



## **Expanding The Benefit of International Monitoring System for Indonesia Multihazard Monitoring**

Prof. Dwikorita Karnawati, Ph.D

Head of The Agency for Meteorology Climatology  
and Geophysics of Indonesia - BMKG

Vienna Institute for CTBT Science and Technology



BMKG

# Indonesia as a member state of CTBTO



- **Signed the agreement** on 24 September 1996
- **Ratified** it on 6 February 2012
- **Hosting** 6 (six) CTBT auxiliary seismic station
- **Signed Tsunami Warning Arrangement** 10 November 2008
- **Established Indonesian Tsunami Early Warning System (Ina TEWS)** on 11 November 2008 and have a role as NTWC, AEIC and TSP and NDC
- **contributes actively to regional** (Southeast Asian Nuclear Weapons Free Zone /SEANWFZ) agreement **and international security and peace**, in accordance with key norms in the field of nuclear non-proliferation and disarmament.



“I am determined to ensure that Indonesia's decision today will create momentum to encourage others who are still holding out to do the right thing. And the only right thing is to ratify the CTBT now, no more procrastination, no more delaying because it is right, it is proper and it makes a more secure world”

*Indonesian Foreign Minister Marty  
Natalegawa*



Inauguration of InaTEWS by Indonesian President Susilo Bambang Yudhoyono

CTBTO



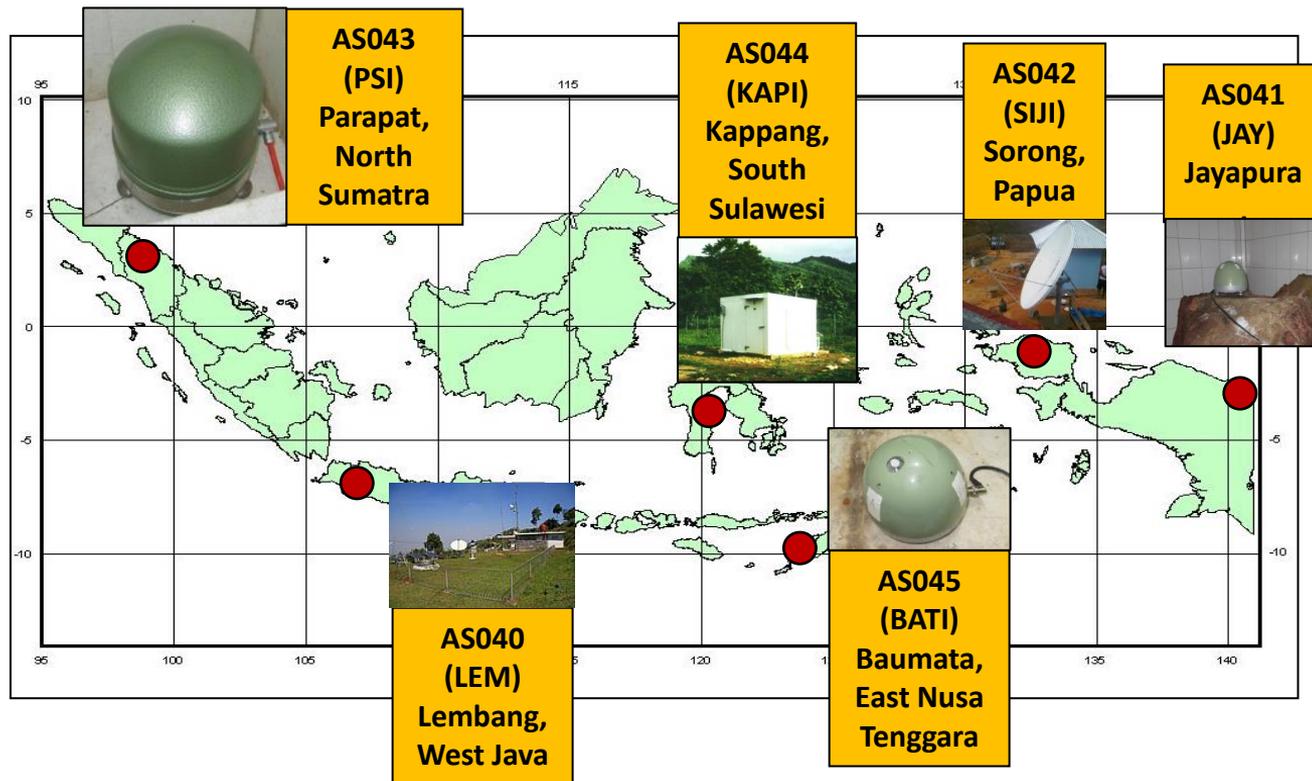
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# CTBT Auxiliary Station in Indonesia



**Additional CTBTO's Station (8 stations) outside the Indonesia region had been integrated into the InaTEWS**

1. Hachijojima, Izu Islands Japan (AS053)
2. Chichijima, Ogaswara Japan (AS055)
3. Chiang Mai Thailand (PS41)
4. Davao, Mindano (AS079)
5. Charter Towers, Australia (AS4)
6. Nana Peru (AS78)
7. Honiara Guadalcanal, Solomon (AS98)
8. Guam, Marianas Islands USA (AS105)



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## INTERNATIONAL MONITORING SYSTEM



1. AS20
2. AS22
3. AS23
4. AS54
5. AS87
6. AS88
7. AS89
8. AS92
9. AS93
10. AS112
11. PS31
12. PS12

- Indonesian NDC planned to add more CBT Station to Increased its capability for detecting an unusual seismic event (UNE, Volcanic eruption, Atypical Tsunami event, etc.)
- Integrating CBT NDC-in-a-Box (NiaB) package software to support InaTEWS

The boundaries and presentation of material on this map do not imply the expression of any opinion on the part of the Preparatory Commission of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO PrepCom) concerning the legal status of any country, territory, city or area or its authorities or concerning the delimitation of its frontiers or boundaries.

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) of 1996 bans nuclear explosions in all environments. Explosions in the atmosphere, under water and in outer space were banned in 1963. CTBT prohibits them underground as well.

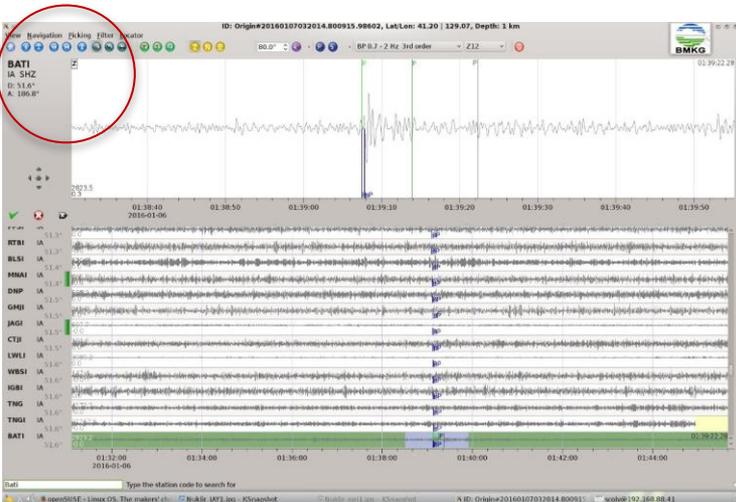
Under CTBT, a global system of monitoring stations, using four complementary technologies, is being established to record data necessary to verify compliance with the Treaty. Supported by 16 radionuclide laboratories, this network of 321 monitoring stations will be capable of registering shock waves emanating from a nuclear explosion underground, in the sea and in the air, as well as detecting radioactive debris released into the atmosphere. The location of the stations has been carefully chosen for optimal and cost-effective global coverage.

The monitoring stations will transmit, via satellite, the data to the International Data Centre (IDC) within CTBTO PrepCom in Vienna, where the data will be used to detect, locate and characterize events. These data and IDC products will be made available to the States Signatories for final analysis.

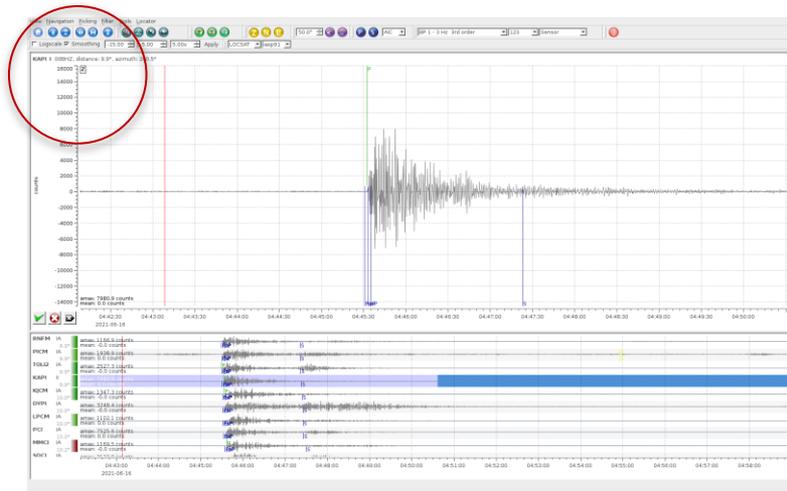
Overlap is a listing of the 337 facilities of the international monitoring system and brief descriptions of their characteristics and capabilities.

Seismic primary array (PS) ●  
 Seismic primary three-component station (PS) ▲  
 Seismic auxiliary array (SA) ●  
 Seismic auxiliary three-component station (SA) ▲  
 Hydroacoustic (hydrophone) station (HA) ◆  
 Hydroacoustic (CT-pho) station (HA) ◆  
 Infrasound station (IS) ◆  
 Radionuclide station (RN) ◆  
 Radionuclide laboratory (RL) ◆  
 International Data Centre, CTBTO PrepCom, Vienna ●

## North Korea Nuclear Testing Detected by the Indonesia CTBTO's Stations in 2017



AS045 (BATI), Baumata, East Nusa Tenggara - Indonesia



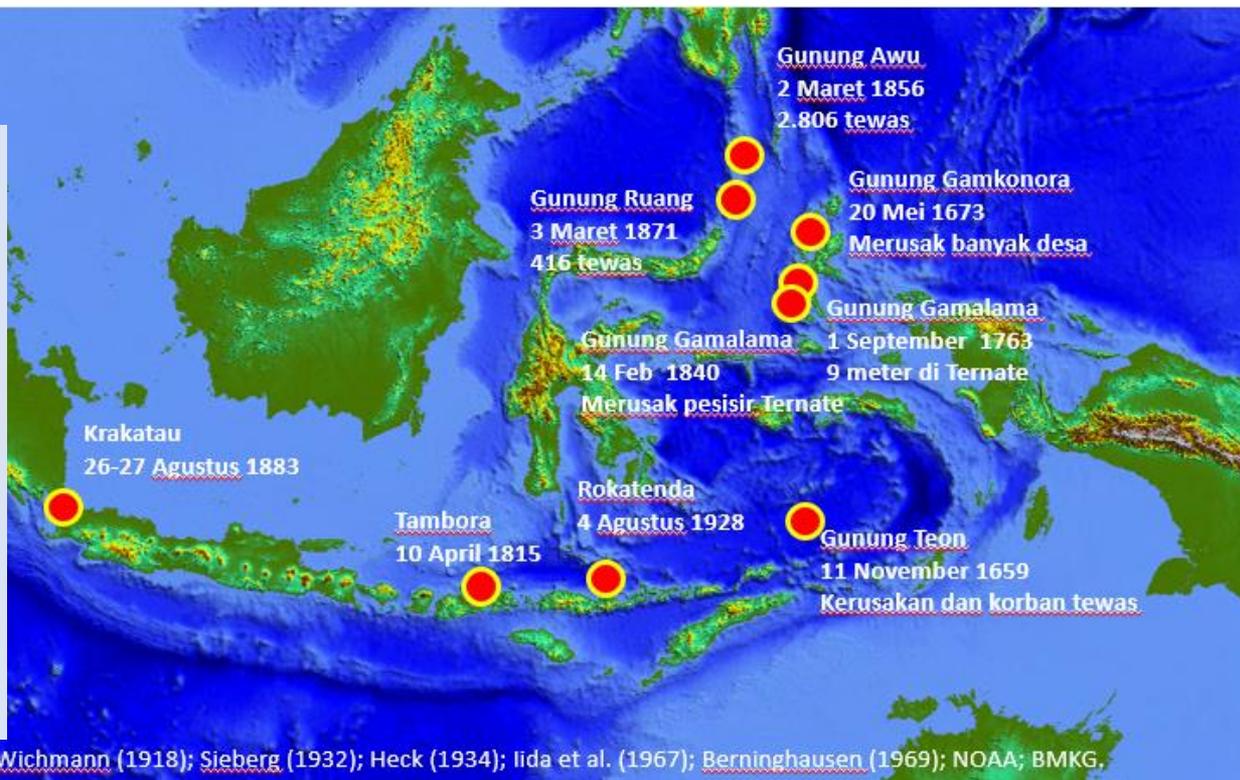
AS044 (KAPI), Kappang, South Sulawesi - Indonesia

- BMKG commits to conduct routine maintenance for the 6 (six) CTBTO's auxiliary stations.
- The sensors operated well to detect the nuclear testing monitoring, such as the North Korea Nuclear Testing in 2017 and the recent atypical tsunami event in the Moluccas

## Central Moluccas Tsunami Earthquake, June 16, 2021

## GOAL:

- Realtime data exchange from local seismic station among NDC in the pacific ocean to support tsunami service provider
- Adding more CBT's regional detection sensor (hydroacoustic and Infrasound) in the SEAPFE region to monitor multihazard event that can be affected to the surrounding countries



Sumber: [Soloviev and Go \(1974\)](#); [Wichmann \(1918\)](#); [Sieberg \(1932\)](#); [Heck \(1934\)](#); [Iida et al. \(1967\)](#); [Berninghausen \(1969\)](#); NOAA; BMKG.

Technical Training for Station Operators from  
Auxiliary Seismic Stations , 20-24 November  
2017, Vienna, Austria



CTBT East Asia Regional National Data Center  
Development Workshop, 17-21 September  
2018, Ulaanbaatar, Mongolia



Infrasound Technology Workshop 2019  
(ITW2019), 10-14 November 2019, Aqaba,  
Jordan



- Indonesian NDC had been participated and actively support the CBT capacity development program
- The Regional Infrasound Workshop and Integrated Training for SEAPFE NDCs (2020) have been canceled due to the pandemic situation. We propose to continue the plan by conducting the program using an online platform
- Joined research between CBT and Indonesian NDC to identify natural and artificial phenomena to support CBT Verification regime in the region
- To strengthened cooperation with CTBTO, Indonesian NDC (BMKG) are proposing secondment in CBT HQ using an internal budget