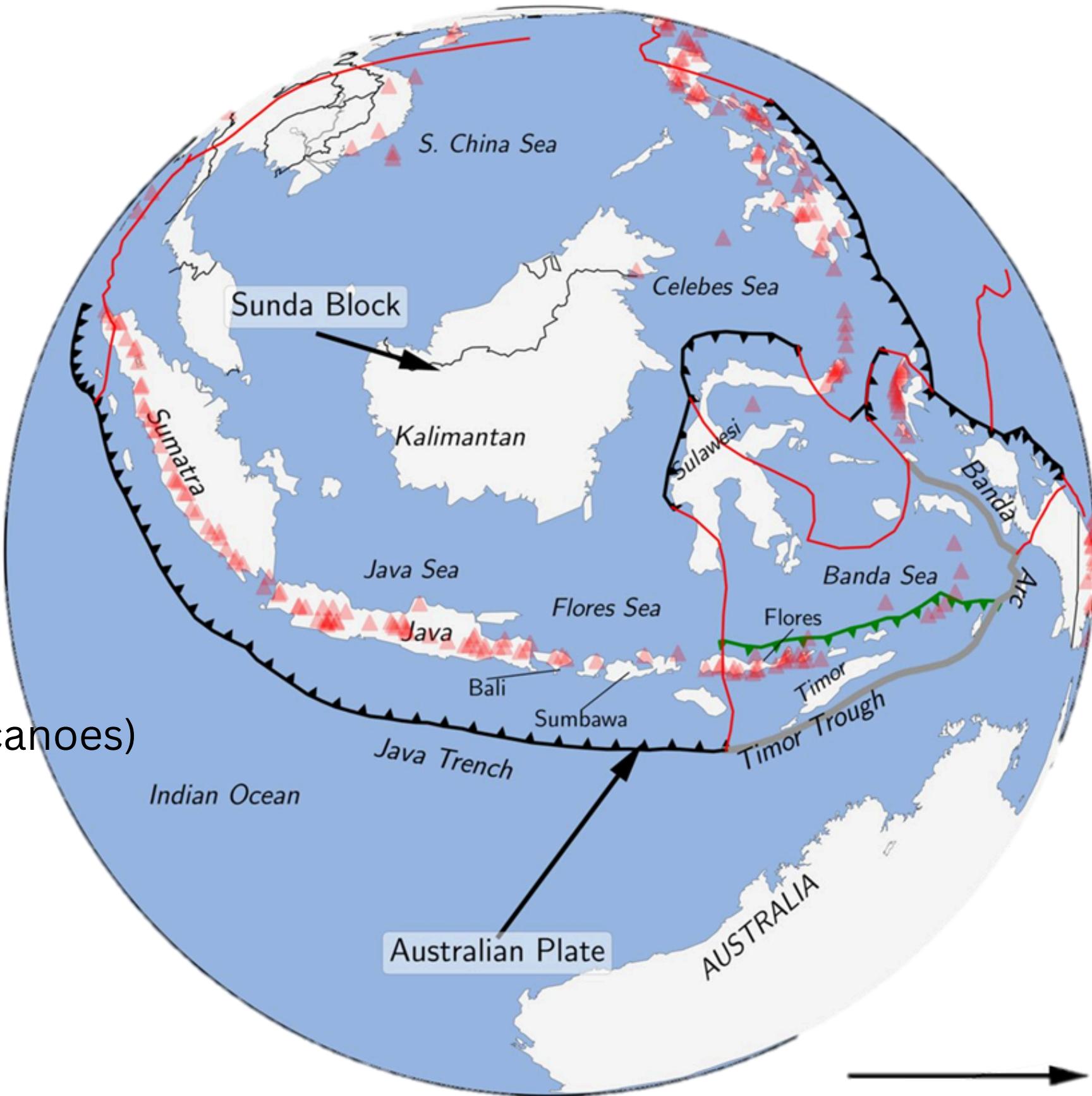




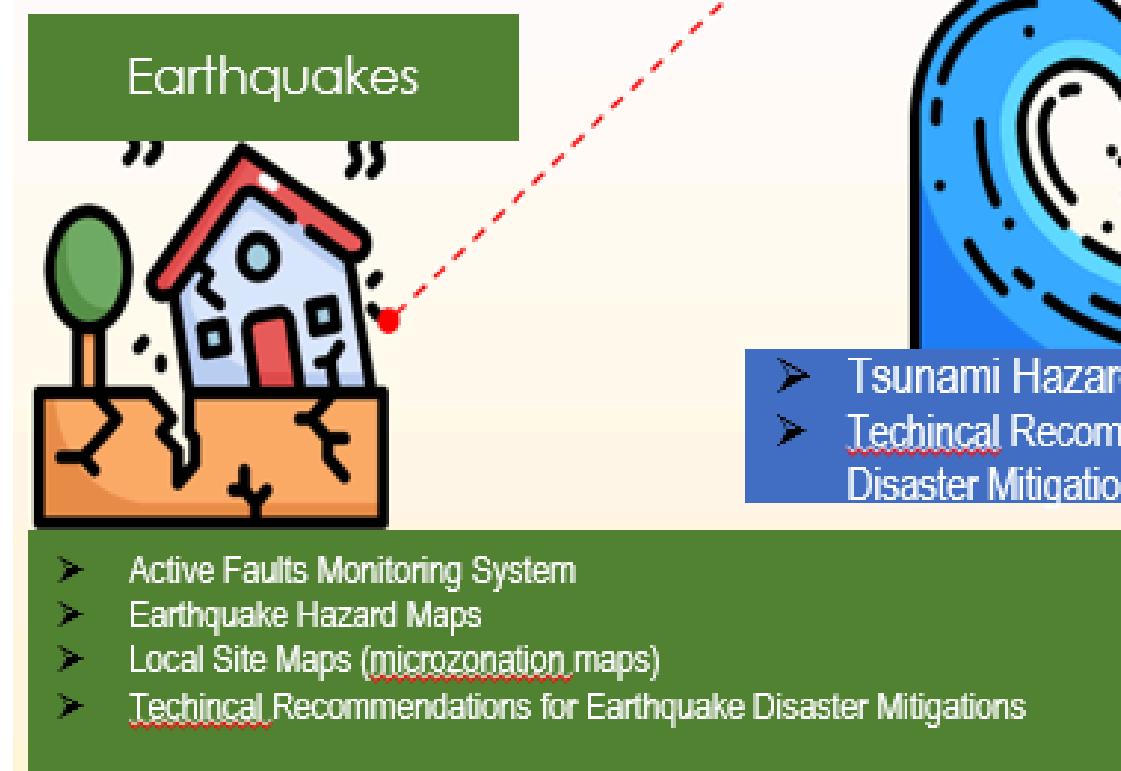
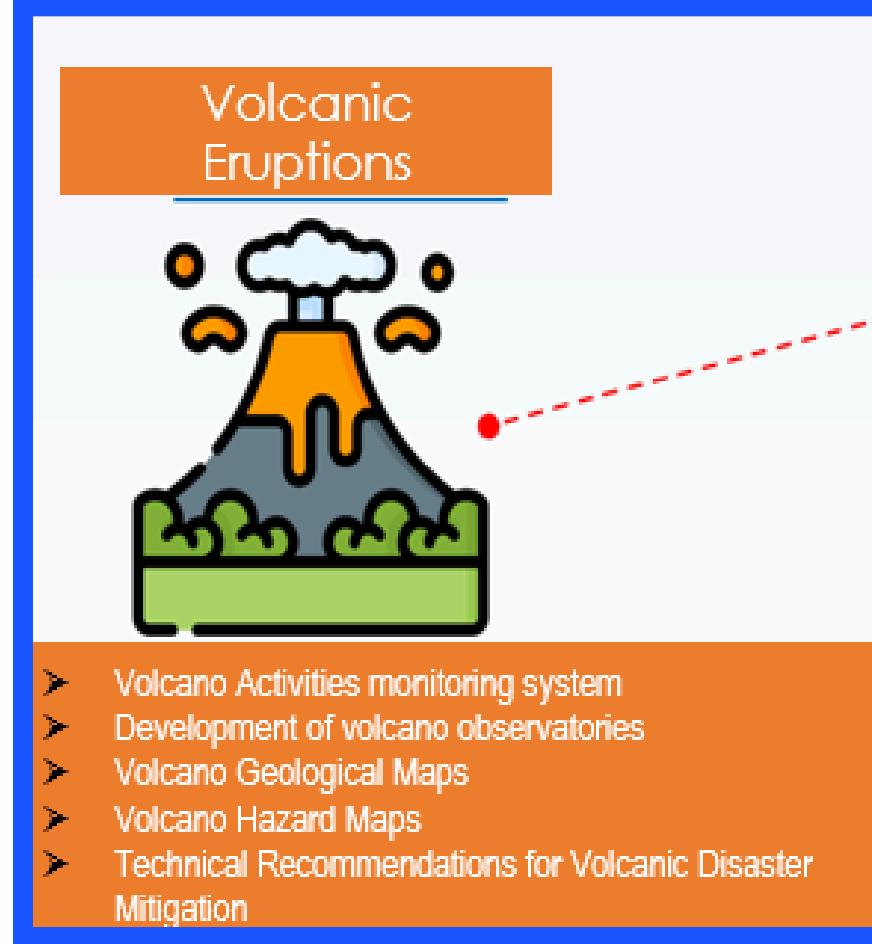
(Country centric capabilities and challenges): the example of Indonesia

- 1. Muhammed Wafid - Head of Geological Agency**
- 2. Heruningtyas Desi Purnamasari - Head of Volcano monitoring Indonesia (CVGHM)**
- 3. Agie Wandala Putra - Meteorology, Climatology, and Geophysical Agency of Indonesia (BMKG)**

TECTONIC OF INDONESIA

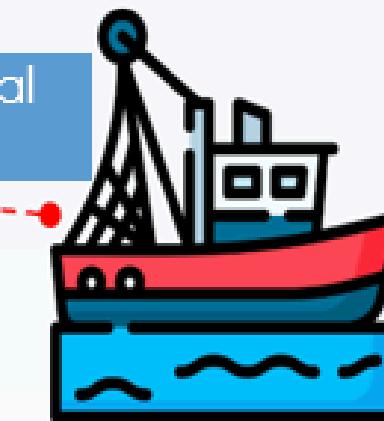


- **17.000 island (34 Provinces)**
- **265 million inhabitants**
- **4 tectonic plates**
- **127 active volcanoes (69 under monitoring-3 submarine volcanoes)**
- **6-12 volcanic eruptions per year**
- **>280 Active Faults** triggering Earthquake (**12 - 15 % of global earthquakes** occur in Indonesia and multiple destructive earthquakes per year)
- **Tsunamigenic** (Tectonic and Non-tectonic)
- **Over 800 Landslides** per year



GEOLOGICAL HAZARD MITIGATIONS

Marine Geological Hazards



- Submarine Landslides
- Technical Recommendations for Abrasion and Accretion
- Submarine Volcano Maps

Land Subsidence



- Land Subsidence Monitoring System
- Land Subsidence Susceptibility Maps
- Technical Recommendations for Land Subsidence Susceptibility

Landslides

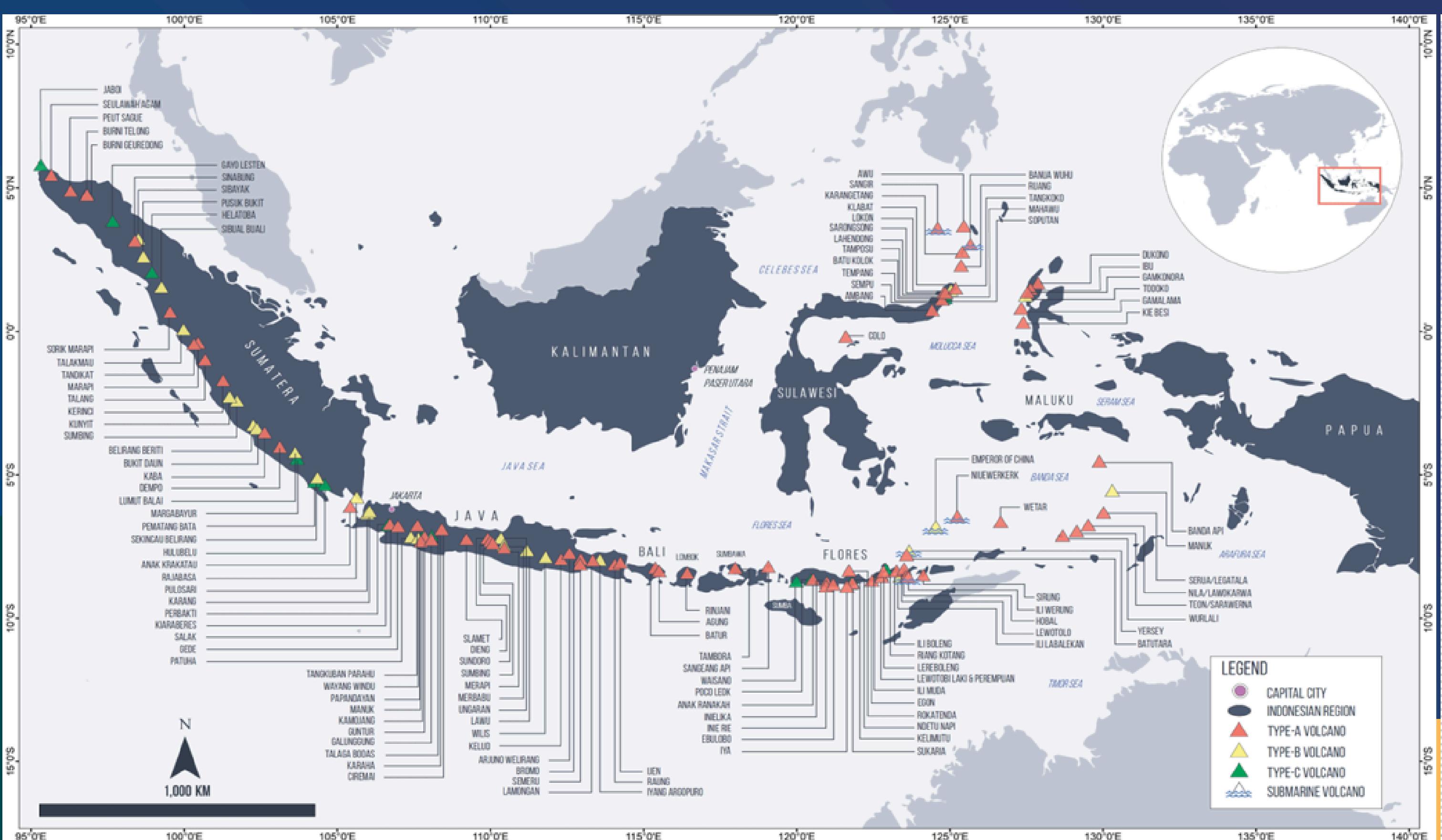


- Landslides Early Warning System
- Landslide Susceptibility Maps
- Technical Recommendations for Landslides Disaster Mitigations

Liquefactions



- Liquefaction Susceptibility Maps
- Technical Recommendations for Liquefaction Susceptibility



127 ACTIVE VOLCANOES

Type A : 77 volcanoes
with eruptive historical
record since 1600 AD

Type B : 29 volcanoes
with eruptive historical
record before 1600 AD

Type C : 21 volcanoes
with solfatara and
fumarole but no eruptive
historical record

Eruptions like these shape our landscapes – and our futures



Eruption of Mount Merapi, Indonesia, September 19, 2024
source : <https://radarjogja.jawapos.com>



The pyroclastic flow of Mount Semeru on December 4, 2021
source : <https://www.tempo.co/>



The eruption of Mount Marapi on February 6, 2024
source : <https://www.tempo.co/>



The 2024 eruption of Mount Ruang produced pyroclastic flows and incandescent lava ejections that reached up to 8 kilometers from the eruption center. (Source : CVGHM)

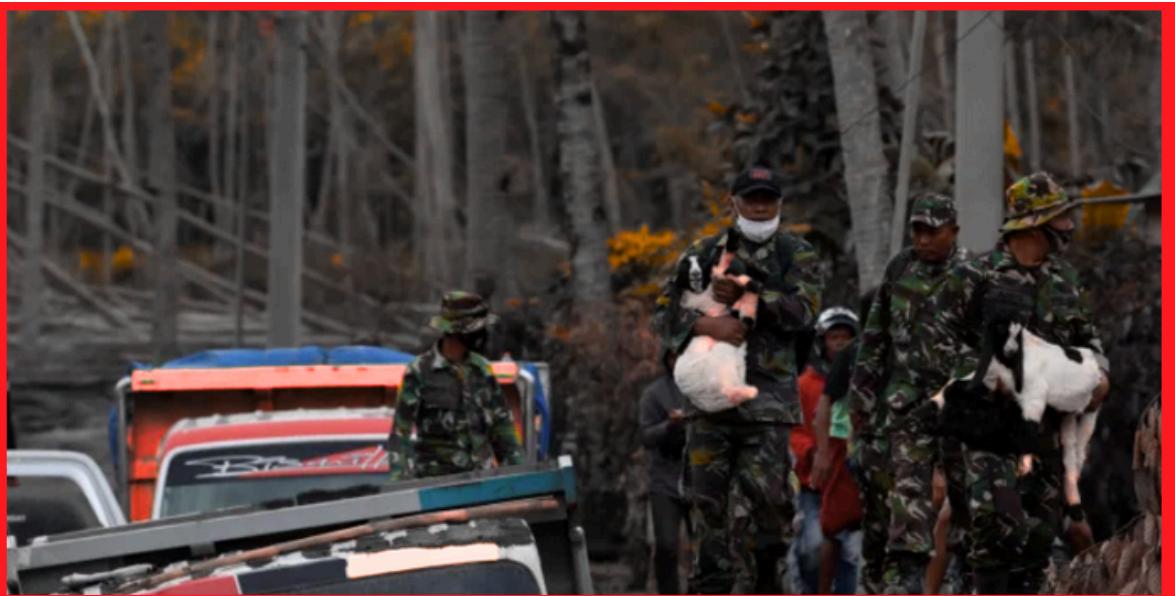


The eruption of Mount Lewotobi Laki-laki on June 17, 2025, produced an eruption column that reached up to 10 kilometers. (Source : CVGHM)



The eruption of Mount Ibu produced an eruption column 5,000 meters high. Source: <https://toraja.tribunnews.com/>

The real-world impact on communities



Mount Semeru erupts in Indonesia, 2021.

Behind every eruption, there are lives disrupted



Source : <https://edition.cnn.com/>

Impact on the aviation sector

Bali flights cancelled after Indonesian volcano spews 10km-high ash tower

Mount Lewotobi Laki-Laki on the island of Flores, east of Bali, erupted on Tuesday afternoon, leading to several airlines cancelling flights



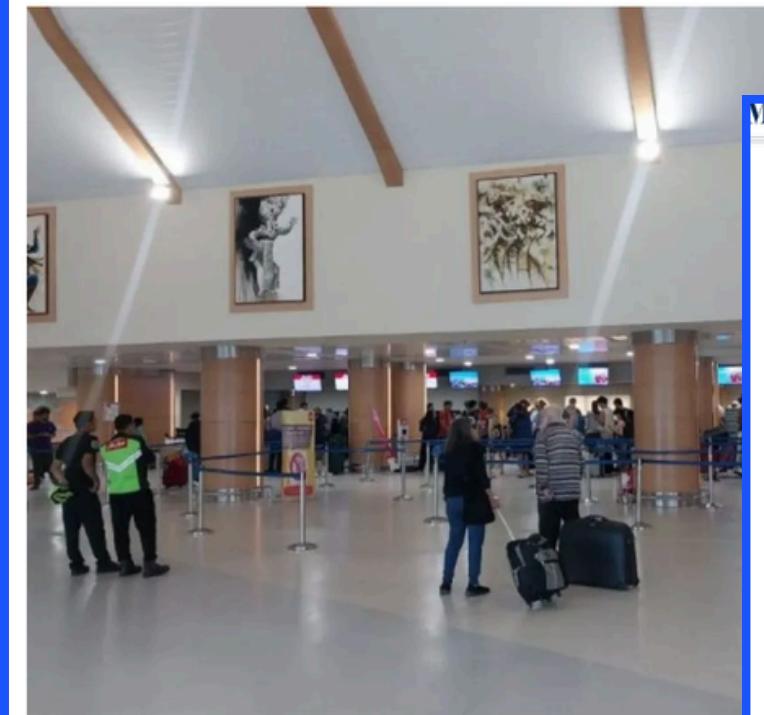
Giant ash plume rises from Indonesia's Mount Lewotobi Laki-Laki volcano – video

ANTARA
INDONESIAN NEWS AGENCY

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Bali: 17 outbound flights canceled due to Lewotobi eruption

June 18, 2025 19:09 GMT+700



I Gusti Ngurah Rai Airport, Bali, said 17 outgoing flights and 15 incoming flights were canceled on Wednesday (June 18, 2025) due to the eruption of Mount Lewotobi Laki-Laki.

Travel > News & Advice

Dozens of Bali flights cancelled after volcano erupts in Indonesia

Airlines say they are closely monitoring the situation and will inform customers of any changes

Amelia Neath • Wednesday 18 June 2025 10:23 BST • 0 Comments



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ENGLISH

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Mount Ruang Erupts Again; Airports Closed, 18 Flights Canceled

Translator Dewi Elvia Muthiariny Editor Laila Afifa

April 30, 2024 | 07:24 pm



TEMPO.CO, Jakarta - Mount Ruang in Sitaro Islands Regency, North Sulawesi has erupted again today, April 30, forcing the closure of several airports in the region.

Center for Volcanology and Geological Hazard Mitigation, Geological Agency, MEMR



Minister of Energy and Mineral Resources Regulation No. 13
of 2016, Article 693

Conduct research, investigation, engineering, and services in the
field of volcanology and geological disaster mitigation.



Tsunami in Poso 2018

Malang earthquake, 2021

Flood in East Nusa
Tenggara, 2021

Sinabung eruption, 2020



Volcanic hazard mitigation is the
effort to reduce risks and impacts
caused by volcanic eruptions.



Mitigate the impact of volcanic
eruptions, early warning systems are
essential.

The 4 hazards managed by Center for Volcanology and Geological Hazard Mitigation, Geological Agency



- 127 active volcanoes
- 20 volcanoes with above-normal status
- 5 million people living within the hazard-prone areas (KRB)
- **Fatalities**
200,000 people (before 1980)
450 people (after 1980)
- **Evacuated**
750,000 people (after 1980)



- ✓ 7000 km subduction zone
- ✓ > 3000 km of active fault lines
- ✓ 150 million people exposed
- ✓ 5 million people exposed to tsunamis
- ✓ Over 250,000 fatalities since the year 2000

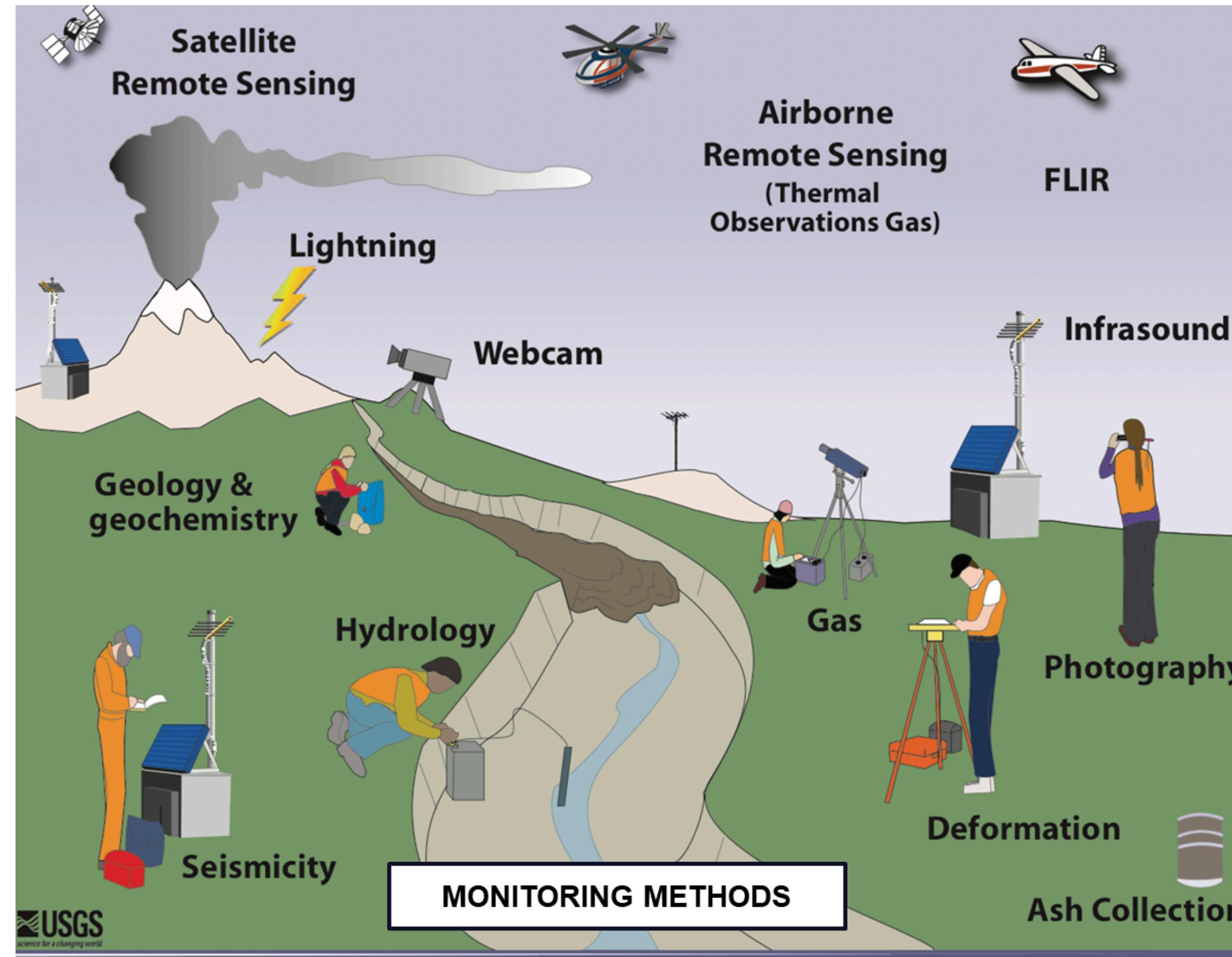


- ✓ 5 million people exposed by tsunamis

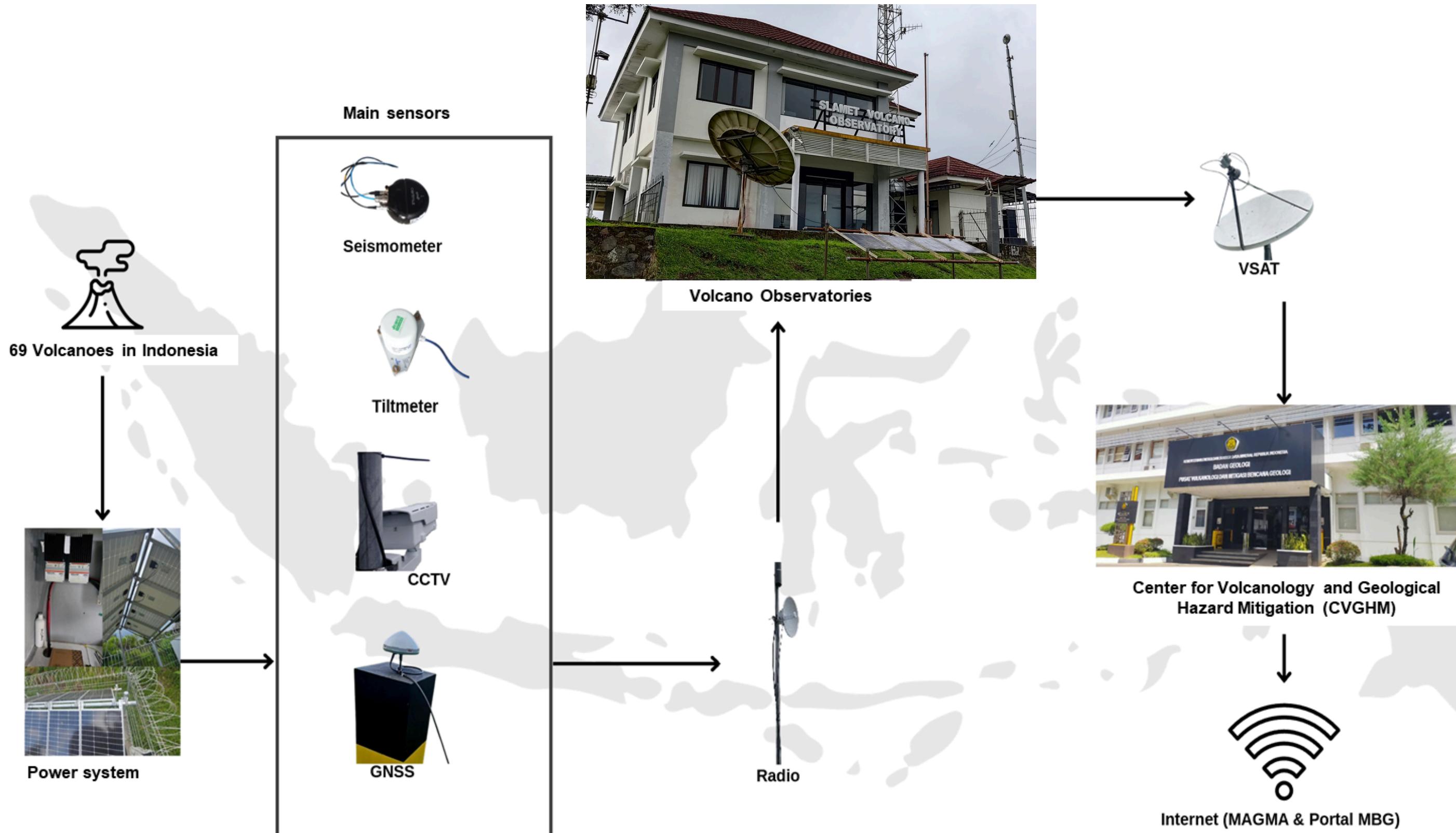


- ✓ 1,300 earthquake events in the past 5 years
- ✓ 60% prone to landslides
- ✓ 40.9 million people in hazard-prone areas
- ✓ 200 deaths per year
- ✓ 4,000 buildings damaged per year
- ✓ 400 hectares of farmland damaged per year

Modernization and Installation of Volcano Monitoring System

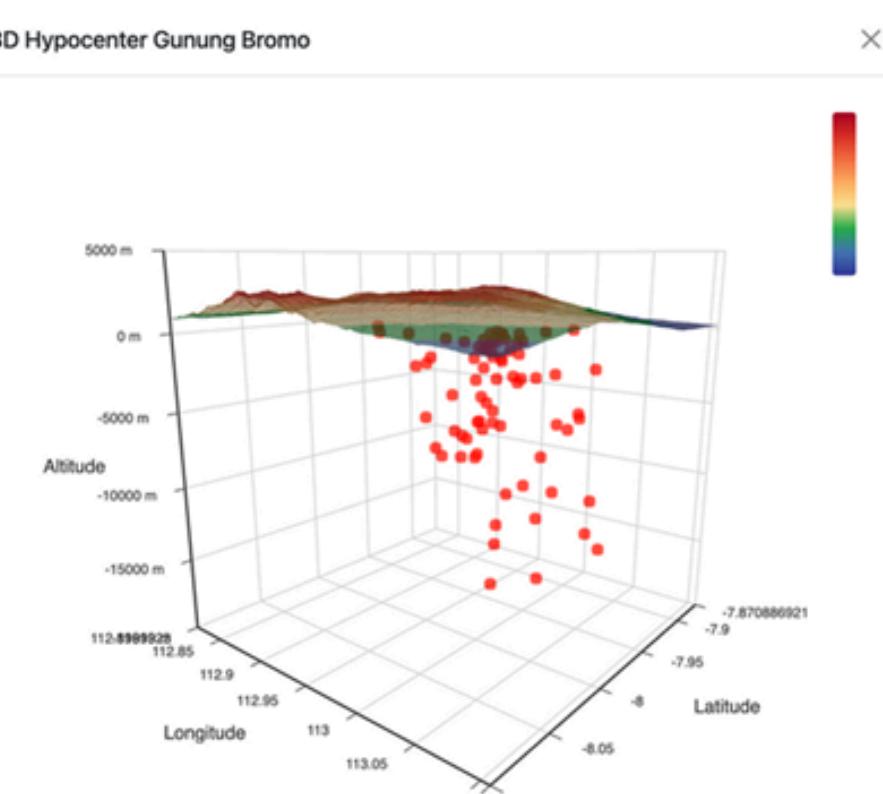
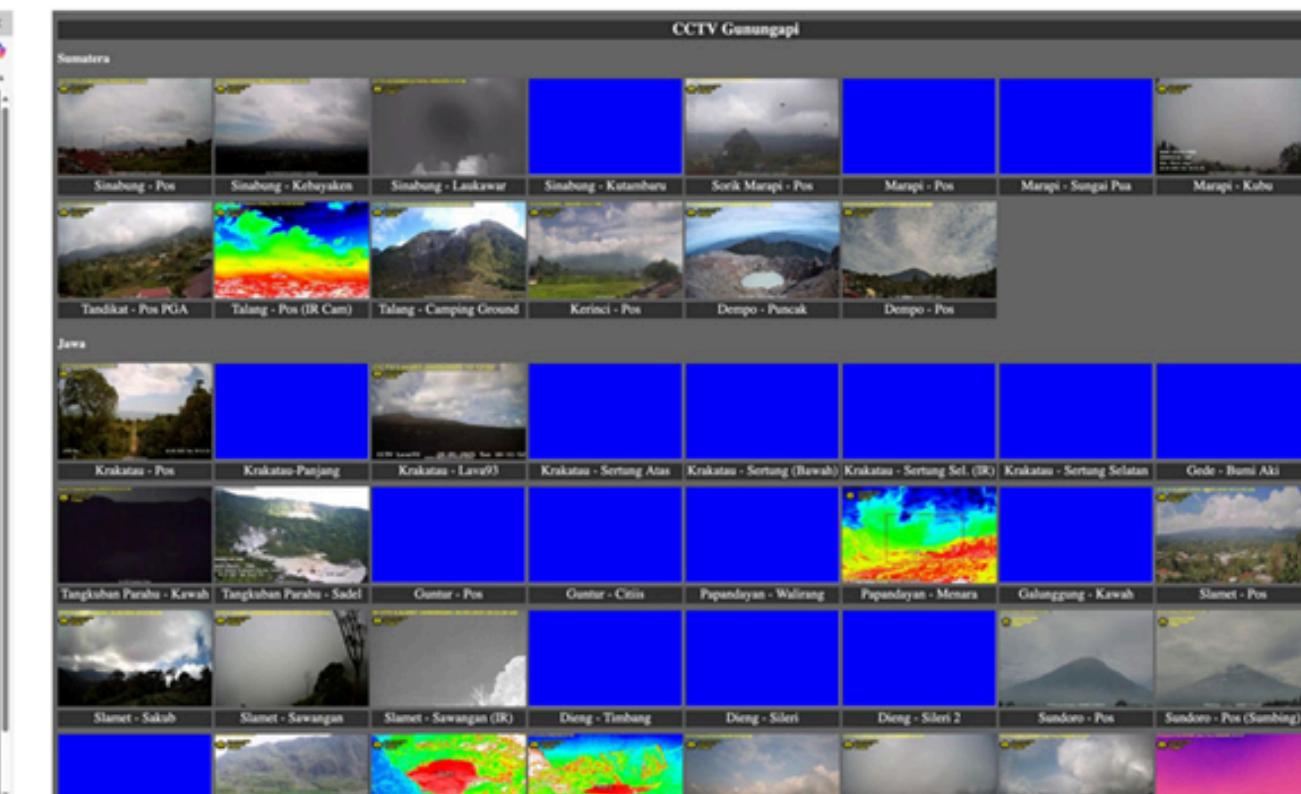
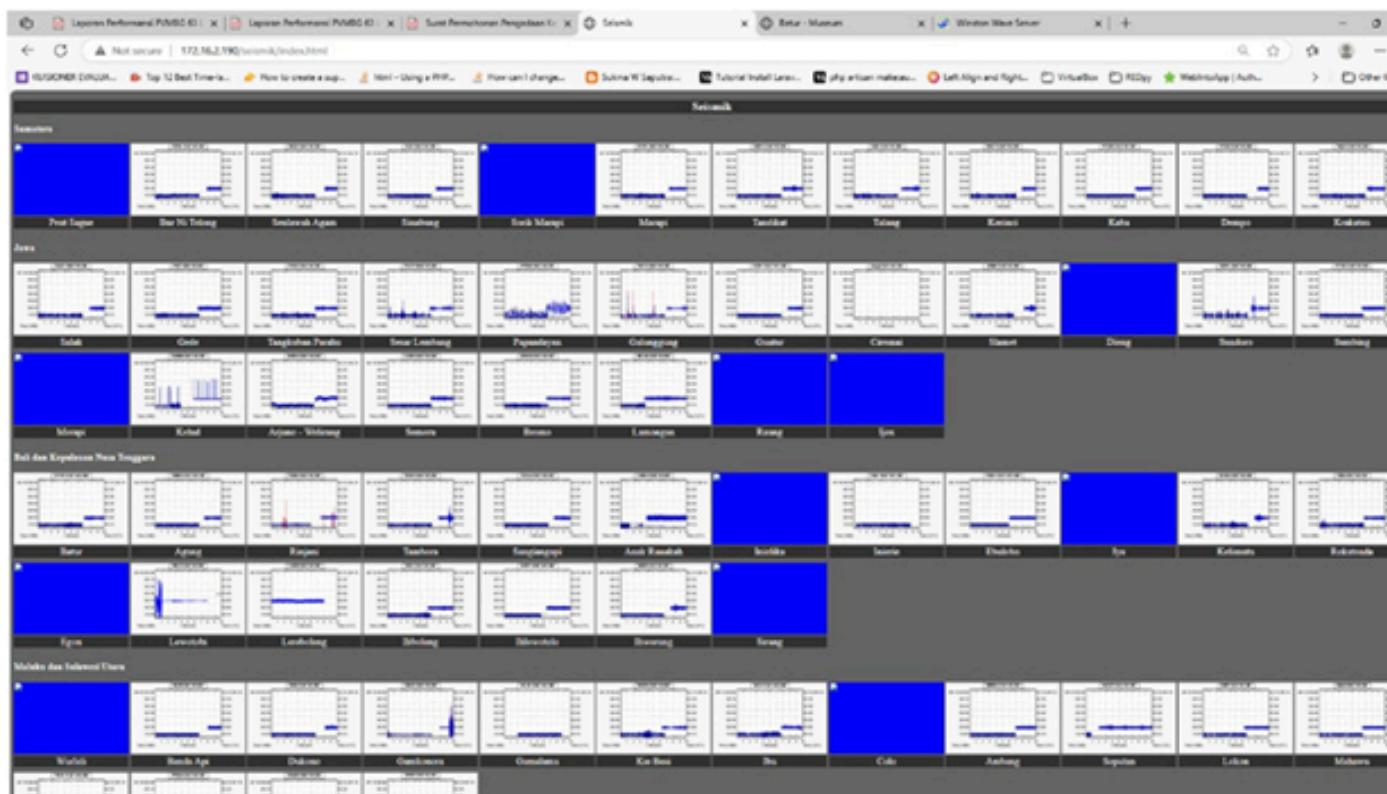
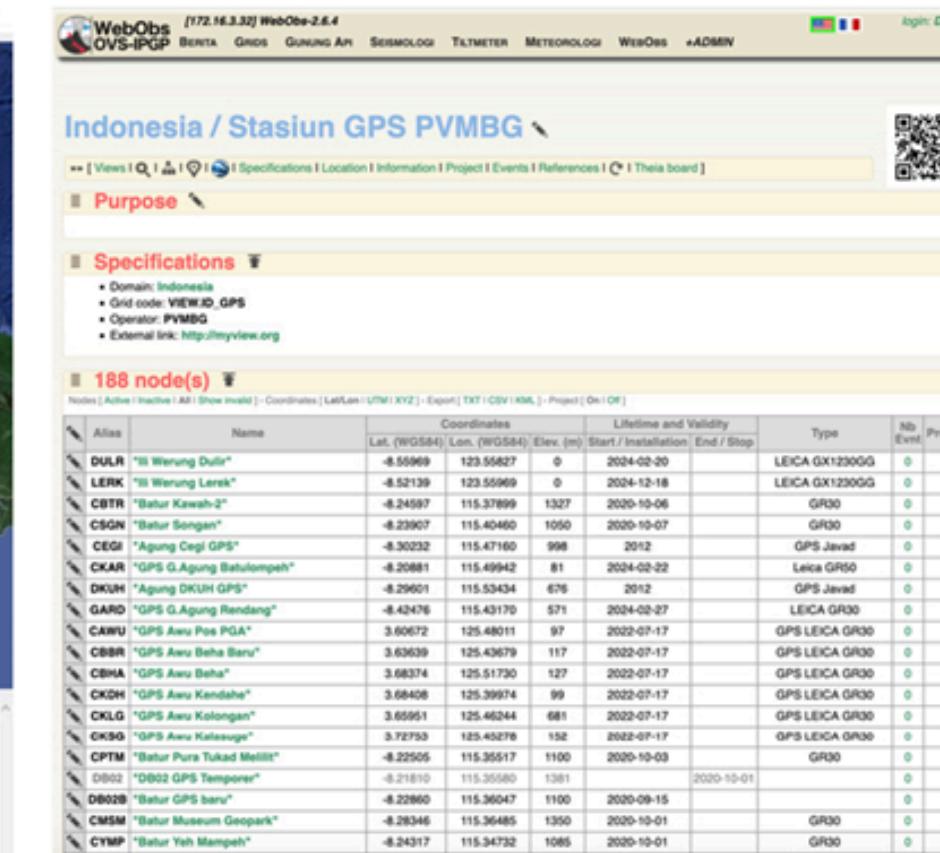
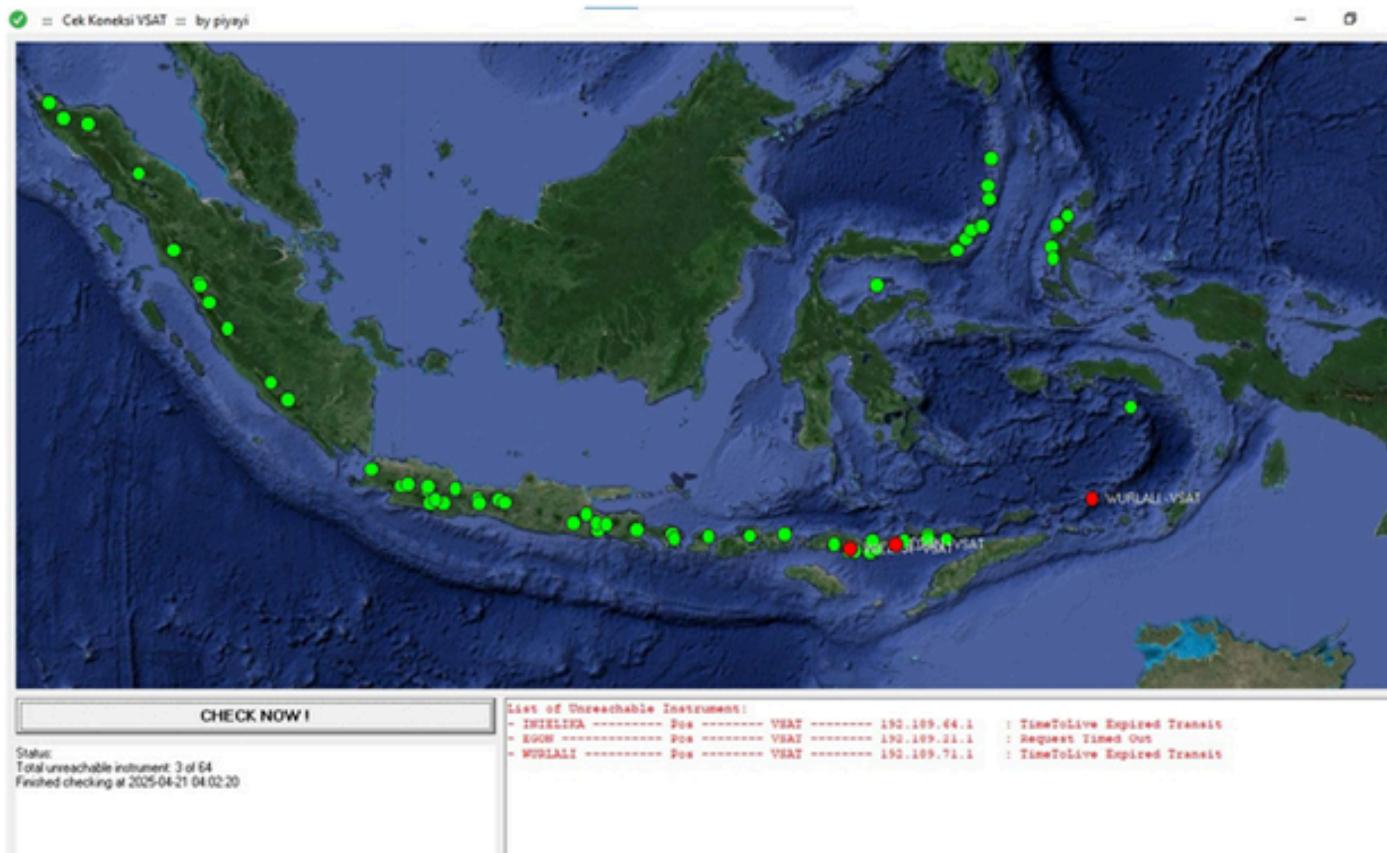


VOLCANO MONITORING SYSTEM IN INDONESIA

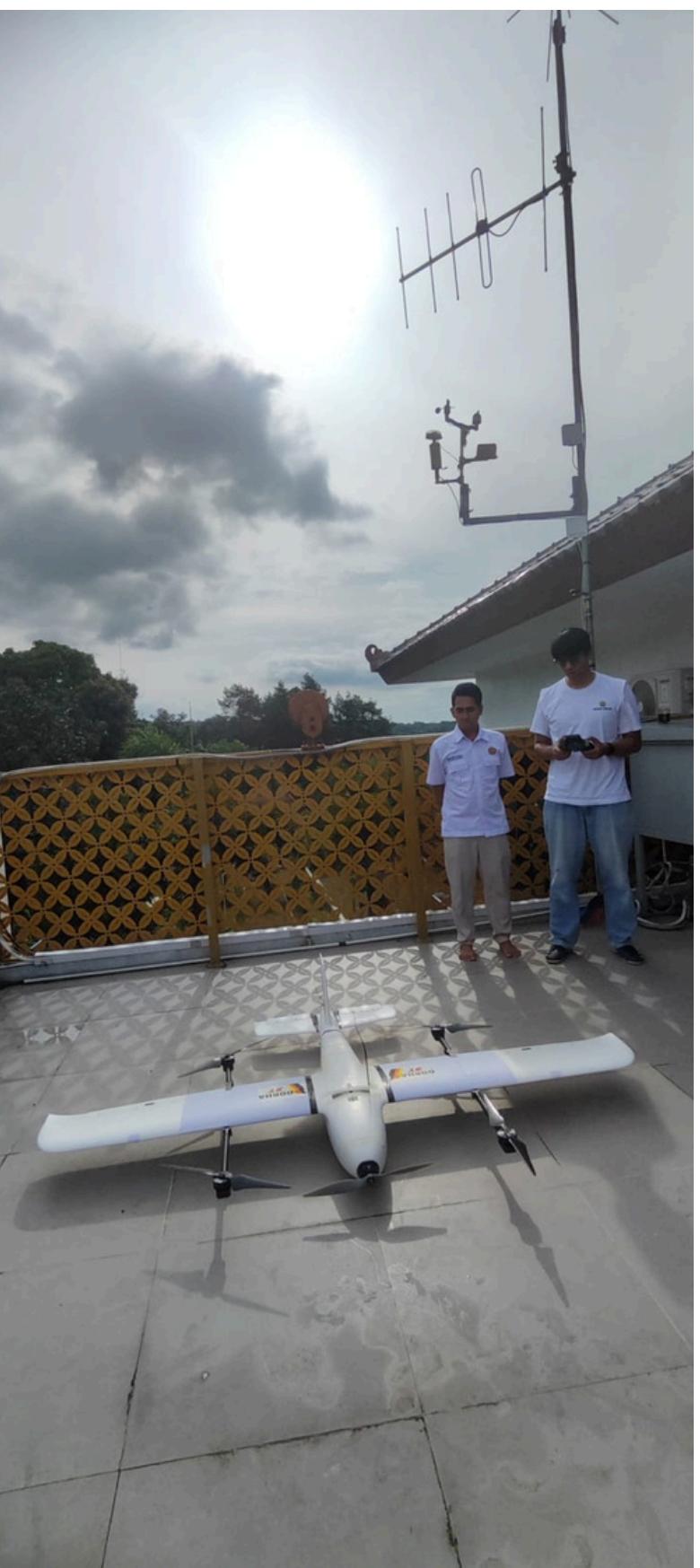
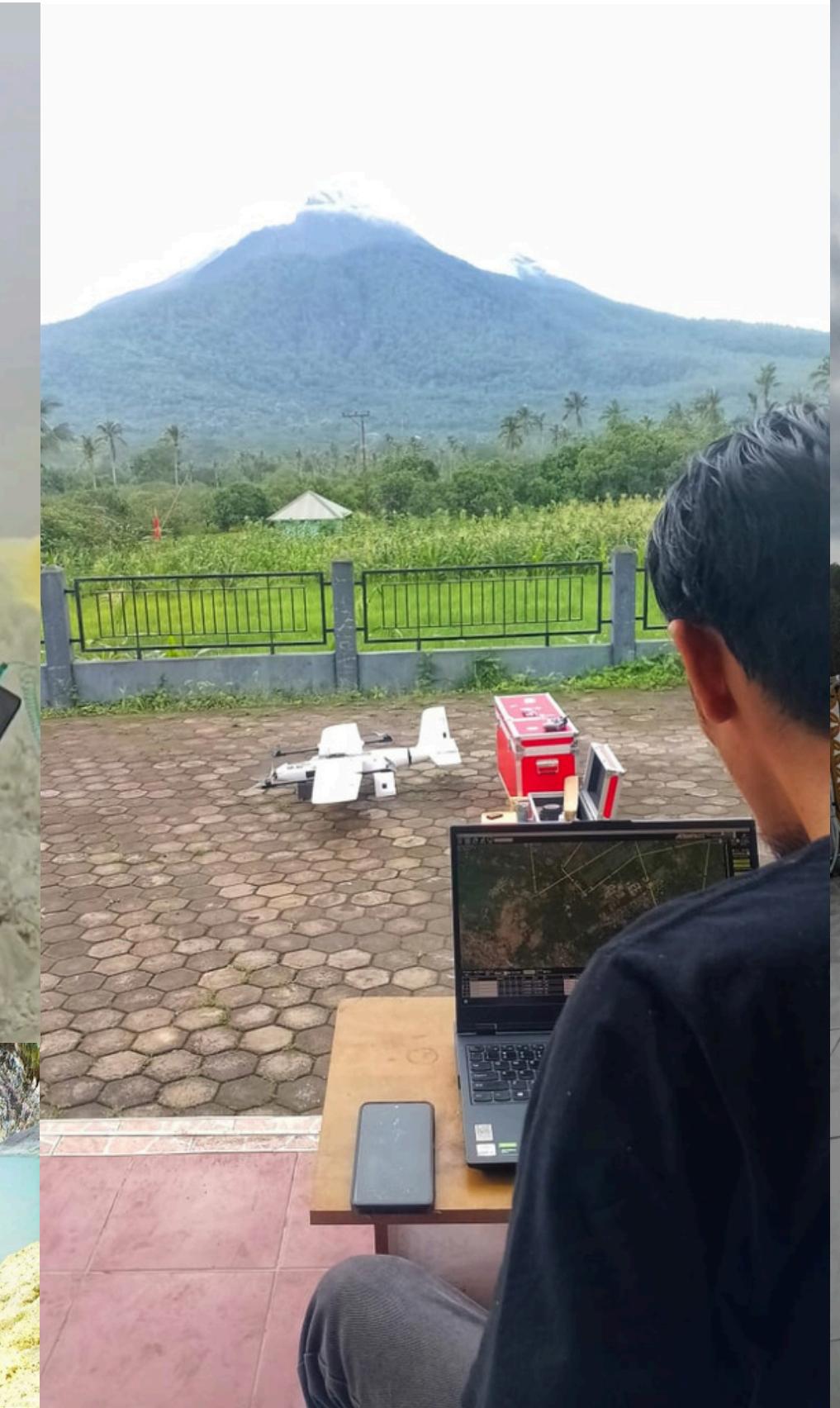


- Current status of 543 volcano monitoring instruments
- 72 Observatory offices
- 243 observer who work to observe 69 volcanoes

VOLCANO MONITORING DATA ACQUISITION SYSTEM IN INDONESIA



Conduct gas measurements at the volcanic crater, collect crater lake water samples, and perform photogrammetry surveys using drones



Dissemination of disaster-prone area maps to tourists, stakeholders, and the public



Kecamatan Simpang Empat, Sumatera Utara, Indonesia
4FR7+8M7, Ndokum Siroga, Kec. Simpang Empat, Kabupaten Karo, Sumatera Utara, Indonesia
Lat 3.141035°
Long 98.464346°
26/08/24 03:39 PM GMT +07:00



Maluku, Gam Ici, Kec. Ibu
Maluku Barat, Maluku

TM661 Verified by Timemark



Gunung Tujuh, Jambi, Indonesia
68V6+H68, Bengkolan Dua, Gunung Tujuh, Kerinci Regency, Jambi 37160
Lat -1.756428°
Long 101.310749°

28/08/24 10:18 AM GMT +07:00



Una-Una, Kec. Una-Una, Kab. Una-Una, Sulawesi Tengah

MN073 Timemark Diverifikasi



Una-Una, Kec. Una-Una, Kab. Una-Una, Sulawesi Tengah

MN073 Timemark Diverifikasi

Information dissemination through mass media, WhatsApp groups with stakeholders, and SMS (Short Message Service) blast.

Press Release Gunung Api

Home | Gunung Api | Press Release Gunung Api

15 entries

AKTIVITAS GUNUNGAPI RAUNG, JAWA TIMI

PENINGKATAN KEGEMPAAN GUNUNGAPI A

LAPORAN KHUSUS

Selengkapnya

PENINGKATAN GEMPA VULKANIK G. LEWOT

PERUBAHAN TINGKAT AKTIVITAS G. LEWOT

Aktivitas G. Gamala

Selengkapnya

Selengkapnya

Selengkapnya

Ketik pesan

19.27

← Info Publik G.A Lewotobi
AMA PAUL KABELEN TRIBUN POS KUPAN...

Selamat siang Bapa Ibu, ijin menyampaikan update aktivitas terkini G. Lewotobi Laki-laki 17/6/25 sbb:

1. Secara visual, Gunung tampak jelas, asap kawah teramat putih sedang hingga tebal, bertekanan lemah dengan tinggi lebih kurang 50 - 200 meter di atas puncak.
2. Pengamatan Seismik sampai saat ini menunjukkan adanya peningkatan gempa Vulkanik Dalam
3. Gempa Vulkanik ini mengindikasikan adanya suplai magma dari kedalam.

Saat ini tingkat aktivitas Gunung api Lewotobi Laki-Laki berada di level III SIAGA; Dengan rekomendasi zona bahaya berada di radius 6 Km. dari pusat aktivitas Gunung api Lewotobi Laki-Laki. Masyarakat agar tetap tenang, namun tetap meningkatkan kewaspadaan jika sewaktu waktu terjadi peningkatan yang signifikan.

Kami akan terus mengupdate aktivitas Gunung api Lewotobi Laki-Laki.

Terimakasih, salam tangguh 🤙
Pos PGA. Lewotobi Laki-Laki. 🙏

HP POS LEWOTOBI LAKI LAKI

Ketik pesan

23.23

← PB LUMAJANG
+62 813-3411-2320, +62 813-5884-616...

- Gunung jelas hingga kabut 0-II. Asap kawah tidak teramat.

KEGEMPAAN

- **Tektonik Lokal**
(Jumlah : 63, Amplitudo : 7-45 mm, S-P : 0-5 detik, Durasi : 16-33 detik)
- **Tektonik Jauh**
(Jumlah : 15, Amplitudo : 5-45 mm, S-P : 0-49 detik, Durasi : 65-157 detik)

KETERANGAN LAIN

Terjadi peningkatan jumlah gempa gempa tektonik lokal sejak tanggal 1 November 2024 mulai pukul 00:00 WIB.

TINGKAT AKTIVITAS

G. Lamongan Level I (Normal)

REKOMENDASI

1. Dalam Tingkat Aktivitas Level I (Normal), maka direkomendasikan agar masyarakat dan pengunjung/wisatawan/pendaki tidak turun dan mendekati dasar kawah di puncak G. Lamongan, serta tidak menginap di dalam kawasan puncak G. Lamongan.
2. BPBD Kab. Lumajang, Pemerintah Provinsi Jawa Timur agar selalu berkoordinasi dengan Pusat Vulkanologi dan Mitigasi Bencana Geologi atau melalui Pos Pengamatan Gunungapi Lamongan di Desa Tegal Randu, Kecamatan Klakah, Lumajang, tentang aktifitas Gunungapi Lamongan.

PENYUSUN LAPORAN
Nur Hidayat

SUMBER DATA
KESDM, Badan Geologi, PVMBG
Pos Pengamatan Gunungapi Lamongan
<https://magma.esdm.go.id/v1/gunung-api/laporan>

Media Sosial PVMBG
<https://linktr.ee/PVMBG>

Ketik pesan

23.17

← 864

TELKOM

Sat, 7 Dec at 05.32

Terjadi Letusan G. Dukono 07 Desember 2024 pkl 06:15; Kolom abu 4800m dari puncak, Hindari Radius 3km dari puncak: BGKOMDIGI

Tue, 24 Dec at 11.03

Terjadi Letusan G. Raung 24 Desember 2024 pkl 10:35; Hindari Radius 3km dari puncak: BGKOMDIGI

Sun, 12 Jan at 14.02

Terjadi Letusan G. Lewotobi Laki-laki 12 Januari 2025 pkl 14:51; Kolom abu 1500m dari puncak, hindari radius 5km dan sektoral baratdaya-timurlaut 6km

Tue, 21 Jan at 11.06

Terjadi Letusan G. Ili Lewotolok 21 Januari 2025 pkl 11:50; Kolom abu 400m, hindari radius 2km dari puncak; BGKOMDIGI

Thu, 20 Mar at 22.52

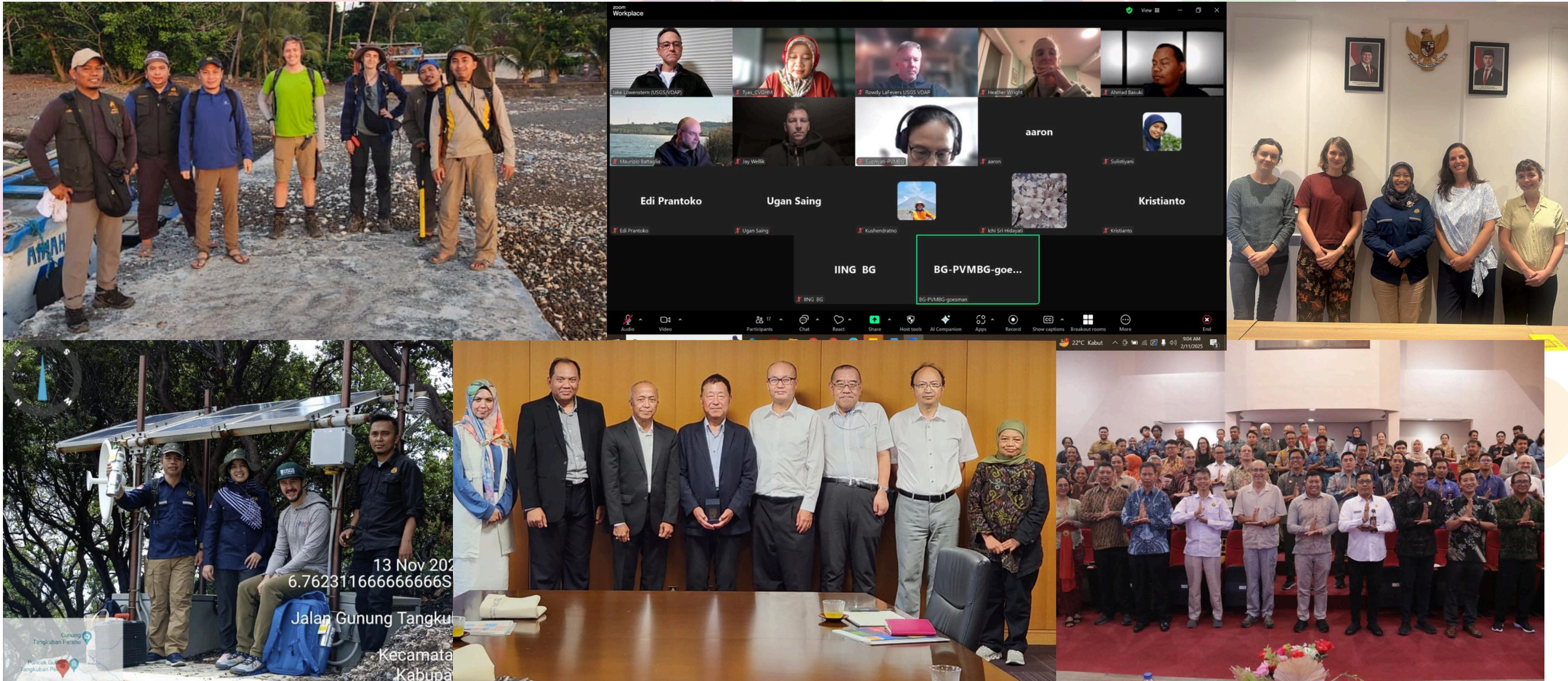
Terjadi Letusan G. Lewotobi Laki-laki 20 Maret 2025 pkl 22:56; Hindari Radius 7km dan 8km sektoral Baratdaya-Timurlaut: BGKOMDIGI

Tue, 22 Apr at 14.18

Terjadi Erupsi Menerus G. Lewotobi Laki-laki 22 April 2025, Hindari Radius 6 km dari Puncak, BG-KOMDIGI

Text Message + SMS

Partnerships that strengthen preparedness (VDAP/USGS, EOS, IRD, DPRI JAPAN, etc)



MAGMA Indonesia



MAGMA Indonesia

“Bridging the Will of Nature to Society”



magma.vsi.esdm.go.id



It was developed by civil servants at the **Center for Volcanology and Geological Hazard Mitigation (CVGHM), Geological Agency, Ministry of Energy and Mineral Resources**.

- 1** Real-time Volcanic Activity
Visuals, seismicity, and recommendations
- 2** Volcanic Ash Information
MAGMA-VONA Report
- 3** Volcanic Eruption Report
MAGMA-VEN Report
- 4** Disaster-Prone Area Map
- 5** Earthquake Information
MAGMA-ROQ
- 6** Landslide Information
MAGMA-SIGERTAN
- 7** Public Reporting System
MAGMA-CRS



BADAN GEOLOGI
Kementerian Energi dan Sumber Daya Mineral



Badan Geologi



@kabargeologi



www.geologi.esdm.go.id



Badan Geologi



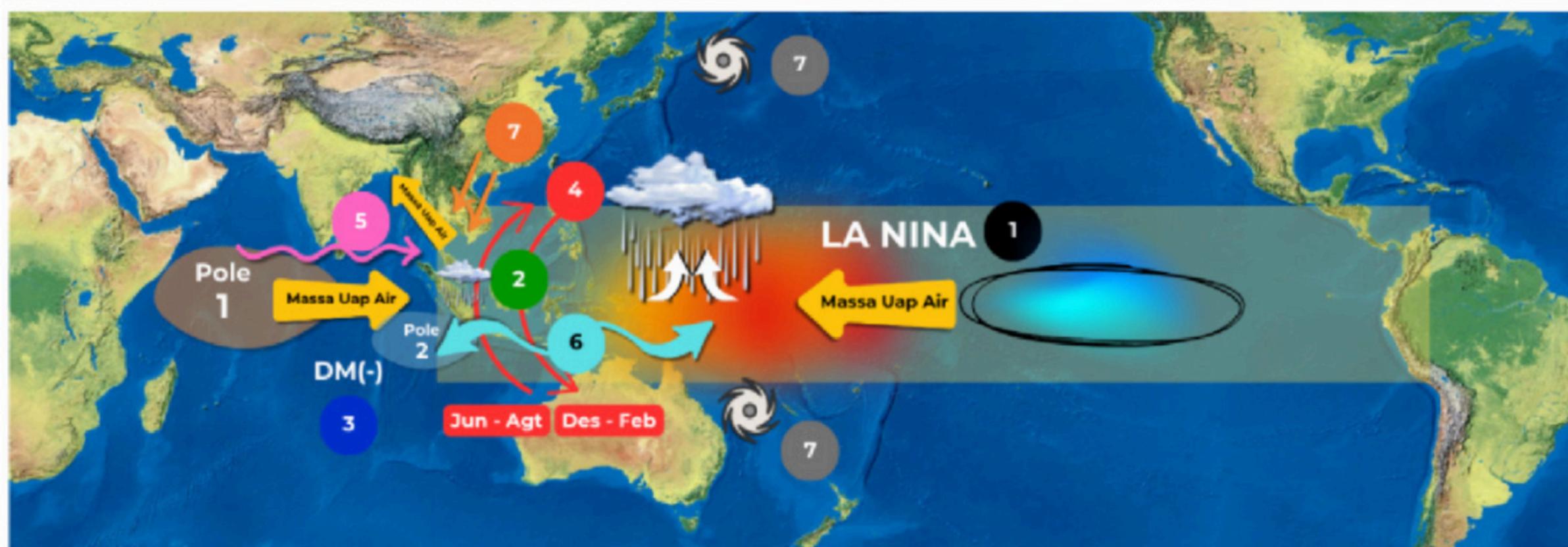
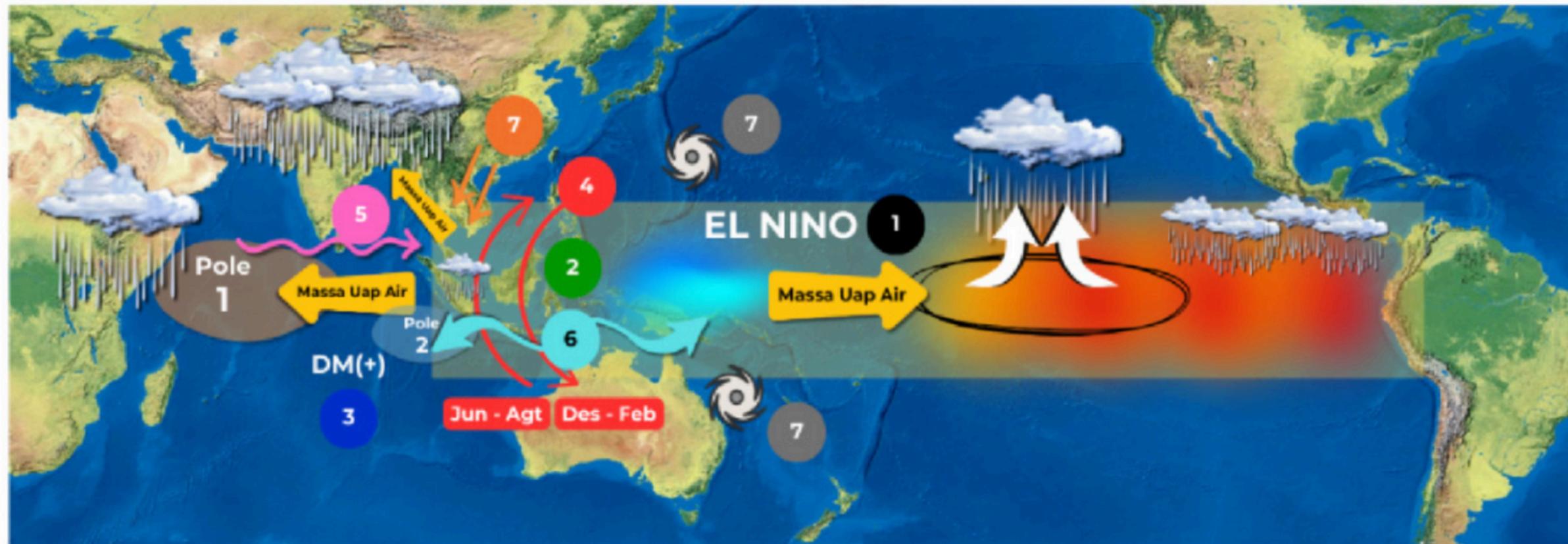
kabargeologi

Indonesia's Weather and Climate Forcing

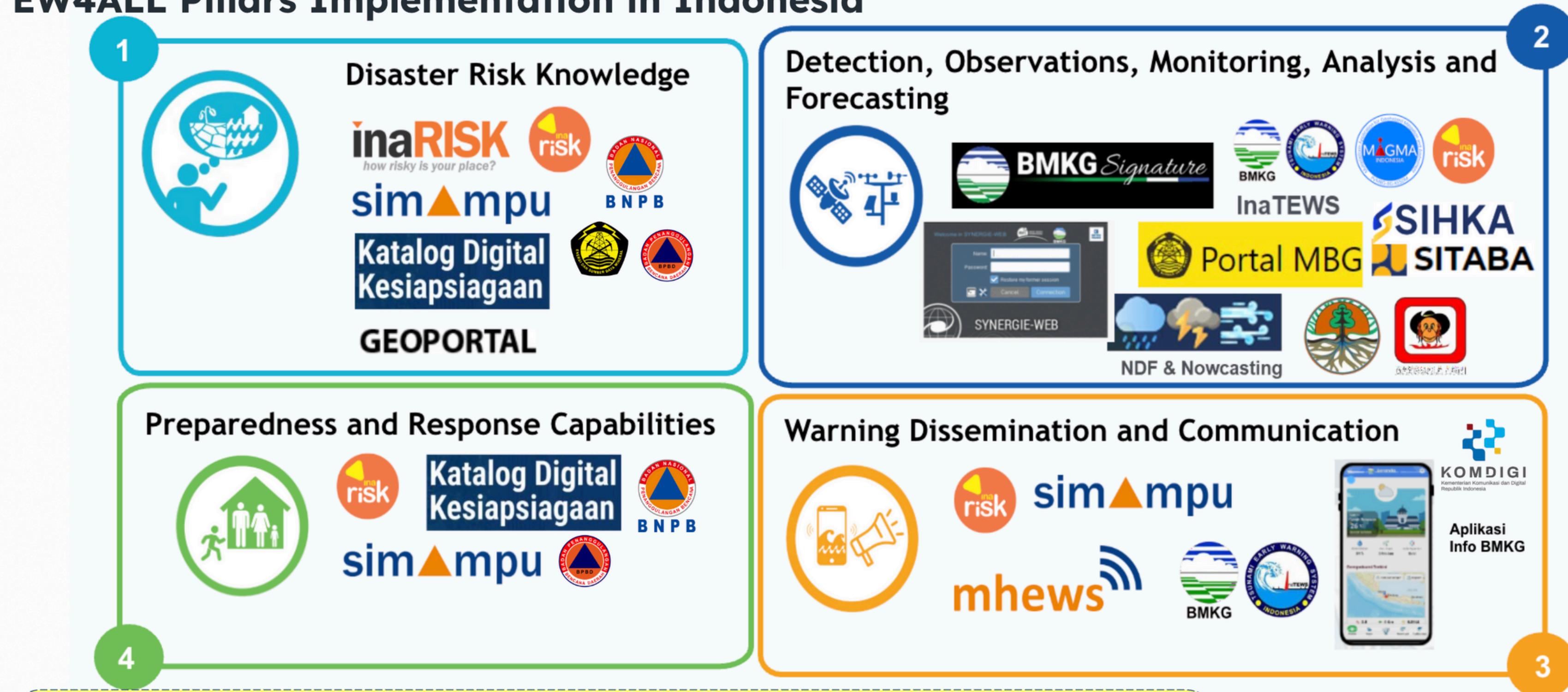
Indonesia's weather and climate are influenced by key drivers: El Niño/La Niña, Madden-Julian Oscillation (MJO), Indian Ocean Dipole (IOD), Cold Surge, Equatorial Waves, Sea Surface Temperature (SST), and Tropical Cyclones.

These factors **shape** not only seasonal rainfall patterns but also **short-term heavy rain events** that can **trigger secondary hazards**, including:

- Landslides in mountainous areas
- Flash floods in river valleys
- **Lahar floods on volcanic slopes**



EW4ALL Pillars Implementation in Indonesia



The BMKG plays a significant role in EW4ALL chain and is also applied in volcanic hazard by:

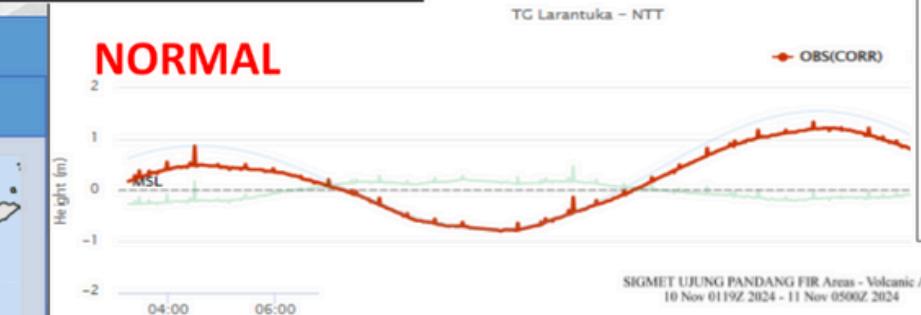
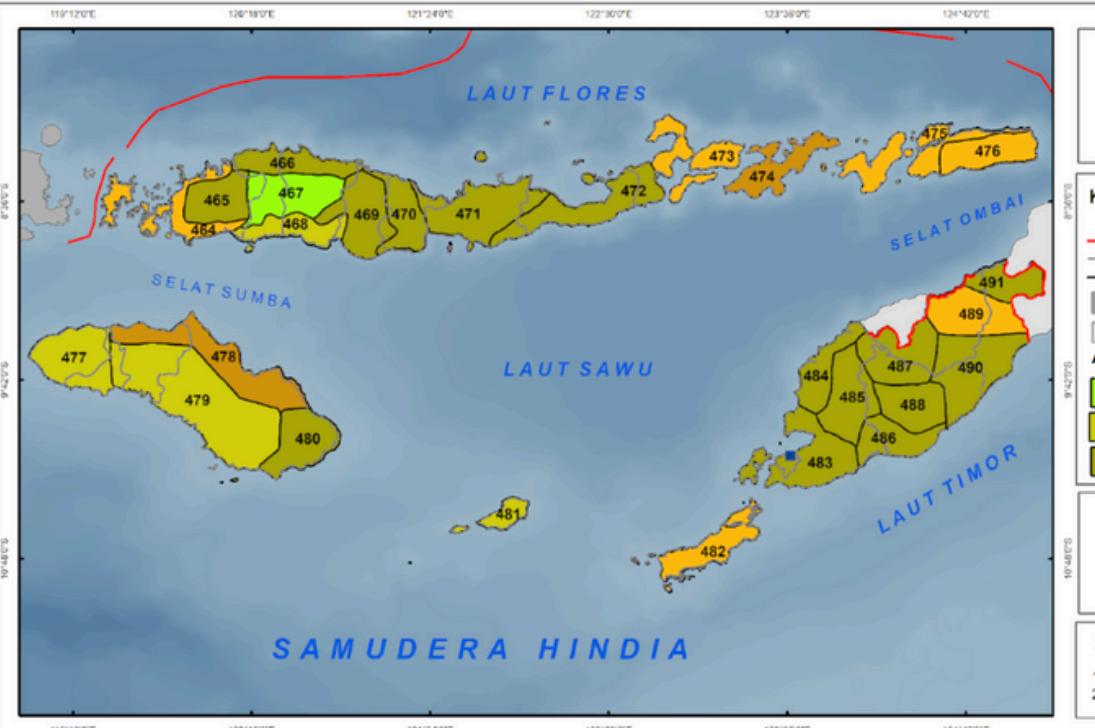
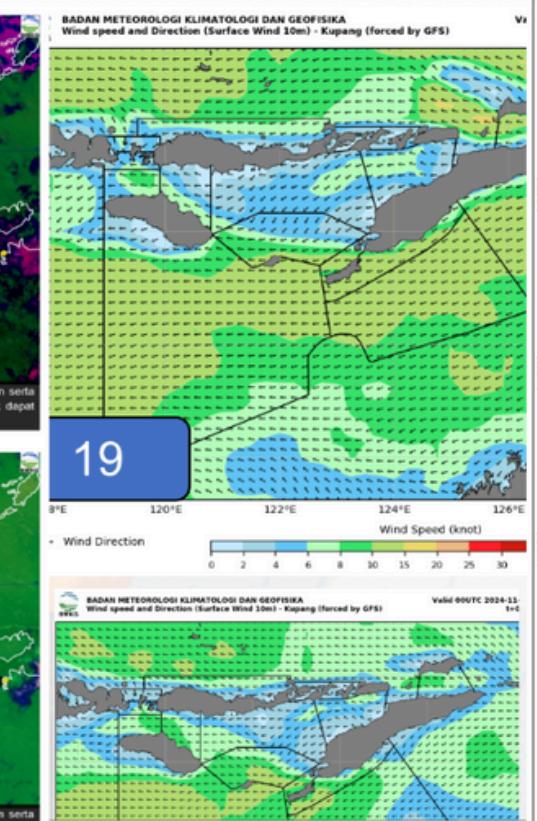
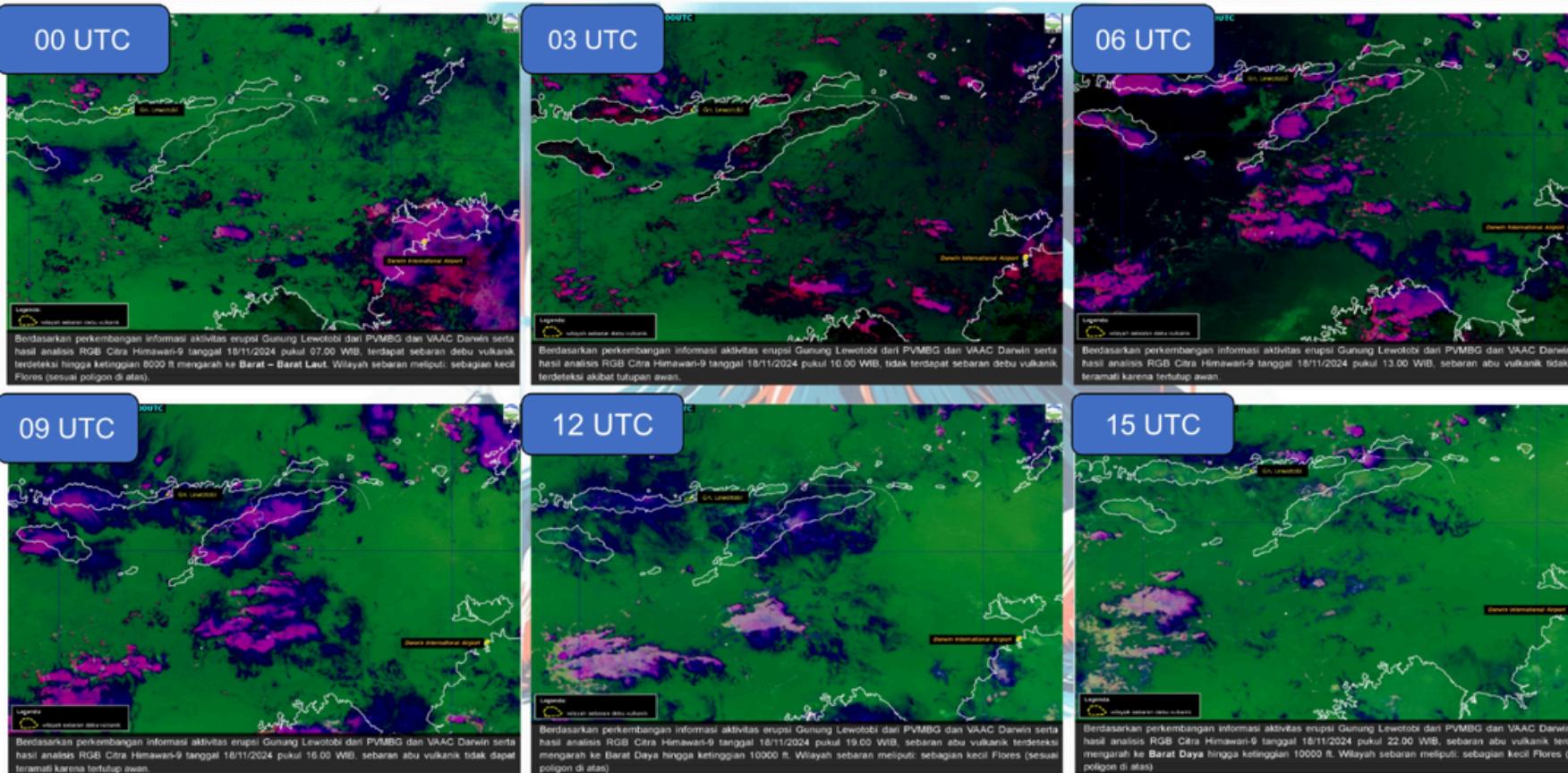
- ❑ Providing weather forecasts and early warnings.
- ❑ Raising public awareness of disaster risks.
- ❑ Facilitating coordination and collaboration among disaster management stakeholders



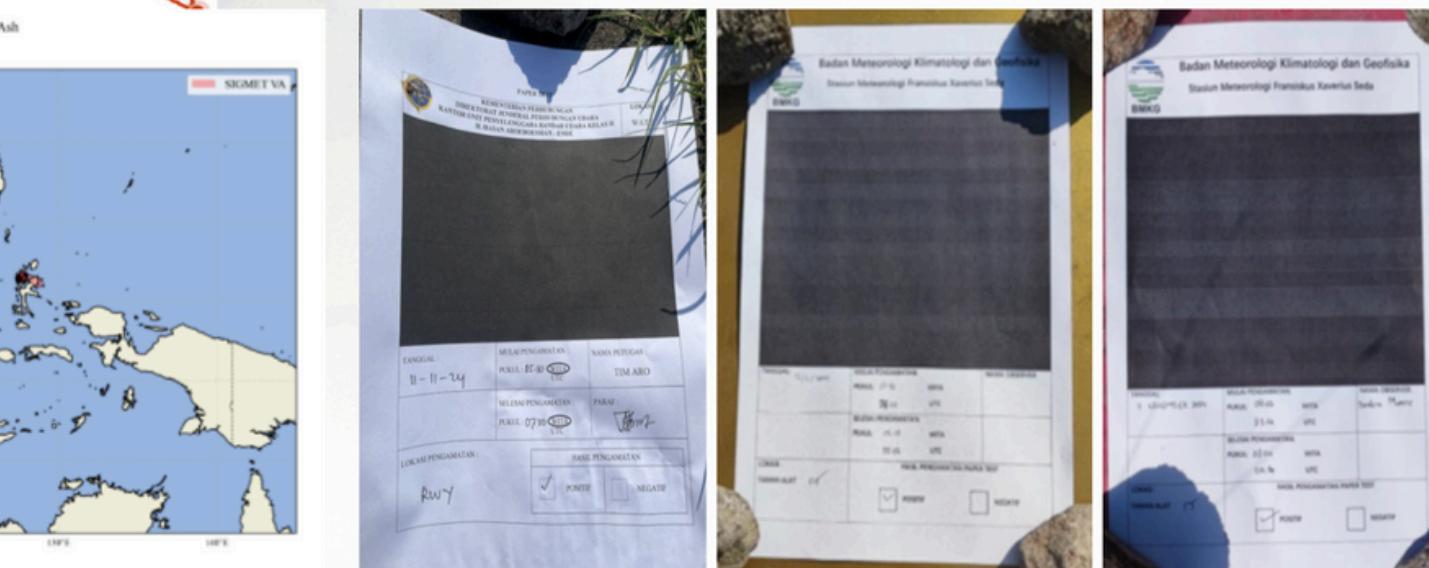
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ORGANIZATION



BMKG's Role in Volcanic Activities Warning: Mt. Lewotobi Laki-laki

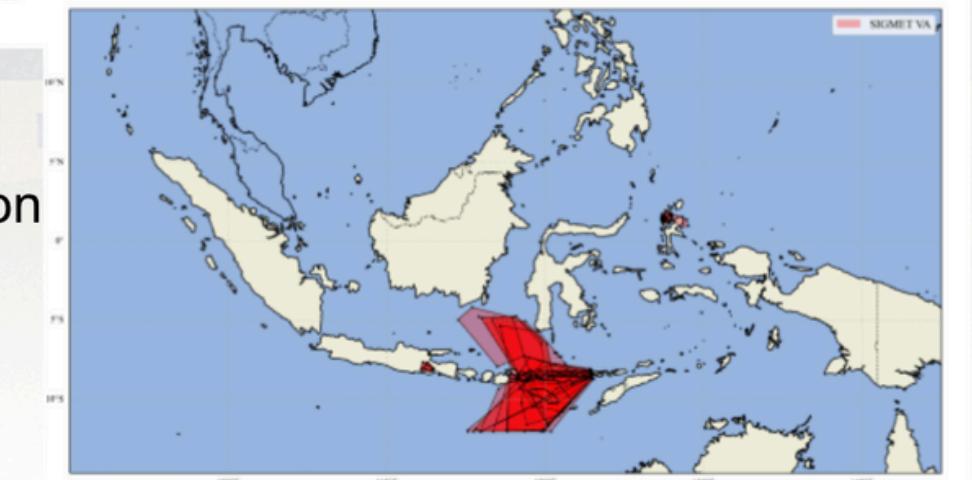


464, 465, 466, ... = ZONA MUSIM (ZOM)	
464 (Kepulauan Padar, Komodo, Manggarai Barat bagian barat dan selatan)	478 (Sumba Tengah bagian utara dan Sumba Timur bagian utara)
465 (Manggarai Barat bagian tengah)	479 (Sumba Barat bagian Timur, Sumba Tengah bagian Selatan dan Sumba Timur bagian Tengah)
466 (Manggarai Barat bagian utara, Manggarai bagian utara dan Ngada bagian utara)	480 (Sumba Timur bagian tenggara)
467 (Manggarai Barat bagian timur, Manggarai bagian tengah dan Manggarai Timur bagian tengah)	481 (Sabu Raijua)
468 (Manggarai Barat bagian tenggara, Manggarai bagian selatan, Manggarai Timur bagian selatan dan Ngada bagian barat daya)	482 (Rote Ndao)
475 (Pantar, Alor bagian barat dan utara)	483 (Kota Kupang dan Kupang bagian barat)
476 (Alor bagian tengah dan tenggara)	484 (Kupang bagian utara)
469 (Manggarai Timur bagian timur, Ngada dan Nagekeo bagian barat)	485 (Kupang bagian tengah dan timur Serta Timor Tengah Selatan bagian barat)
	491 (Timor Tengah Utara bagian timur laut dan Belu bagian utara)



BMKG provides the following services:

- Detection of volcanic ash dispersion using satellite imagery (direction and trajectory) and Sulfur Dioxide (SO₂)
- Early prediction of the rainy season onset in East Nusa Tenggara
- Forecast of volcanic ash dispersion
- Forecast of convective cloud development in East Nusa Tenggara
- Forecast of wind direction and speed
- Prediction of sea level height from tide gauges and maritime AWS
- Observation of local air quality using paper tests



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Early
Warnings
for All



Building Operational Rainfall-Lahar Early Warning System: Framework



PVMBG (Geological Agency) provides:

- volcano status (Level 1 to 4)
- volcano activity report
- volume of volcanic material on the summit
- lahar flow pathways



BNPB/BPBD/local government provides:

- identify hazard-prone areas (Kawasan Rawan Bencana/KRB)
- raising public awareness and mitigation for residents in KRB
- EWS with rain gauge station, CCTV and Automatic Water Level Recorder
- population distribution data, critical infrastructure, housing, and other exposure elements in risk zones



BASARNAS (National Search and Rescue Agency) provides:

- high-risk locations
- potential evacuation



Ministry of Public Works provides:

- survey of watershed and river characteristics
- flow rate modeling based on rainfall intensity and duration

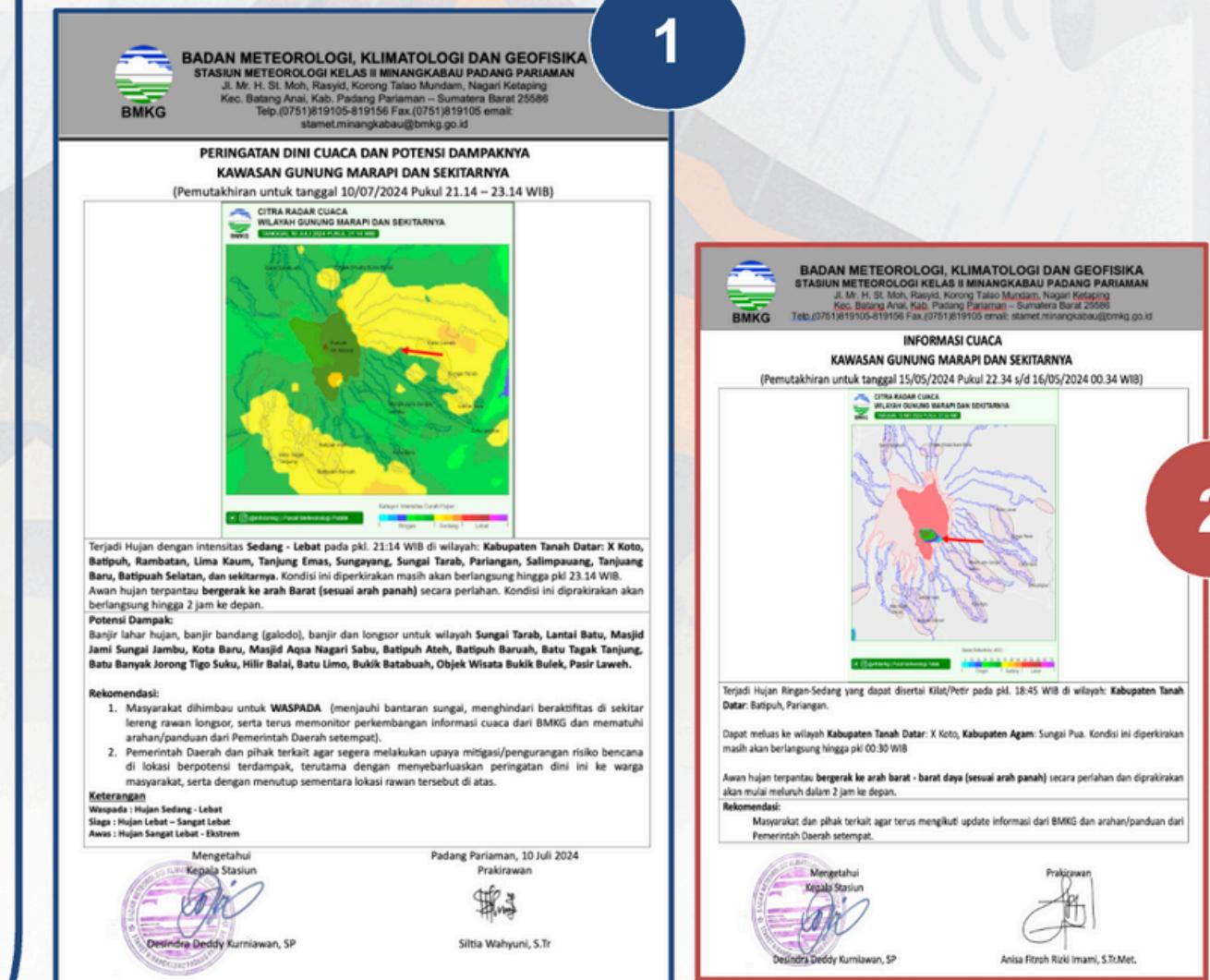
Retrieved Information:

Rain/Heavy Rain + Active Volcano (Level 2 or higher) + Eruption Phase and Material Loading + Local Observations + Reports from field



BMKG provides:

meteorological information on potential weather patterns (particularly heavy rainfall) that may trigger natural hazards in volcanic areas, and act as advisory



BMKG released two type of products:

1. **Early Warning Bulletin (EWB)**
2. **Weather Information Bulletin (WIB)**

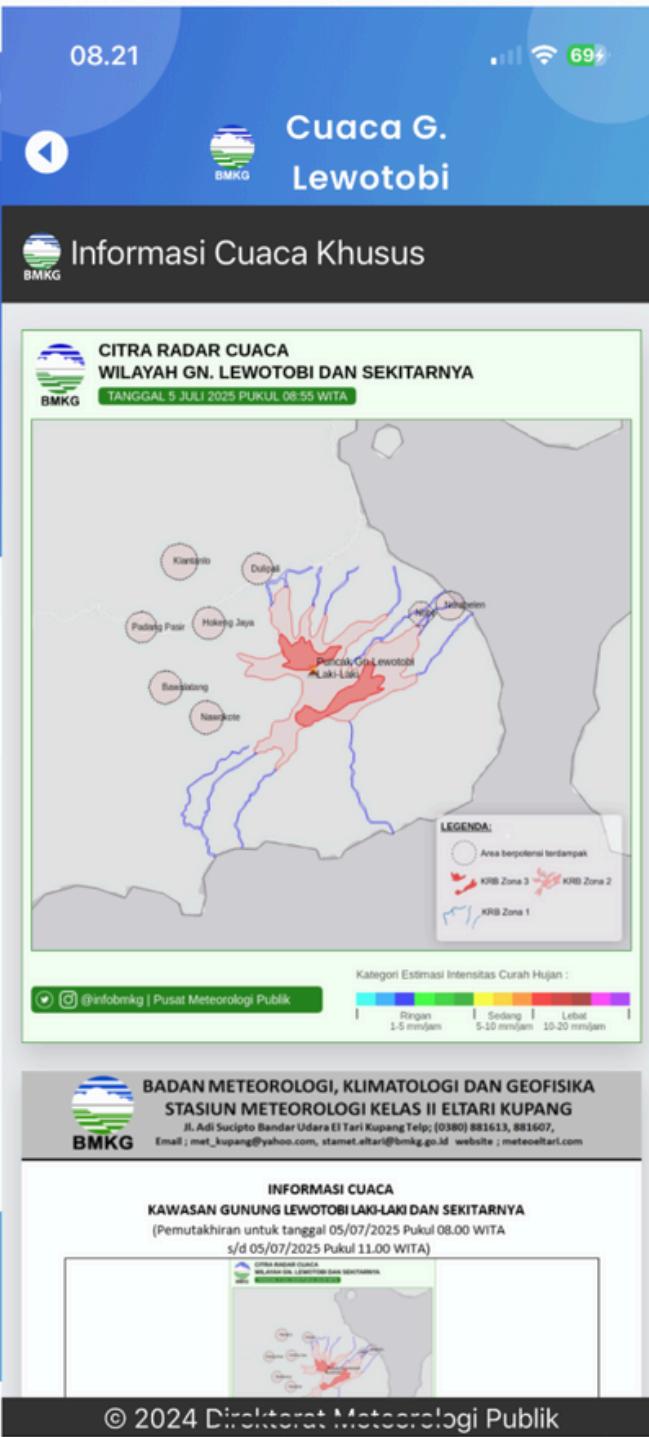
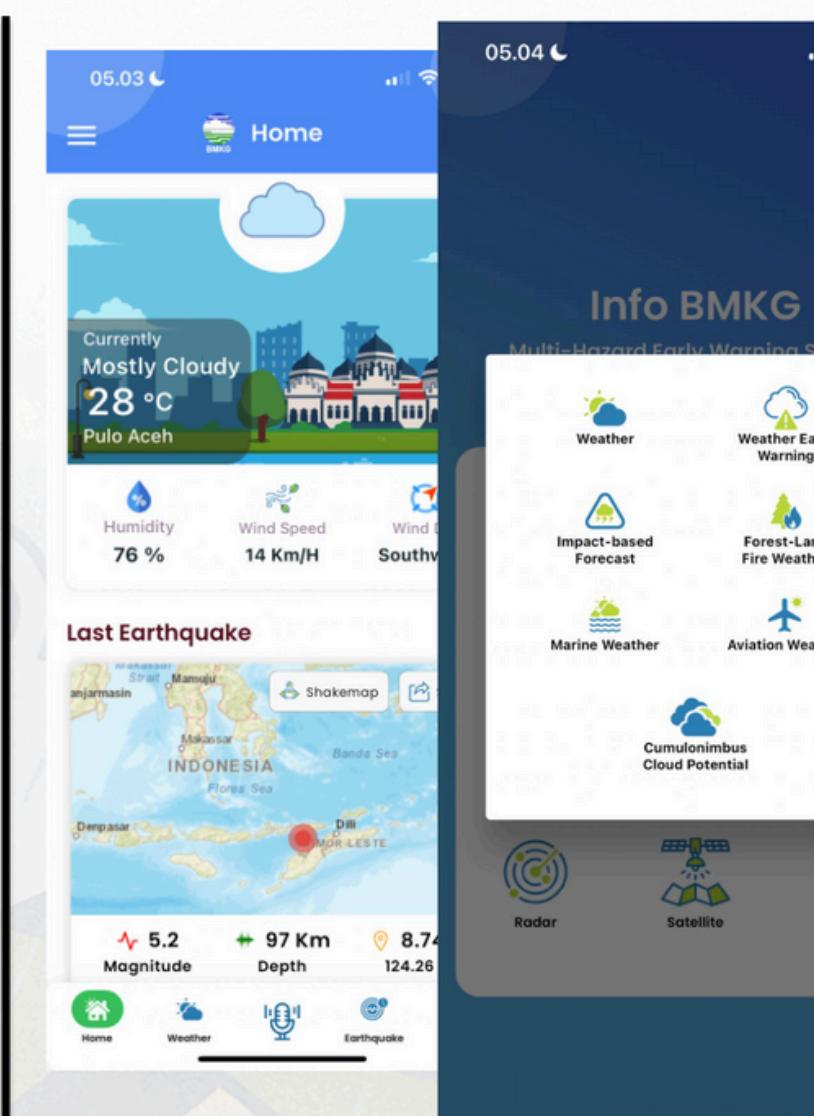
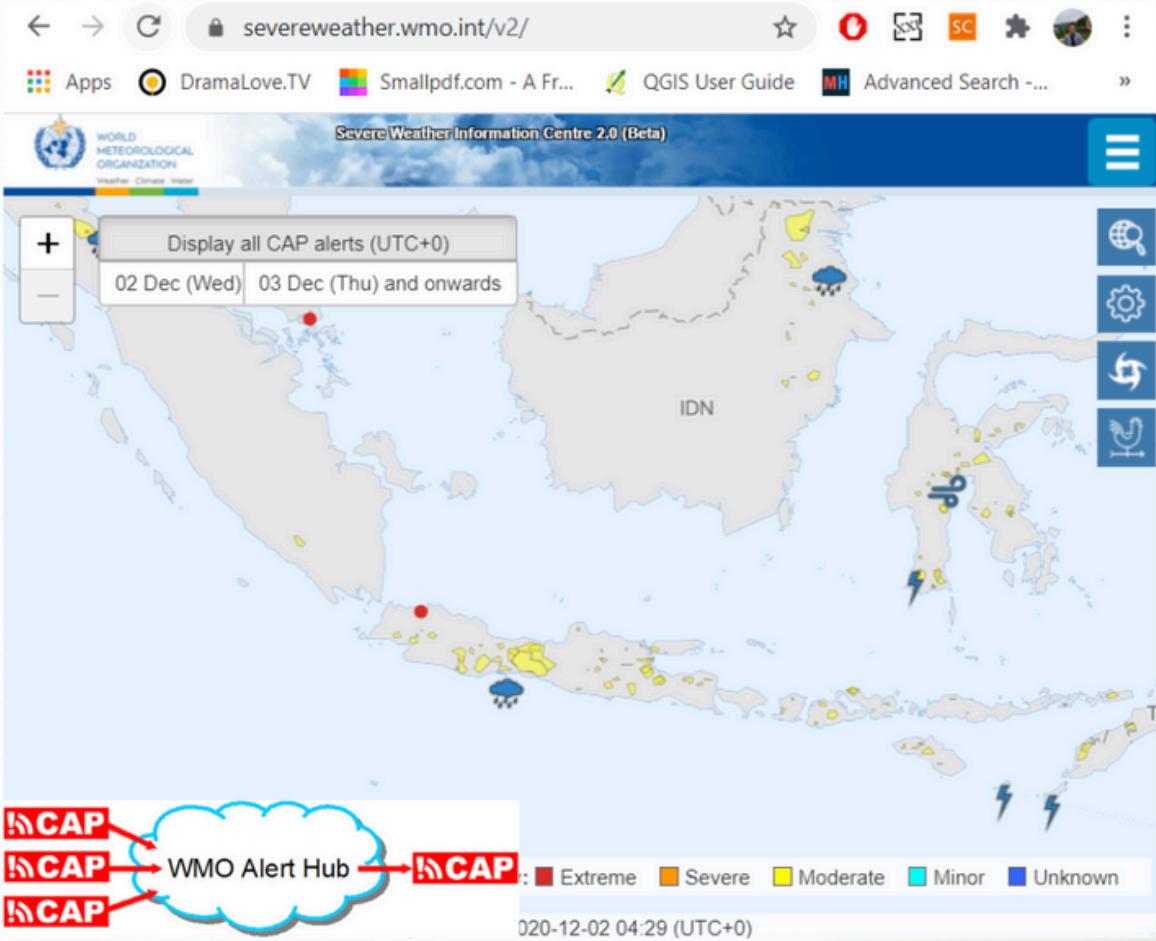


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Early
Warnings
for All



BMKG's End-to-End Capacity



The Common Alerting Protocol (CAP) is a standardized message format designed to deliver warnings for **All-Media, All-Hazards, and Everyone**.

- All-Media:** TV, radio, phone, signage, e-mail, social media, and websites;
- All-Hazards:** weather, fires, earthquakes, and volcanic events; and
- Everyone:** general public, specific users/communities, and/or designated authorities.

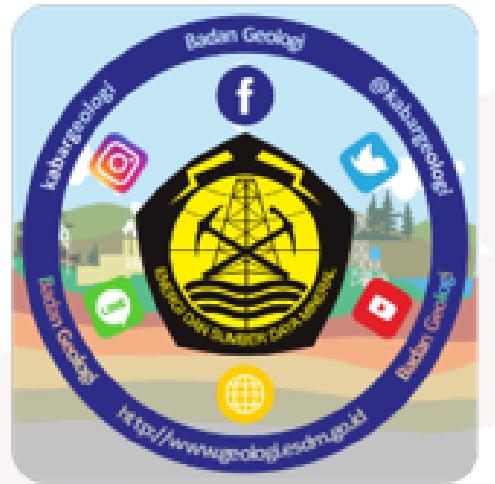
Leveraging over **10 million active users** on the **infoBMKG app** and a wide range of dissemination channels, such as: websites, public displays, SMS, radio, television, and more, **Indonesians** are increasingly familiar with **risk-based early warnings, including** those related to **volcanic hazards** integrated into **Impact-Based Forecast platform**.



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Early
Warnings
to All





THANK YOU...

***“Driven by Service
Guided by Excellence”***



Realistic



Achievable



Measurable

#EnergyTransitions