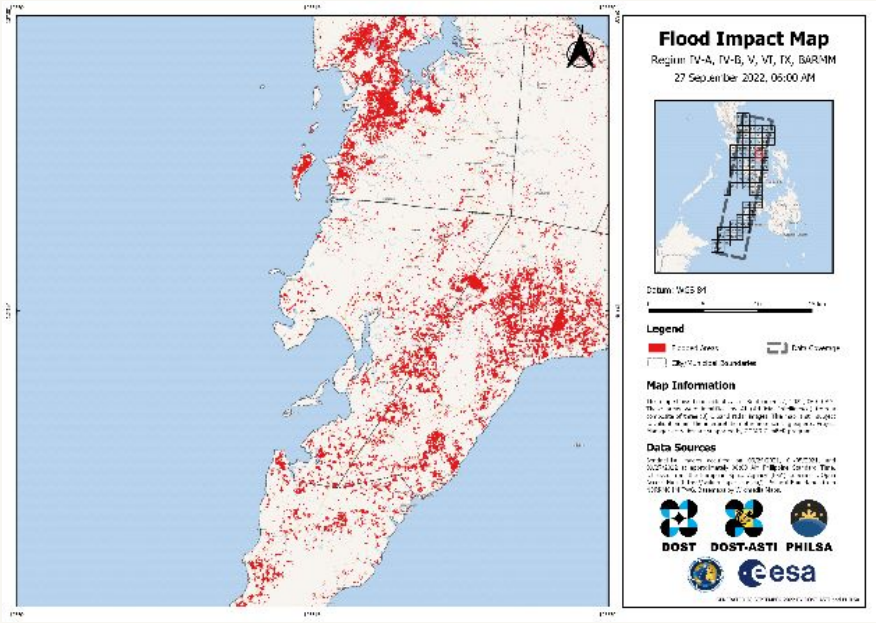

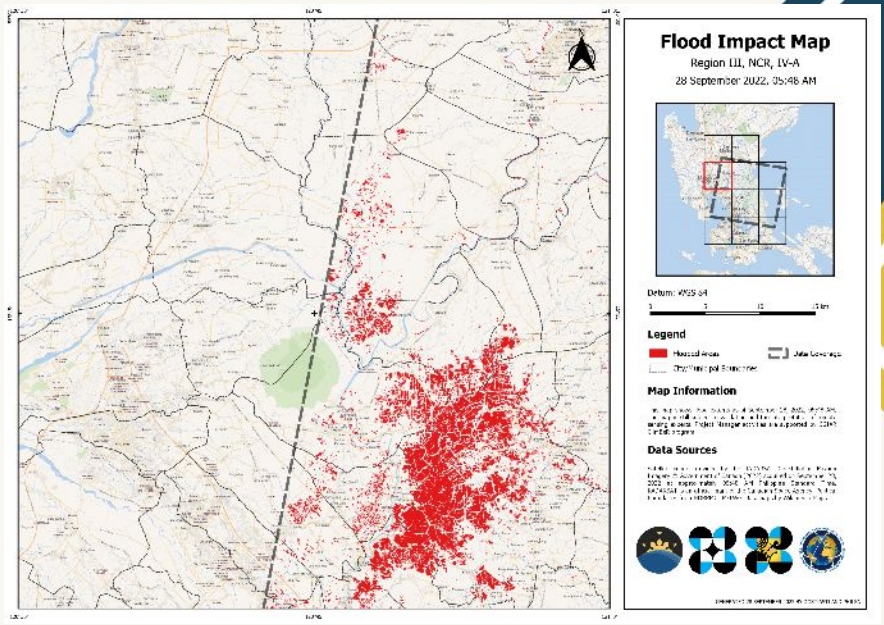

The value-added products are distributed to mandated agencies and other stakeholders **for free**, through email and social media.

#KardingPh FLOOD IMPACT MAPS Inbox ×

drrm@philsa.gov.ph 11:18 AM (16 minutes ago)
to Ryan, ocda, ocddamonilla, ocd.operationsservice, ndrrmoc, ncr, civildefensencr, region3, ocdregion3, region4a, jbpatalinjugiii, ncr, records, dost4a, mjpabilay, official, dost.ro5.ord, do

Good day, everyone!

The Philippine Space Agency and DOST-ASTI's DRR Teams have generated flood impact maps from the recent onslaught of #KardingPh. The maps show potentially flooded areas **extracted from RadarSat and Sentinel satellites captured on 27 and 28 September 2022, respectively.**

Please be advised that the thematic accuracy of the flood maps might be lower in urban and forested areas due to inherent limitations of the SAR analysis technique, hence, this is still subject to the validation and interpretation of remote sensing experts.

You can download the maps and shape files on these folders:

- Sentinel: https://bit.ly/3E2m3k8
- RadarSat: https://bit.ly/3RogO1n

Please use and disseminate these maps and data as you see fit. If you have any questions, please do not hesitate to respond to this email, cc: datos@asti.dost.gov.ph.

You may also visit the Facebook pages of DATOS and PhilSA for near real time updates of our weather monitoring efforts.

Thank you very much!

PhilSA

Activities

PhilSA

Charter Activation

Date	International Event Name	Local Event Name
31 October 2022	Nalgae	Paeng
26 September 2022	Noru	Karding
23 August 2022	Ma-On	Florita
13 April 2022	Megi	Agaton
16 December 2021	Rai	Odette

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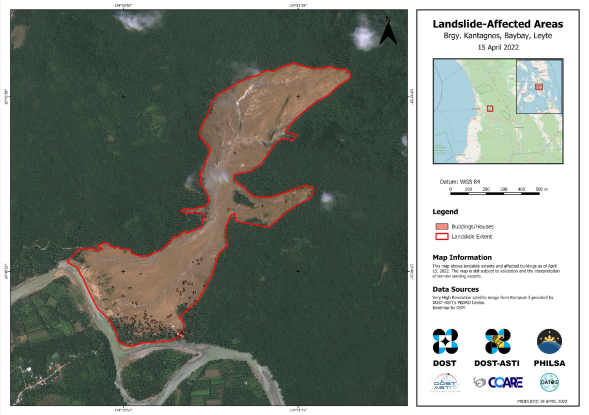
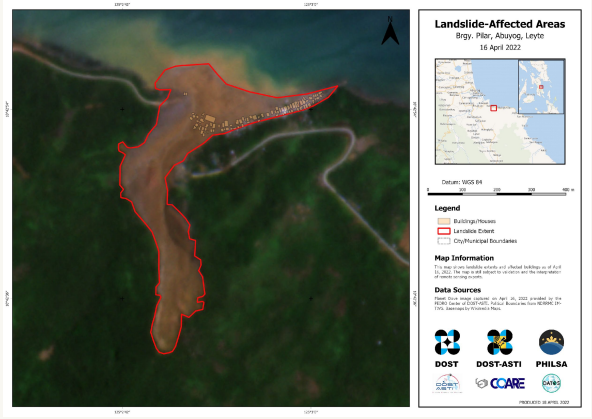
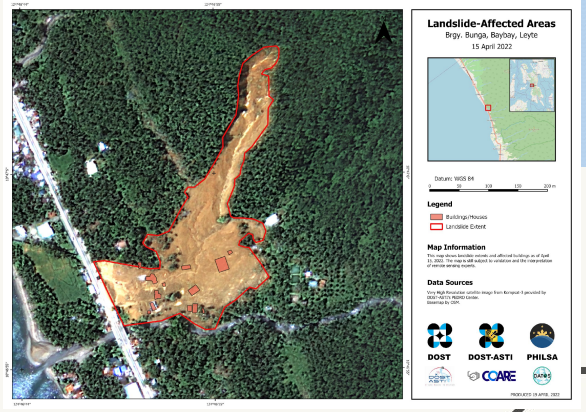
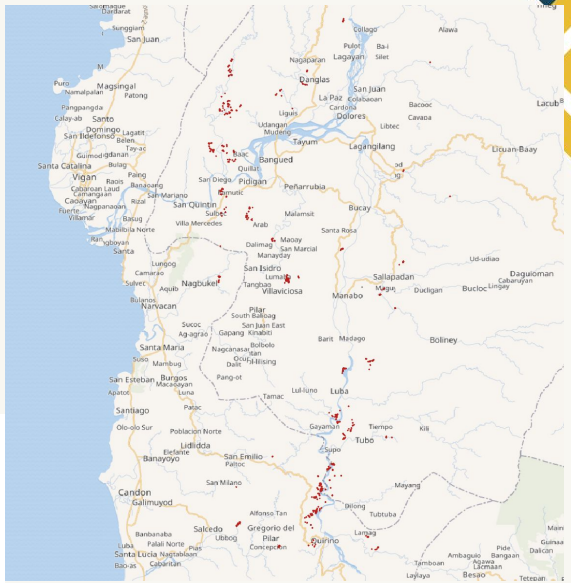
Landslide Mapping









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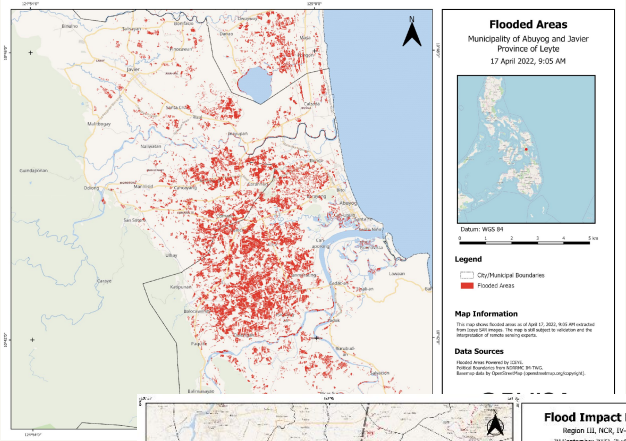
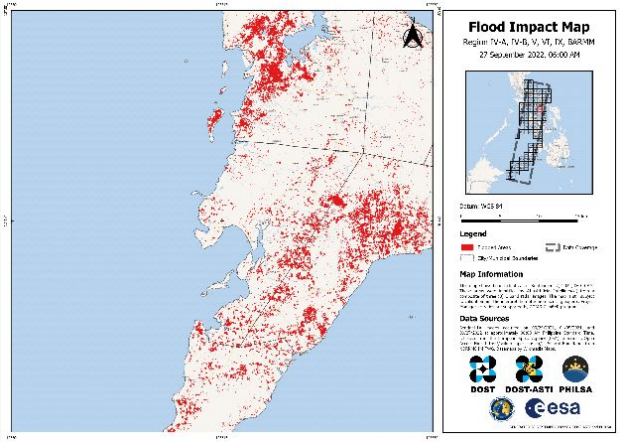
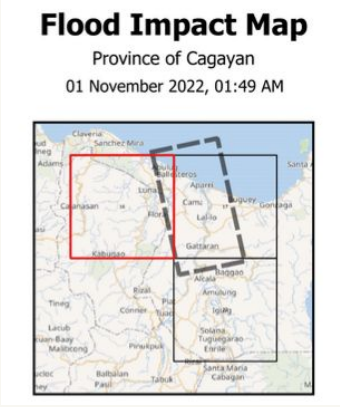
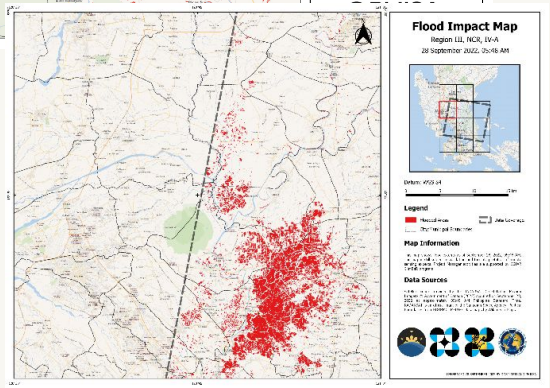
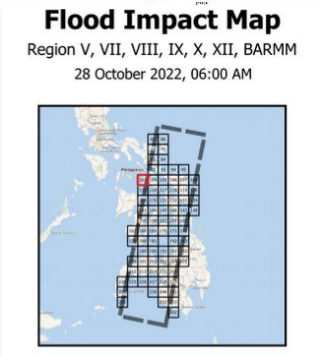
Flood Mapping

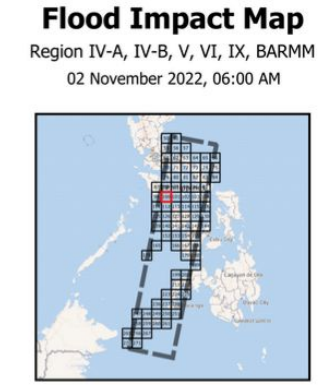












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Change Detection

Rio Grande de Mindanao – Southwest
Cotabato City Area AOI3

14 October2022

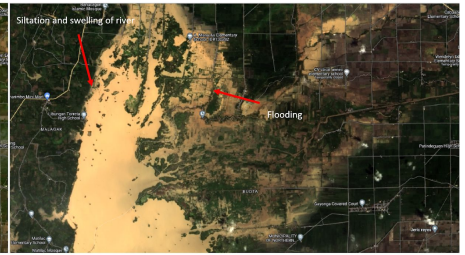
30 October 2022

Siltation and flooding on agricultural and built-up areas as seen on Landsat 9 imagery.

Malagak – Northern Kabuntalan
Maguindanao | AOI 5

14 October2022

30 October 2022



PEDRO Center
Satellite Image Subscription

Pigcawayan, North Cotabato via KompSAT-3

09 November 2018

02 November 2022

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UN SPIDER Technical Advisory Mission to the Philippines

September 26-30, 2022

UN disaster experts emphasize importance of space in DRRM during Ph Technical Advisory Mission

Posted by: Philippine Space Agency 26 October 2022

UN-SPIDER experts, PhilSA officials and personnel, and the participants of the UN-SPIDER TAM Workshop (29 September 2022, Novotel Manila Araneta City)

UN-SPIDER meets with PhilSA and NDRRMC representatives (27 September 2022, Eastwood Richmonde Hotel)

UN-SPIDER delegates receive tokens of appreciation from the Philippine Space Agency. L-R: PhilSA Deputy Director General Dr. Gay Jane P. Perez, Dr. Rui Kotani, Dr. Giriraj Amarnath, Dr. Komali Kantamaneni, Victoria Leat, Dr. James Carl Hagen, PhilSA Director General Dr. Joel Joseph S. Marciano, Jr., Dr. Shirish Ravan, Dr. Arijit Roy, Dr. Manzul Hazarika, Abhineet Jain (29 September 2022, Novotel Manila Araneta City)

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