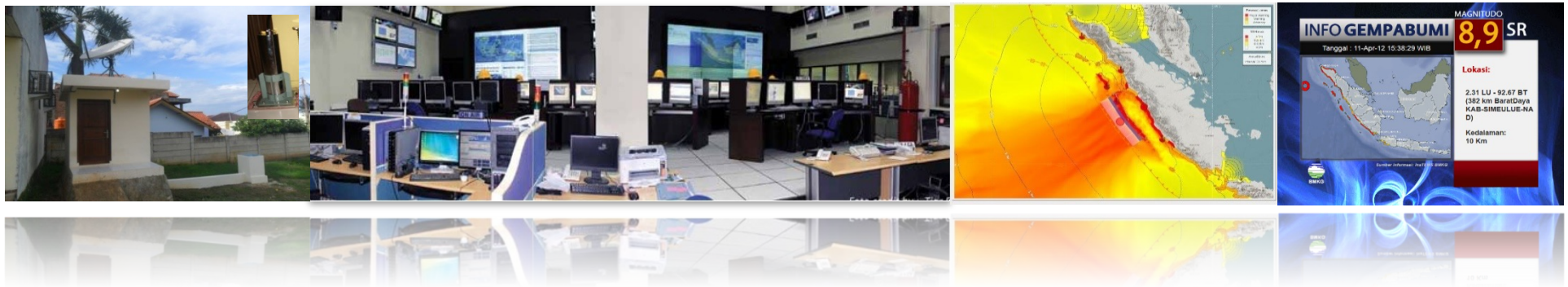
TSUNAMI NON SEISMIC MONITORING SYSTEM IN INDONESIA TSUNAMI EARLY WARNING SYSTEM (INATEWS)



Januar Arifin

Center for Earthquake and Tsunami
Agency for Meteorologi Climatology and Geophysics (BMKG)

International Tsunami Workshop on Understanding and lessons learned from the tsunami generated by the Hunga Tonga-Hunga Ha'apai volcano eruption on 15 January 2022
Nuku'alofa, Kingdom of Tonga

11 September 2023

OUTLINE

1. TSUNAMI DETECTION IDSL INSTALLATION

   ON ANAK KRAKATAU VOLCANO (GAK)

2. INDONESIAN TSUNAMI NON-TECTONIC MONITORING SYSTEM (InaTNT):

   CURRENT DEVELOPMENT STATUS 2023

TSUNAMI DETECTION IDSL INSTALLATION ON ANAK KRAKATAU VOLCANO (GAK)

TIM BMKG – KKP – BAKTI – PVMBG – DISNAV HUBLA

29 APRIL – 1 MAY 2022

BMKG

KEMENTERIAN KELAUTAN DAN PERIKANAN

BAKTI

BADAN GEOLOGI

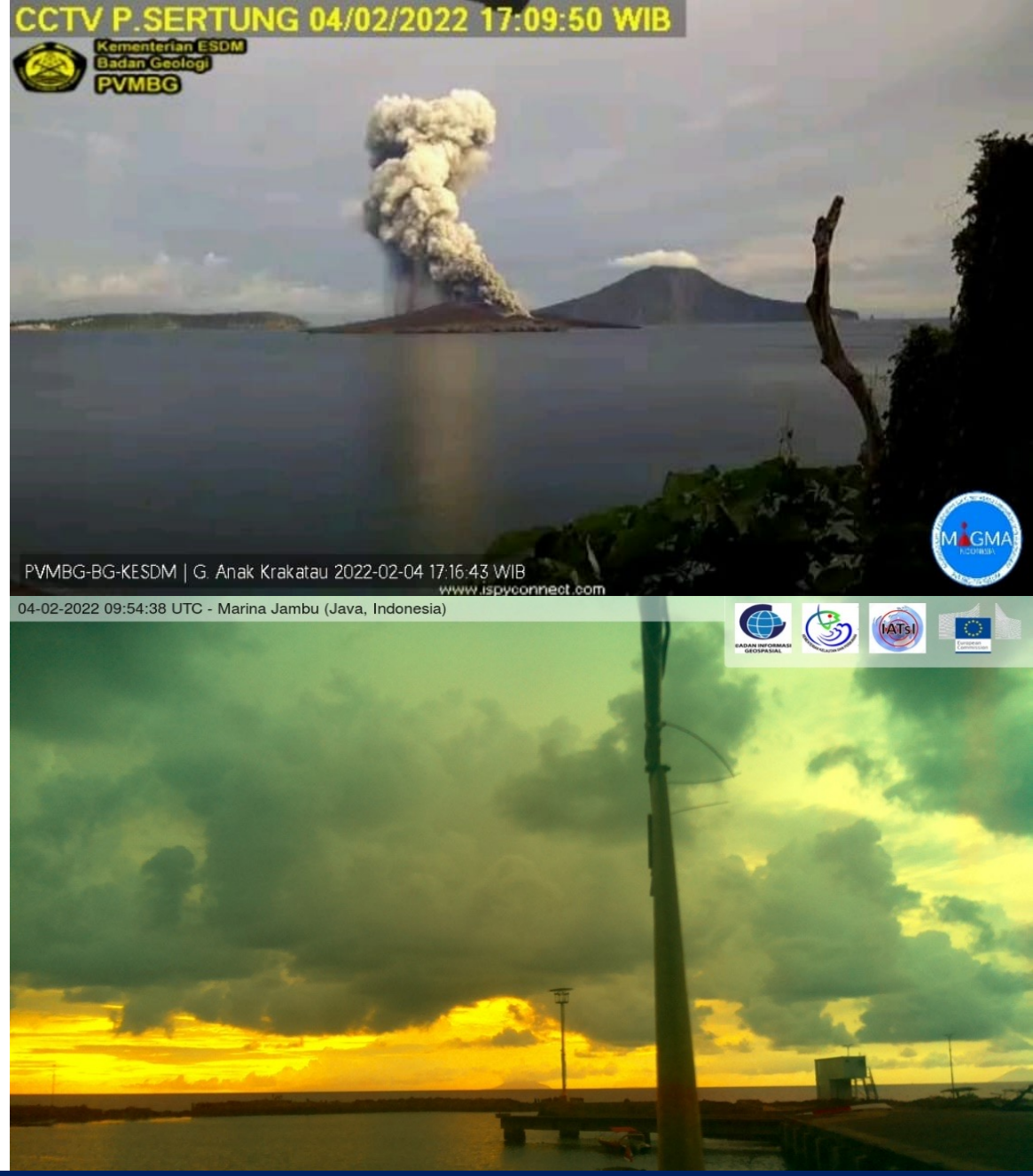
DIREKTORAT JENDERAL PERHUBUNGAN LAUT

European Commission

Joint Research Centre

BACKGROUND

- The recent escalation in volcanic activity/eruption of Anak Krakatau is becoming increasingly concerning.
- The potential threat of a tsunami disaster due to the volcanic activity of Anak Krakatau.
- The absence of a system capable of directly detecting early tsunami warnings in the waters of Anak Krakatau.
- The installation of Inexpensive Device for Sea Level (IDSL) to strengthen early tsunami warnings in the waters of Anak Krakatau.



OBJECTIVES

- Installation of the IDSL tsunami detection device **capable of identifying sea level anomalies, automatically triggering the system to alert local authorities** about potential tsunamis generated by volcanic activity. This enables swift disaster response actions to be taken.
- **Availability of tsunami detection**, allowing the InaTEWS BMKG tsunami early warning system to detect waves much earlier, mere minutes after the event initiation. Through this device, warnings can be issued before tsunami waves reach residential and community infrastructure in the Sunda Strait and surrounding areas.
- **Strengthening the capacity of InaTEWS BMKG** to provide rapid and accurate early tsunami warnings, especially in the Sunda Strait region.

ACTIVITY SCOPE

1. Installation of IDSL detection devices
2. Installation of AWS-WL Devices as a complement and sensor backup
3. Installation of VSAT Station supporting communication devices

LOCATION

Sea Navigation Tower Platform on Rakata Island, Water of Mount Anak Krakatau

JRC Map | 28/04/2022

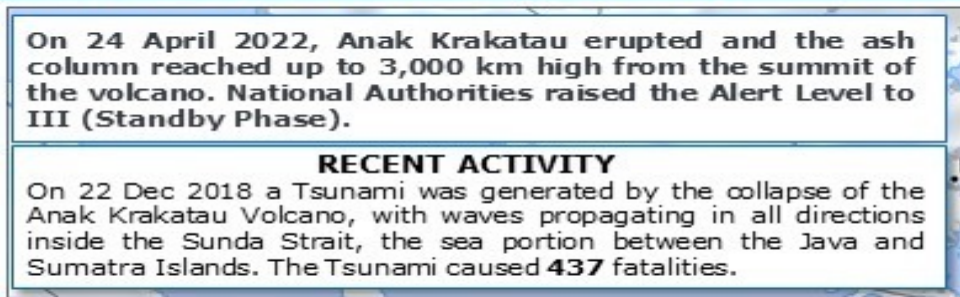
Indonesia | Anak Krakatau volcanic eruption

On 24 April 2022, Anak Krakatau erupted and the ash column reached up to 3,000 km high from the summit of the volcano. National Authorities raised the Alert Level to III (Standby Phase).

RECENT ACTIVITY

On 22 Dec 2018 a Tsunami was generated by the collapse of the Anak Krakatau Volcano, with waves propagating in all directions inside the Sunda Strait, the sea portion between the Java and Sumatra Islands. The Tsunami caused **437** fatalities.

Volcanic hazard map



Volcano

Populated places

HAZARD ZONE I

r = 8 km — Area potentially affected by ash fall and probably hit by incandescent ejected rock fragments of lapilli sizes

HAZARD ZONE II

Area potentially affected by lava flow and possibly affected by pyroclastic flows

r = 5 km — Area potentially affected by heavy ash fall and possibly affected by incandescent ejected rock fragments by pebble size

HAZARD ZONE III

Area frequently affected by lava flow and possibly affected by pyroclastic flow

r = 2 km — Area frequently affected by heavy ash fall and incandescent ballistic projectiles (volcanic bomb)

0 12.5 25 km

Early Warning System

- JRC IDSL installed
- New JRC IDSL to be installed
- Tide Gauges (BIG)
- IA Seismic Network (BMKG)

JRC IDSL: Inexpensive Device for Sea-Level Measurement
BMKG: Indonesian Agency for Meteorology, Climatology and Geophysics
BIG: Indonesian Geospatial Information Agency
[1] *With satellite communication by BMKG/BAKTI*
[2] *Connection via Telkomsel GSM link from a new tower installed on Sebesi Island*

CONSIDERATIONS FOR PLACEMENT OF TSUNAMI DETECTION EQUIPMENT ON RAKATA ISLAND

- Well-sheltered location.
- Coastal characteristics highly suitable, an existing navigation tower platform is available.
- wide beach.
- Early tsunami detection can be achieved in less than 5 minutes.
- Existing structure is highly suitable for equipment placement, facilitating installation and maintenance.

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EQUIPMENT LIST OF INEXPENSIVE DEVICE FOR SEA LEVEL (IDSL)

NO	ITEM PERANGKAT / PERLENGKAPAN	QTY	KETERANGAN
1	Sensor Water Level Ultrasonik	1 Unit	Pengukur Tinggi Muka Laut/Air (akurasi 1 - 5 mm dengan range 5 - 10 m)
2	Solar panel 100W	1 unit	Power Supply tenaga Surya
3	Baterai (7.2 Ah & 36 Ah)	3 unit	Baterai/Aki yangt terdiri 1 unit di box utama (7.2 Ah) dan tambahan 3 unit di box ke-2 (36 Ah).
4	Regulator Tegangan	1 unit	Pengatur daya
5	Mini Computer (Raspberry Pi B+)	1 unit	Sistem Akusisi dan logging data serta transmisi
6	Modem Teltonika	1 Unit	GSM Transmitter dan Wireless Access
7	Webcam/CCTV	1 Unit	Kamera Webcam/CCTV untuk visual monitoring
8	Dudukan Tiang IDSL	1 set	Mounting Perangkat IDSL

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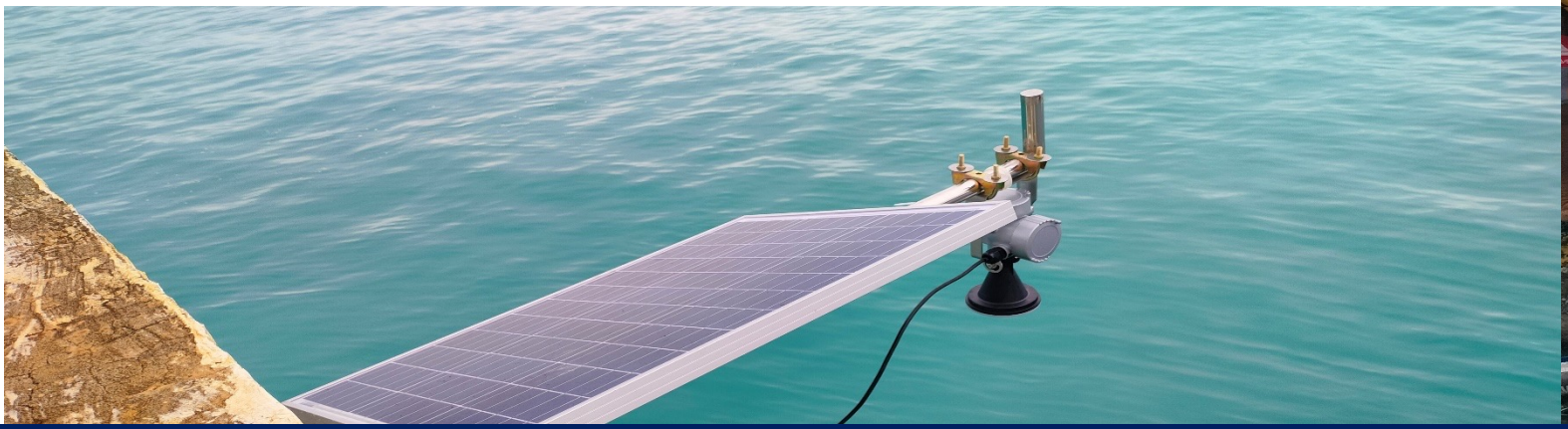
EQUIPMENT LIST OF AUTOMATIC WEATHER STATION (AWS) WATER LEVEL

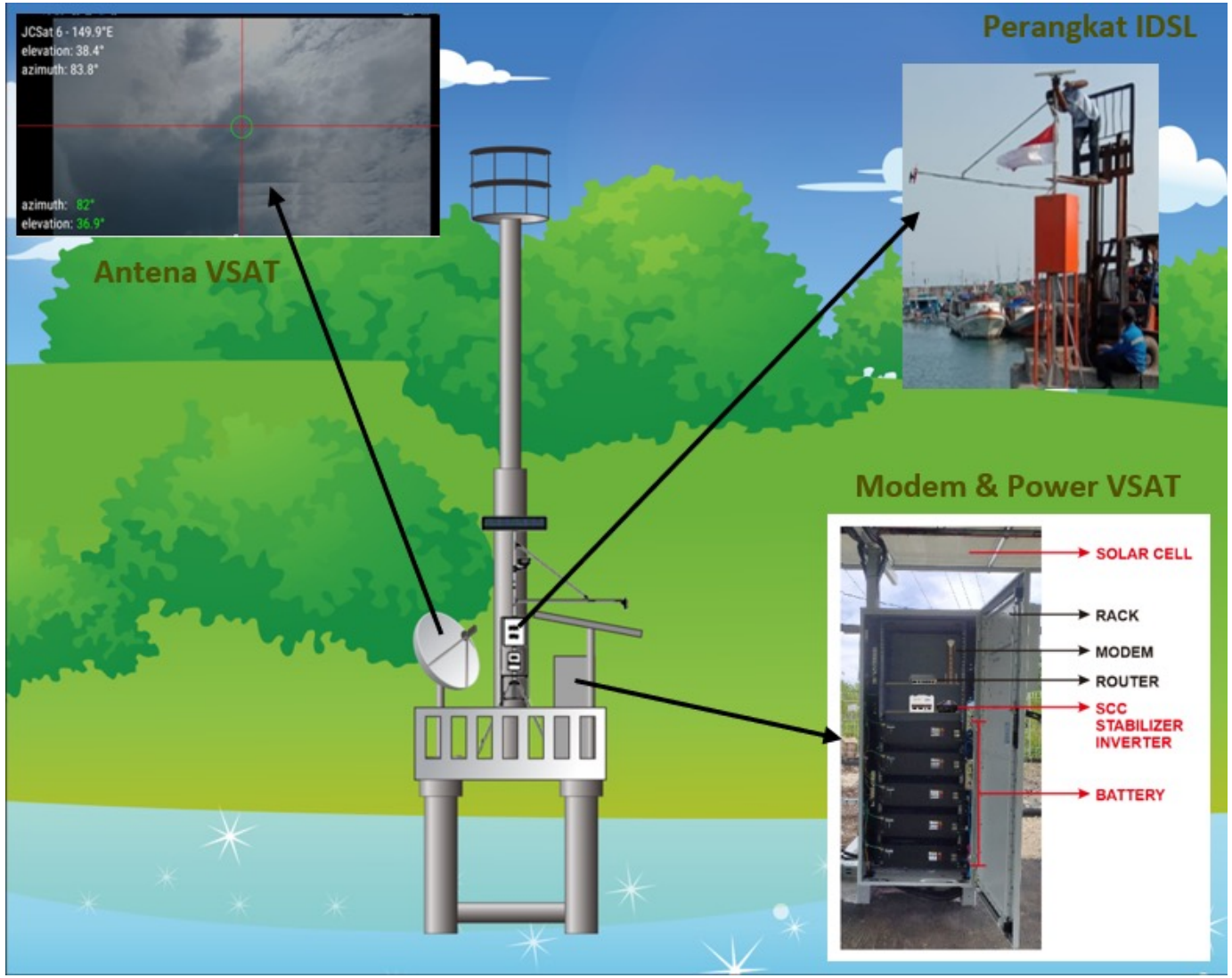
NO	ITEM PERANGKAT / PERLENGKAPAN	QTY	KETERANGAN
1	Dudukan Tiang AWL	1 Set	Mounting Perangkat AWS
2	Sensor Water Level	1 unit	Pengukur Tinggi Muka Laut/Air
3	Sensor Water Temperature	1 unit	Pengukur Suhu Air
4	Sensor Hujan/Rain Gauge	1 unit	Pengukur Intensitas Hujan
5	Sensor Suhu dan Kelembaban	1 unit	Pengukur Suhu dan Kelembaban Udara
6	Solar Panel	1 Set	Power Supply tenaga Surya
7	Data Logger Box (Data Logger, Baterai 17Ah, Regulator dan Modem)	1 Set	Sistem Akuisisi dan Power Supply Module

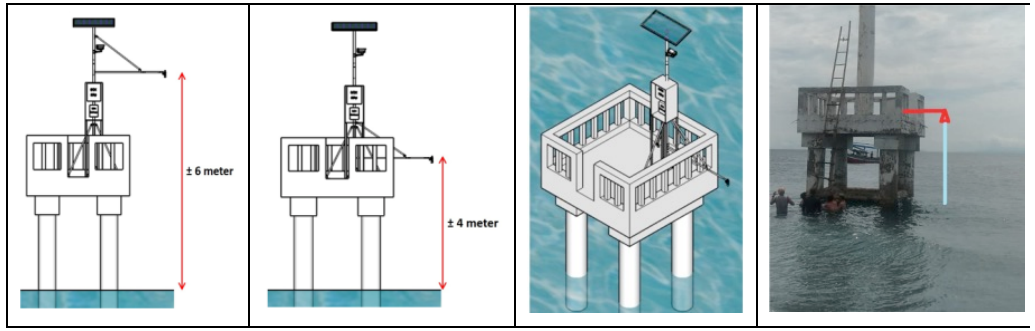


EQUIPMENT LIST OF VSAT STATION BAKTI – KOMINFO

NO	MODUL	MERK	TYPE	SERIAL NUMBER	QTY	KET
			MINI POWER PACK			
1	STRUKTUR	Struktur PV Support	Any		1	Set
2	ROOF TOP	Besi Rel 4mtr	Any		4	Pcs
3	ACCESSORIES	Kabel 1x4mm2 1000V DC	Any		60	m
4		MC4, 1000 Vdc	Any		4	set
5		Cable Ties 20 cm @ 100 pcs	EWIG	2.5 x 200mm, nylon	1	Pack
6		Lakban penambal bocor, lem talang	Flashband	lebar 5 cm, panjang 3 meter	1	Pack
7	MODUL SURYA	Solar Panel 330 WP	Any	330W	4	Pcs
8	GROUNDING	Grounding Cable 6mm	Any		50	Meter
9		Skun SC 6-8	Any		6	Pcs
10	POWER SYSTEM	Kabinet	Any		1	Pcs
11		Solar Inverter 3kVA	Epever		1	Pcs
12		Baterai Lithium 48V 100Ah	Any		3	Pcs
13	DISTRIBUTION PANEL	MCB 2A	Schneider	Schneider C6A 1P	2	Pcs
14		MCB 63A	Schneider	Schneider 63A 1P	2	Pcs
15		MCB 100A	Nader/ABB/Schneider	100 A, 80 V DC	2	Pcs
16		Arrester / Surge Controller	OBO	V20-C	2	Pcs
17		LVD Module	Any	12 - 60 V, 30 A	1	Pcs
18		Terminal Block UK10	Any		6	Pcs
19		Stopper MCB	Any		12	Pcs
20		Jumper Terminal Block UK10	Any		6	Pcs
21		Pilot Lamp 22 mm Merah	Any	22 mm, 48 V, Merah	1	Pcs
22		Pilot Lamp 22 mm Hijau	Any	25 mm, 48 V, Hijau	1	Pcs
23		Besi Din Rail	Any		50	cm
24		Kabel NYAF 1 mm Merah	Any	NYAF 1 mm, Merah	2.5	Pcs
25		Kabel NYAF 1 mm Hitam	Any	NYAF 1 mm, Hitam	2.5	Pcs
26		Kabel NYAF 4 mm Merah	Any	NYAF 4 mm, Merah	30	cm
27		Kabel NYAF 4 mm Hitam	Any	NYAF 4 mm, Hitam	30	cm
28		Kabel PV 6 mm	JJ-LAPP / LEONI	XLRE 4 mm / 6 mm	1.5	m
29		Kabel NYAF 16 mm Merah	Any	NYAF 16 mm, Merah	5	m
30		Kabel NYAF 16 mm Hitam	Any	NYAF 16 mm, Hitam	5	m
31		Skun Y 1.25 mm	Any		10	Pcs
32		Skun SC 16-6	Any		20	Pcs
33		Ferules 1,25 mm	Any		2	Pcs
34		Ferules 4 mm	Any		6	Pcs
35		Ferules 6 mm	Any		6	Pcs
36		Ferules 16 mm	Any		12	Pcs
37		Vynil 16 mm Merah	Any		20	Pcs
38		Vynil 16 mm Hitam	Any		20	Pcs
39		Cable Gland PG 21	Any	PG 21, Outdoor	2	Pcs
40		Jumper Sisir MCB	Any		3	Pcs
41		Baut Self Tapping	Any	Pan Head 4 mm	4	Pcs
42		Busbar Grounding	Any	Busbar Tembaga 5 Lubang	1	Pcs
			GROUND SEGMENT			
43	GROUND SEGMENT	ANTENA 1.2 M	Prodelin		1	Set
44		BUC	NJRC	NJT8302UF	1	Unit
45		LNB	NJRC	NJR2842L	1	Unit
46		MODEM	HUGHES	HT2300	1	Unit
47		ROUTER	MIKROTIK	RB 760 iGS	1	Unit
48		ACCESS POINT	UNIFI	AC - MESH - PRO	1	Unit
49		MOUNTING PRM	ANY	PRM	1	Unit
50		MATERIAL INSTALASI	ANY	ANY	1	Lot

DESIGN OF TSUNAMI DETECTION EQUIMENT INSTALLATION ON RAKATA ISLAND





IDSL dan VSAT Installation Layout on Navigation Platfrom HUBLA

BMKG

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INSTALLATION TEAM

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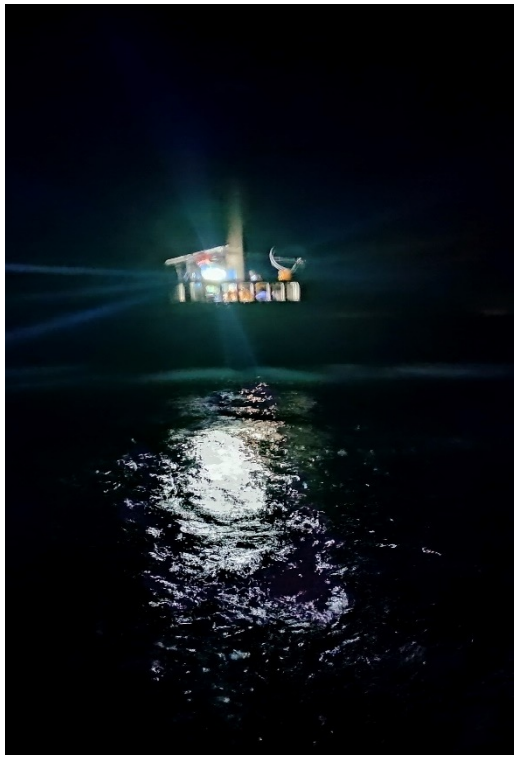
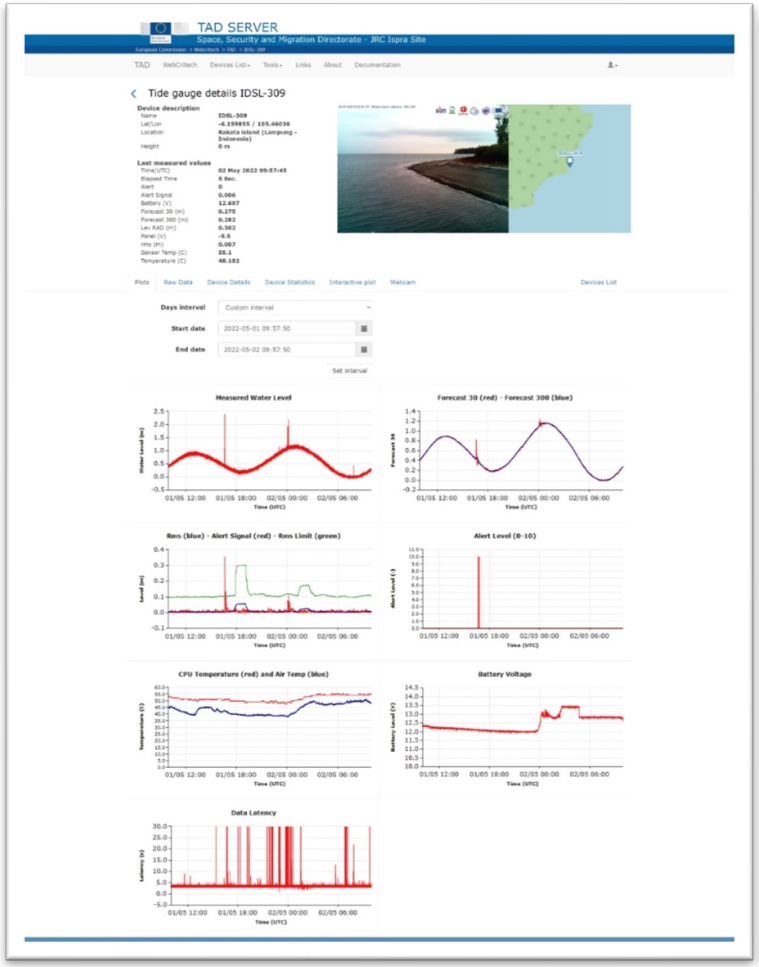
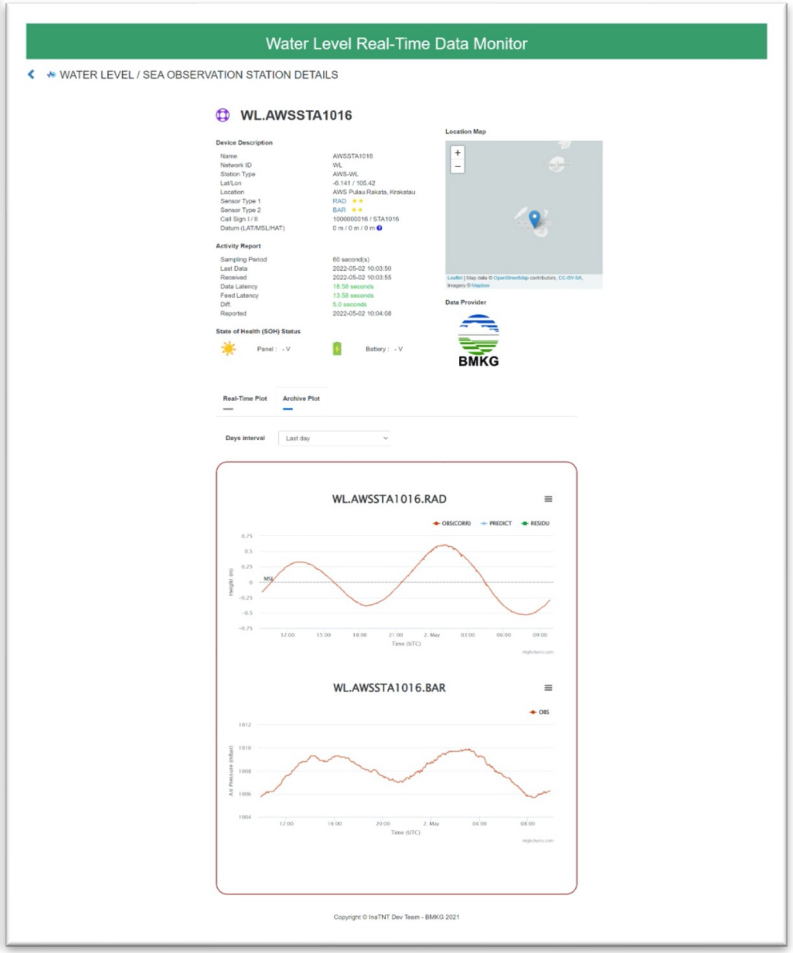
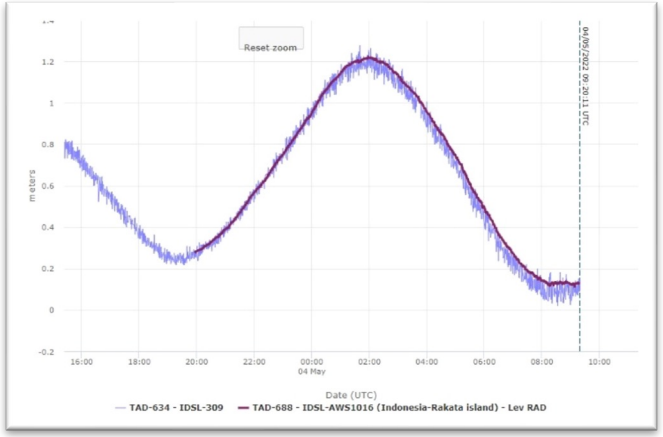


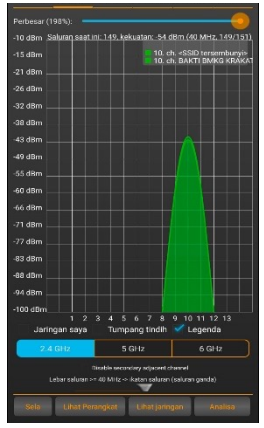
INSTALLATION PROCESS

INSTALLATION RESULT









INDONESIAN TSUNAMI NON-TECTONIC MONITORING SYSTEM

InaTNT

INDONESIA TSUNAMI NON TEKTONIK

BMKG BIG BPPT

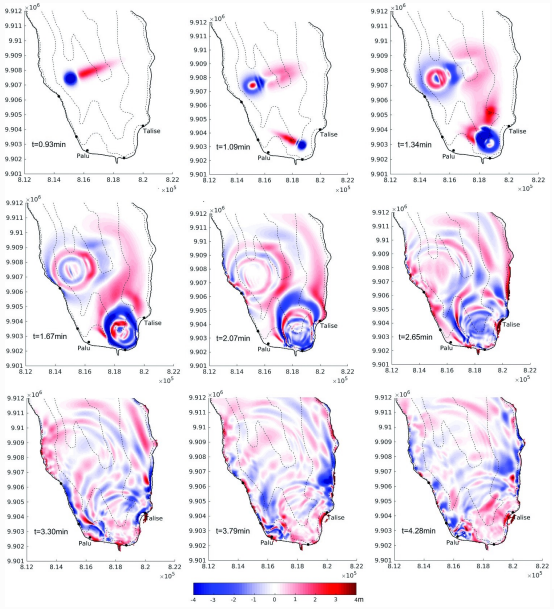
CURRENT DEVELOPMENT STATUS 2023

17:02:43WIB

Origin Time

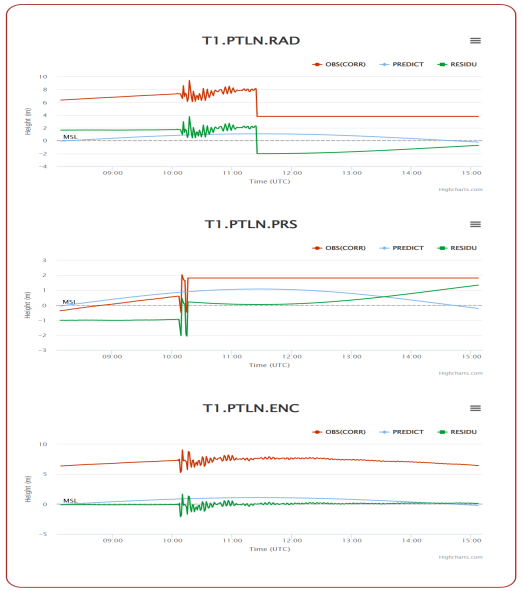
17:06WIB

The tsunami hit the city of Palu (~3.5')



Model tsunami (Aranguiz et al. 2020)

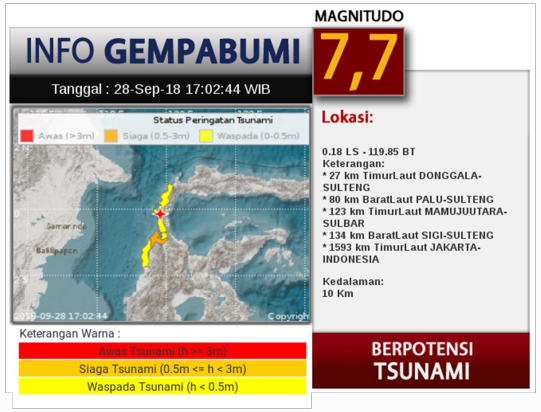
Tsunami recorded on the Pantoloan TG(17:06)



Tsunami recorded on the CCTV of a private house in Palu

https://www.youtube.com/watch?v=Cxg9gP17KOw&t=506s

17:07WIB



BMKG issued Tsunami Early Warning System (+5')

Chronology of TSUNAMI KRAKATAU 22 DECEMBER 2018

BACKGROUND

21 Dec
07:00 WIB — BMKG issues early warning of high sea waves

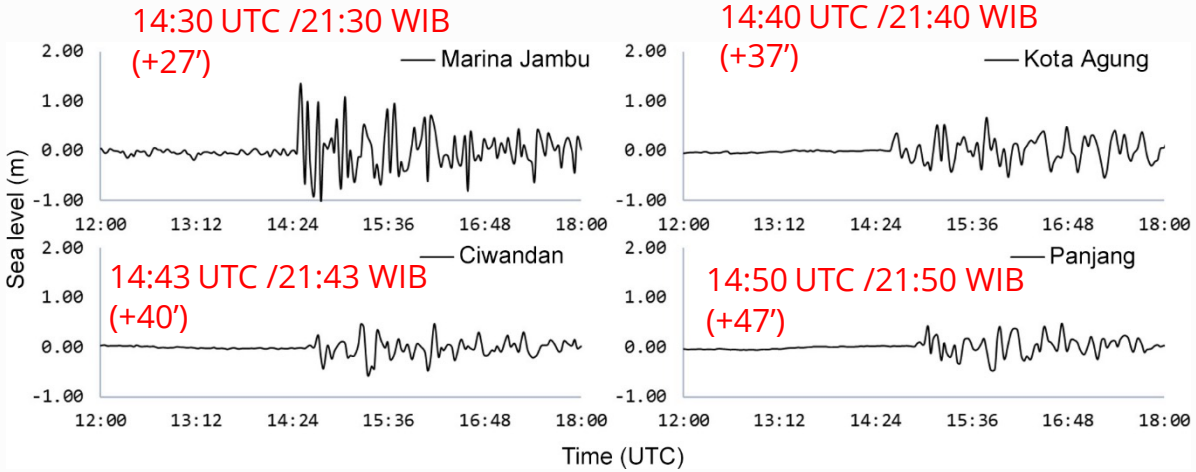
20:56 WIB — PVMBG announced Mount Anak Krakatau Eruption

21:30 WIB — BMKG received reports of abnormal high tides

21:30 – 22:00 WIB — BMKG checked Tide Gauge data

22:30 WIB — BMKG issued a press release for an atypical Sunda Strait tsunami

Tsunami Record



OBJECTIVES OF INATNT DEVELOPMENT

1. • **Integrate sea level observation data** from internal and external resources/stakeholders internal into a single integrated system and display

2. • **To provide sea level anomaly automatic detection facility** through mareogram data as heads up for the operator

3. • **To provide supporting system and SOP** for Non Tectonic Tsunami Warning System.

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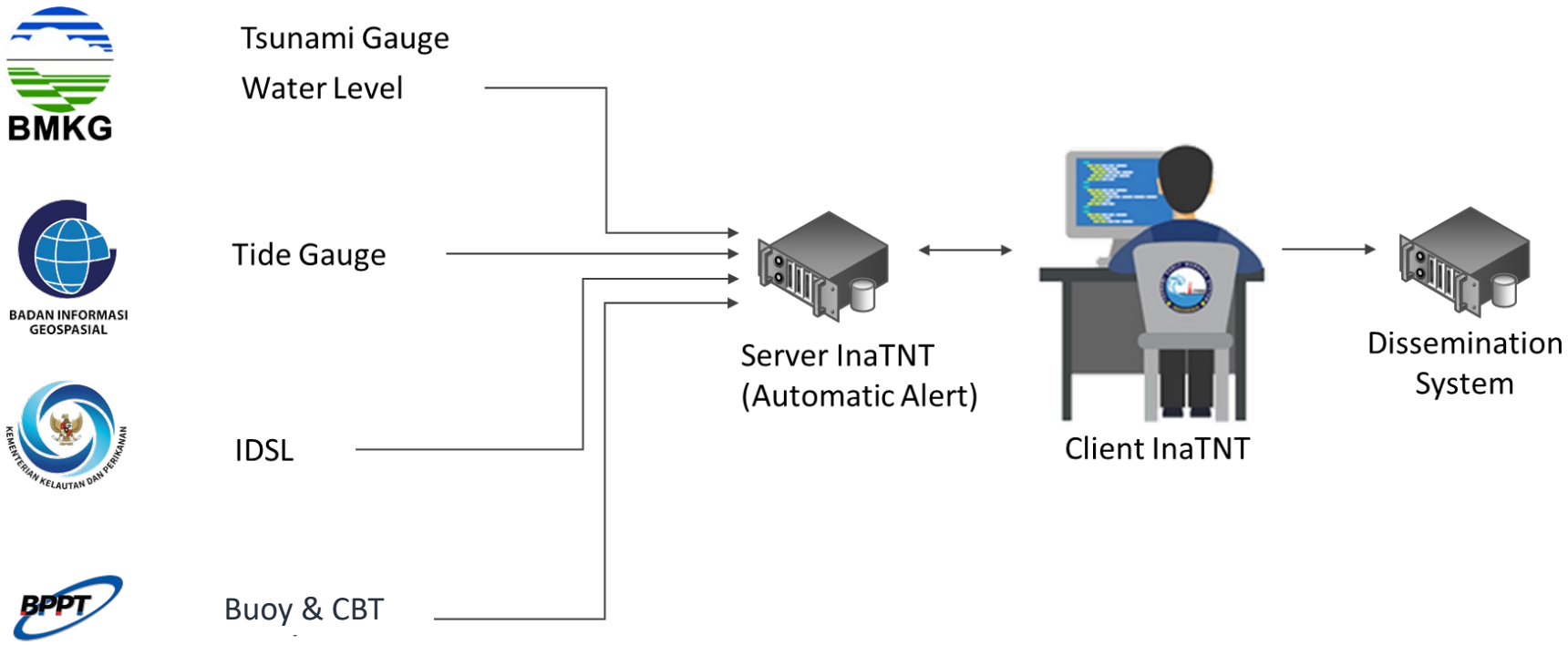
DEFINITION

InaTNT is an integrated system that functions **to detect sea level change anomalies that indicate a tsunami is recorded by sea level observation sensors** owned by BMKG, BIG, BPPT and KKP. The presence of InaTNT will improve the performance of the InaTEWS System in detecting tsunamis caused by tectonic and non-tectonic sources.



INTEGRATED SEA SURFACE MONITORING SENSORS FROM INATEWS INSTITUTIONS

PGT - BMKG

TSUNAMI GAUGE

PUSMAR - BMKG

AWS – WATER LEVEL

BPPT/BRIN

IDSL – WATER LEVEL

BPPT/BRIN

TSUNAMI BUOY

BPPT/BRIN

Cable Based Tsunameter (CBT)

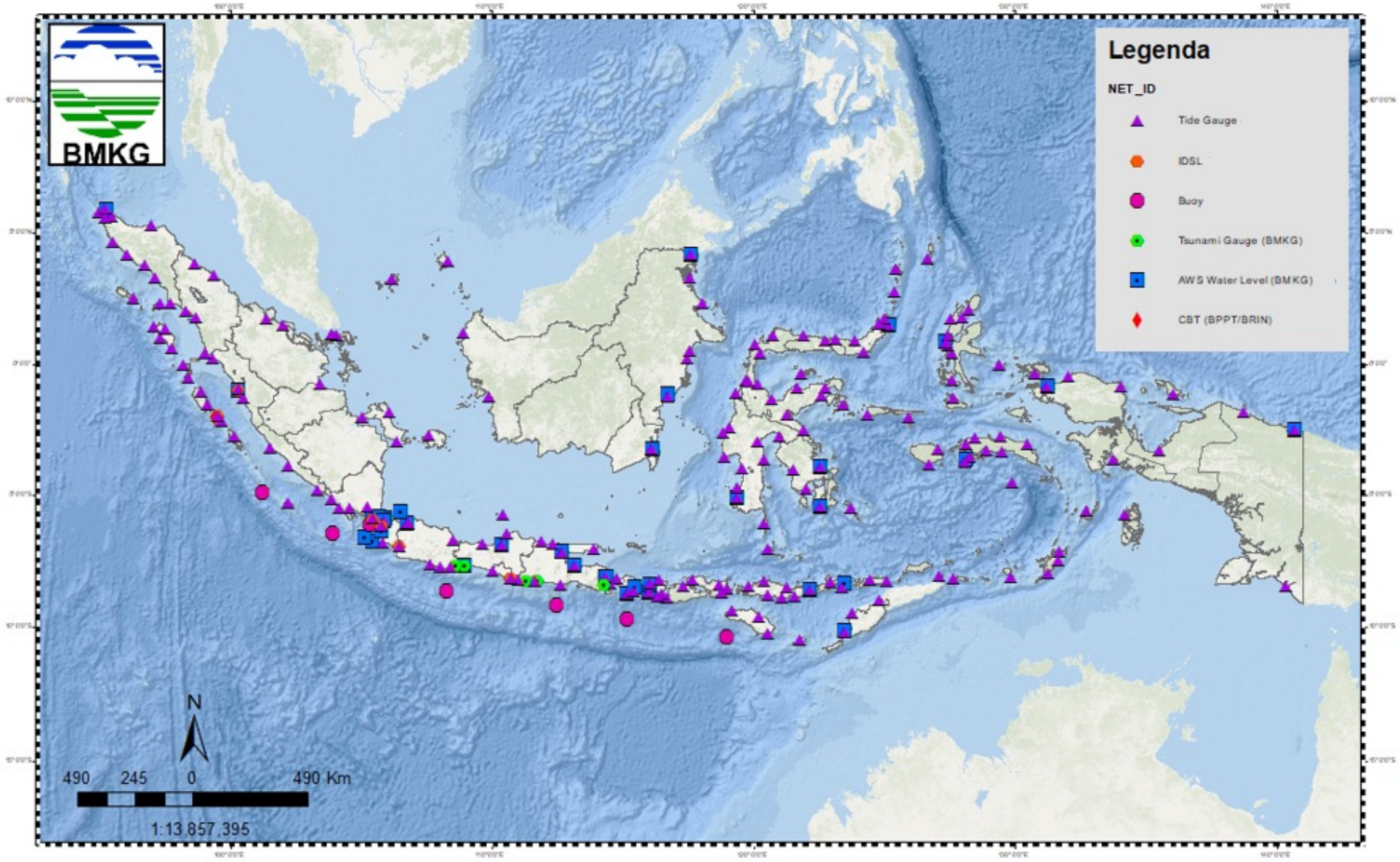
BIG

TIDE GAUGE

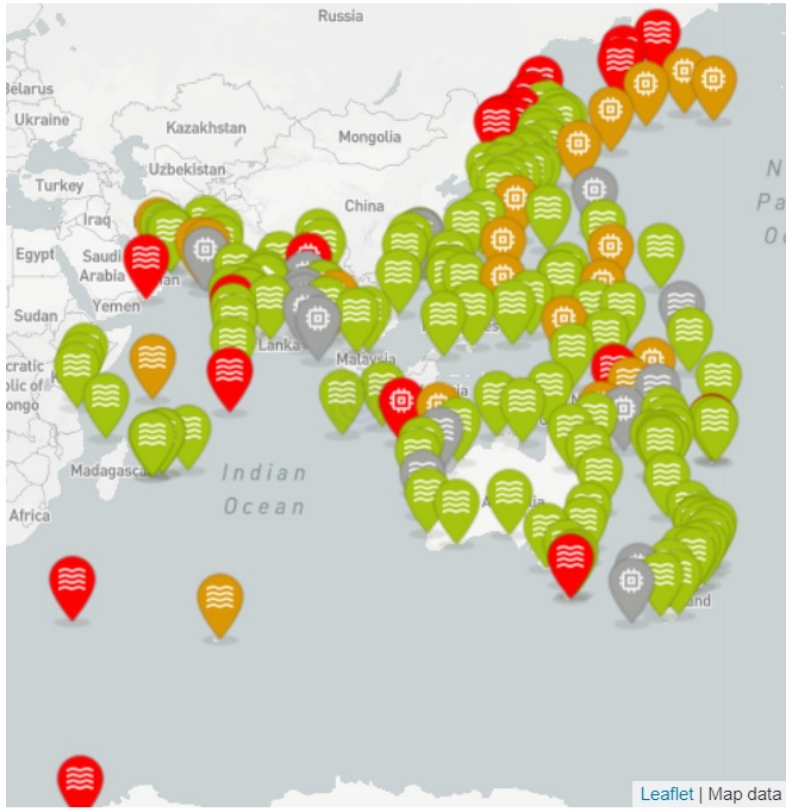
NO	NETWORK	TOTAL	OWNER	SAMPLING RATE	TRANSMIT RATE
1	**AWS Water Level**	35	BMKG	1 minute	1 minute
2	**Tsunami Gauge**	5	BMKG	1 minute	5 minutes
3	**Tide Gauge 1**	237	BIG	1 minute	5 minutes
4	**Tide Gauge 2 (RT)**	26	BIG	5 seconds	5 seconds
5	**IDSL**	11	KKP/BRIN	11 seconds	11 seconds
6	**Buoy**	7	BPPT/BRIN	15 minutes (normal mode) / 15 seconds (tsunami mode)	1 hour (normal model) / 1 minutes (tsunami mode)
7	**CBT**	2	BPPT/BRIN	15 seconds	15 seconds

Number of Integrated Sea Level Monitoring Sensors : 298 Sensors

SEA LEVEL MONITORING SENSOR FOR TSUNAMI DETECTION



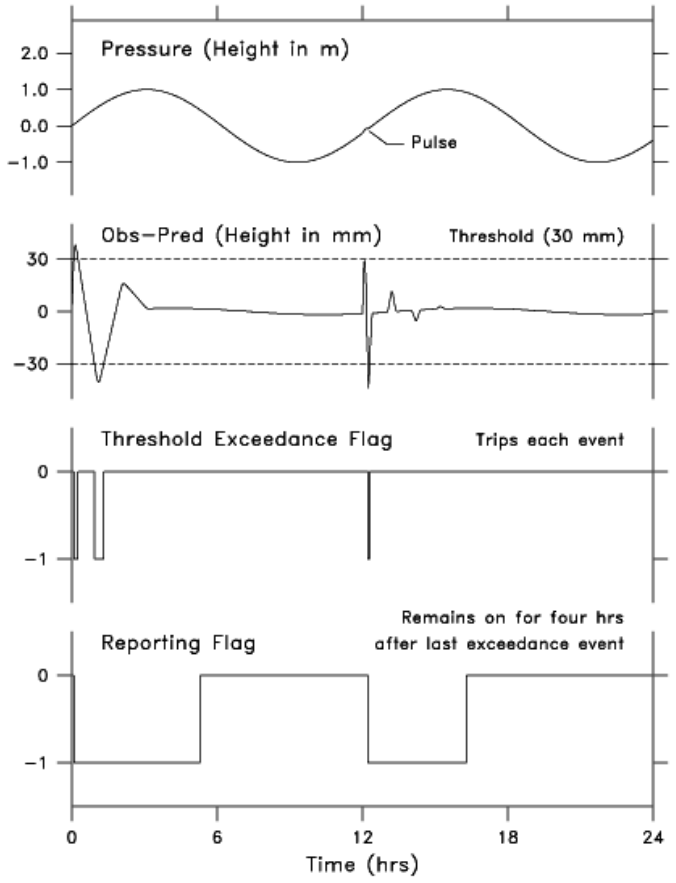
TELE-TSUNAMI OBSERVATION (INDIAN OCEAN)



NO	NETWORK	TOTAL	OWNER
1	**Dart Buoy NOAA**	33	NOAA
2	**Tide Gauge IOC**	165	IOC
3	**Tide Gauge INCOIS (India)**	7	INCOIS
	TOTAL	**205**	

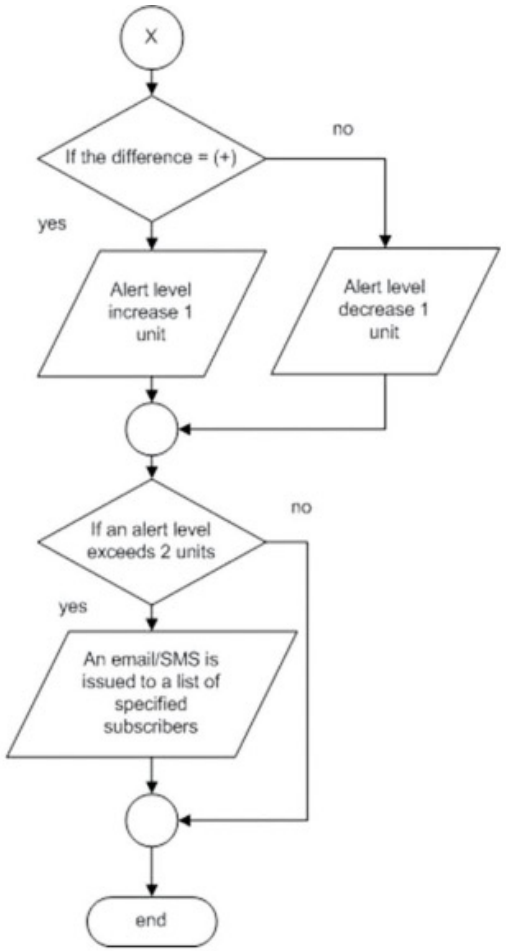
TSUNAMI DETECTION ALGORITHM APPLIED IN INATNT

TDA - BUOY



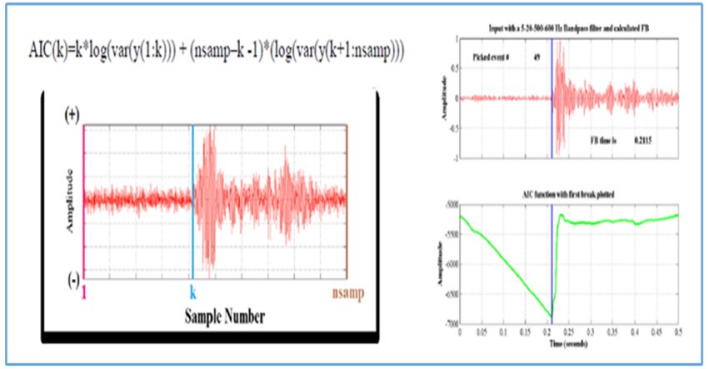
https://nctr.pmel.noaa.gov/tda_documentation.html

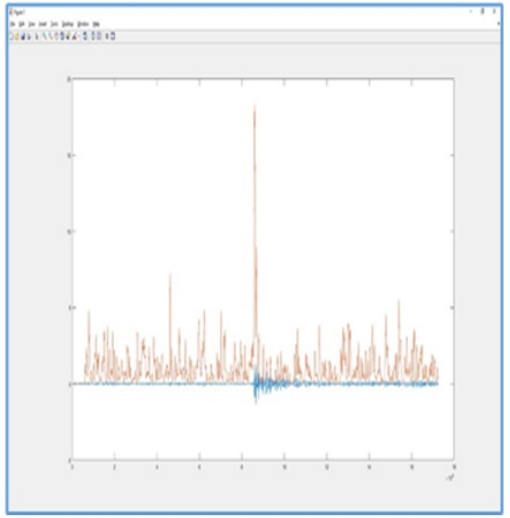
TDA - IDSL



IDSL Alert Mechanism (Annunziato, 2015)

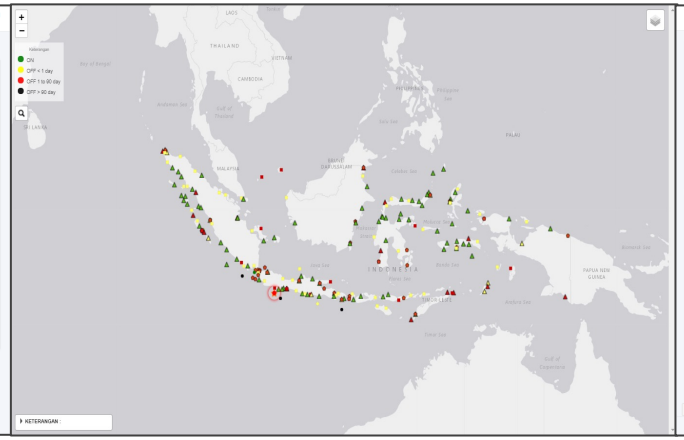
TDA - INATNT



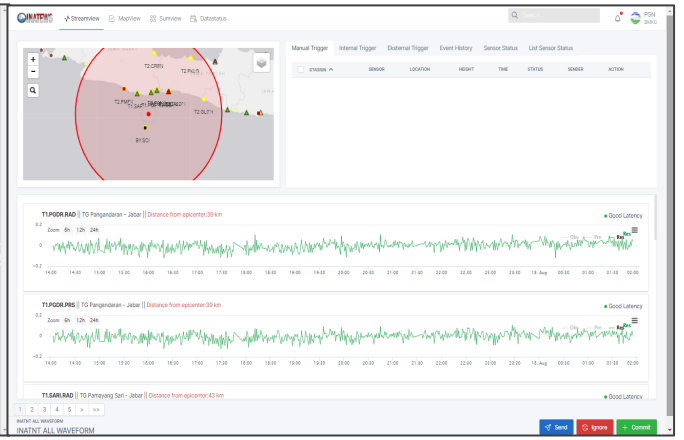


INATNT GRAPHICAL USER INTERFACE (GUI) MODULES

STREAMVIEW

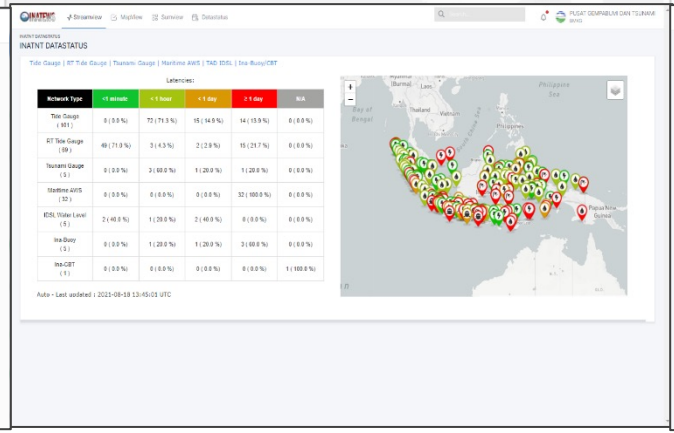


MAPVIEW

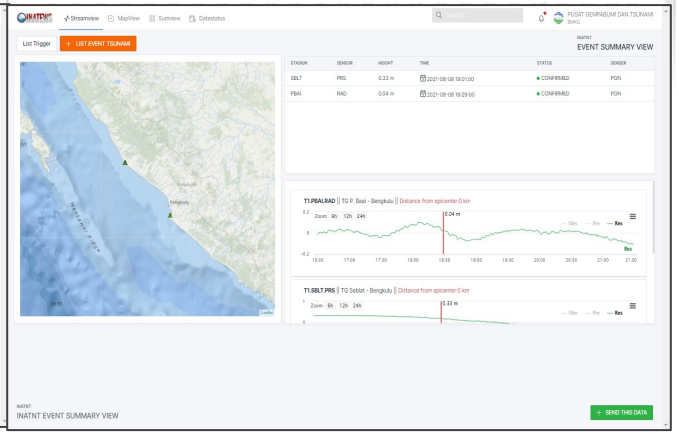


MONVIEW

CREATE EVENT



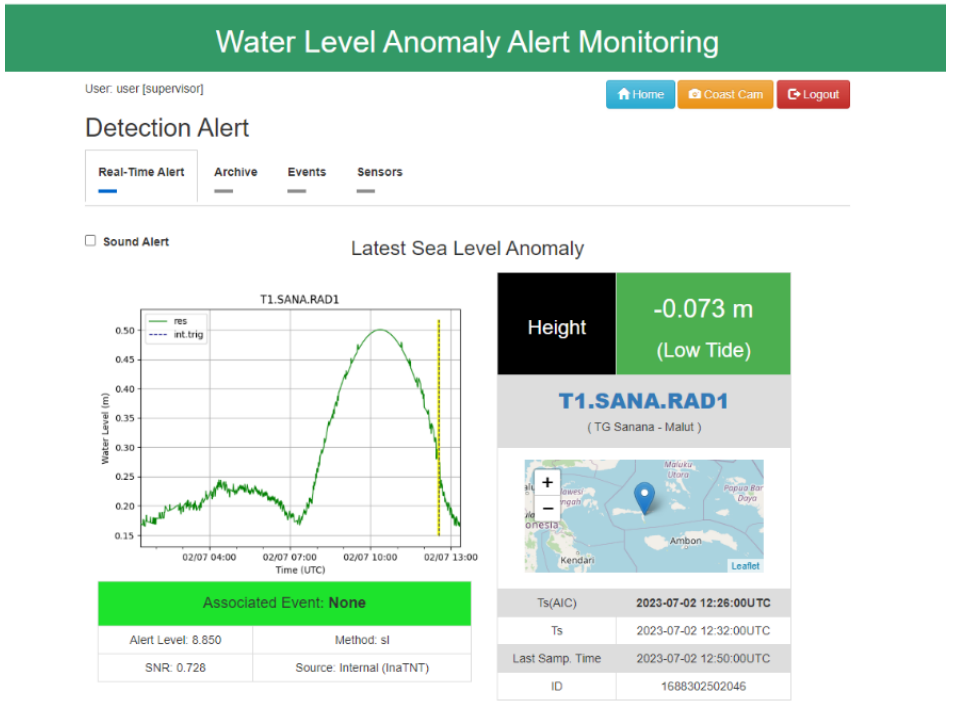
DATA STATUS



SUMVIEW

AUTOMATIC SEA LEVEL ANOMALY MONITORING

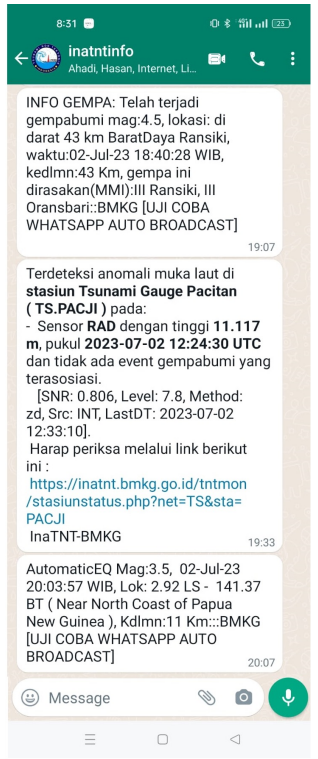
MONITORING GUI AUTOMATIC SEA LEVEL ANOMALY DETECTION



AUTOMATIC SEA LEVEL ANOMALY ALERT MESSAGE VIA WHATSAPP

Last Sea Level Anomaly Alerts (Auto Update)

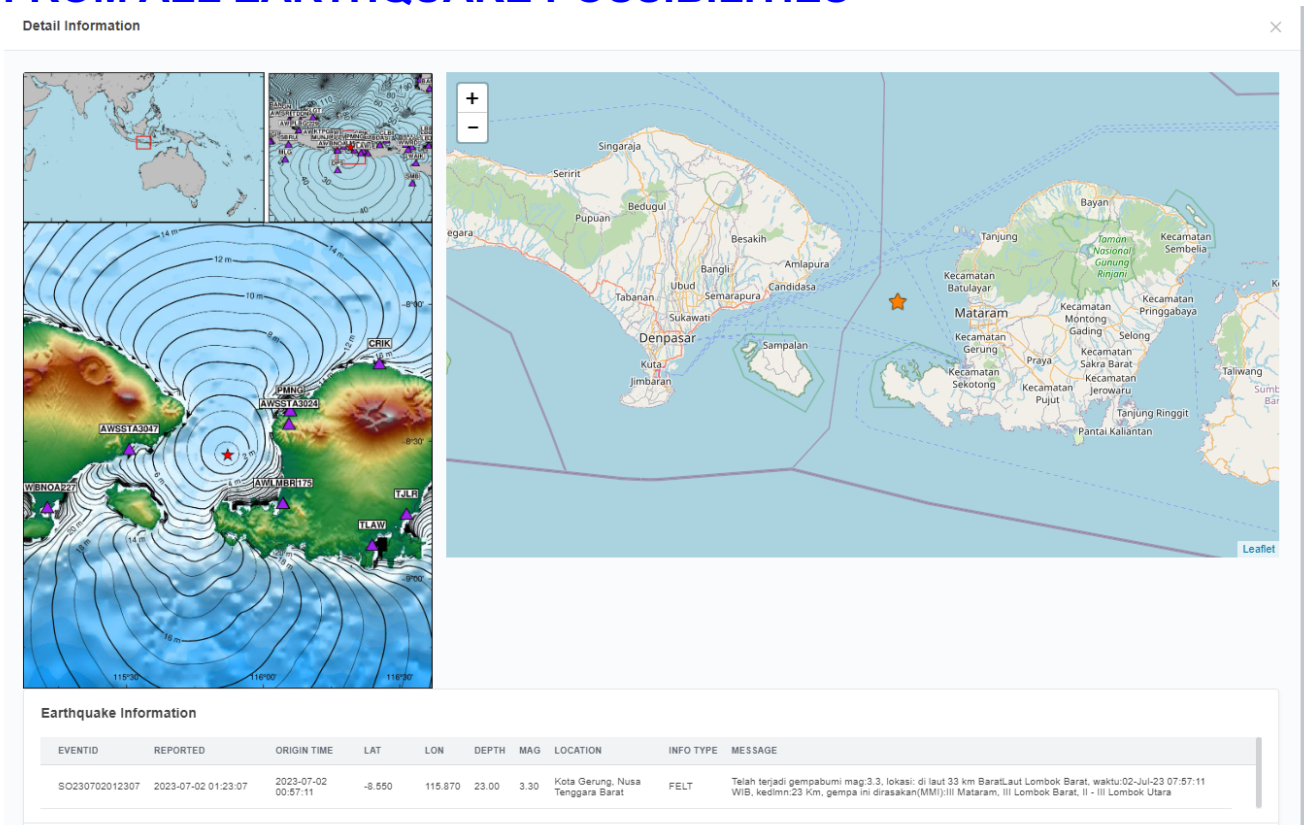
ID	CHANNEL	TS_AIC	TS	WH	LAST_DATA	LEVEL	METHOD	SNR	EVENT_ASSOC	SRC	
1688302502046	T1.SANA.RAD1	2023-07-02 12:26:00	2023-07-02 12:32:00	-0.073	2023-07-02 12:50:00	8.850	sl	0.728	None	INT	View
1688301212530	TS.PACJI.RAD	2023-07-02 12:24:30	2023-07-02 12:32:40	11.117	2023-07-02 12:33:10	7.801	zd	0.806	None	INT	View
1688298629728	TS.PACJI.RAD	2023-07-02 11:49:00	2023-07-02 11:40:10	11.235	2023-07-02 11:50:10	7.719	zd	2.037	None	INT	View
1688298271339	TS.PACJI.RAD	2023-07-02 11:42:40	2023-07-02 11:39:50	11.236	2023-07-02 11:44:10	7.604	zd	1.467	None	INT	View
1688298198108	TS.PACJI.RAD	2023-07-02 11:39:20	2023-07-02 11:39:50	11.236	2023-07-02 11:43:00	7.706	zd	1.431	None	INT	View
1688297655495	WL.AWSSTA2225.RAD	2023-07-02 11:14:00	2023-07-02 11:23:00	-0.148	2023-07-02 11:34:00	8.652	sl	-0.933	None	INT	View
1688297415485	TS.PACJI.RAD	2023-07-02 11:29:20	2023-07-02 11:29:30	5.431	2023-07-02 11:30:00	32.082	sl	0.085	None	INT	View
1688297256524	TO.PAGO.PWL	2023-07-02 11:09:00	2023-07-02 11:16:00	0.084	2023-07-02 11:21:00	8.083	sl	1.498	None	INT	View
1688297004432	T1.SRBY.RAD1	2023-07-02 10:40:00	2023-07-02 10:40:00	0.078	2023-07-02 11:20:00	8.207	sl	-0.232	None	INT	View
1688291502900	T2.JYPR.RAD1	2023-07-02 09:51:10	2023-07-02 09:51:20	-1.452	2023-07-02 09:51:35	9.954	sl	-0.251	None	INT	View
1688290401261	T1.PRGI.PRS1	2023-07-02 09:24:01	2023-07-02 09:25:14	-0.083	2023-07-02 09:26:12	7.655	zd	1.587	None	INT	View
1688289841878	T1.PRGI.PRS1	2023-07-02 09:13:04	2023-07-02 09:16:14	0.300	2023-07-02 09:21:06	8.319	sl	0.361	None	INT	View
1688289841855	T1.PRGI.PRS2	2023-07-02 09:13:04	2023-07-02 09:15:01	0.253	2023-07-02 09:21:06	8.061	sl	0.316	None	INT	View
1688289610532	T1.PRGI.PRS2	2023-07-02 09:05:03	2023-07-02 09:11:07	0.198	2023-07-02 09:15:01	8.358	sl	-0.618	None	INT	View
1688289546958	T1.PRGI.PRS2	2023-07-02 09:04:04	2023-07-02 09:13:04	0.198	2023-07-02 09:15:01	9.923	sl	-1.059	None	INT	View



Alert notifications will be activated on this GUI when any detected sea level anomaly occurs, displaying the tsunami height, arrival time, potential earthquake event associated with the anomaly, and the detection method used. Each anomaly alert meeting specific criteria will be forwarded via WhatsApp message to the InaTNTInfo group for internal consumption

TSUNAMI TRAVEL AND ARRIVAL TIME PREDICTION

TSUNAMI TRAVEL AND ARRIVAL TIME PREDICTION FROM ALL EARTHQUAKE POSSIBILITIES



Estimated Time Arrival

---LAT---	---LON---	-------STATION-------	----------ARRIVAL TIME UTC (RANGE)----------
-8.4000	116.0867	AWSSTA3024 WL	2023-07-02 01:04:22 ~ 2023-07-02 01:04:28
-8.5333	115.5200	AWSSTA3047 WL	2023-07-02 01:07:39 ~ 2023-07-02 01:07:45
-8.7333	116.0533	LMBR T1	2023-07-02 01:07:46 ~ 2023-07-02 01:07:52
-8.3833	116.1033	PMNG T1	2023-07-02 01:12:49 ~ 2023-07-02 01:12:55
-8.3833	116.1033	PMNG T2	2023-07-02 01:12:49 ~ 2023-07-02 01:12:55
-8.2216	116.4260	CRIK T1	2023-07-02 01:18:12 ~ 2023-07-02 01:18:18
-9.7411	115.2090	DPS BY	2023-07-02 01:19:59 ~ 2023-07-02 01:20:05
-8.1892	114.8330	CLBW T1	2023-07-02 01:27:08 ~ 2023-07-02 01:27:14
-8.7833	116.5367	TJLR T1	2023-07-02 01:38:43 ~ 2023-07-02 01:38:49
-8.7833	116.5367	TJLR T2	2023-07-02 01:38:43 ~ 2023-07-02 01:38:49
-8.7465	115.2099	BNOA T1	2023-07-02 01:43:04 ~ 2023-07-02 01:43:10
-8.7471	115.2087	AWSSTA2227 WL	2023-07-02 01:43:43 ~ 2023-07-02 01:43:49
-8.4500	117.3700	BDAS T1	2023-07-02 01:44:16 ~ 2023-07-02 01:44:22
-8.1333	114.4200	KTPG T1	2023-07-02 01:45:40 ~ 2023-07-02 01:45:46
-9.1928	112.5199	MLG BY	2023-07-02 01:45:49 ~ 2023-07-02 01:45:55
-8.8948	116.7490	BNTE T1	2023-07-02 01:45:50 ~ 2023-07-02 01:45:56
-8.8948	116.7490	BNTE T2	2023-07-02 01:45:50 ~ 2023-07-02 01:45:56
-10.4146	119.0387	SMB BY	2023-07-02 01:46:02 ~ 2023-07-02 01:46:08
-8.3851	114.5730	JBRN T1	2023-07-02 01:46:33 ~ 2023-07-02 01:46:39
-8.2142	117.7090	CLBI T1	2023-07-02 01:47:57 ~ 2023-07-02 01:48:03
-8.2142	117.7090	CLBI T2	2023-07-02 01:47:57 ~ 2023-07-02 01:48:03
-8.8836	116.3990	TLAW T1	2023-07-02 01:50:41 ~ 2023-07-02 01:50:47
-8.8836	116.3990	TLAW T2	2023-07-02 01:50:41 ~ 2023-07-02 01:50:47
-8.1500	114.4200	AWSSTA2092 WL	2023-07-02 01:51:31 ~ 2023-07-02 01:51:37
-8.3833	118.7033	BIMA T1	2023-07-02 01:52:40 ~ 2023-07-02 01:52:46
-8.3833	118.7033	BIMA T2	2023-07-02 01:52:40 ~ 2023-07-02 01:52:46
-7.9951	119.9360	LBB02 CT	2023-07-02 01:52:53 ~ 2023-07-02 01:52:59
-8.1500	114.4367	AWSSTA3046 WL	2023-07-02 01:53:21 ~ 2023-07-02 01:53:27
-8.1750	119.9210	LBB01 CT	2023-07-02 01:54:23 ~ 2023-07-02 01:54:29
-9.3896	119.2190	WAIK T1	2023-07-02 02:01:03 ~ 2023-07-02 02:01:09
-8.4342	112.6840	SBRU T1	2023-07-02 02:06:11 ~ 2023-07-02 02:06:17
-8.7167	118.8033	WWRD T1	2023-07-02 02:17:46 ~ 2023-07-02 02:17:52
-8.5833	119.0200	SAPE T1	2023-07-02 02:18:46 ~ 2023-07-02 02:18:52
-8.2667	111.7867	POPJI TS	2023-07-02 02:21:22 ~ 2023-07-02 02:21:28
-8.4379	114.3480	MUNJI TS	2023-07-02 02:22:50 ~ 2023-07-02 02:22:56
-8.3000	111.7200	PRGI T1	2023-07-02 02:38:54 ~ 2023-07-02 02:39:00
-8.3000	111.7367	ID308 ID	2023-07-02 02:39:25 ~ 2023-07-02 02:39:31
-5.5678	119.9221	BANT T1	2023-07-02 02:41:45 ~ 2023-07-02 02:41:51
-8.4926	119.8760	LBJO T1	2023-07-02 02:52:58 ~ 2023-07-02 02:53:04
-7.0667	113.9367	KLGT T1	2023-07-02 03:04:05 ~ 2023-07-02 03:04:11
-7.2333	113.3033	TDDN T1	2023-07-02 03:12:38 ~ 2023-07-02 03:12:44
-7.7149	113.2160	PBLG T1	2023-07-02 03:23:36 ~ 2023-07-02 03:23:42
-7.7149	113.2160	PLBG T2	2023-07-02 03:23:36 ~ 2023-07-02 03:23:42
-7.7167	113.2200	AWSSTA2229 WL	2023-07-02 03:25:24 ~ 2023-07-02 03:25:30
-5.1000	119.4200	UJPD T1	2023-07-02 03:40:06 ~ 2023-07-02 03:40:12
-5.1000	119.4200	AWSSTA2179 WL	2023-07-02 03:44:06 ~ 2023-07-02 03:44:12
-7.2000	112.7533	AWSSTA2091 WL	2023-07-02 05:02:41 ~ 2023-07-02 05:02:47
-6.8644	112.3680	LMGN T1	2023-07-02 05:33:35 ~ 2023-07-02 05:33:41
-6.8644	112.3680	LMGN T2	2023-07-02 05:33:35 ~ 2023-07-02 05:33:41
-7.2000	112.7200	SRBY T1	2023-07-02 05:36:58 ~ 2023-07-02 05:37:04
-6.7667	111.9367	TBAN T1	2023-07-02 06:21:49 ~ 2023-07-02 06:21:55

InaTNT displays the predicted time travel and arrival time of the tsunami at each water level station for all possible earthquake events

AIR PRESSURE/BAROMETER OBSERVATION SENSOR (AWS-WL) INTEGRATED TO INATNT TO DETECT AIR WAVE PHENOMENON FROM VOLCANIC BLAST

WL.AWSSTA2080

Device Description

Name	AWSSTA2080
Network ID	WL
Station Type	AWS-WL
Lat/Lon	-5.931456 / 105.996233
Location	AWS Maritim Merak
Sensor Type 1	RAD ★★
Sensor Type 2	BAR ★★
Call Sign I / II	3000000016 / STA2080
Datum (LAT/MSL/HAT)	0 m / 0 m / 0 m

Activity Report

Sampling Period	60 second(s)
Last Data	2022-02-05 08:13:28
Received	2022-02-05 08:13:39
Data Latency	37.17 seconds
Feed Latency	26.17 seconds
Diff.	11.0 seconds
Reported	2022-02-05 08:14:05

State of Health (SOH) Status

Panel : - V Battery : - V

Location Map

Data Provider

BMKG

WL.AWSSTA2231

Device Description

Name	AWSSTA2231
Network ID	WL
Station Type	AWS-WL
Lat/Lon	-6.010302 / 105.9543
Location	AWS Maritim Ciwandan
Sensor Type 1	RAD ★★★★
Sensor Type 2	BAR ★★
Call Sign I / II	3000000027 / sta2231
Datum (LAT/MSL/HAT)	0 m / 0 m / 0 m

Activity Report

Sampling Period	60 second(s)
Last Data	2022-02-05 08:14:17
Received	2022-02-05 08:14:48
Data Latency	48.41 seconds
Feed Latency	17.41 seconds
Diff.	31.0 seconds
Reported	2022-02-05 08:15:05

State of Health (SOH) Status

Panel : - V Battery : - V

Location Map

Data Provider

BMKG

WL.AWSSTA2090

Device Description

Name	AWSSTA2090
Network ID	WL
Station Type	AWS-WL
Lat/Lon	-5.86973 / 105.755494
Location	AWS Maritim Bakauheni
Sensor Type 1	RAD ★★★
Sensor Type 2	BAR ★★
Call Sign I / II	3000000004 / STA2090
Datum (LAT/MSL/HAT)	0 m / 0 m / 0 m

Activity Report

Sampling Period	60 second(s)
Last Data	2022-02-05 08:22:26
Received	2022-02-05 08:22:36
Data Latency	39.28 seconds
Feed Latency	29.28 seconds
Diff.	10.0 seconds
Reported	2022-02-05 08:23:05

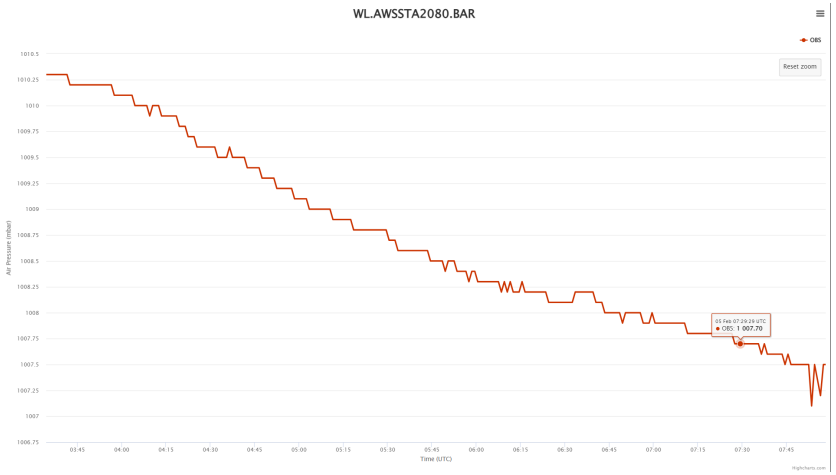
State of Health (SOH) Status

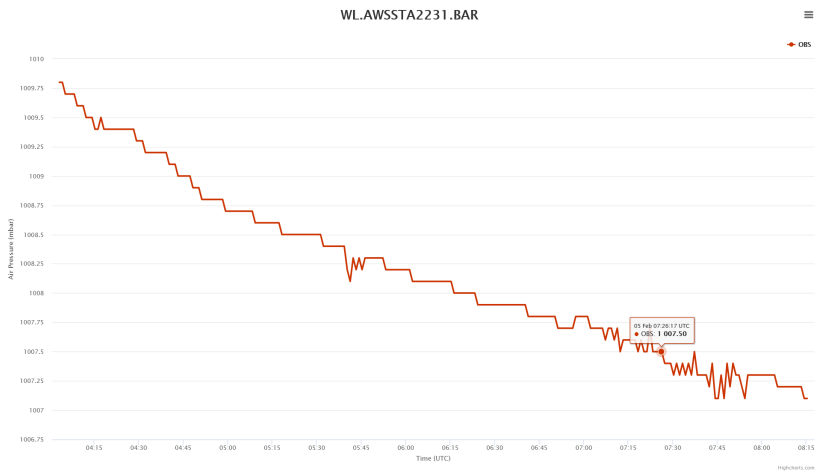
Panel : - V Battery : - V

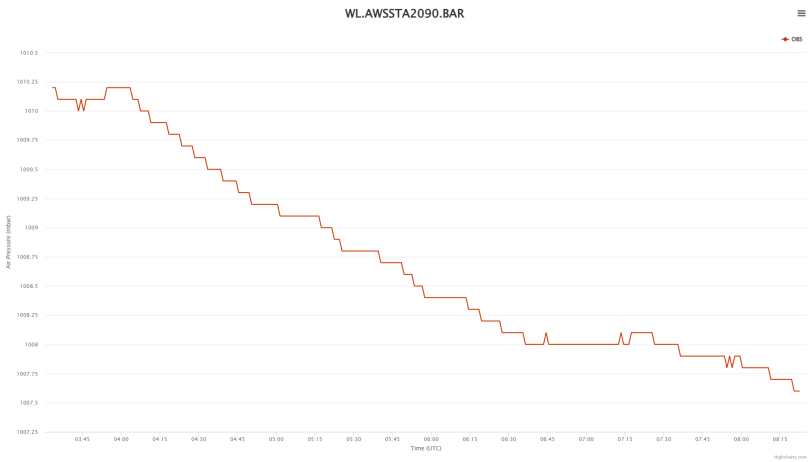
Location Map

Data Provider

BMKG







INEXPENSIVE DEVICE SEA LEVEL MEASUREMENT (IDSL) & TSUNAMI GAUGE SENSORS ARE EQUIPPED BY COASTAL CAM/CCTV TO VISUALLY CONFIRM TSUNAMI WAVE

ID.ID301

Device Description

Name	ID301
Network ID	ID
Station Type	IDSL-WL
Lat/Lon	-5.936047 / 105.512106
Location	P.Sebesi - Lampung -Sumatra
Sensor Type 1	RAD ★★★★
Call Sign I / II	206 / IDSL-301
Datum (LAT/MSL/HAT)	0.59 m / 0.88 m / 1.23 m ⚠

Activity Report

Sampling Period	15 second(s)
Last Data	2022-02-05 08:32:17
Received	2022-02-05 08:32:18
Data Latency	47.26 seconds
Feed Latency	46.26 seconds
Diff.	1.0 seconds
Reported	2022-02-05 08:33:04
Coastal Cam	Latest Image

State of Health (SOH) Status

Panel : -5.5 V Battery : 12.76 V

Location Map

Data Provider

ID.ID302

Device Description

Name	ID302
Network ID	ID
Station Type	IDSL-WL
Lat/Lon	-6.189322 / 105.841088
Location	Marina Jambu
Sensor Type 1	RAD ★★★★★
Call Sign I / II	207 / IDSL-302
Datum (LAT/MSL/HAT)	0.16 m / 0.48 m / 0.86 m ⚠

Activity Report

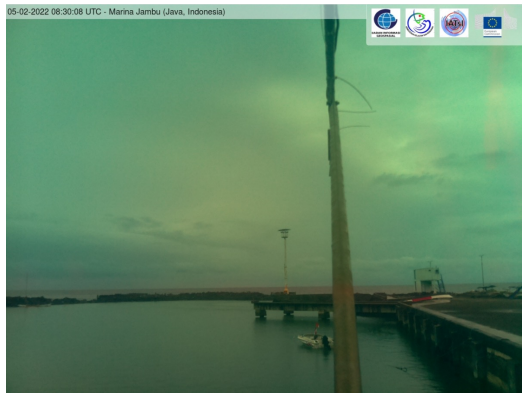
Sampling Period	15 second(s)
Last Data	2022-02-05 08:35:30
Received	2022-02-05 08:35:41
Data Latency	34.93 seconds
Feed Latency	23.93 seconds
Diff.	11.0 seconds
Reported	2022-02-05 08:36:04
Coastal Cam	Latest Image

State of Health (SOH) Status

Panel : -5.5 V Battery : 12.44 V

Location Map

Data Provider



ID.ID309

Device Description

Name	ID309
Network ID	ID
Station Type	IDSL-WL
Lat/Lon	-6.159855 / 105.46036
Location	Pulau Rakata, Krakatau
Sensor Type 1	RAD ★★★★★
Call Sign I / II	634 / IDSL-309
Datum (LAT/MSL/HAT)	0.22 m / 0.51 m / 0.79 m ⚠

Activity Report

Sampling Period	5 second(s)
Last Data	2022-06-17 23:54:50
Received	2022-06-17 23:54:57
Data Latency	15.25 seconds
Feed Latency	8.25 seconds
Diff.	7.0 seconds
Reported	2022-06-17 23:55:05
Coastal Cam	Latest Image

State of Health (SOH) Status

Panel : 0 V Battery : 12.18 V

Location Map

Data Provider

Real-Time Plot | Archive Plot | Power Status

Coastal Cam

TS.MUNJI

Device Description

Name	MUNJI
Network ID	TS
Station Type	TSUNAMI GAUGE
Lat/Lon	-8.4379 / 114.348
Location	Tsunami Gauge Muncar
Sensor Type 1	RAD ★★★★★
Sensor Type 2	PRS ★★★★★
Call Sign I / II	1017 / 1017
Datum (LAT/MSL/HAT)	0.69 m / 1.09 m / 1.77 m ⚠

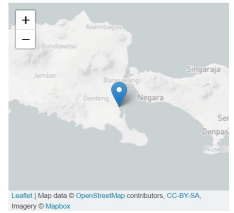
Activity Report

Sampling Period	60 second(s)
Last Data	2022-06-23 21:01:00
Received	2022-06-23 21:04:31
Data Latency	5.07 minutes
Feed Latency	1.57 minutes
Diff.	3.52 minutes
Reported	2022-06-23 21:06:04
Coastal Cam	Latest Image

State of Health (SOH) Status

Panel : 0.18 V Battery : 12.22 V

Location Map

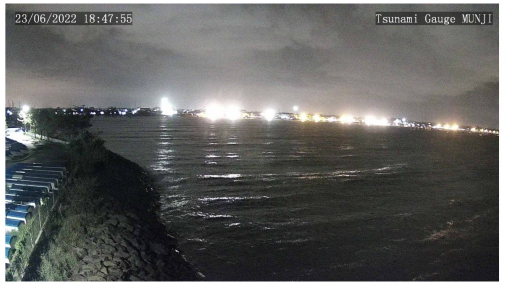


Data Provider

BMKG

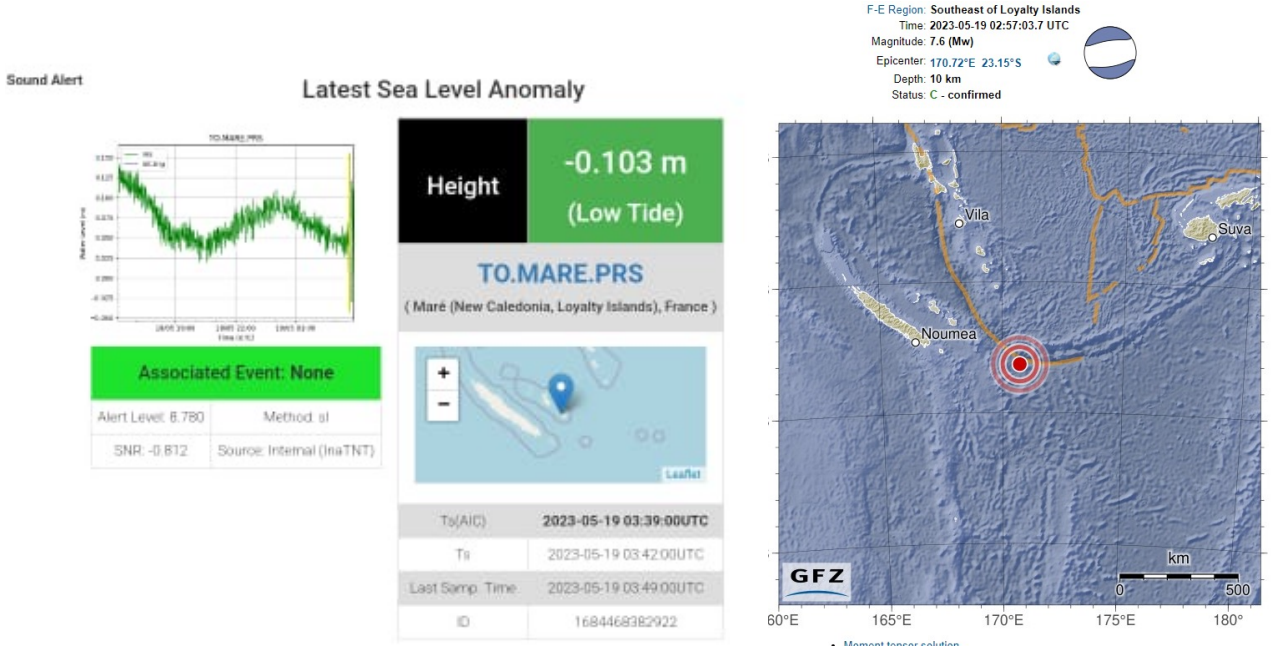
Real-Time Plot | Archive Plot | Power Status

Coastal Cam

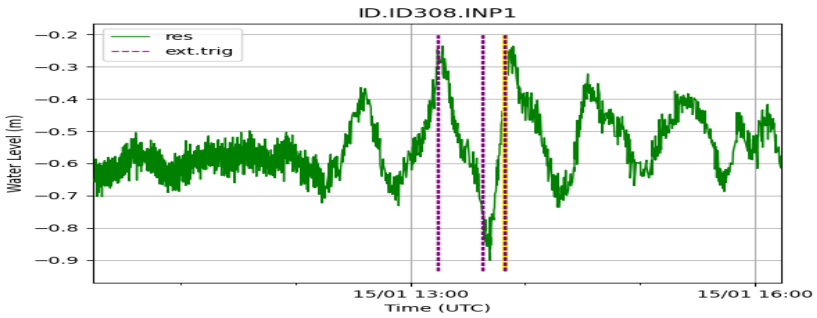


DETECTED EVENTS

DETECTED TSUNAMI TRIGGERED BY EARTHQUAKE MAGNITUDE 7.7 QUAKE OFF NEW CALEDONIA IN INATNT ON 29 MAY 2023



DETECTED METEOTSUNAMI / RISSAGA PHENOMENON FROM 15 JANUARY 2022 HUNGA TONGA VOLCANIC ERUPTION BLAST IN INATNT SYSTEM



The small tsunami was detected caused by the atmospheric disturbance in IDSL Sensor in Prigi, East Java

THANK YOU

CENTER FOR EARTHQUAKE AND TSUNAMI BMKG