Six new tidal stations for the Italian national alert system for tsunamis generated by earthquakes

(*Sistema d'Allertamento nazionale per i Maremoti generati da sisma-SiAM*)

(ISPRA-CN-COS-SiAM & GEO-RIS)

INSTITUTIONAL CONTEXT

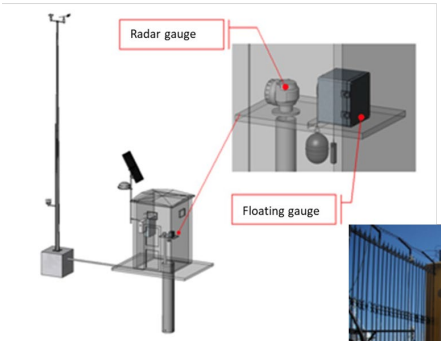
In **2009**, **Italy joined** the **Program of the Intergovernmental Coordination Group for early warning and tsunami mitigation systems in the north-eastern Atlantic, the Mediterranean and connected seas. the Northeast Atlantic, the Mediterranean and the connected seas** (ICG-NEAMTWS) promoted and coordinated within the UNESCO Intergovernmental Oceanographic Commission (IOC/UNESCO) with an included alert system.

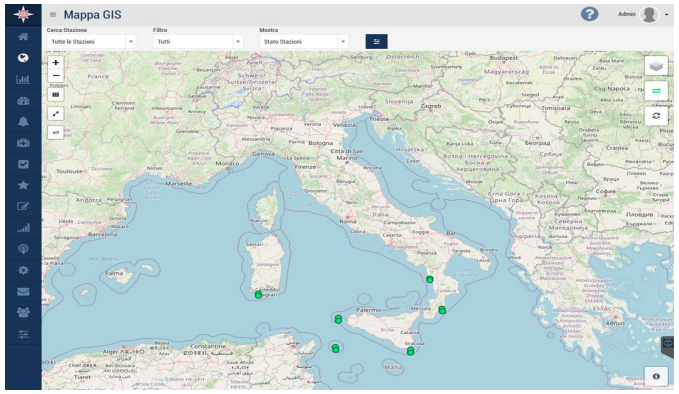
Within NEAMTWS, sea level surveillance in the Mediterranean area is ensured through the tidal networks of coastal countries, whose data are collected and distributed by IOC/UNESCO (http://www.ioc-sealevelmonitoring.org) and by the JRC of the European Commission.

The **Directive of the President of the Council of Ministers** of 17 February 2017 establishing the **National Alert System for Tsunamis generated by earthquakes - SiAM** is published in the Italian Official Gazette (GU General Series n.128 SG of 05-06-2017) involving the National Institute for Geophysics and Vulcanology (INGV), the Department of Civil Protection (DPC) and the National Institute for Environmental Protection and Research (ISPRA).
The System operates through the functional integration of the technical skills and instrumental networks of DPC of INGV and ISPRA.

EVOLUTION OF THE ITALIAN ALERT SYSTEM FOR TSUNAMIS

- From 2017 to 2021, tsunami detection was performed by the National tidal network;
- The historical Italian Tide Gauge (RMN) is probably the most important sea level measurement network in the Mediterranean. However, this network was conceived to measure **sea level** to determine **tides** and includes the meteomarine network of the Italian coasts.
- The measured parameters common for all stations are Microwave level sensor, Shaft-encoder level sensor (float), Barometric sensor, Temperature/humidity sensor, Water temperature sensor, Wind speed sensor, Wind direction sensor (Metereology sensors).
- The historical tide gauge network located in the main Italian ports has till now supported the national tsunami alert system.
- From May 2021 a **new generation network** conceived exclusively for the **identification and timely characterization** of **Tsunamis** is operational.





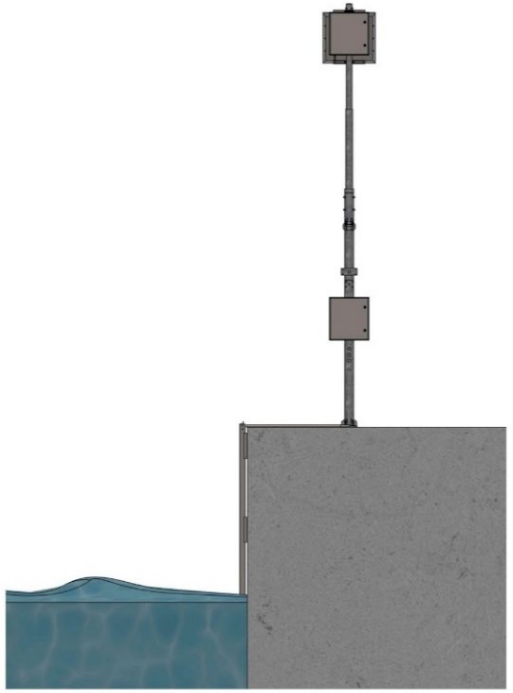
ASSETS OF THE ITALIAN ALERT SYSTEM FOR TSUNAMIS

ISPRA has launched, within the SiAM framework, a program for the implementation of a high precision and high frequency long wave measurement network with the installation of **8 new stations** for sea level measurement, located in the **Central and Southern Tyrrhenian Sea**, in the **Sicilian Channel** and in the **Ionian Sea**, and able to withstand severe operating conditions.

They provide support to:

- Monitoring sea level at high precision and accuracy
- Monitoring sea state
- Coastal defense
- Research

And are linked with the Italian National tide gauge network (RMN).



ASSETS, FACILITIES & EXPERTISE

Water	• sea level • water temperature
Image	Video Monitoring
Position (GPS)	• Latitude, longitude
Data trasmission	• Satellite •IRIDIUM (Short Burst Data) • UMTS 4 or 5G •xG channel IMEI Iridium

PIEZOMETRIC SENSOR & THERMISTOR

Techinical Specifications	
Measuring range	0-10m o 0-20m
Precision	0.002 %FS
Accuracy	0.02 %FS
Serial output interfaces	RS485
Working temperatures	-20°C + 80°C
Degree of protection	IP 68
Temperature sensor	TP1000 precision = 0.1°C
Energy consumption	< 8mA

ASSETS, FACILITIES & EXPERTISE

Real-time monitoring:

- **onshore** :

-Meteorology

-Tide gauges (RMN)

- Almost **offshore**:

- **New generation tide gauges** stations

-Experimental **Buoy**

The new stations are located:

in **Cetraro Lido** (Calabria), **Capo Teulada** (Sardinia), **Portopalo di Capo Passero** (Sicily), **Roccella Jonica** (Calabria) and on the small islands of **Marettimo** (Sicily) and **Pantelleria** (Sicily), in order to alert and confirm potential tsunami events.

SERVICE DELIVERY
OF THE ITALIAN ALERT SYSTEM FOR TSUNAMI

- **Implementation** of the **observation system** of **sudden changes in the sea** level by making data available in real time from the **new measuring stations of long waves**, with **high sampling frequency**, positioned in strategic venues;
- The system is oriented to the **instantaneous detection** of the physical parameter **H** (height of the sea level), identifying sudden changes in sea level, and is able to provide prompt notification to ISPRA in the event of deviations greater than 10% and 30%, with respect to the mean sea level expected, also considering both the astronomical and meteorological components;
- Technological improvement of observation stations and implementation with measurement sensors of other physical and environmental parameters (pressure, temperature, altitude localisation via GPS; image acquisition via photo-video camera, etc.);
- **Production of periodic**/annual operational **reports** regarding sismo-induced tsunami events;
- Making available and public the registrations of the new stations through the use of the ISPRA-SiAM-TAD-Server https://tsunami.isprambiente.it/TAD_Server/Home platform, which also includes the registrations of the RMN and other stations in the Mediterranean area, made available by other data suppliers (e.g. Joint Research Center of the European Commission, JRC).

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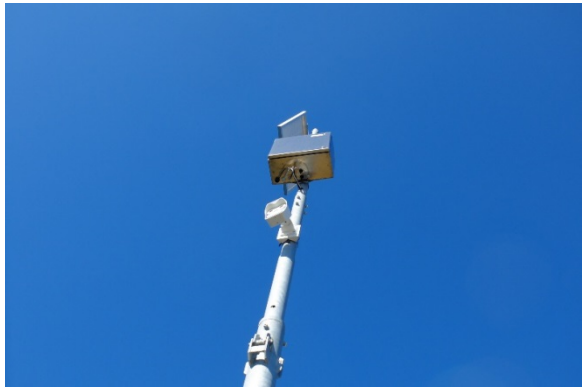
Sistema Nazionale per la Protezione dell'Ambiente

SISTEMA D'ALLERTAMENTO NAZIONALE PER I MAREMOTI GENERATI DA SISMA
SiAM

ASSETS & FACILITIES



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SISTEMA D'ALLERTAMENTO NAZIONALE PER I MAREMOTI GENERATI DA SISMA
SiAM

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

North Eastern Atlantic Mediterranean and connected seas Tsunami Information Centre

ASSETS & FACILITIES

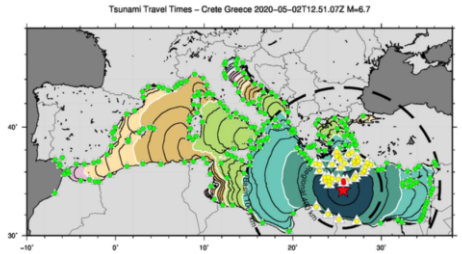
TECHNICAL REPORTS

ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

Comunicato evento

Il maremoto del 2 maggio 2020

Mar Mediterraneo orientale



Roma, 02 maggio 2020

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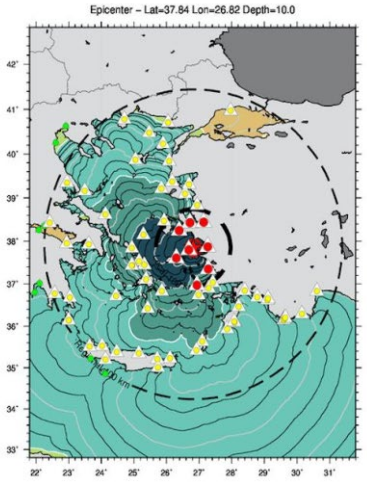
Comunicato evento

Il maremoto del 30 ottobre 2020

Mar Egeo – Isola di Samos



Roma, 30 ottobre 2020

ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

Centro Nazionale per la caratterizzazione ambientale e la protezione della fascia costiera e l'oceanografia operativa

Responsabile: Maurizio Ferla

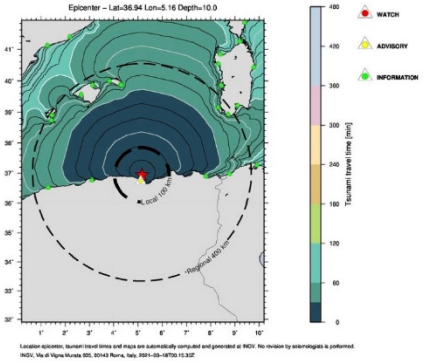
Comunicato evento

Il maremoto del 18 Marzo 2021

Mar Mediterraneo Occidentale

Sezione tecnico operativa di supporto al SiAM
Reperibilità H24/7

Giovanni Arena - Calogero Gera - Nicola Giordano



Roma, 18 Marzo 2021

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www.isprambiente.gov.it/it/servizi/sistema-nazionale-di-allerta-maremoti-1

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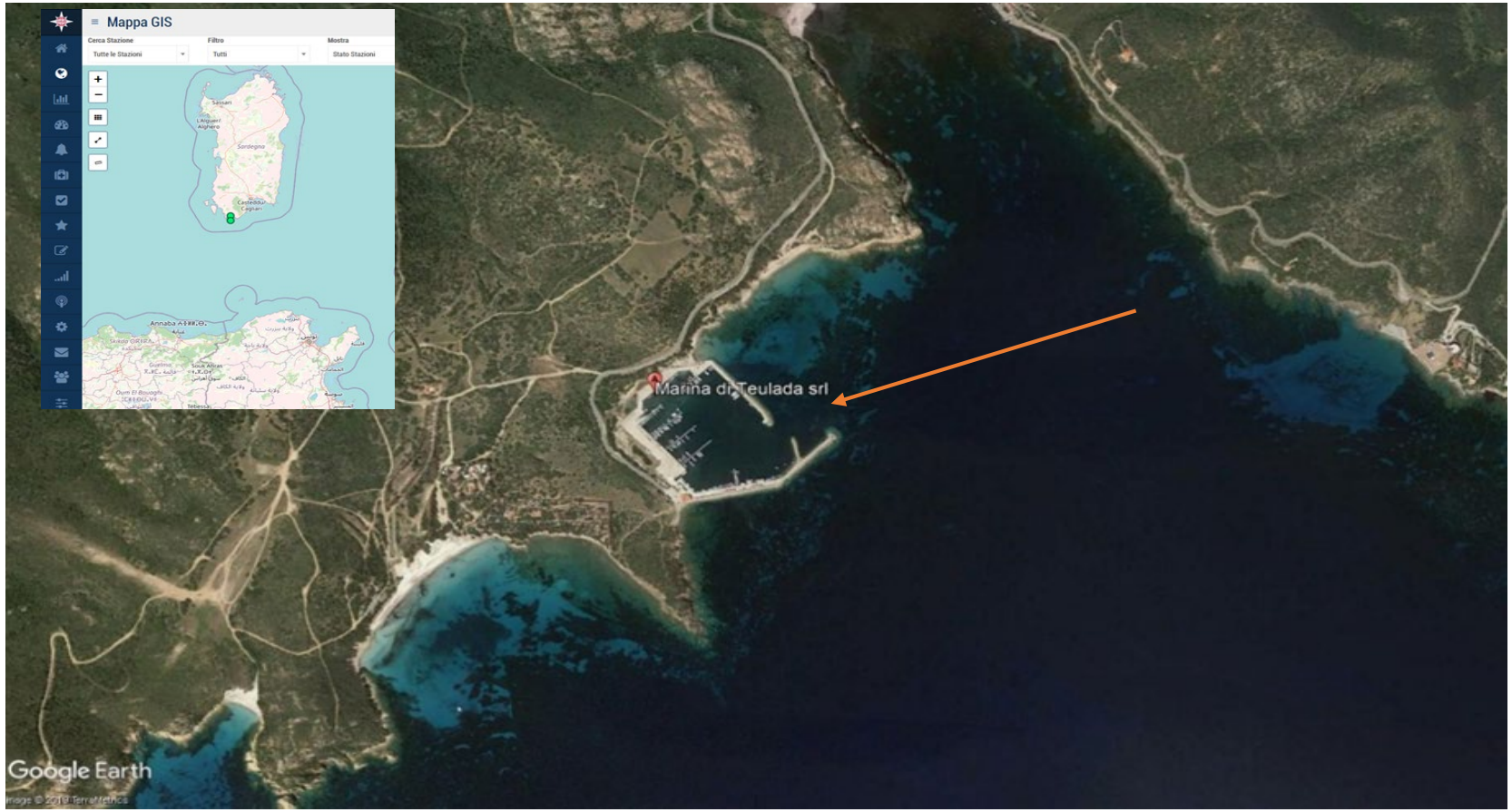
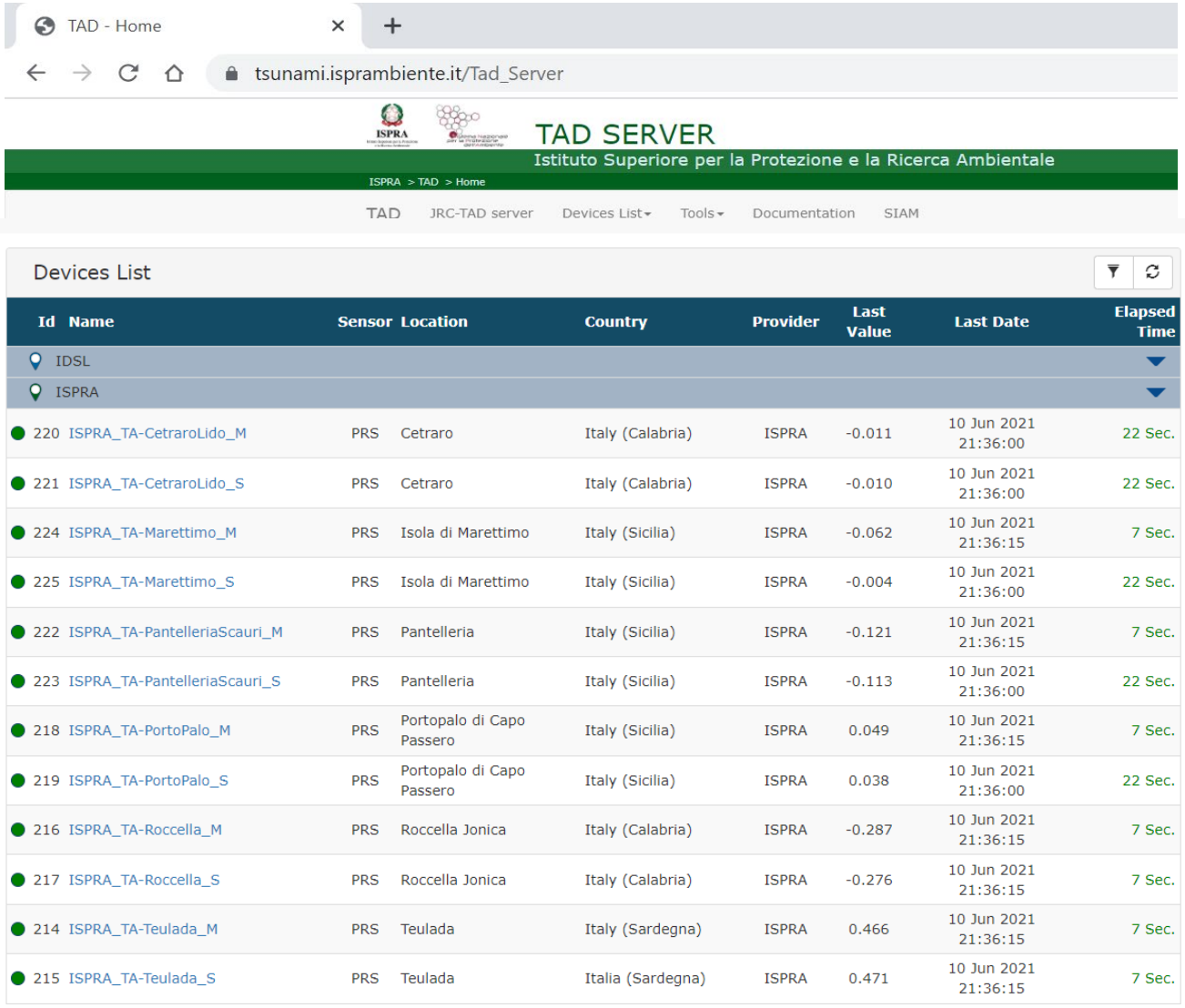
Sistema Nazionale per la Protezione dell'Ambiente

SISTEMA D'ALLERTAMENTO NAZIONALE PER I MAREMOTI GENERATI DA SISMA
SiAM

TEULADA STATION (SARDINIA)





Id	Name	Sensor	Location	Country	Provider	Last Value	Last Date	Elapsed Time
	IDSL							
	ISPRA							
220	ISPRA_TA-CetraroLido_M	PRS	Cetraro	Italy (Calabria)	ISPRA	-0.011	10 Jun 2021 21:36:00	22 Sec.
221	ISPRA_TA-CetraroLido_S	PRS	Cetraro	Italy (Calabria)	ISPRA	-0.010	10 Jun 2021 21:36:00	22 Sec.
224	ISPRA_TA-Marettimo_M	PRS	Isola di Marettimo	Italy (Sicilia)	ISPRA	-0.062	10 Jun 2021 21:36:15	7 Sec.
225	ISPRA_TA-Marettimo_S	PRS	Isola di Marettimo	Italy (Sicilia)	ISPRA	-0.004	10 Jun 2021 21:36:00	22 Sec.
222	ISPRA_TA-PantelleriaScauri_M	PRS	Pantelleria	Italy (Sicilia)	ISPRA	-0.121	10 Jun 2021 21:36:15	7 Sec.
223	ISPRA_TA-PantelleriaScauri_S	PRS	Pantelleria	Italy (Sicilia)	ISPRA	-0.113	10 Jun 2021 21:36:00	22 Sec.
218	ISPRA_TA-PortoPalo_M	PRS	Portopalo di Capo Passero	Italy (Sicilia)	ISPRA	0.049	10 Jun 2021 21:36:15	7 Sec.
219	ISPRA_TA-PortoPalo_S	PRS	Portopalo di Capo Passero	Italy (Sicilia)	ISPRA	0.038	10 Jun 2021 21:36:00	22 Sec.
216	ISPRA_TA-Roccella_M	PRS	Roccella Jonica	Italy (Calabria)	ISPRA	-0.287	10 Jun 2021 21:36:15	7 Sec.
217	ISPRA_TA-Roccella_S	PRS	Roccella Jonica	Italy (Calabria)	ISPRA	-0.276	10 Jun 2021 21:36:15	7 Sec.
214	ISPRA_TA-Teulada_M	PRS	Teulada	Italy (Sardegna)	ISPRA	0.466	10 Jun 2021 21:36:15	7 Sec.
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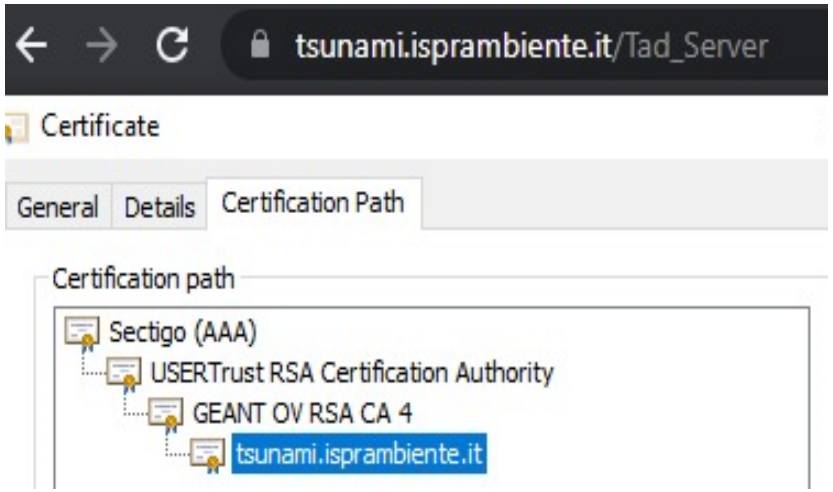

The digital platform:
www.tsunami.isprambiente.it
is certified by the competent International Authority and the IN/OUT data traffic is encrypted with a 3072 bit RSA key.

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SISTEMA D'ALLERTAMENTO NAZIONALE PER I MAREMOTI GENERATI DA SISMA
SiAM

PEC e Contatti | Accessibilità | Privacy | Note Lega

TAD SERVER

Istituto Superiore per la Protezione e la Ricerca Ambientale

ISPRA > TAD > ISPRA_TA-Teulada_M

TAD | JRC-TAD server | Devices List | Tools | Documentation | SIAM

Tide gauge details ISPRA_TA-Teulada_M

Device description

Name	**ISPRA_TA-Teulada_M**
Lat/Lon	**38.927562 / 8.719502**
Location	**Teulada (Sardegna - Italy)**
Height	**0 m**
Webcam 1	**Link**

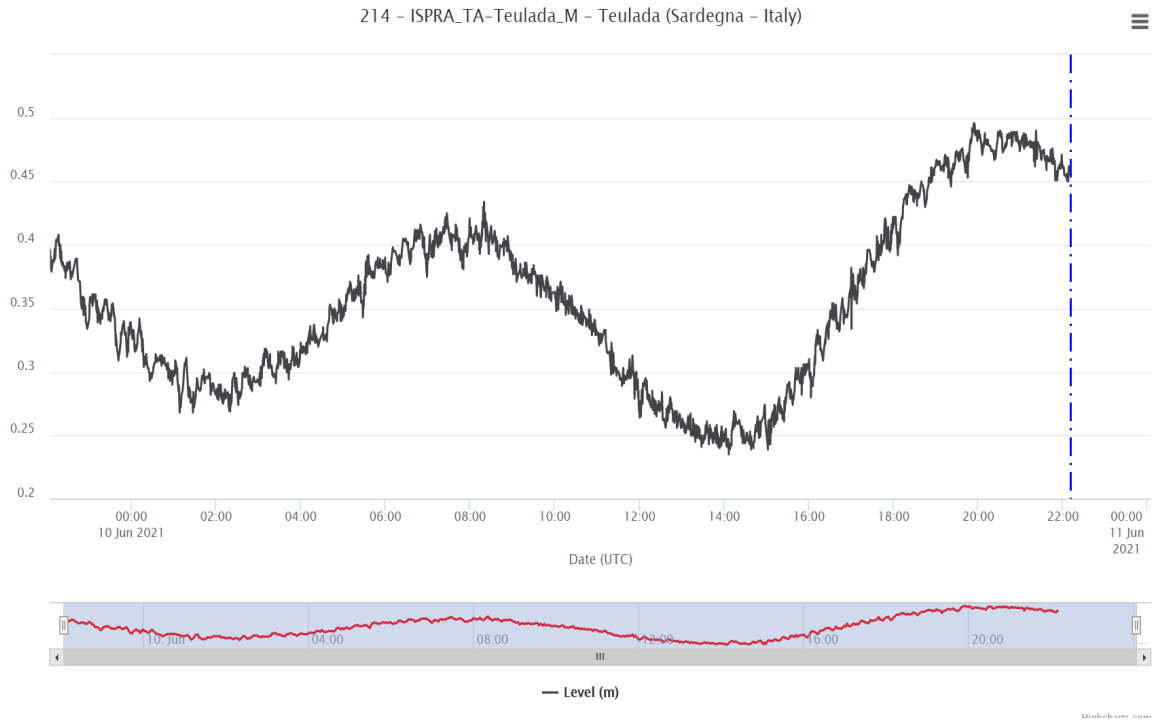
Last measured values

Time(UTC)	**10 Jun 2021 22:04:45**
Elapsed Time	**23 Sec.**
Alert	**0**
Alert signal (m)	**0.005**
Forecast 30 (m)	**0.451**
Forecast 300 (m)	**0.456**
Level (m)	**0.451**
rms 30 (m)	**0.005**
Water Temp (m)	**20.3**

Plots | Raw Data | Device Details | Device Statistics | Interactive plot | Devices List

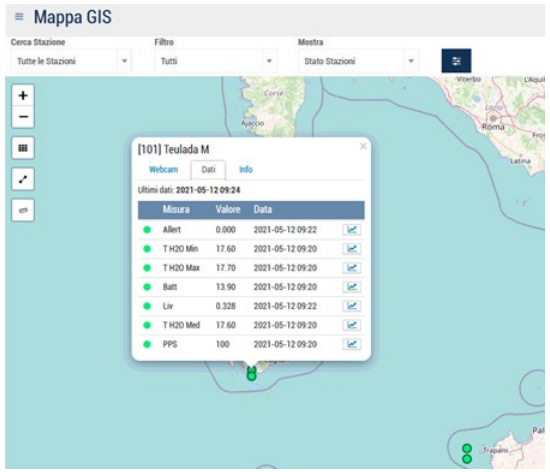
214 - ISPRA_TA-Teulada_M - Teulada (Sardegna - Italy)

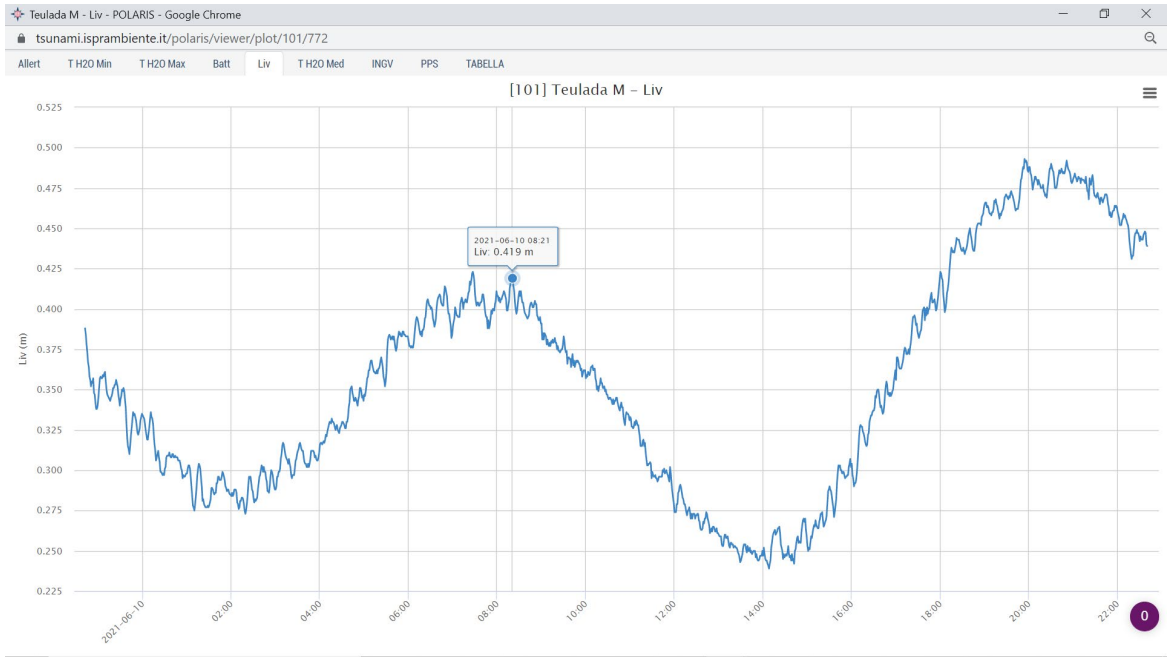
Plots | Raw Data | Device Details | Device Statistics | Interactive plot | Devices List

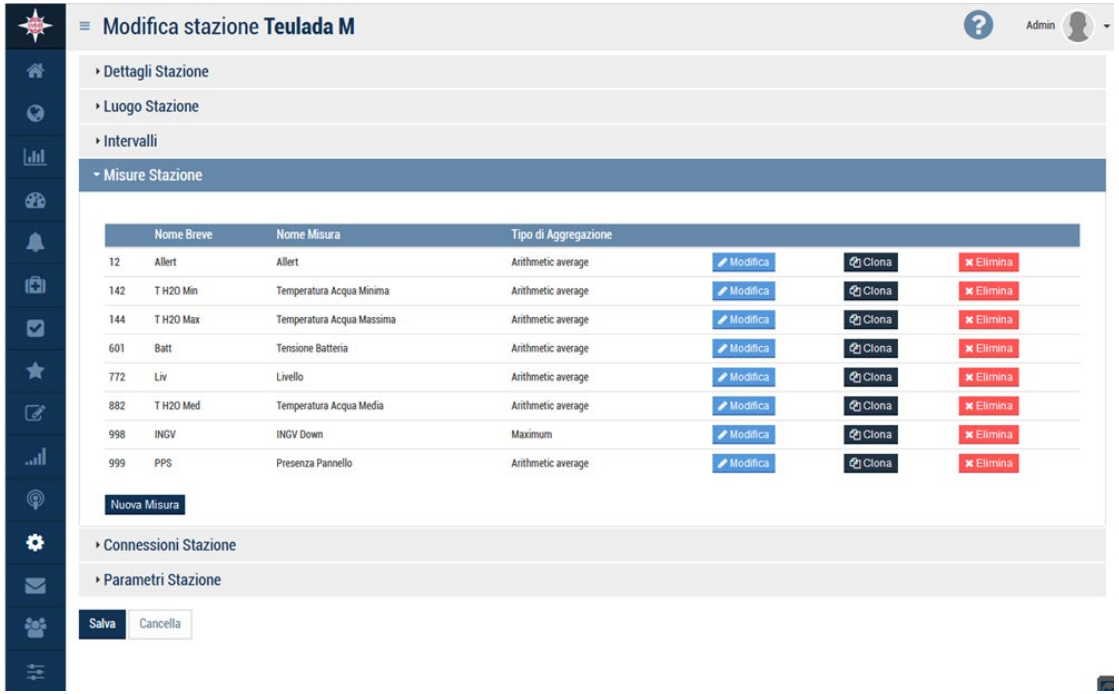


SiAM Sea Levels

https://tsunami.isprambiente.it/polaris





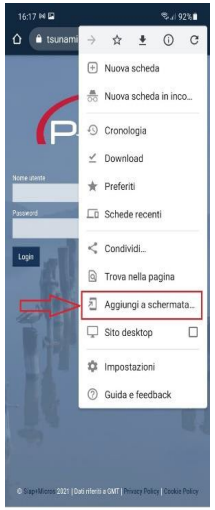


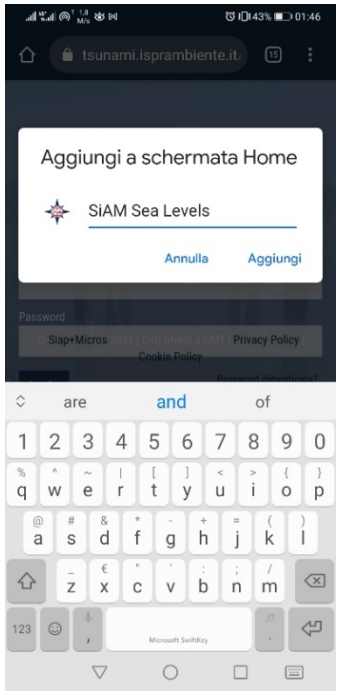
SiAM Sea Levels

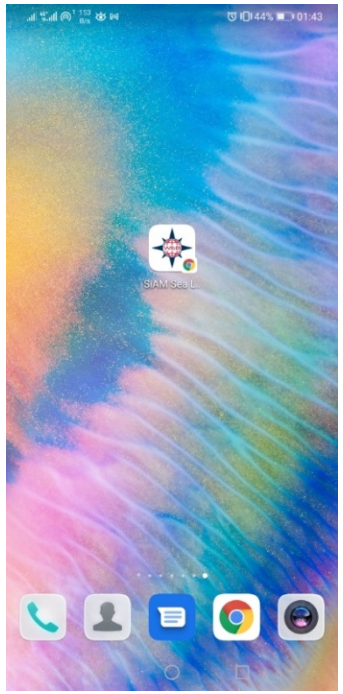
tsunami.isprambiente.it/polaris

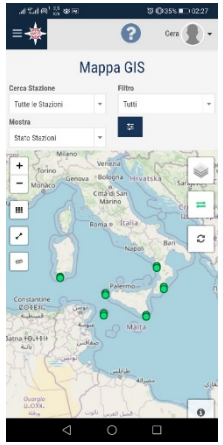
WEB APP

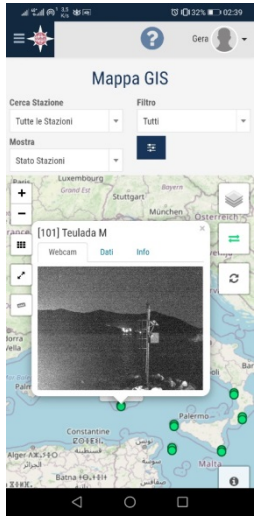
1) Start the Google Chrome web browser application on the phone
2) Copy and paste the address into the search bar: tsunami.isprambiente.it/polaris/log in
3) Wait for the page to load and then tap the menu button (the 3 dots at the top right)
4) Select Add to Home screen from the menu
5) Change the preference name (eg SiAM Sea Levels) select Add
6) The system generates a direct icon to the page. The icon can be moved to the preferred position (even in a folder with other apps).

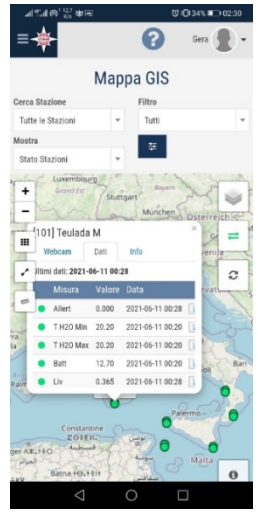


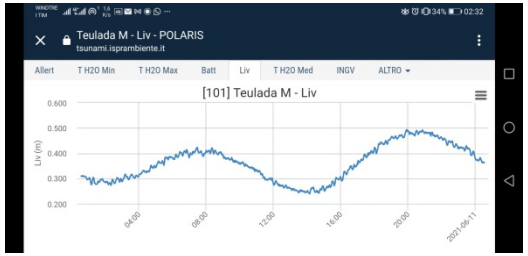












INNOVATIVE COMPONENT

Experimental **oceanographic buoy** with satellite data transmission system (GPS and Galileo) on board resulting from the collaboration between ISPRA and the European Commission's Joint Research Center (JRC).

Thank you

SISTEMA D'ALLERTAMENTO NAZIONALE
PER I MAREMOTI GENERATI DA SISMA
SiAM

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