

PAGASA Early Warning System



CHRISTOPHER F. PEREZ

Philippine Atmospheric, Geophysical and Astronomical Services
Administration (PAGASA)

Advancing Volcanic Hazards in Early Warning For All Workshop 2025

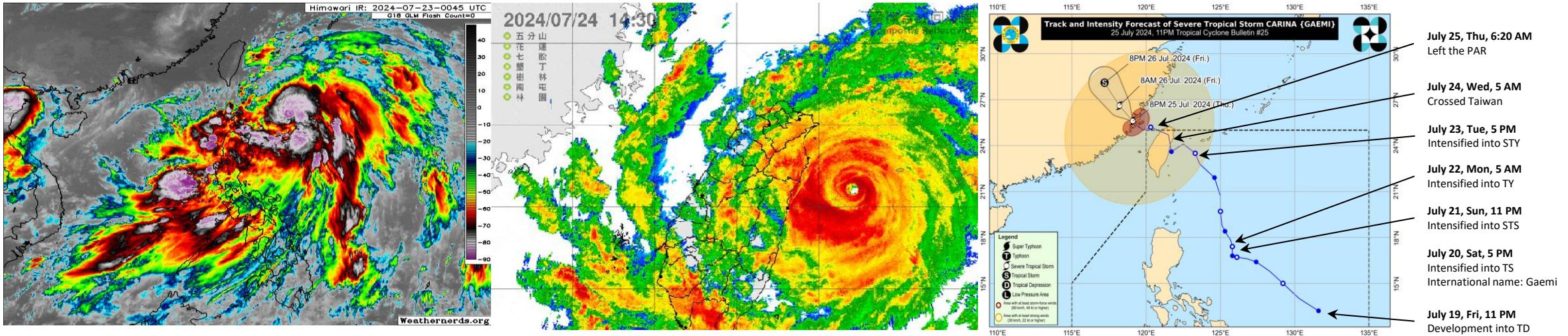
Geneva, Switzerland

07 - 09 July 2025

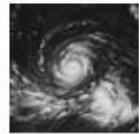


- 1) Brief Background on the Philippines' Weather And Climate
- 2) Key Hazards in the Philippines
- 3) PAGASA Commitments on the EW4ALL Initiatives
- 4) Importance of Collaboration and Multidisciplinary Strategies
- 5) Best Practices, Areas for Improvement and Challenges
- 6) Future perspectives

Brief Background on the Philippines' Weather And Climate

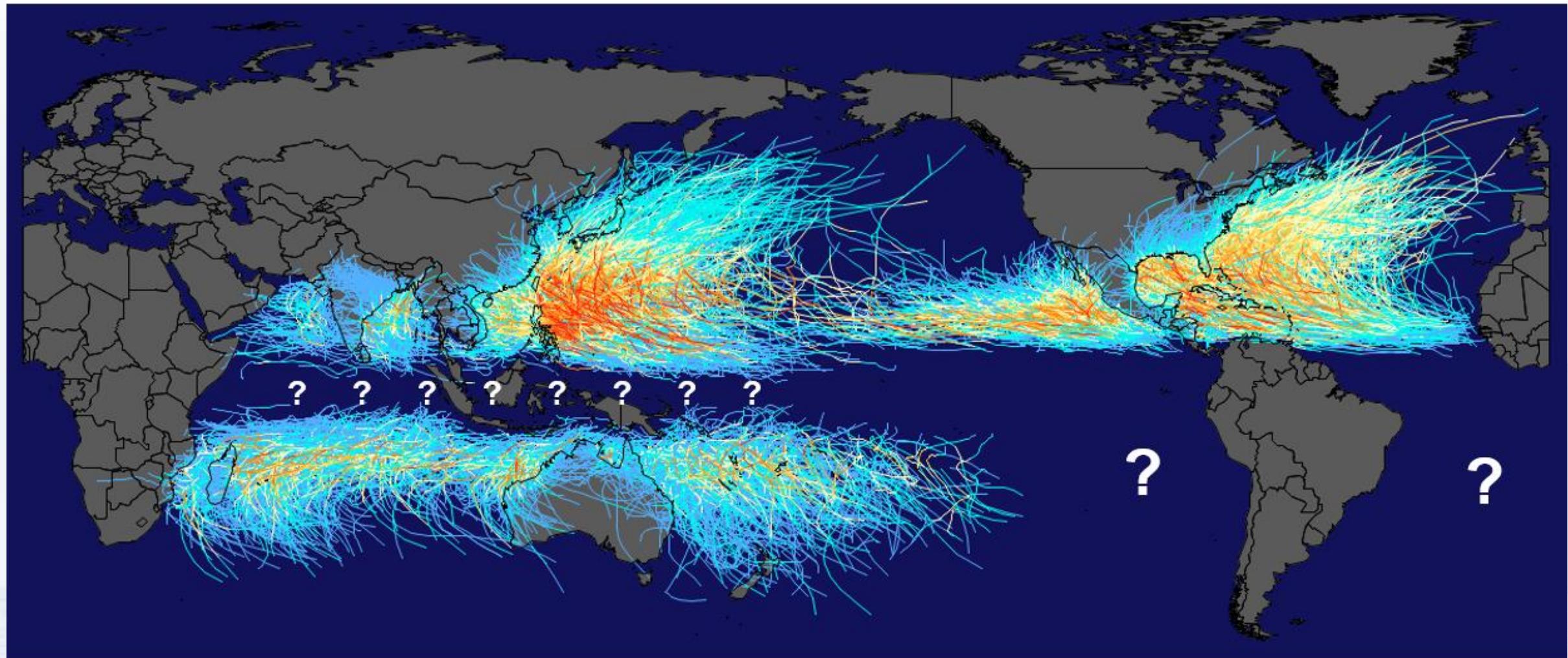


- Northeast and Southwest Monsoons, low pressures, shearlines, intertropical convergence zone and tropical cyclones are some of the weather systems that affect the country.
- The combined effects of the enhanced Southwest Monsoon or “Habagat,” and Super Typhoon “Carina” (int’l name: GAE) last year have left around PhP 4.73 billion worth of agricultural damage in the country.



The Science Behind Typhoons

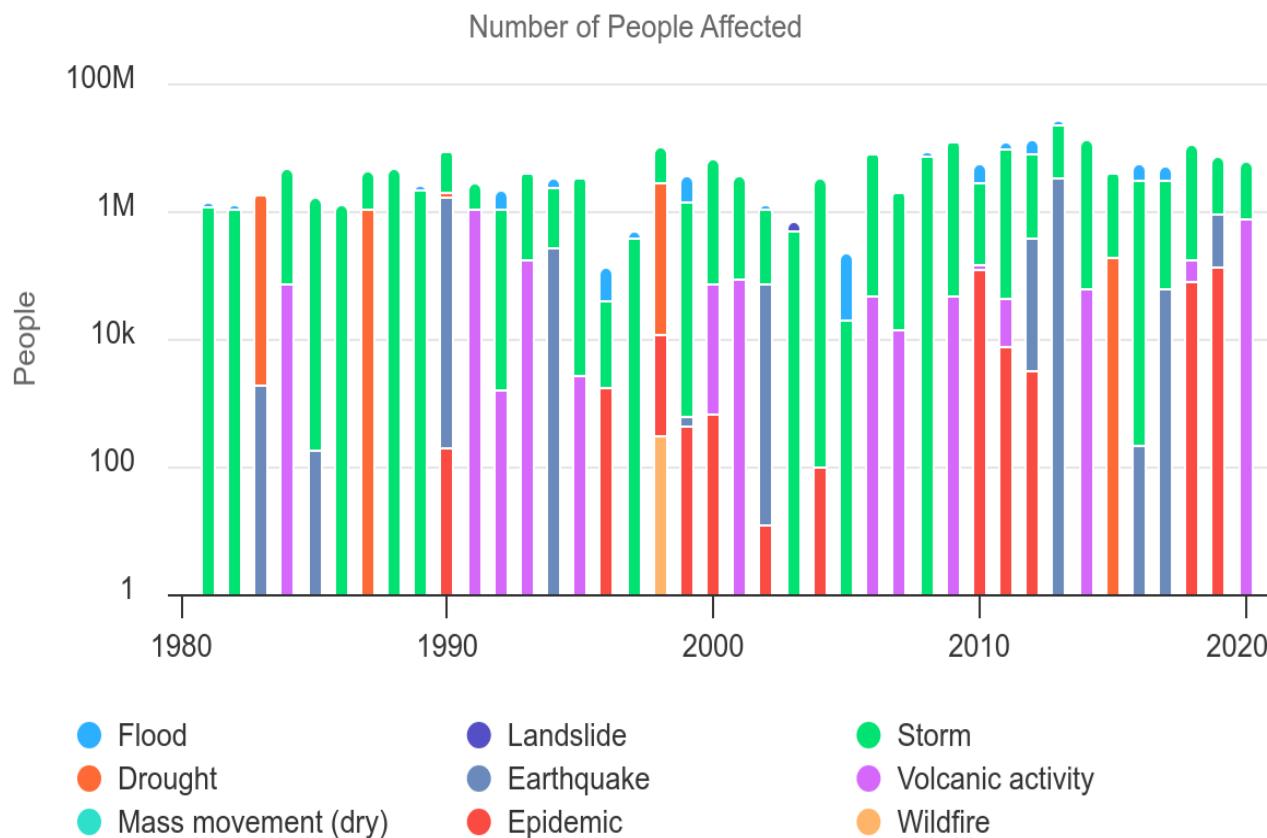
Tropical Cyclone Basins



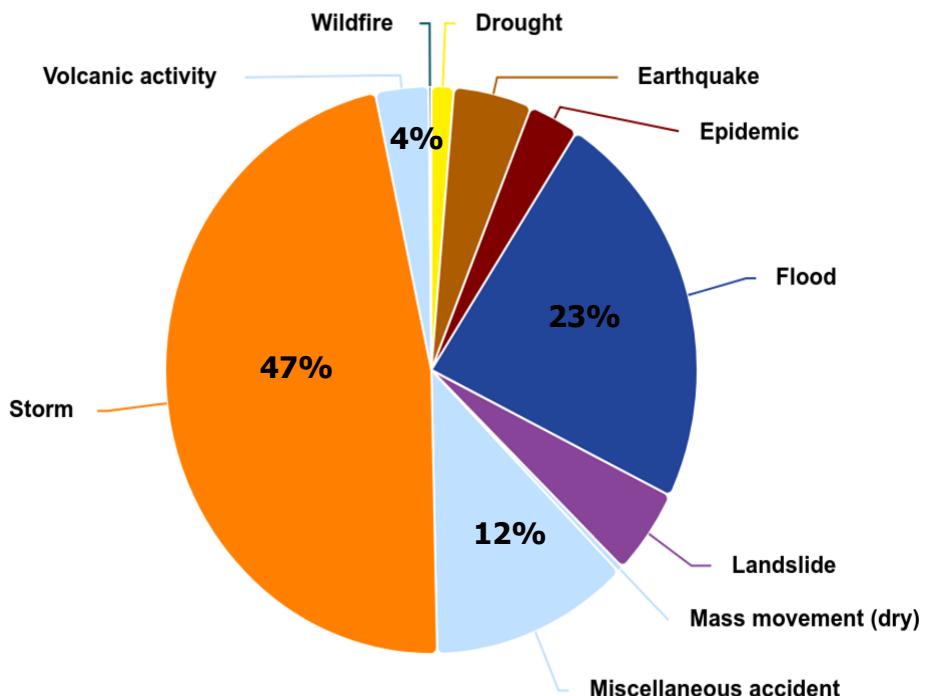
Key Hazards in the Philippines



Key Natural Hazard Statistics of the Philippines during 1980-2020

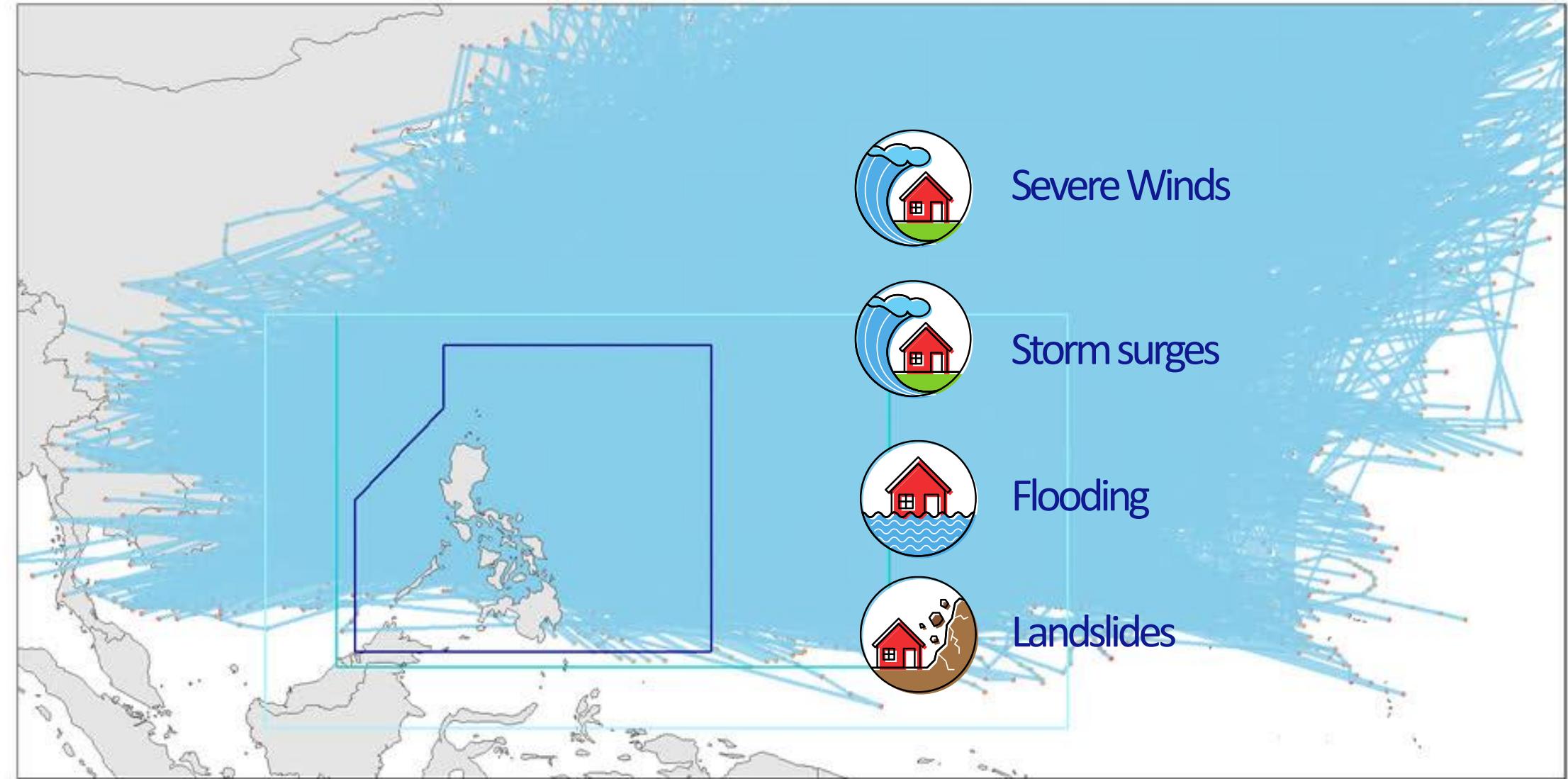


Average Annual Hazard Occurrence for 1980-2020



Source: WorldBank Climate Change Portal

Key Hazards in the Philippines



83

Synoptic/Agromet stations



175

Automatic Weather Stations

11

Upper Air stations

7

Aviation Weather Observation
Stations

22

Disdrometer-Parsivel Stations



28

Lightning Detection Systems

19

Doppler RADARS

7

X-Band RADARS (stationary)

32

High Frequency RADARS



17

Flood Forecasting and
Warning System



EW4All Pillars	Severe Wind	Heavy Rainfall
Disaster risk knowledge	<p>Hazard susceptibility and risk assessment</p> <ul style="list-style-type: none"> Existing nationwide regional and local severe wind hazard maps at 5%, 2%, 1%, 0.5%, and 0.2% AEP in GeoRisk Philippines Existing severe wind risk maps for selected areas (e.g., Metro Manila, Cebu City) through completed risk analysis projects <p>Disaster prevention and mitigation</p> <p>Early Preparedness Actions for Local Governments under the Operation L!STO Disaster Preparedness Manual</p>	<p>Hazard susceptibility and risk assessment</p> <p>Existing rain-induced landslide and flood susceptibility map in GeoRisk Philippines</p> <p>Disaster Prevention and Mitigation</p> <p>Early Preparedness Actions for Local Governments under the Operation L!STO Disaster Preparedness Manual</p>
Detection, observations, monitoring, analysis and forecasting of hazards	<p>Public Forecast and Warning Products</p> <ul style="list-style-type: none"> Tropical Cyclone Advisory Tropical Cyclone Bulletin + Tropical Cyclone Wind Signals Tropical Cyclone Warning for Agriculture Tropical Cyclone Warning for Shipping <p>Specialized Forecast and Warning Products</p> <ul style="list-style-type: none"> High Seas and Offshore Waters Forecast (and Warning) Gale Warning (for coastal waters) SIGMET for tropical cyclones <p>National Met-Hydro Observation Network</p> <p>Numerical Weather Prediction Model Products (WRF 12km and 3km, ECMWF 0.1-degree resolution, probability of exceedance for rainfall and winds)</p> <p>PAGASA Satellite Ground Receiving Stations (GRS)</p> <ul style="list-style-type: none"> HimawariCast System (multiple sites nationwide) GEO-KOMPSAT-2A GRS (Quezon City) CMACast System (Quezon City) <p>Utilization of meteorological satellite products from other NMHS/centers</p> <p>Meteorological data and information exchange via the WMO GTS (operational) and WIS 2.0 (under testing)</p>	<p>Public Forecast and Warning Products</p> <ul style="list-style-type: none"> Tropical Cyclone Advisory Tropical Cyclone Bulletin Weather Advisory (for non-TC cases) Heavy Rainfall Warning Thunderstorm Watch/Information and Advisory

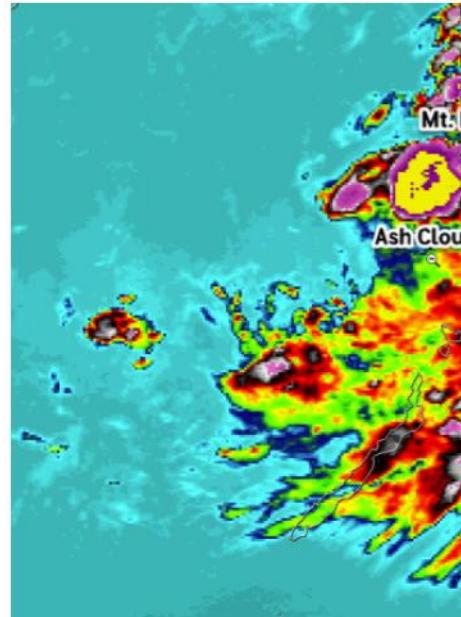


EW4All Pillars	Severe Wind	Heavy Rainfall
Warning dissemination & communication	<ul style="list-style-type: none">Adoption of Common Alerting Protocol (CAP) Services in PAGASA (since 2014)Utilization of social media and YouTube for live weather updates (since 2017)Parallel horizontal and vertical information dissemination framework (national to local)	
Preparedness to respond	<ul style="list-style-type: none">Pre-Disaster Risk Assessment (PDRA) mechanismOffice of Civil Defense Four-Tier Emergency Preparedness and Response (EPR) ProtocolsCritical Preparedness Actions for Local Governments under the Operation L!STO Disaster Preparedness ManualL!STO Disaster Preparedness Manual	

Importance of Collaboration and Multidisciplinary Strategies



Mt. Pinatubo in Central Luzon erupted in 1991.



Infrared satellite photo of Typhoon Yunya and Mt. Pinatubo (CIMSS/GMS-4 Satellite)

https://www.aol.com/volcano-vs-typhoon-island-hit-152205335.html?guccounter=1&guce_referred=ahR0cHM6Ly93cyD4HYO7oD1fsQfE9CMk1EM17fa8iAyLBAv3xyQbzMldUFo955IRsgECUsUTW2-v7hrNrpN8JC62ZuTQG6BUpV2v_Bsl6_2EST



Following Mount Pinatubo's cataclysmic June 15, 1991, eruption, thousands of roofs collapsed under the weight of ash made wet by heavy rains (see example in photo above). Ash deposits from the eruption have also been remobilized by monsoon and typhoon rains to form giant mudflows of volcanic materials (lahars), which have caused more destruction than the eruption itself (photo at right shows village buried by lahar). (Photo above courtesy of Peter Baxter, University of Cambridge.)

<https://pubs.usgs.gov/fs/1997/fs113-97/>

PAGASA provided Severe Weather Bulletins regarding Typhoon "DIDING" (int'l name: Yunya) to DRRM-partner government agencies during its course.



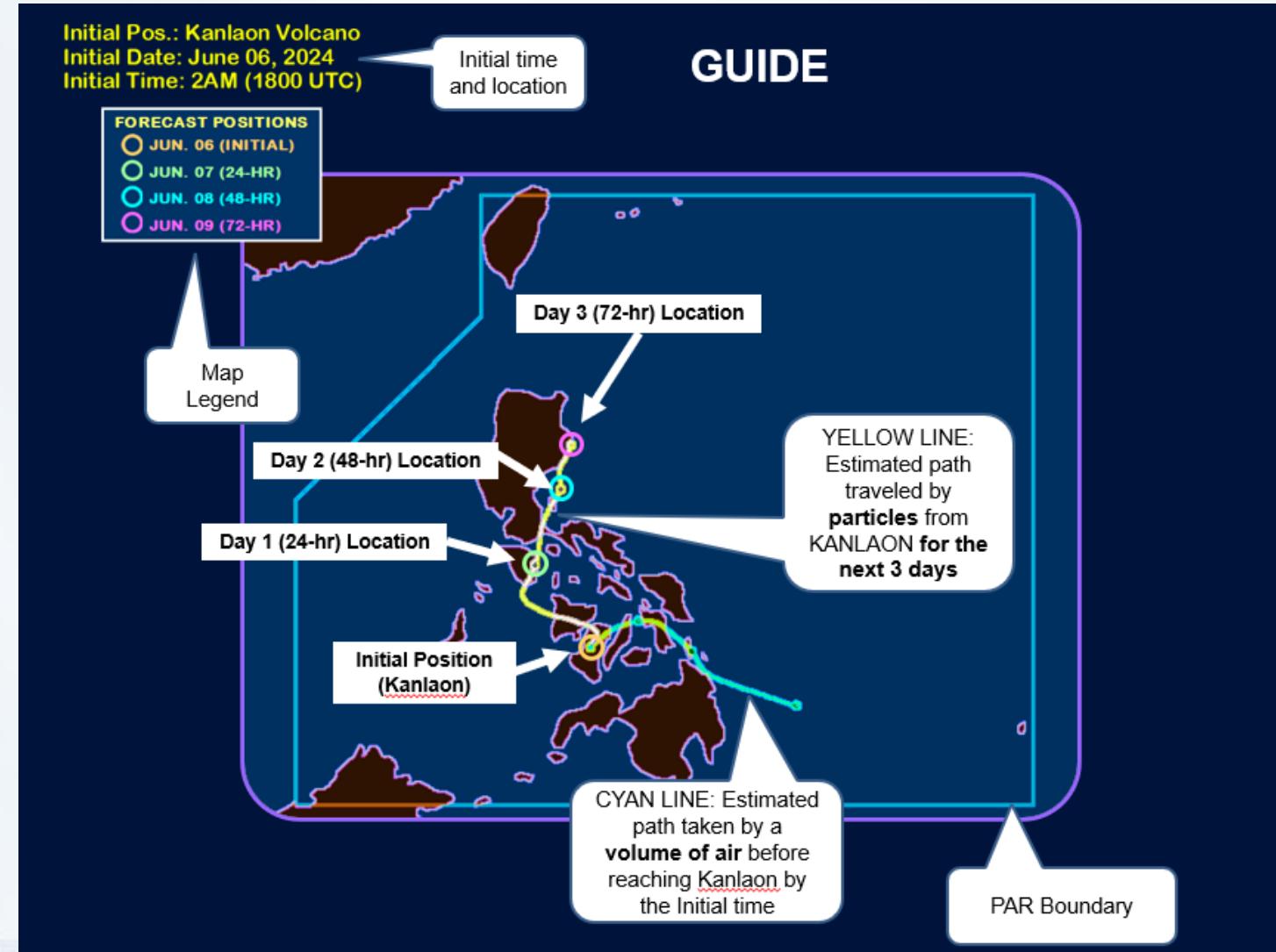
Mt. Kanlaon in Western Visayas

PAGASA continues to provide the **Air Parcel trajectory** to know the estimated locations traveled by airborne particles emitted by the Kanlaon Volcano for the next three days (yellow line). The cyan line (supplemental information only) can be used to trace back the origin of the volume of air over Kanlaon Volcano at the initial time (see **Guide**, next slide)



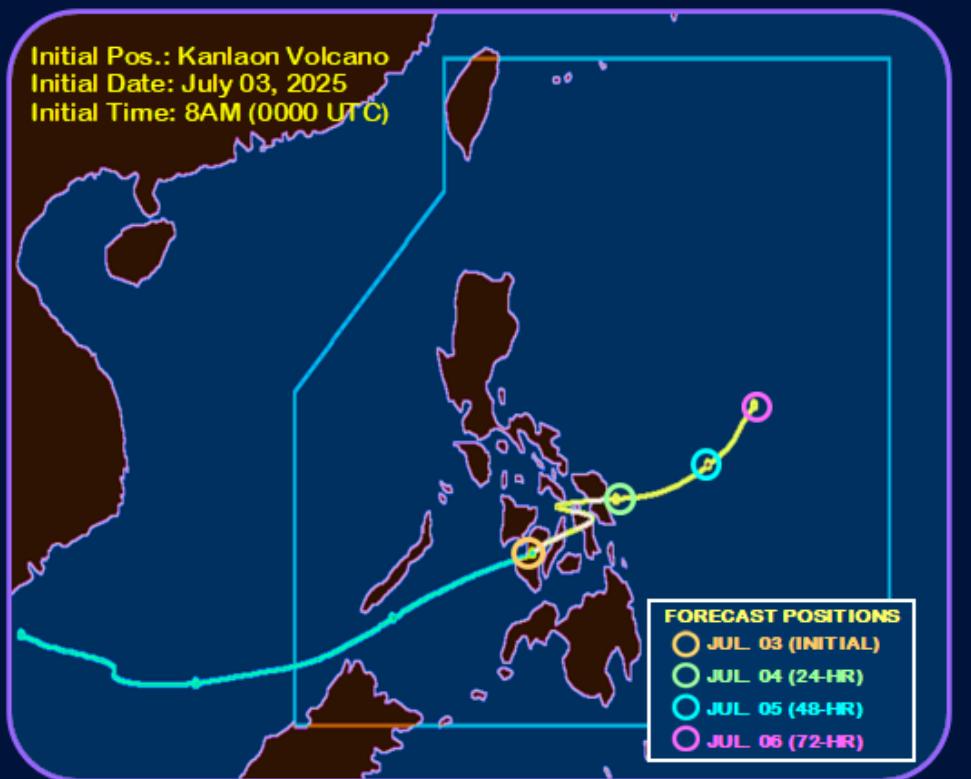
The **wind speed and direction map** shows wind information from ~1km to ~12km above sea level.

- PAGASA forecasts the air parcel trajectory using data from Global Spectral Model (GSM) of Japan Meteorological Agency. (The data used in the analysis is initialized at 8 AM, 03 July 2025).

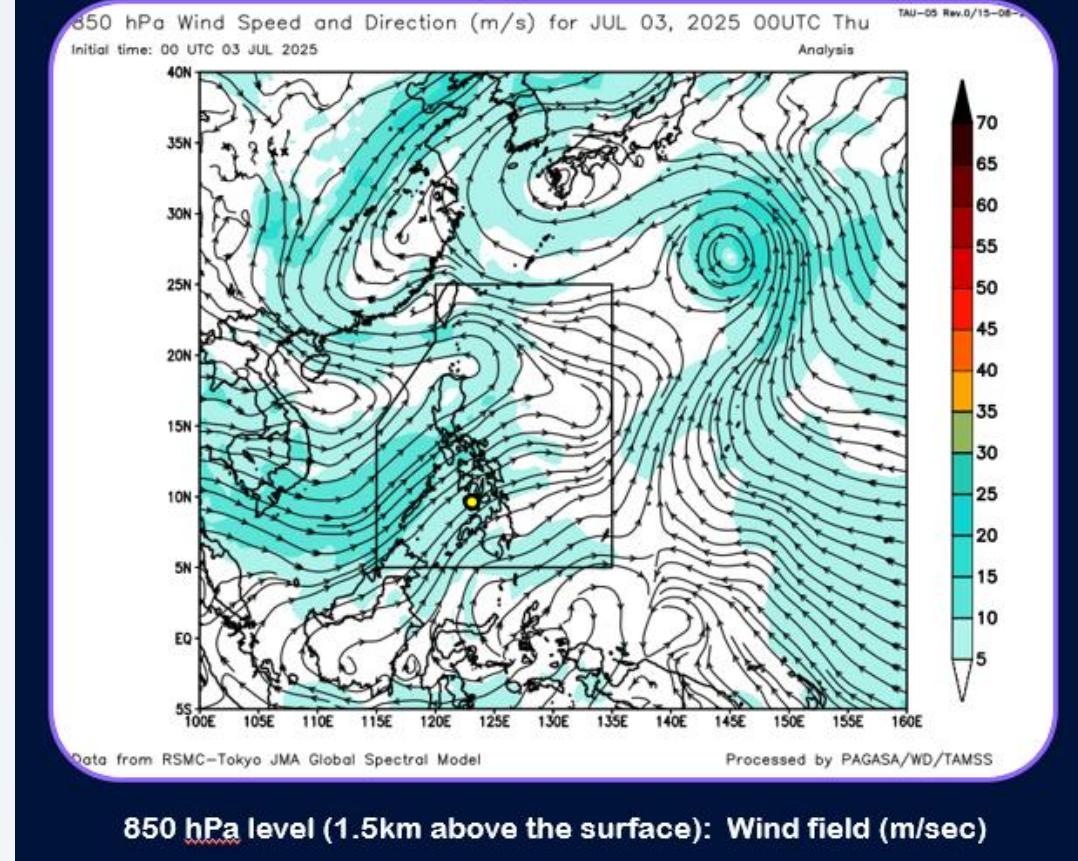




850 hPa (~1.5Km) Level

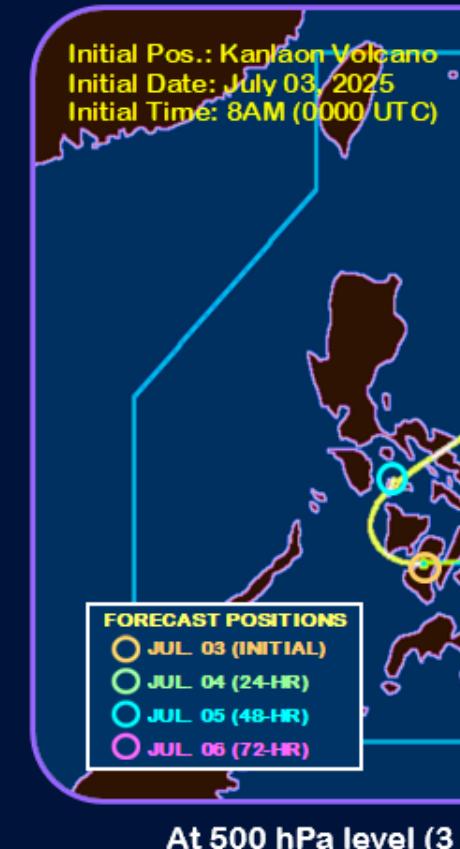
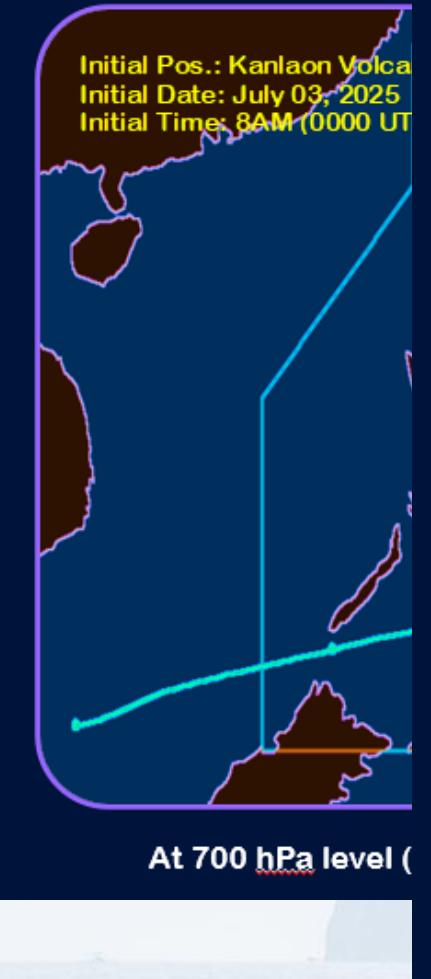


850 hPa (~1.5Km) Level

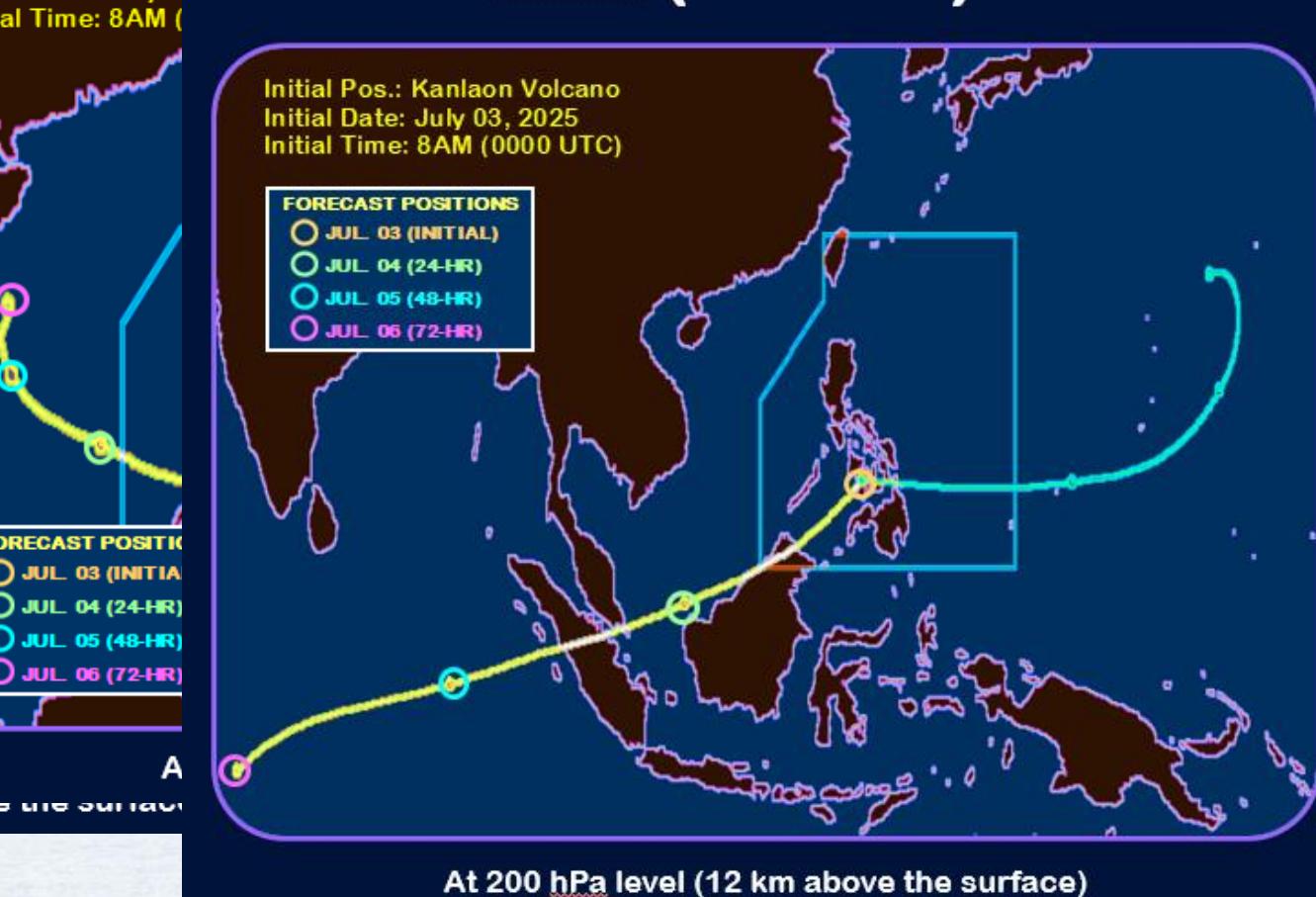




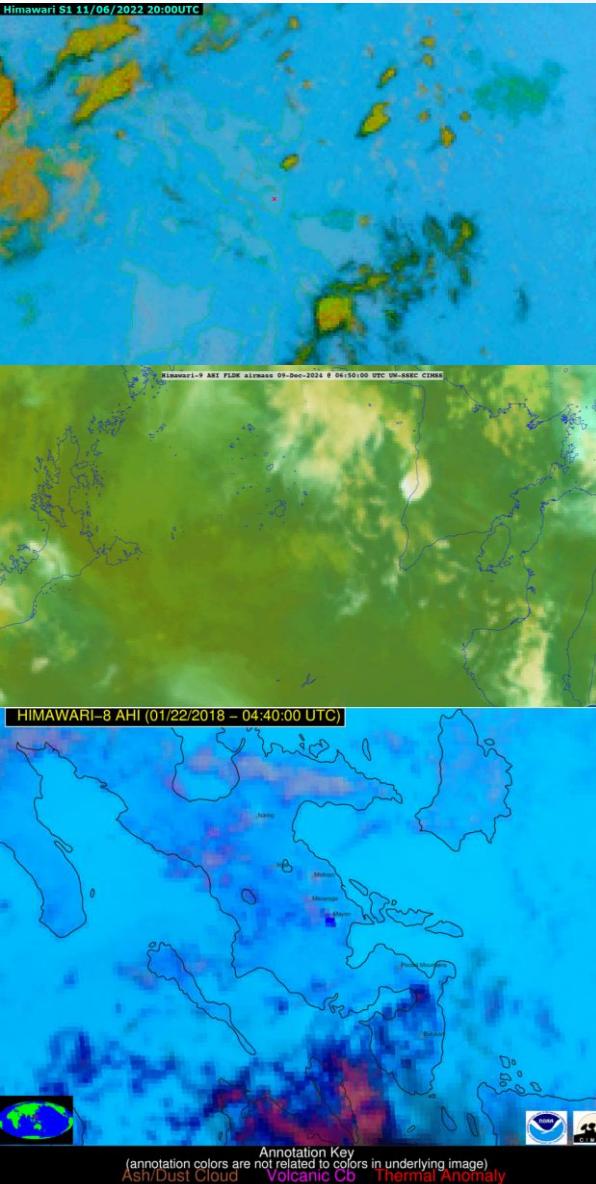
700 hPa (~3Km) Level 500 hPa (~5 Km) Level



300 hPa (~9 Km) Level 200 hPa (~12km) Level



Importance of Collaboration and Multidisciplinary Strategies



Flight into a volcanic ash cloud is considered unsafe and should be avoided due to severe adverse effects on the aircraft such as:

- Engine malfunction
- Long-term engine damage
- Clogging of exposed sensors
- Abrasion of external surface

PAGASA issues **SIGMET (SIGnificant METeorological information) for volcanic ash (VA)** to provide timely and concise warnings about hazardous volcanic ash clouds that may affect aircraft safety. This information enables pilots and other civil aviation users to make informed decisions and avoid potentially dangerous areas.

Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
Philippine Atmospheric, Geophysical and
Astronomical
Services Administration(PAGASA)
Weather Division



AMSS-07 Rev.1/24-06-2024
Management System
ISO 9001:2015
www.tuv.com
ID 910000309



SIGMET FOR VOLCANIC ASH

WVPH31 RPLL 141221

RPHI SIGMET 6 VALID 141221/141821 RPLL-

RPHI MANILA FIR MT KANLAON PSN N1025 E12308 VA CLD OBS AT 1130Z WI N1043 E12202 - N1042 E12211 - N1039 E12210 - N1038 E12202 - N1043 E12202 SFC/FL110 FCST AT 1730Z WI N1043 E12135 - N1023 E12149 - N1009 E12130 - N1039 E12113 - N1043 E12135 AND OBS AT 1130Z WI N1025 E12307 - N1026 E12257 - N1021 E12300 - N1025 E12307 SFC/FL090 FCST AT 1730Z WI N1018 E12250 - N1000 E12240 - N1014 E12214 - N1031 E12230- N1018 E12250=

"tracking the sky...helping the country"

Aeronautical Meteorology Services Section
Rm.415, 4th Floor, IPT Bldg., NAIA Terminal 1, Pasay City

Tel. Nos. (632) 8852 2927
(632) 8832 3023

www.bagong.pagasa.dost.gov.ph



Importance of Collaboration and Multidisciplinary Strategies



Volcanic Ash Advisory Text

FVFE01 RJTD 122038

VA ADVISORY

DTG: 2025

VAAC: TOK

VOLCANO:

PSN: N102

AREA: PHI

SUMMIT EI

ADVISORY

INFO SOU

AVIATION

ERUPTION

OBS VA D1

OBS VA CL

N1021 E12

FCST VA C

N1024 E12

FCST VA C

N1035 E12

FCST VA C

N1035 E11

RMK: NIL

NXT ADVIS

[Back to I](#)

Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
PHILIPPINE INSTITUTE OF VOLCANOLOGY AND
SEISMOLOGY



(1) VOLCANO OBSERVATORY NOTICE FOR AVIATION (VONA)
(2) Issued: (20250414/1628Z)
(3) Volcano: Kanlaon (CAVW# 0702-02=)
(4) Current Aviation Color Code:
(5) Previous Aviation Color Code:
(6) Source: Kanlaon Volcano Observatory (PHIVOLCS)
(7) Notice Number: PIVS-VONA-KV-20250414-4_UPDATE
(8) Volcano location: N 10 deg 24 min E 123 deg 7 min
(9) Area: Negros Oriental
(10) Summit Elevation: 7989 ft (2435 m)
(11) Volcanic Activity Summary: Onset: 1628Z
Duration: 01:10:00
Eruption Type: ash emission
492 ft (150 m)
indiscreet; West drift
observed in VKLM IPCam with accompanying weak tremor and
infrasound signal.
(12) Volcanic Cloud Height:
(13) Other volcanic cloud information:
(14) Remarks:

(15) Contacts: Philippine Institute of Volcanology and Seismology
Volcano Monitoring and Eruption Prediction Division
mail.vmped@phivolcs.dost.gov.ph (632) 8927-1095; (632)
8426-1468 loc 311 or 312

(16) Next Notice: A new VONA will be issued if conditions change significantly.
While a VONA is in effect, regularly scheduled updates are posted at <http://www.phivolcs.dost.gov.ph>

Postal Address: PHIVOLCS Building, C.P. Garcia Avenue, U.P. Campus

Diliman, Quezon City 1101 Philippines

Website www.phivolcs.dost.gov.ph

Tel. Nos.: +63 2 8426-1468 to 79; +63 2 8926-2611

Fax Nos.: +63 2 8929-8366; +63 2 8929-3757



Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
Philippine Atmospheric, Geophysical and
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Weather Division



AMSS-07 Rev.1/24-06-2024

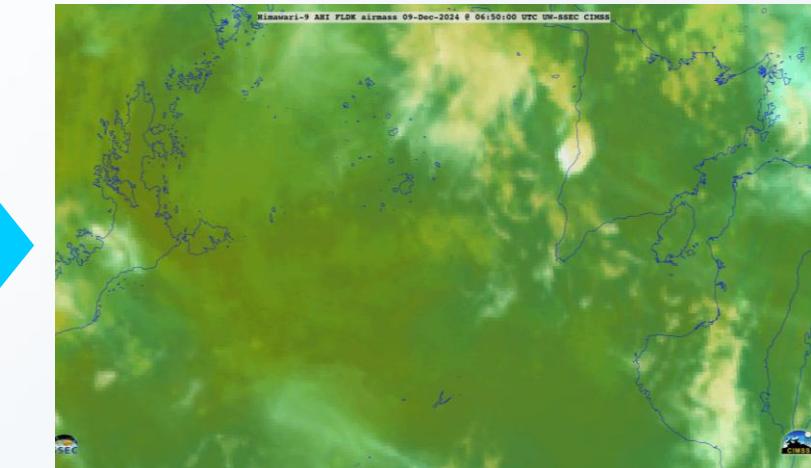
SIGMET FOR VOLCANIC ASH

WVPH31 RPLL 141221
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FCST AT 1730Z WI N1018 E12250 - N1000 E12240 - N1014 E12214 - N1031 E12230- N1018
E12250=

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PAGASA issues SIGMET VA

PAGASA receives Volcano Observatory Notice for Aviation (VONA) from PHIVOLCS and Volcanic Ash Advisory (VAA) from Tokyo VAAC



PAGASA analyzes movement of VA
from satellite imagery and monitors
subsequent updates PHIVOLCS and
Tokyo VAAC



Is volcanic ash signature still present in
Manila Flight Information Region (FIR)?



PAGASA cancels its SIGMET VA



Importance of Collaboration and Multidisciplinary Strategies



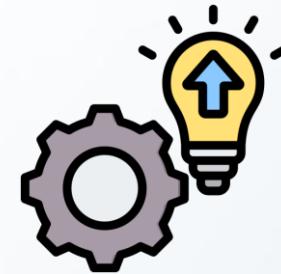
PAGASA participation on the National Disaster Risk Reduction and Management Council's (NDRRMC) Pre-Disaster Risk Assessments (PDRA) meetings on both national and local levels before, during and even after the event of a tropical cyclone.





What worked well?

- Capacity of PAGASA in providing Forecast and Early Warning for the different hydrometeorological hazards.
- The existence of Pre-Disaster Risk Assessment (PDRA) mechanism at the national, regional, and local levels to bridge hazard information into preparedness actions.



What needs to be improved?

- Updated hazard susceptibility and risk maps
- Sufficient annual appropriations for the expansion of new meteorological and hydrological observation station and the operations and maintenance of observation facilities
- Impact-based forecasts (IBF) both at the national and local levels to support early action.
- Preparedness actions protocols by local governments and national agencies needs to be updated and aligned to IBF.



Disaster Risk Knowledge

- Central national exposure database not yet fully realized.
- Limited hazard vulnerability data for buildings, houses, agriculture, and critical infrastructure and lifelines.
- Impact forecasting still far from operational.
- Poor data sharing framework for risk information.
- Infrequent updating of hazard and risk maps
- Limited funding for a robust disaster risk knowledge data bank

- Preparedness and response capabilities highly dependent on income and fiscal status of local government authorities
- Disaster managers typically co-terminus with their appointing executives, affecting knowledge retention in DRRM.
- Lack of legal framework for use of DRRM funds before a disaster for anticipatory action activities



- Limited manpower (meteorologists, hydrologists, field station personnel, instrument technicians)
- Limited annual appropriation to support growing number of equipment, facilities, and services
- Sparse station network with limited observation frequency (mostly every 3 h)
- Manual instruments and visual observations
- Poor integration of observation network
- Vulnerable met telecommunications infrastructure
- No DA and BC for in-house high-resolution NWP
- Limited high-performance computers (HPC)
- Most products still text-based (no digital forecasts)

- Emergency cell broadcast implemented manually
- CAP not fully maximized (only used for typhoon and river flood-related messages), with no integration to cell broadcast systems
- Some local governments issue their localized weather warnings despite not being their role.
- Conflicting and fake weather information from pseudo-meteorologists, and weather enthusiasts
- Multilingual setting poses challenge in warning communication



Thank you for your attention!



**Department of Science and Technology-
Philippine Institute of
Volcanology and
Seismology**

Volcano Early Warning Systems

**Early
Warnings
for All**

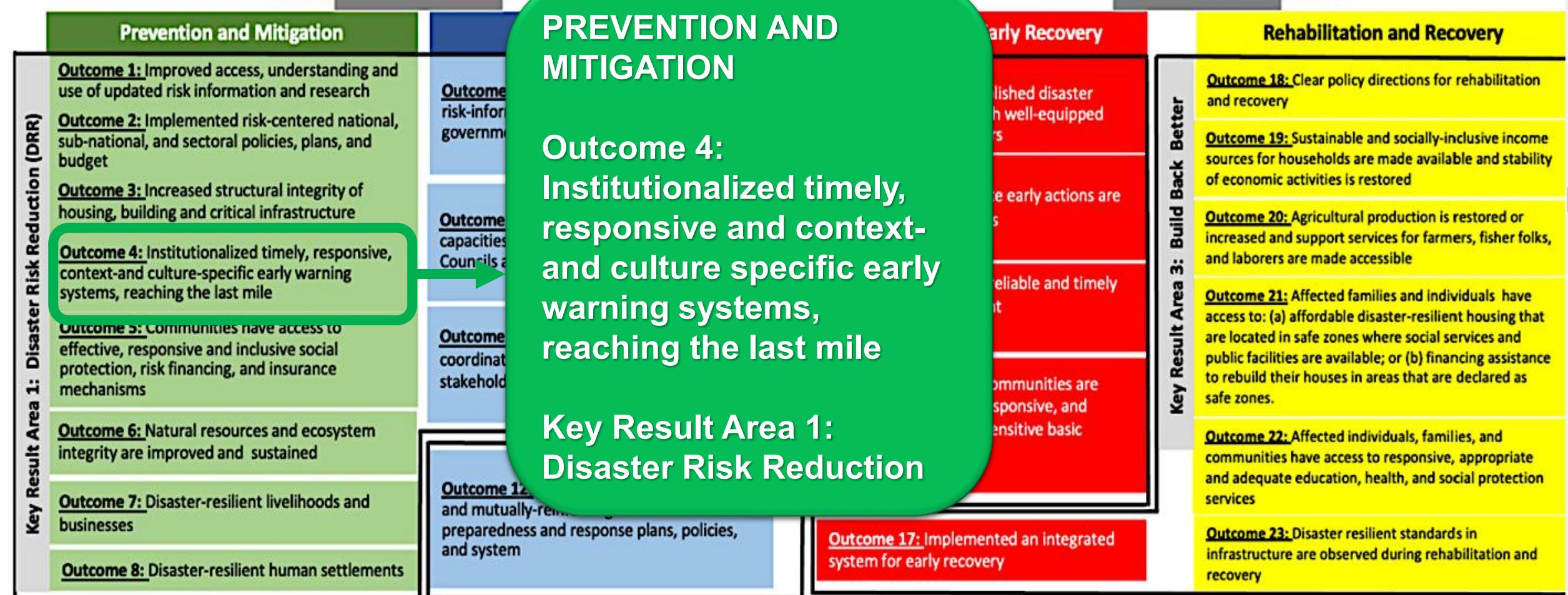


Department of Science and Technology
PHIVOLCS
Philippine Institute of Volcanology and Seismology

Republic Act No. 10121 (2010)

NATIONAL DISASTER RISK REDUCTION AND MANAGEMENT COUNCIL

Secretariat: Office of Civil Defense



PREVENTION AND MITIGATION

Outcome 4:
Institutionalized timely, responsive and context-and culture specific early warning systems, reaching the last mile

Key Result Area 1: Disaster Risk Reduction

VISION

A leading global science and technology institution of empowered men and women helping develop communities safe from and resilient to volcanic eruptions, earthquakes, tsunamis and other related hazards.

MISSION

We provide timely, quality and socially-inclusive information and services for warning, disaster preparedness and mitigation. This we 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 capacity enhancement of communities for comprehensive disaster risk reduction.

SOCIETAL OUTCOME: Communities have achieved resilience to volcanic eruptions, earthquakes, tsunamis and other related hazards

Organizational Goal 1: Enhanced safety of communities

1. Accurately predicted and simulated geologic phenomena
2. Provided accurate and timely warning and information
3. Developed cost-effective monitoring and warning system
4. Empowered partners to lead in reducing risks from geologic hazards down to the barangay level
5. Enhanced collaboration with stakeholders

Organizational Goal 2: Highly responsive and competent staff

1. Highly prominent, globally recognized experts
2. Motivated, rewarded and competent staff
3. Effective and efficient systems, procedures, structures
4. Inspiring, dynamic leadership

Excellence**Innovation****Integrity****Service****STRATEGIC INITIATIVES FOR EARLY-WARNING:**

- ▲ **National Volcano Monitoring and Warning**
- ▲ **National Earthquake Monitoring and Information**
- ▲ **National Tsunami Monitoring and Early Warning**
- ▲ **Landslide Monitoring, Early Warning and Risk Assessment**

9 Volcano Observatories
on 8 most active volcanoes
(Bulusan, Hibok-Hibok,
Kanlaon, Mayon, Pinatubo,
Taal, Matutum, Parker)

- Resident Volcanologist (VO chief officer)
- 3-8 Technical personnel
- Engineers, physicists, geologists

Planned Volcano Observatories (2026-2030):

- Northern Luzon
- Camarines



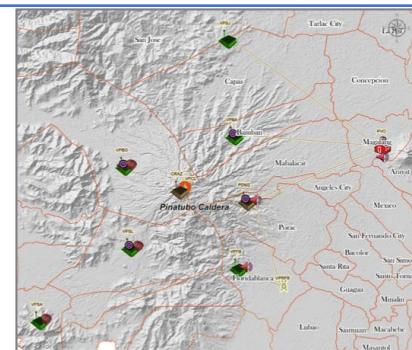
7 Volcano Networks

on 12 monitored volcanoes
 (+ Iriga, Isarog, Apo, Leonard-Kniasseff)

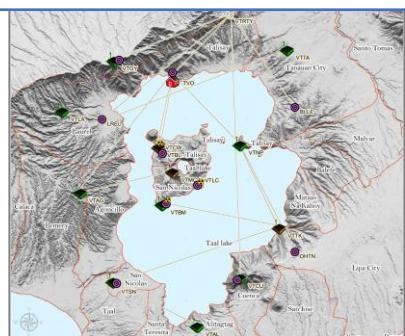
106 built multi-parameter +
 repeater stations

- ▲ 81 remote seismic systems
- ▲ 37 infrasound systems
- ▲ 16 repeater stations
- ▲ 51 continuous GPS stations
- ▲ 24 electronic tilt stations
- ▲ 4 continuous gas stations
- ▲ 14 all-weather stations
- ▲ 33 IP/IR camera systems
- ▲ 5 thermal camera systems

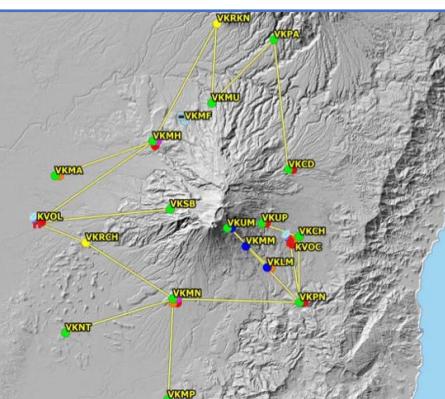
PINATUBO VOLCANO NETWORK



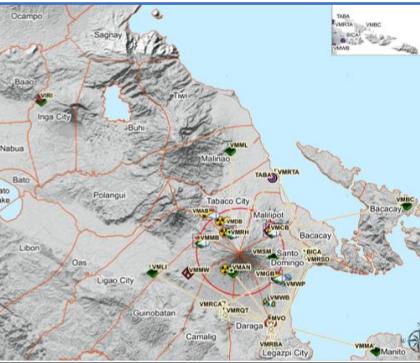
TAAL VOLCANO NETWORK



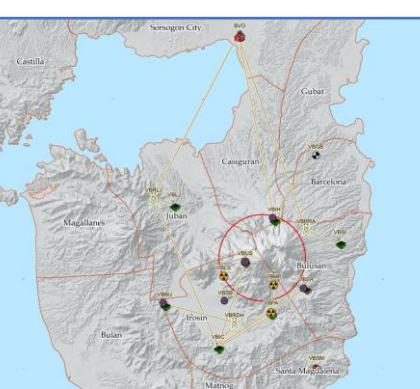
KANLAON VOLCANO NETWORK



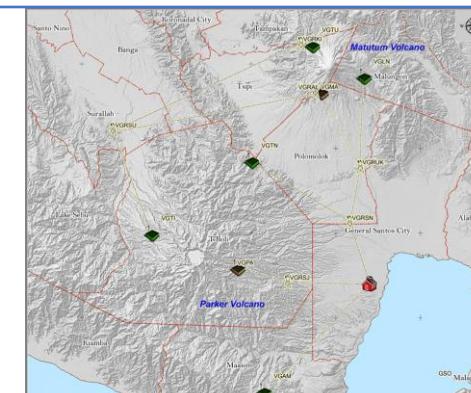
MAYON VOLCANO NETWORK



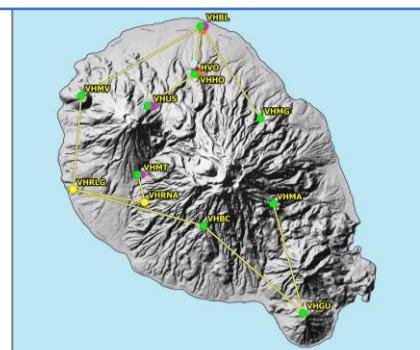
BULUSAN VOLCANO NETWORK



PARKER-MATUTUM VOLCANO NETWORK



HIBOK-HIBOK VOLCANO NETWORK



Volcano Monitoring Data Acquisition Systems

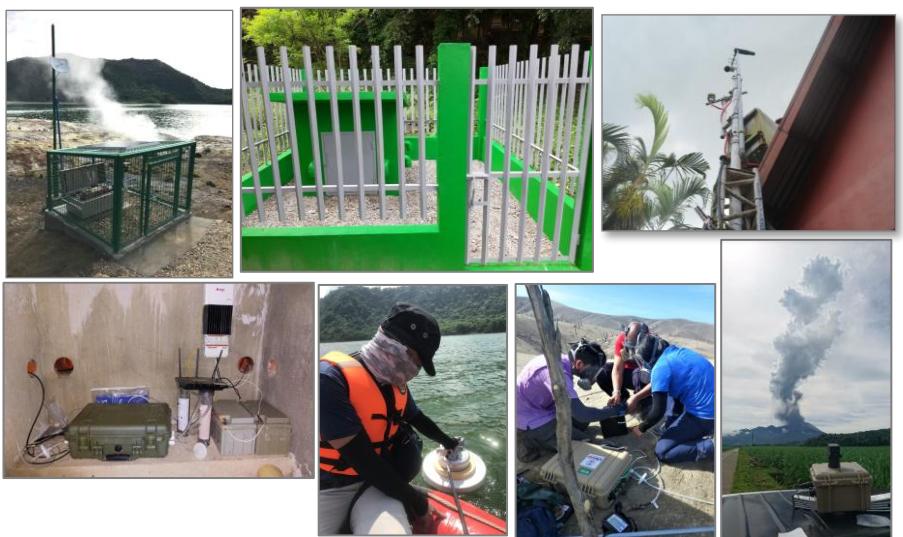
SEISMIC MONITORING STATIONS



GROUND DEFORMATION STATIONS / CAMPAIGNS



GEOCHEMICAL STATIONS / CAMPAIGNS



VISUAL AND WEATHER MONITORING

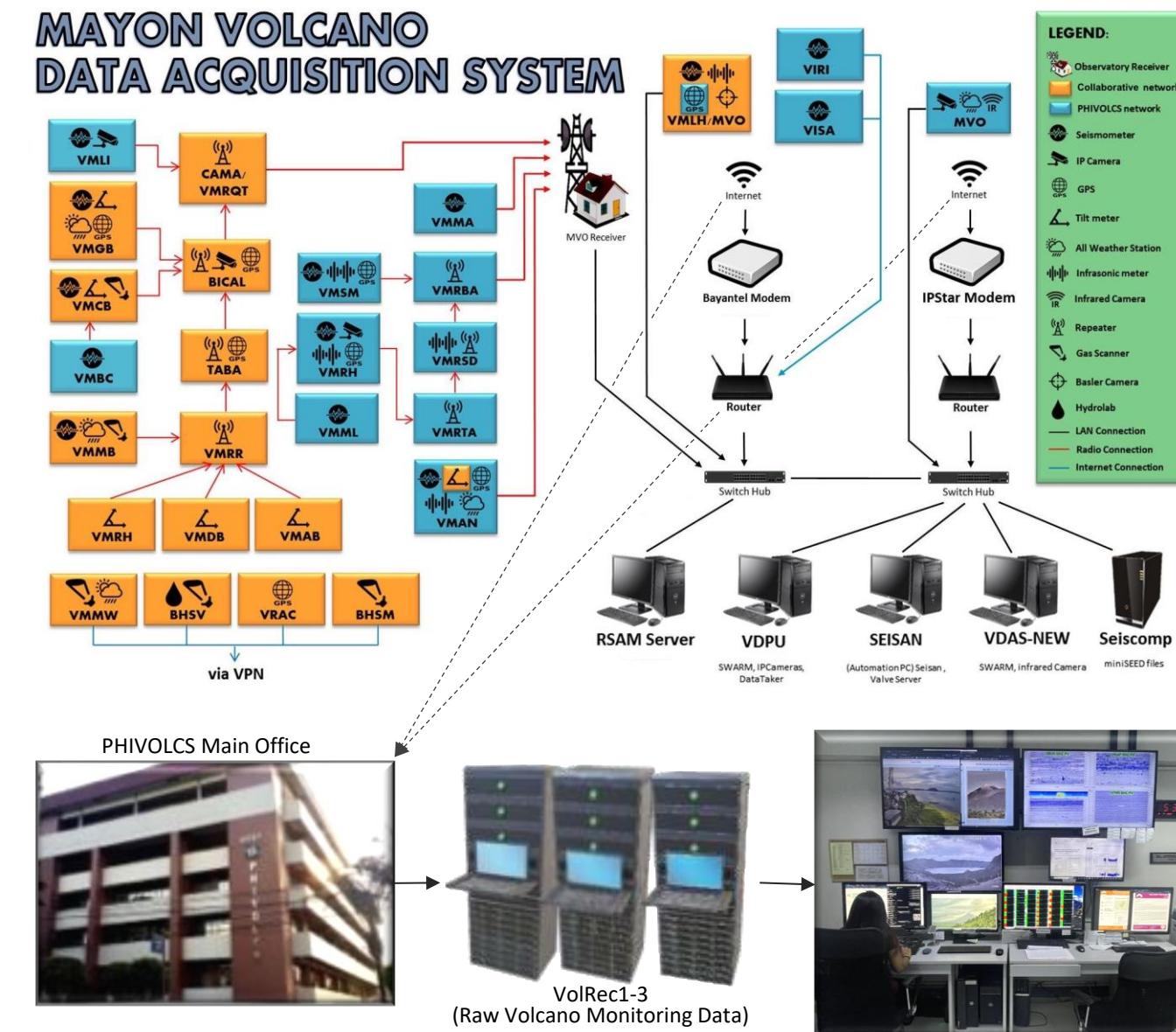


MICROGRAVITY / RESISTIVITY CAMPAIGNS

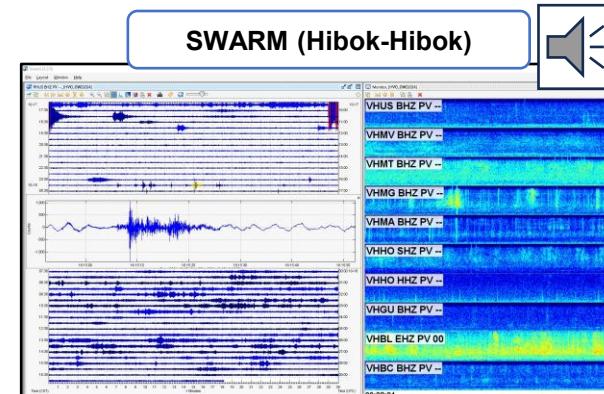
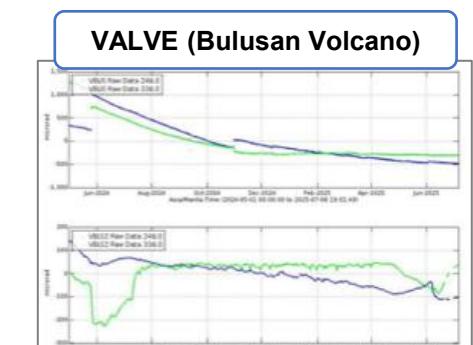
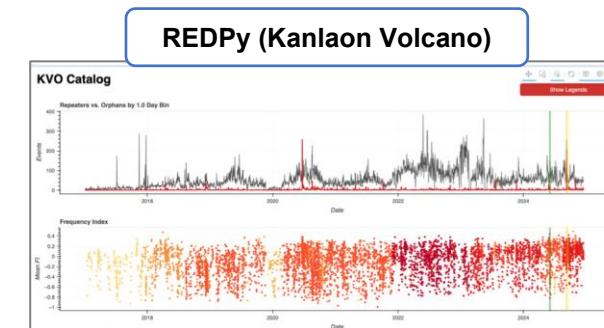
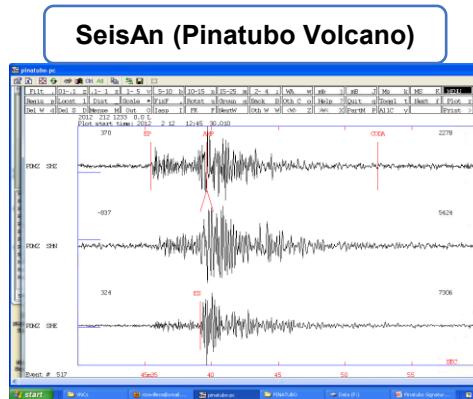
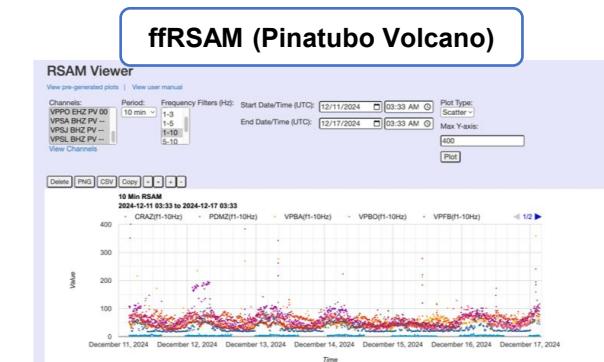


COMMUNICATIONS SYSTEMS

MAYON VOLCANO DATA ACQUISITION SYSTEM



Seismic, Infrasound and geodetic data processing w/ OpenSource software (SWARM, SeisAn, VALVE, RedPy, ffRSAM, Pensieve)



Welcome to LAVA-DOME!
Local Active Volcanoes Archive-Dynamic Operational Monitoring Environment

Monday - Jul 07 2023

Volcanic Earthquakes

Today (12 AM - Present) 24 Hours (12 AM Yesterday - 12 AM Today) Past 7 days

0	0	3
Mayon VOLCANO	BULUSAN VOLCANO	KANLAON VOLCANO
0	0	0
TAAL VOLCANO	HIBOK-HIBOK VOLCANO	PINATUBO VOLCANO

Mayon Volcano 09 June 2023



DOST
PHIVOLCS
PHILIPPINE INSTITUTE OF VOLCANOLOGY AND SEISMOLOGY

Map **Satellite**

Volcano Monitoring Network
Bulusan

Show Marker Label

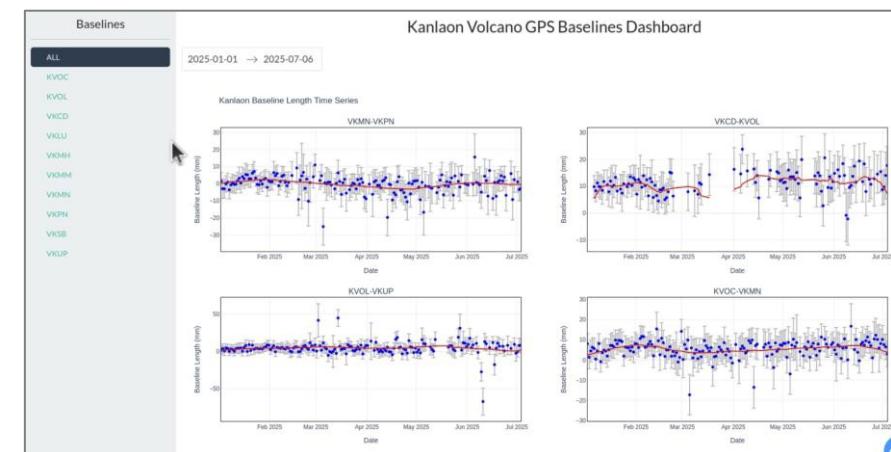
- GPS
- EDM
- Gas
- Hydrology
- Seismics
- Visual Observation
- UAV
- Precise Levelling
- Meteo
- Thermal(td)
- Fields

Map showing the location of the Volcano Monitoring Network in the Philippines, specifically around the Bulusan volcano. The map includes labels for Legazpi City, Matnog, Sorsogon City, Lupton, Gubat, and various towns in Albay and Sorsogon provinces. A legend on the right details the monitoring stations and their types.

LAVA-DOME (Operational Database):

<https://vmepd.phivolcs.dost.gov.ph>

- WOVODat schema customized for operational use
- Real-time data intake and processing (e.g. lake CO₂/dT, Multigas, GPS baselines)
- Data upload tools (e.g. daily VQ phase data via Sei2LAVA, SO₂ flux, EDM data, etc.)
- Operational performance tools (Exit Report, Network state-of-health)



Department of Science and Technology
PHIVOLCS
 The Philippine Institute of Volcanology and Seismology

DOCUMENTATION ▾ STAFF SECTION ▾ VISUALIZATION ▾

VODS Form

Note: * fields are necessary in saving data.

* Select Volcano * Select Update * Date: YYYY-MM-DD **Save**

PHIVOLCS
DOCUMENTATION
STAFF SECTION
VISUALIZATION
OPERATIONAL TOOLS
Logout (Marlon Boms)

Main Office Duty Officer Exit Report Form

Normal : Emergency

Monday, July 7, 2025 Time In

Duty Officer:

[Add](#) [Remove](#)

1. System/Server Check:

Server & Digital Display	Dumptools	IP Cameras	Tilt	RSAM
Remark				
Satellite Image				
MOOS				
MROVA				
EOSDIS				
Worldview				
Tropomi				
IRMMS				
Remark				

2. SMS Distribution (Group):

VOOS	comment	IP Database Upgrading/Checking
Summary		IP Database Snapshot
VOOS Update	comment	Logistics
comment		

3. Bulletin Distribution:

Bulletin type: Regular Update

Bulletin needs review: NO / YES

If Yes (Approver's initial/lastname/mode of comm):

Fax/CD	comment	IP Database Upgrading/Checking
Fax/CD - secure fax journal		IP Database Snapshot
Fax (Other recipient)		Logistics
Email		comment
PHIVOLCS Website		VOOS Checking & Saving
Facebook		Bulletin Archiving
Twitter		VMFEPD E-mail Accounts
comment		

4. Advisory Distribution:

Fax/CD	comment	IP Database Upgrading/Checking
Fax/CD - secure fax journal		IP Database Snapshot
Fax (Other recipient)		Logistics
Email		comment
PHIVOLCS Website		VOOS Checking & Saving
Facebook		Bulletin Archiving
Twitter		VMFEPD E-mail Accounts
comment		

5. IP Database Upgrading/Checking:

IP Database Snapshot	comment	IP Database Upgrading/Checking
Logistics		IP Database Snapshot
VOOS Checking & Saving		Logistics
Bulletin Archiving		comment
VMFEPD E-mail Accounts		VOOS Checking & Saving
IPAM (IP Database)		Bulletin Archiving
IPAM (IP Database) Incoming/Outgoing		VMFEPD Documents Incoming/Outgoing
comment		

6. Weekly DO Responsibilities:

Tilt data sending with comment) & Weekly Submissions	IP Database Upgrading/Checking	IP Database Upgrading/Checking
DO Area Orderliness		IP Database Snapshot
FC FW Reporter & Survey Block		Logistics
FC FW Reporter & Survey Block		comment
Data Backup (Phivolcs PCDesktop/Backup Shortcut)		VOOS Checking & Saving
FC Report updating		Bulletin Archiving
Weekly Observation Summary		VMFEPD Documents Incoming/Outgoing
comment		

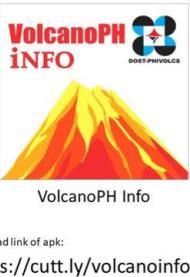
7. Emergency Duties (with VONA Drill):

Information Distribution (Directors, Division Chief)	IP Database Upgrading/Checking	IP Database Upgrading/Checking
Information Distribution (DOIC, Div Chiefs, RVR)		IP Database Snapshot
Emergency Notifications (EIN)		Logistics
VNO Notification for Aviation (VONA)		comment
comment		

8. Others:

9. Maintenance Flag:

VHP#	Id	Observatory	Code	Instrument	Number of Days with Issues	Type	Target Date of Maintenance
10048		Bulakan	VBMP_20250703_1	Seismometer	4 (Inter 2025-07-09	Non Operational	2025-07-11
10040		Bulakan	VBMP_20250703_1	AWS	4 (Inter 2025-07-09	Non Operational	2025-07-10
9824		Vigan	VBMS_20250703_1	IP Cam	33 (Inter 2025-07-05	Non Operational	2025-07-11
9787		Vigan	VBMS_20250703_1	Seismic (Pulled out)	46 (Inter 2025-07-20	Non Operational	2025-07-11
6963		Vigan	VBHD_20240331_1	GPS (Pulled out)	481 (Inter 2024-03-10	Non Operational	2025-07-08
6958		Karlskrona-Indak	VOIC_20240331_1	AWS (Pulled out)	294 (Inter 2024-03-10	Non Operational	2025-07-08
10041		Karlskrona	VKMA_20250701_0	Seismic	5 (Inter 2025-07-01	Intermittent	2025-07-07
10036		Karlskrona	VKMA_20250701_0	IP Cam	6 (Inter 2025-07-01	Intermittent	2025-07-07
10033		Karlskrona	VKMA_20250701_0	Seismic	6 (Inter 2025-07-01	Intermittent	2025-07-07
10030		Karlskrona	VKMA_20250630_0	GPS	7 (Inter 2025-06-30	Intermittent	2025-07-19
5443		Karlskrona	VKLM_20250630_1	IP Cam (Pulled out)	745 (Inter 2025-06-30	Non Operational	2025-07-16
5448		Karlskrona	VKLM_20250630_1	Tilt (Pulled out)	745 (Inter 2025-06-30	Non Operational	2025-07-16
5446		Karlskrona	VKLM_20250630_1	Seismic (Pulled out)	745 (Inter 2025-06-30	Non Operational	2025-07-16
9981		GSO	VGTA_20250631_1	GPS	13 (Inter 2025-06-28	Non Operational	2025-07-17
9980		GSO	VGTA_20250631_1	IP Cam	13 (Inter 2025-06-28	Non Operational	2025-07-17
9979		GSO	VGTA_20250631_1	Seismic	13 (Inter 2025-06-28	Non Operational	2025-07-17
9181		GSO	VGTU_20250602_1	GPS	154 (Inter 2025-06-02	Non Operational	2025-08-30
9180		GSO	VGTU_20250602_1	GPS	154 (Inter 2025-06-02	Non Operational	2025-08-28
9142		GSO	VGTU_20250602_1	Seismic	154 (Inter 2025-06-02	Non Operational	2025-08-28
9120		GSO	VGTU_20250617_1	Seismic	160 (Inter 2025-06-17	Non Operational	2025-08-28
9099		GSO	VLAM_20250123_1	Seismic	164 (Inter 2025-01-23	Non Operational	2025-07-18
8896		GSO	VGTL_20241227_1	GPS	210 (Inter 2024-12-08	Non Operational	2025-08-28
10028		Mayon	VMCO_20250623_1	Tilt	7 (Inter 2025-06-28	Non Operational	2025-07-15
10023		Mayon	VMCO_20250623_1	Seismic	7 (Inter 2025-06-28	Non Operational	2025-07-15
10014		Mayon	VMAL_20250628_1	Thermal Cam	8 (Inter 2025-06-28	Non Operational	2025-07-14
10013		Mayon	VMAL_20250628_1	Tilt	8 (Inter 2025-06-28	Non Operational	2025-07-14
10022		Mayon	VMAL_20250628_1	IP Cam	8 (Inter 2025-06-28	Non Operational	2025-07-14
10011		Mayon	TABA_20250628_1	GPS	8 (Inter 2025-06-28	Non Operational	2025-07-14

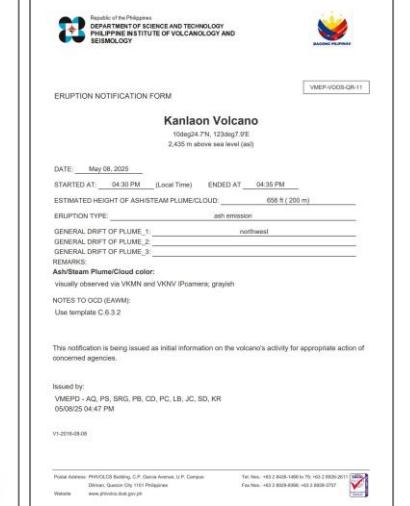
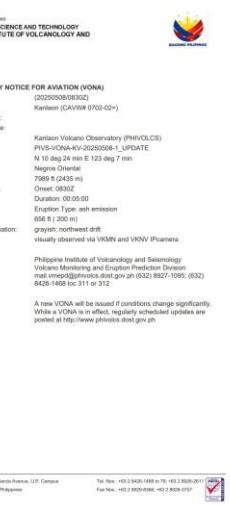
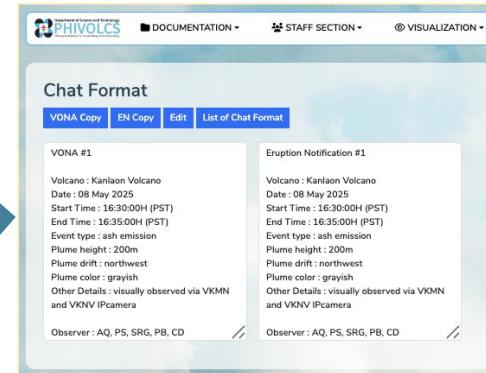
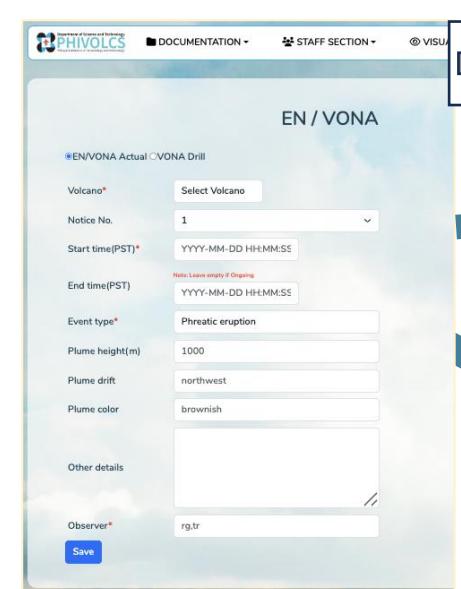



Download link of apk:
<https://cutt.ly/volcanoinphop>

LAVA-DOME (Operational Database):

<https://vmpd.phivolcs.dost.gov.ph>

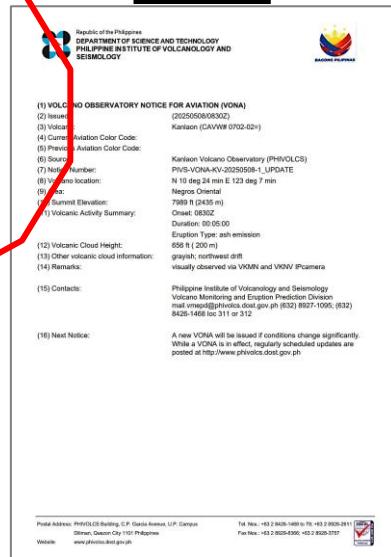
- Tools for bulletin/advisory/update infographic creation for VolcanoPH Info App, SocMed
- Automated templates for Eruption Notification (EN) and Volcano Notification for Aviation (VONA) w/ Early-Alert Warning Messaging (EAWM)



Emergency Information Protocol

Monthly
drills w/
Tokyo-
VAAC

VONA

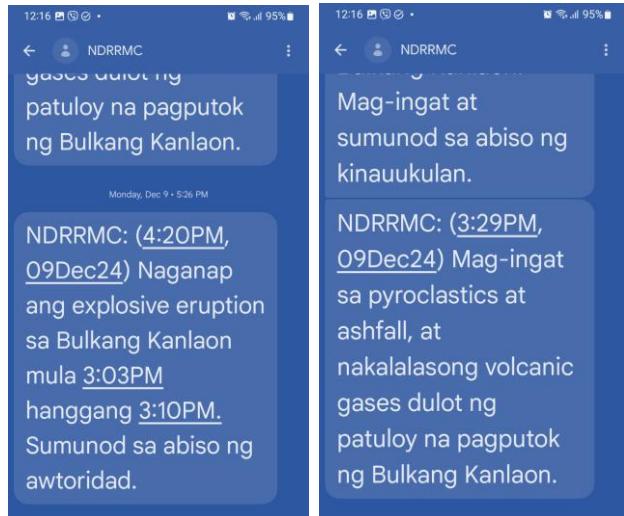


≤ 10 Minutes

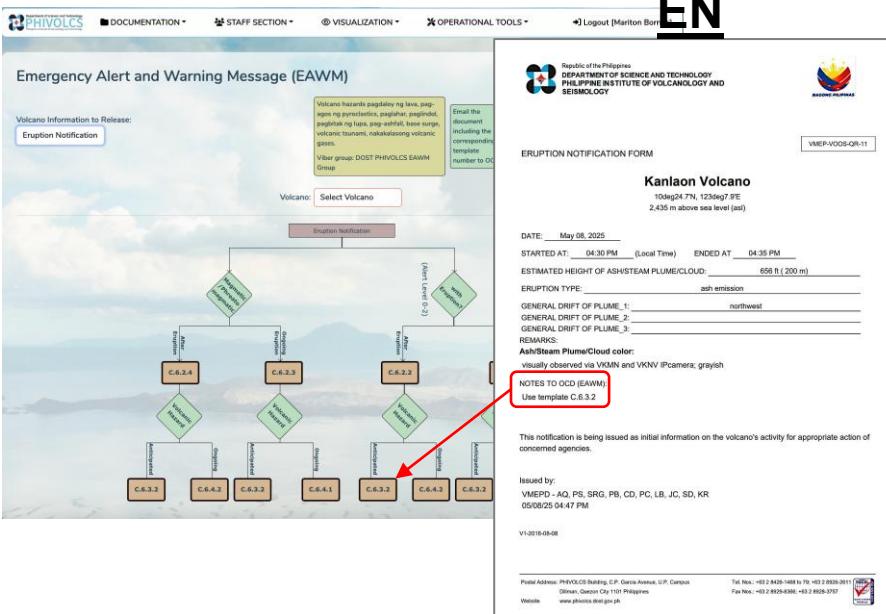
email
fax

- ▲ (CAAP) Civil Aviation Authority of the Philippines
- ▲ (PAGASA) Philippine Atmospheric, Geophysical and Astronomical Services Administration
- ▲ (Tokyo-VAAC) Tokyo Volcanic Ash Advisory Center

SIGMET



EN



≤ 10 Minutes

email
chat

- ▲ (OCD) Office of Civil Defense
- ▲ (DOST-CO) Department of Science and Technology Secretary
- ▲ (OP-PCO) Office of the President through the Presidential Communications Office

EAWM

**Republic Act 10639
(Free Mobile Disaster Alerts Act)**

- ▲ (ISP) Independent Service Providers



**! EAWM may be late
(up to a day) or not
received !**

Visitors: 891298 Alert Level Status: Taal - 1 (+632) 8426-1468 loc 311/312 mail.vmpd@phivolcs.dost.gov.ph

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Local Active Volcanoes Archive

Volcano Status View or download the latest volcano bulletins, advisories, updates & other issuances, or archived issuances. [Explore →](#)

Volcanic Earthquake Check out the latest locatable volcanic earthquake in monitored Philippine volcanoes. [Explore →](#)

Volcano Catalog Browse & learn about volcanoes of the Philippines interactively. [Explore →](#)

Monitoring Data Search, view or download monitoring data on volcanic seismicity, ground deformation, gas, visual and other parameters. [Explore →](#)

Visualize Data Visualize time-series volcano monitoring data interactively. [Explore →](#)

Image Gallery View or download volcano photos & scanned selected legacy monitoring records. [Explore →](#)

PHIVOLCS-LAVA is the database of multi-parameter monitoring data acquired through the years by instrumental and visual observation of the Philippines active volcanoes. [Learn More →](#)

WOVODat in PHIVOLCS
The backend database and core scripts of WOVODat were programmed by the Earth Observatory of Singapore (EOS) in Open Source MySQL and PHP, respectively, and were completed in 2012. [Read More →](#)

What is WOVODat
The World Organization of Volcano Observatories Database, or WOVODat, is a **database structure or schema** designed for standardized digital storage and use of processed volcano monitoring data by all WOVO member organizations. [Learn More →](#)

PHIVOLCS Volcano Database History
From the early 1990's, PHIVOLCS had been using spreadsheets of simple to more complex functionalities for storing, analysis and visual output of processed volcano observation data... [Read More →](#)

PHIVOLCS-LAVA (Public portal): <https://wovodat.phivolcs.dost.gov.ph>

- Public access to volcano monitoring data for supporting research, assessments
- Legacy data older than 2017 (updating in progress)
- Volcano catalog (review in progress)
- Real-time tools (for Operations Centers)
 - Located volcanic earthquakes
 - Soft Launch: VOLCAN- Volcano Observation Live Capture Net

The screenshot displays several key features of the PHIVOLCS-LAVA Public portal:

- LOCATED VOLCANIC EARTHQUAKE:** A map of the Philippines showing the location of the latest volcanic earthquake. The map includes labels for major cities like Baguio, Manila, and Cebu, and surrounding bodies of water like the West Philippine Sea and South China Sea.
- Monitoring Data:** A section showing monitoring data for the Upper Pantao Station, including a "Monitoring Data" table and a "BULK DATA DOWNLOAD" form.
- Image Gallery:** A section showing camera snapshots from the Volcano Observation Live Capture Net, with labels for "Camera Snapshots WSTN (PST Time)" and "Camera Snapshots VMM (PST Time)".
- Real-time Seismic Amplitude Measurement:** Two line graphs for the VKUP EHZ and VKUP EHZ: Upper Pantao Station, showing seismic amplitude over time (UTC Time).

Alert Level	Monitoring Criteria	Interpretation	Recommendations
0 NORMAL	Background parameters: Volcanic earthquakes typically <5/day; Main Crater Lake gas (diffuse CO ₂) emission within 1,000 tonnes/day, average water temperature <35°C and acidity >pH2.5; General stationary or deflationary trends in ground deformation.	Quiescence; no eruption in foreseeable future.	Permanent habitation on Taal Volcano Island, the Permanent Danger Zone is strongly discouraged because steam-driven and gas eruptions can occur without warning.
1 LOW-LEVEL UNREST	Abnormal parameters: Moderate level of seismicity with some felt events; Lake gas (diffuse CO ₂) emission > 1,000 tonnes/day, lake and slight increases in fumarole temperatures and acidity; Low level change in Main Crater Lake temperature and/or acidity; Slight inflationary ground deformation changes in most stations/ benchmarks.	Hydrothermal or tectonic unrest.	Entry into the Taal Volcano Island Main Crater, the Daang Kastila fissure and the Mt. Tabaro eruption site must be prohibited due to the possibilities of steam-driven, gas or hydrothermal explosions.
2 INCREASING UNREST	Increasing changes in parameters: Elevated level of seismic activity with some felt events in Taal Volcano Island and Taal Caldera; Occurrence of volcano-tectonic swarms and low-frequency events; Sustained increases in inflationary ground deformation; Increasing fumarole temperature and acidity, upwelling in the Main Crater Lake; significant increases in CO ₂ emission, instrumental detection of airborne SO ₂ >500 tonnes/day; Slight positive microgravity changes in the Caldera.	Shallow hydrothermal unrest and/or deep-seated magmatic intrusion may be occurring.	Entry into Taal Volcano Island must be prohibited.
3 INTENSIFIED UNREST	Intensifying changes in parameters: Sudden increase or decline in seismic activity; Perceptible earthquakes, occurrence of swarms of shallow volcano-tectonic and/or hybrid earthquakes; Increasing SO ₂ ; Significant increase in ground inflation, rapid increase in ground tilt; Pronounced microgravity changes recorded; Precursory phreatic eruptions may occur.	Magmatic unrest is imminent.	TVI, Taal Lake and lakeshore communities of Agoncillo and Laurel, Batangas, must be evacuated.
4 HAZARDOUS ERUPTION IMMINENT	Accelerating changes or abrupt decline in parameters: Rapidly intensifying volcanic earthquakes, intense volcanic tremor, frequent felt earthquakes; Profuse steaming or explosions along existing and perhaps new vents and fissures; Elevated SO ₂ flux; Accelerating increase or reversal of ground deformation patterns; precursory phreatomagmatic or low-level magmatic eruption may occur.	Pre-climactic eruption in progress, which may or may not lead to highly explosive magmatic eruption.	Communities in pre-determined hazards zones for base surge and volcanic tsunami must be evacuated.
5 HAZARDOUS ERUPTION ONGOING	Highly explosive magmatic eruption in progress; Sustained tall eruption column (>20 kms) with umbrella cloud and pyroclastic density currents (PDCs) visibly transporting across TVI and Taal Lake. VT, hybrid and eruption tremor events continuously recorded by caldera and farther stations, felt at high intensities in the Taal region.	Hazardous Plinian eruption in progress.	Extreme hazards of base surges, column-collapse PDCs, volcanic tsunami, thick tephra fall/ ashfall and fissuring can impact communities around the lake and downwind. Additional areas for evacuation may be recommended.

Evacuation of PDZ and High Hazard Zones

Numeric Alert Level Scheme:

- Since Pinatubo 1991 eruption
- Alerts 1-2: Prohibition of PDZ entry
- Alert Level 3: Evacuation of PDZ + High Hazard Zones
- Alert Level 4: Evacuation for worst-case scenario
- Alert Level 5: Statement only of ongoing worst-case scenario eruption

DRRM Applications:

- Contingency Plans (City/Municipal, Provincial, Regional)
- NDRRM Plan (Operation List-Response- Incident Command System)

Climate / Hazard impacts on monitoring infrastructure

- ▲ Repetitive damage, recovery and rehabilitation
- ▲ High cost and time consumption of maintenance
- ▲ Physical toll on VO personnel
- ▲ Direct impairment of early-warning service

Human Resource:

- ▲ High turnover of personnel
- ▲ Very rigid and small plantilla (65 positions for 9 VO plus PHIVOLCS Main Office)
- ▲ Skills development for communication, crisis management



Damages caused by Typhoon Glenda (Rammasun), July 2014



Best Practices:

- ▲ Early-warning program strategically aligned to organizational goals, mission and vision and role in the overall DRR framework
- ▲ Use of multi-parameter stations with both high-resolution and low-cost systems; OpenSource applications
- ▲ WOVODat schema for operations, early warning and public access to monitoring data
- ▲ Leveraging partnerships and applications for information dissemination
- ▲ Alert Levels embedded in government emergency plans

Challenges:

- ▲ Climate and other hazard impacts
- ▲ Human resource

THANK YOU!



Department of Science and Technology
PHIVOLCS
Philippine Institute of Volcanology and Seismology

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