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ICG/CARIBE-EWS XVIII
May, 5-7+9, 2025

Status Report of the ICG/NEAMTWS (2024-2025)

Alessandro Amato
Chair

Amr Hamouda and Ignacio Aguirre Ayerbe
(vice Chair)

Denis Chang Seng
Technical Secretary

North-East Atlantic, Mediterranean anc connected seas Tsunami Warning and mitigation System

WG1 - Hazard assessment and modelling

(J. Macias / A. Gailler)

WG2 - Seismic, Geophysical and Sea Level Measurements

(A. von Gyldenfeldt / D. Cambaz)

WG3 - Public Awareness, Preparedness and Mitigation

(C. Valbonesi / R. Partheniu)

Task Team on Tsunami Exercises

C. Ozer Sozdinler / M. Charalampakis

Task Team on Operations

A. Piatanesi / F. Carrilho

Task Team on Documentation

N. Kalligeris / S. Lorito

Task Team on Tsunami Ready

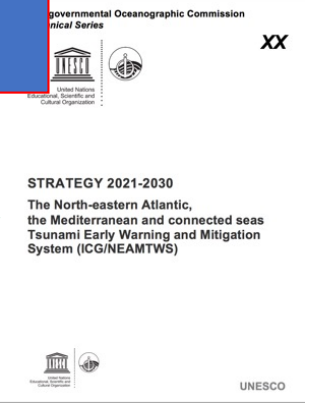
E. Daskalaki / M.A. Baptista

New Task Team
Non seismic tsunami sources

F. Romano / R. Omira

New Task Team
Governance

I. A. Ayerbe/ D. Cambaz



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NEAMTWS MEETINGS 2024-25

13 May 2024: ICG/NEAM Steering Committee (online)

11 April 2024: Coastal Cities and Communities Joining Tsunami Ready, Ocean Conference, Barcelona

24-25 May 2024 CoastWAVE Project- Phase 1 Closure Meeting, Alexandria, Egypt

Coastal Horizons: … Strengthen Resilience to Coastal Hazards, 57 IOC Exec. Council, June 202 – Side Event

Nov. 2024: Global Symposium, Banda Aceh, Indonesia

26 Nov. 2024: ICG/NEAM Steering Committee

27-29 Nov. 2024: ICG/NEAMTWS XIX Session

2024: Several TSp meetings

2025: Santorini situation meetings
2025: Lisbon TSP meeting on PTF application (March)
2025: Tsunami Source meeting
2025: Istanbul NEAM Steering Committee (May)

Major Workshop

- Partners and Stakeholders Convened in Alexandria, Egypt 24-25 May 2024
- CoastWAVE Project- Phase 1 Closure Meeting

Major International Workshop

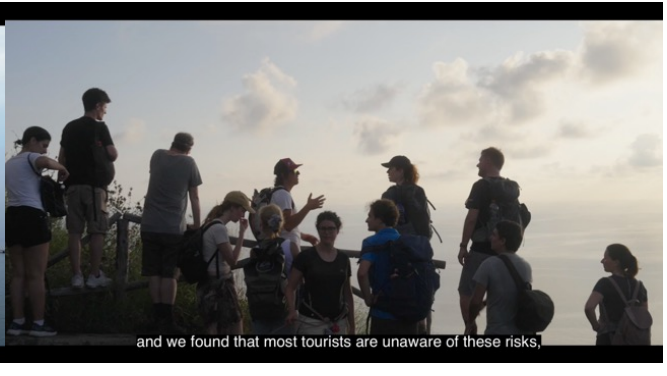
80 International Experts Participated

- Stromboli Workshop, Organized by INGV, Italy 5-7 October 2024

Focus on volcanic tsunami observations, modeling, hazard assessment, and forecasting

A movie on Stromboli tsunami EWS

presented at the 2024 NEAM ICG, Paris, Nov. 2024



NEAM participation in the Global Symposium, Banda Aceh, Nov. 2024

Thanks
Harkunti
and staff !

Tsunami source meeting with a special focus on two high-risk zones:
the Hellenic Arc and the Azores-Gibraltar Fracture Zone
UNESCO HQ, Paris, March 2025
CoastWave2.0 Project

- Known Hazards and looking beyond
- Learning from history: major tsunamis revisited
- Open Science and data standardization (EPOS)
- Probabilistic Approaches (NEAMTHM18)
- Moving forward

Some D&R and news from the last NEAM ICG

- ✓ **Reaffirmed** the target to have a total of **25 UNESCO-IOC Tsunami Ready Recognized communitie**s in NEAM countries by the end of 2026…
- ✓ **Noted** the official closure of Phase I of the European Union DG-ECHO CoastWAVE project on 30 June 2024 and the external evaluation carried out…
- ✓ Also **noted** the official start of Phase II of the new **CoastWAVE Project (CoastWAVE 2.0)** 'Scaling-Up and Strengthening the Resilience of Coastal Communities in the NEAM and its kick-off workshop on 6 November 2024;
- ✓ **Agreed** to adopt the **threat levels** as requested by the Task Team on Tsunami Watch Operations…
- ✓ **Decided** to establish the **new Task Team on Governance** and conduct the next NEAMWave exercise in March 2026 (**NEAMWave26**);
- **Projects** Related to NEAMTWS (EU), EPOS, GeoInquire, GTM, NEAM-COMMITMENT: NEAM Collaboration fOr iMproved tsunaMi rIsk miTigation and manageMENT
- Also appreciates the increase in number of **actions submitted** (Ocean Decade Call 7) in the NEAM region endorsed and submitted **to Ocean Decade**
- Appreciates the newly recognized UNESCO-IOC **Tsunami Ready Communities** in Egypt (Alexandria), France (Cannes), Greece (Samos), Italy (Minturno), Spain (Chipiona) and Türkiye (Büyükçekmece) in 2024;

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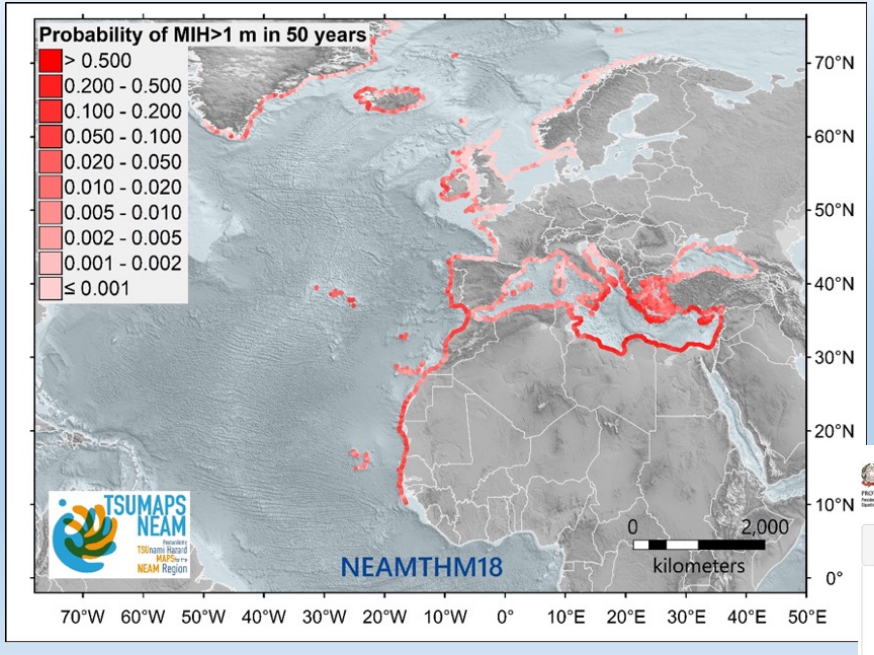
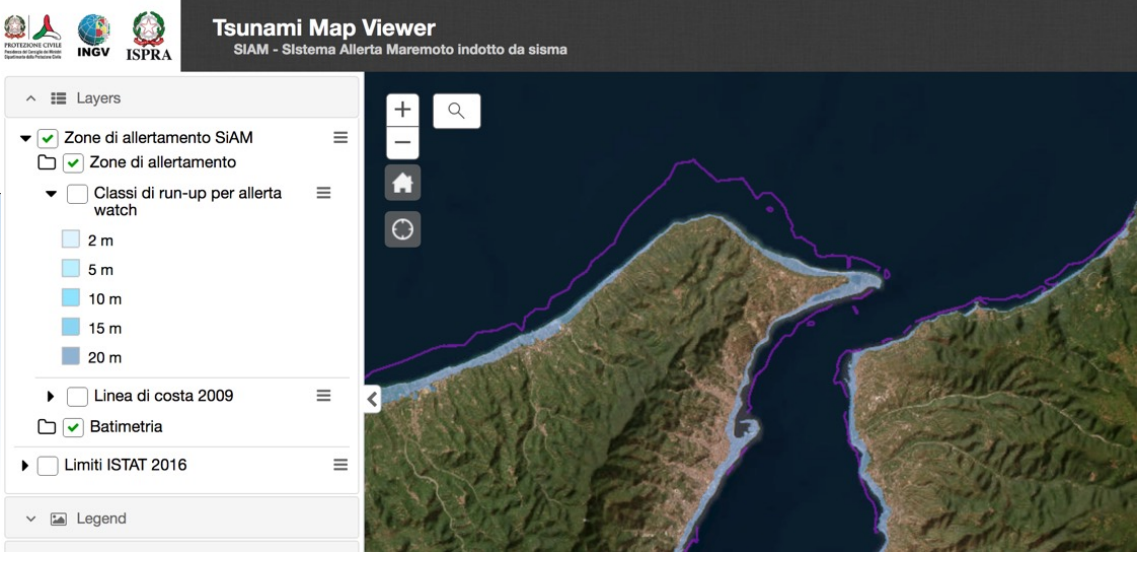
PILLAR 1 - HAZARD 2024

S-PTHA assessment at national and local level (for defining inundation zones)



- In some countries (e.g. **Italy**) the TSUMAPS-NEAM S-PTHA were used to define the **inundation zones**.
- In the DG-ECHO NEAM-Commitment project (Feb. 2025) the approach will be applied to **Spain Greece, Cyprus**, to have inundation maps at national scale, agreed with Govt/CP authorities

- Other approaches at **regional / local scale** are being adopted (e.g. France, Larnaca/Cyprus, Stromboli, etc.)
- Larnaca, Cyprus Hi-Res local PTHA (within CW.1 project)



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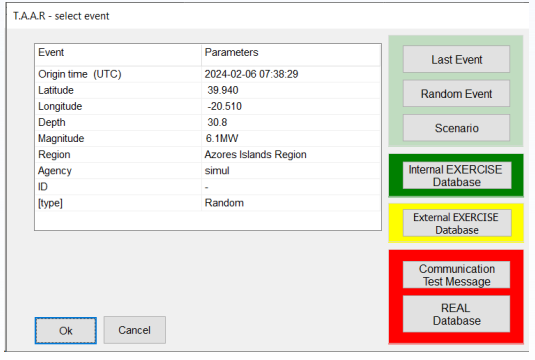
PILLAR 2 - WARNING 2024

Exercises

Monthly communication tests (1/month) by each of the 5 TSP

- Concern on no response from some MS
- Capacity to receive warning in case of real events
- Statistics on telecom



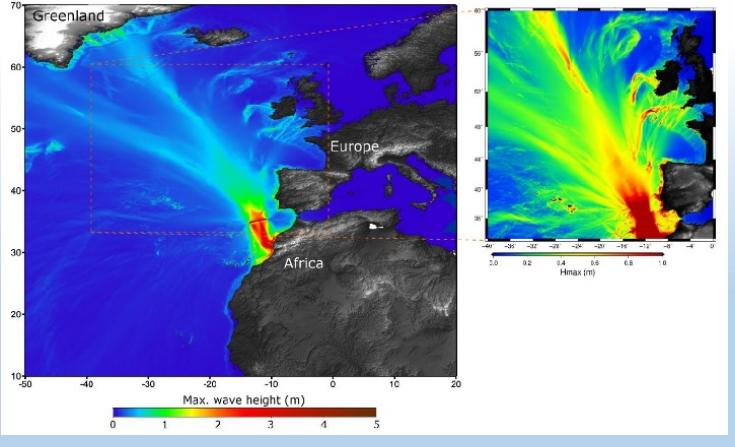
IPMA

NEAMWave Exercises

ICG/NEAMTWS TSUNAMI EXERCISE

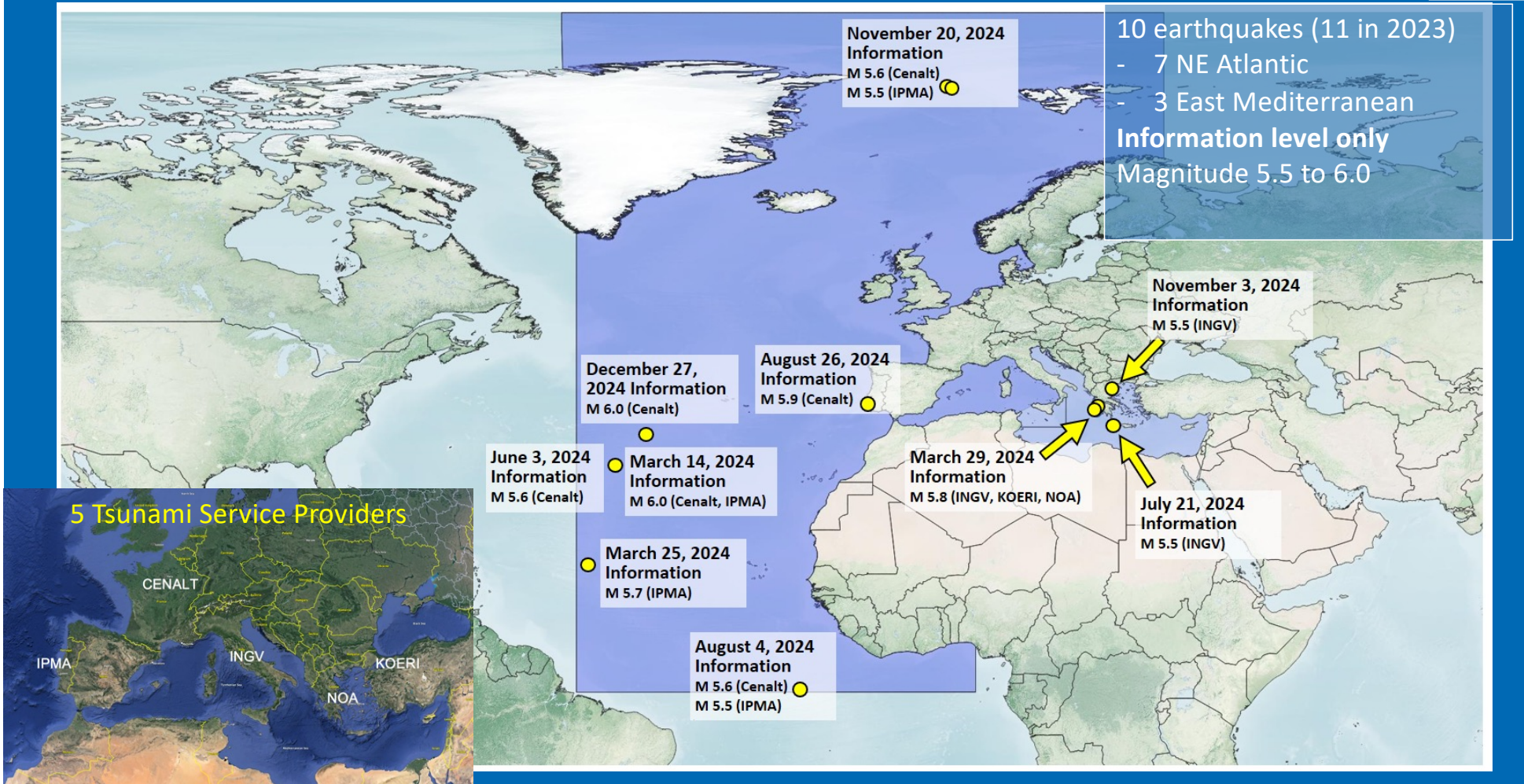
NEAMWave23

- NEAMWave23 Report available
  - Scenario NE Atlantic (Portugal, France)
  - Scenarios Mediterranean (Italy, Greece, Turkey)

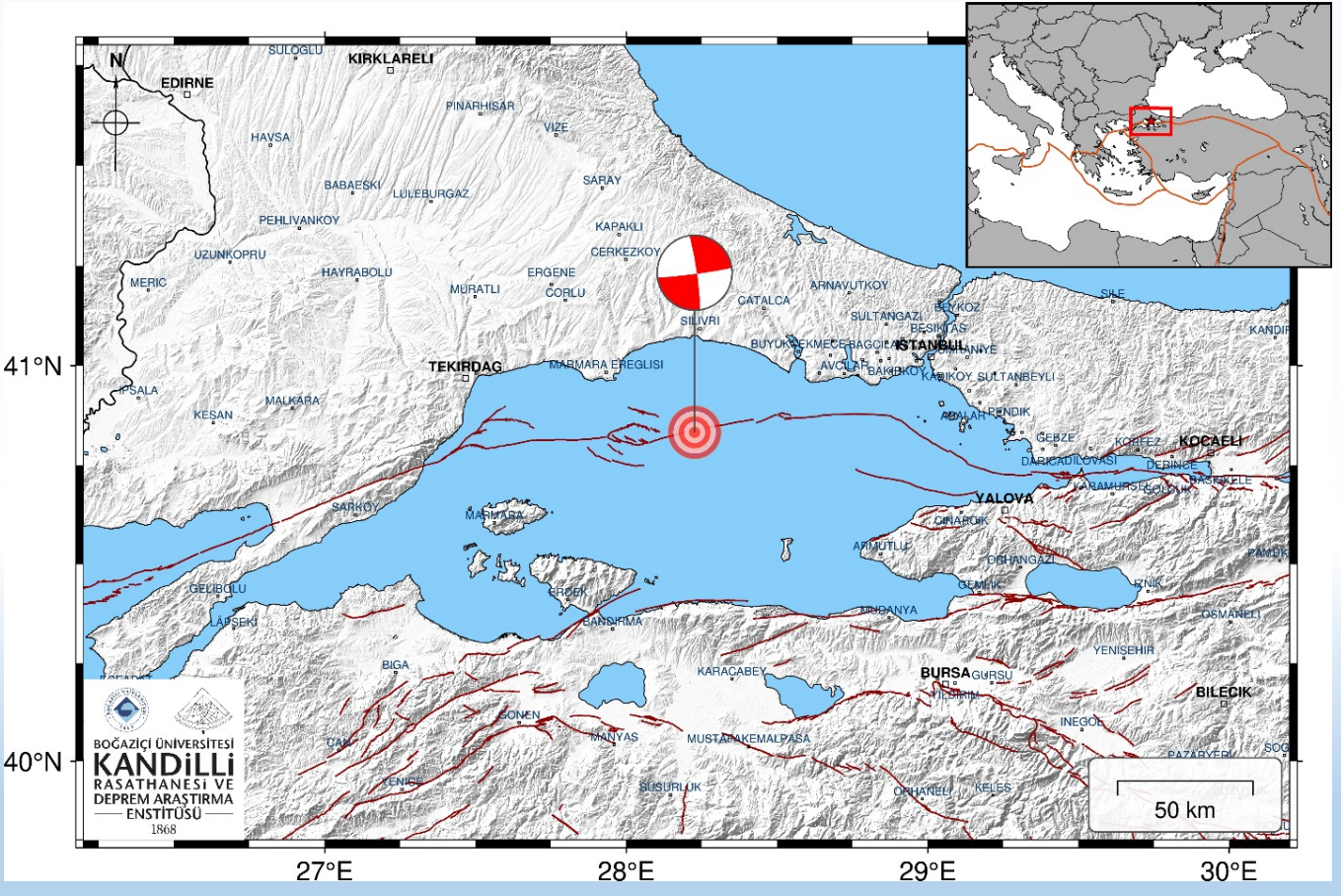


Next NEAMWave scheduled on Spring 2026

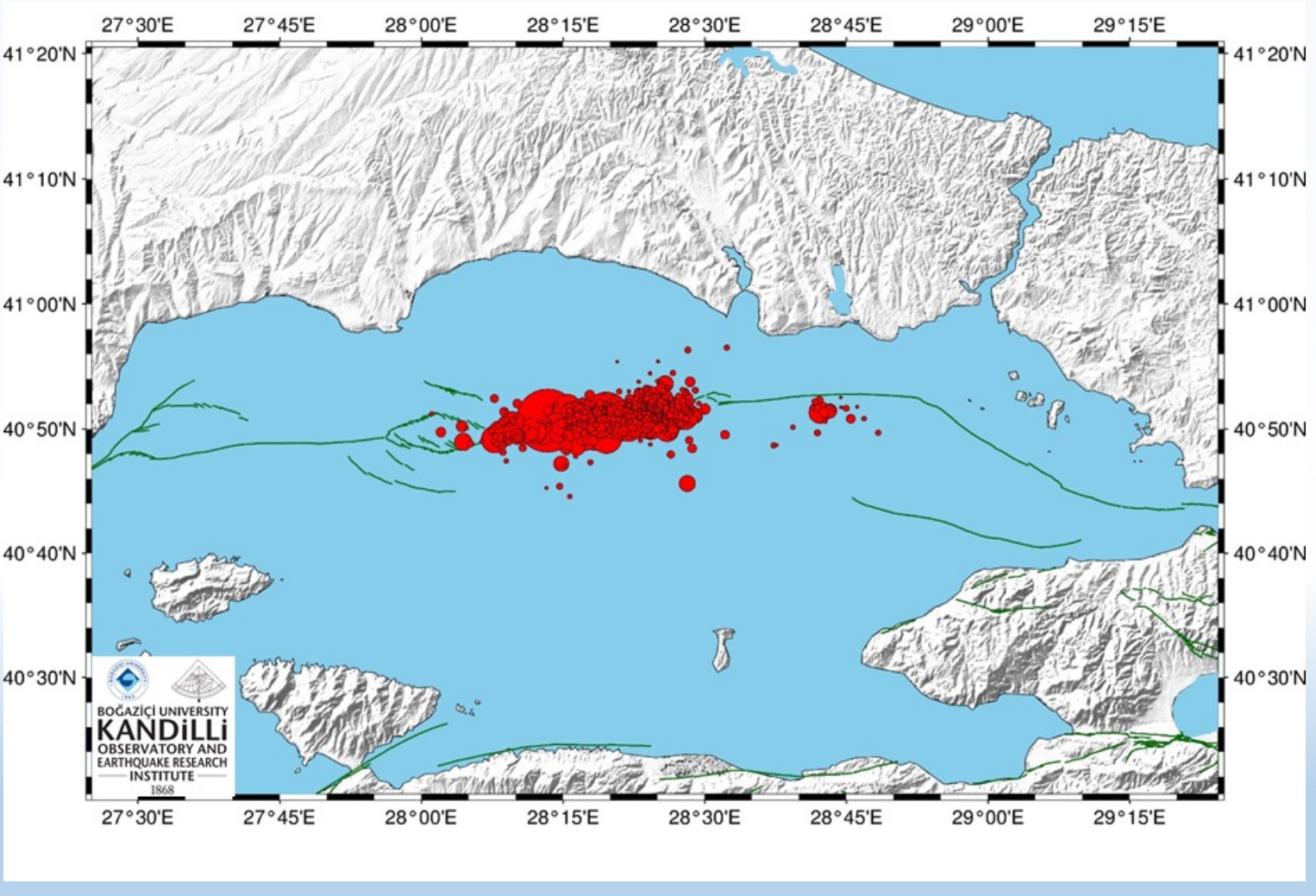
NEAMTWS 2024 Events



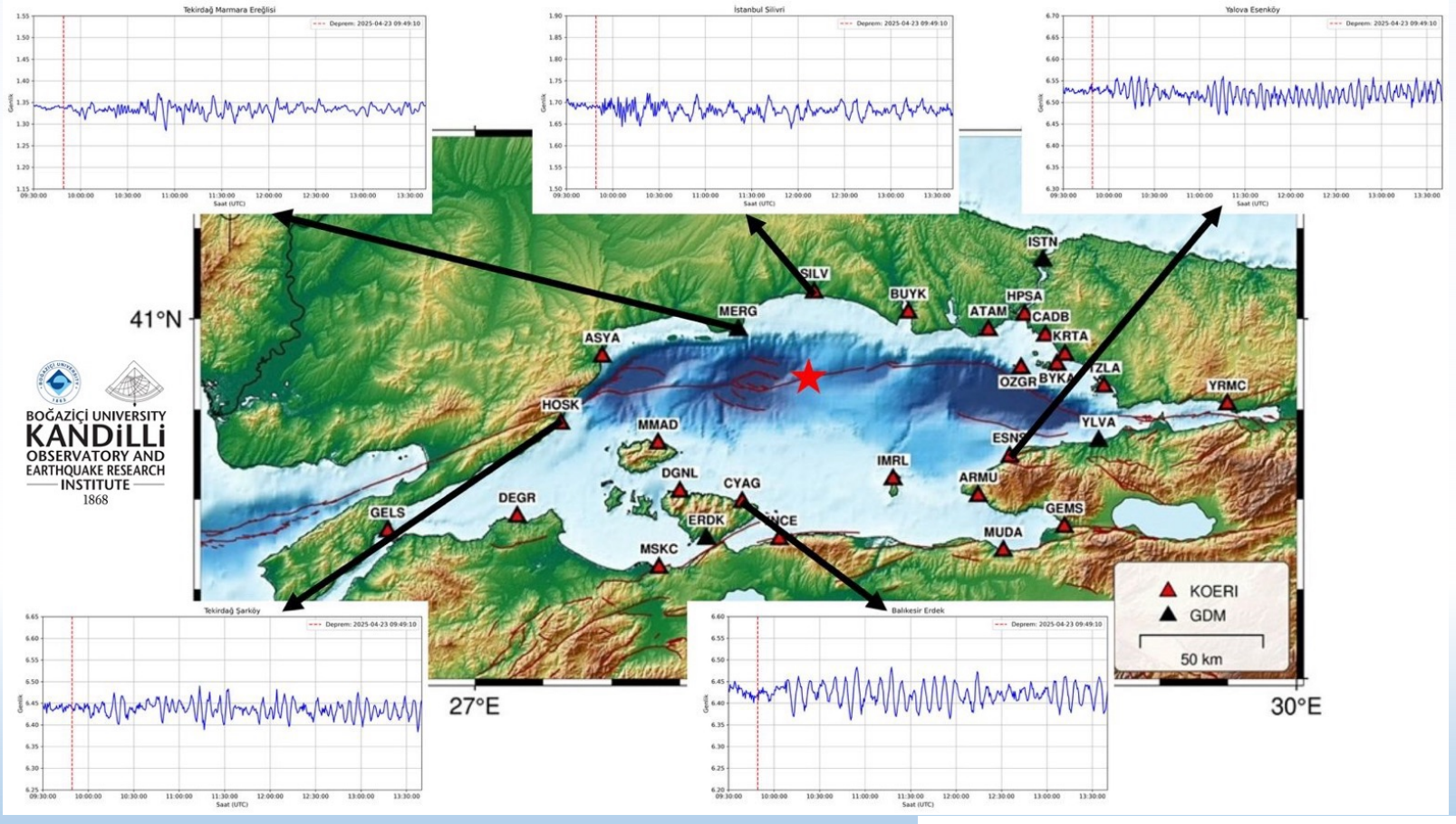
Advisory for a Mw6.3 earthquale in Marmara Sea on Aprile 23, 2025



Location map of the Marmara Sea (23.04.2025, 09:49:09 UTC) earthquake.



Marmara Sea earthquake activity (***M1.1-M6.1: 575 earthquakes***) in between ***23.04.2025 - 29.04.2025***



Sea level measurements in the Marmara Sea region

COUNTRY	GAUGE LOCATION	LAT	LON	TIME	AMPLITUDE(M)	PERIOD(MIN)
TURKIYE	ISTANBUL SILIVRI	41.0724	28.2390	0950Z 23 APR	00.03	02.1
TURKIYE	TEKIRDAG M.EREGLI	40.9690	27.9622	0954Z 23 APR	00.02	06.4
TURKIYE	YALOVA ESENKOY	40.6183	28.9532	1003Z 23 APR	00.04	04.8
TURKIYE	BALIKESIR ERDEK	40.4924	27.9761	1006Z 23 APR	00.06	06.4
TURKIYE	TEKIRDAG SARKOY	40.7098	27.3143	1010Z 23 APR	00.05	06.4

TSUNAMI MESSAGE NUMBER 005
NEAM TSUNAMI SERVICE PROVIDER KOERI (TURKIYE)
ISSUED AT 1150Z 23 APR 2025
…
AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS
ORIGIN TIME - 0949Z 23 APR 2025
COORDINATES - 40.86 NORTH 28.23 EAST
DEPTH - 10.00 KM
LOCATION - TURKEY
MAGNITUDE - 6.3 [Mwp]

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY.

COUNTRY	GAUGE LOCATION	LAT	LON	TIME	AMPLITUDE(M)	PERIOD(MIN)
TURKIYE	ISTANBUL SILIVRI	41.0724	28.2390	0950Z 23 APR	00.03	02.1
TURKIYE	TEKIRDAG M.EREGLI	40.9690	27.9622	0954Z 23 APR	00.02	06.4
TURKIYE	YALOVA ESENKOY	40.6183	28.9532	1003Z 23 APR	00.04	04.8
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TURKIYE	TEKIRDAG SARKOY	40.7098	27.3143	1010Z 23 APR	00.05	06.4

Media/News

https://www.newsbomb.gr/kosmos/story/1644087/nyxta-agonias-stin-konstantinoypoli-oi-ektimiseis-karastathi-kai-synolaki-gia-ton-seismo-ton-6-2r

https://gazeteoksijen.com/turkiye/marmara-denizi-tarihinin-ilk-tsunami-alarminda-sistem-nasil-calisti-240518

How did the system work in the first tsunami alarm in the history of the Marmara Sea?

The 6.2 magnitude earthquake that occurred off the coast of Silivri on April 23 also brought Istanbul's current preparedness capacity against tsunami risk to the agenda. The warning given by the Kandilli Observatory in the sixth minute of the earthquake was recorded as the first tsunami alarm in the history of the Marmara Sea.

Tsunami recorded (up to 6cm) at many of the 24 tide gauges located in Marmara Sea

https://gazeteoksijen.com/turkiye/marmara-denizi-tarihinin-ilk-tsunami-alarminda-sistem-nasil-calisti-240518

INGV TSP message

TSUNAMI MESSAGE NUMBER 001
NEAM INGV IT-NTWC TSUNAMI SERVICE PROVIDER
ISSUED AT 0953Z 23 APR 2025

... TSUNAMI ADVISORY ...
THIS ALERT APPLIES TO TURKIYE

... TSUNAMI INFORMATION ...
THIS ALERT APPLIES TO ALBANIA ... ALGERIA ... BOSNIA_HERZEGOVINA ...
CROATIA ... CYPRUS ... EGYPT ... FRANCE ... GREECE ... ISRAEL ...
ITALY ... LEBANON ... LIBYA ... MALTA ... MONACO ... MONTENEGRO ...
MOROCCO ... SLOVENIA ... SPAIN ... SYRIA ... TUNISIA ... UK

THIS ALERT IS ADDRESSED TO ALL COUNTRIES AND INSTITUTIONS SUBSCRIBED
TO THE SERVICES OF INGV TSP IN ITS MONITORING AREA

THIS MESSAGE IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY
NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE
DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY
ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS
ORIGIN TIME - 0949Z 23 APR 2025
COORDINATES - 40.91 NORTH 28.21 EAST
DEPTH - 19 KM
LOCATION - TURKIYE
MAGNITUDE - 6.3

ALERT LEVEL IS ASSIGNED ACCORDING TO THE ABOVE ESTIMATIONS OF

Initial message issued by INGV-TSP **4 minutes** after the earthquake.

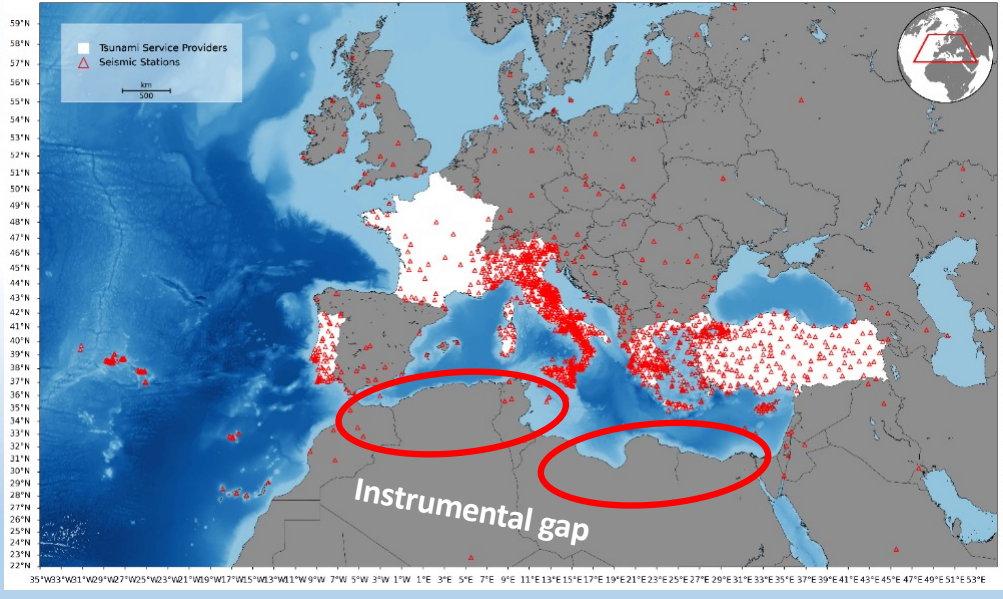
Three more messages with readings and END.

PTF testing OK

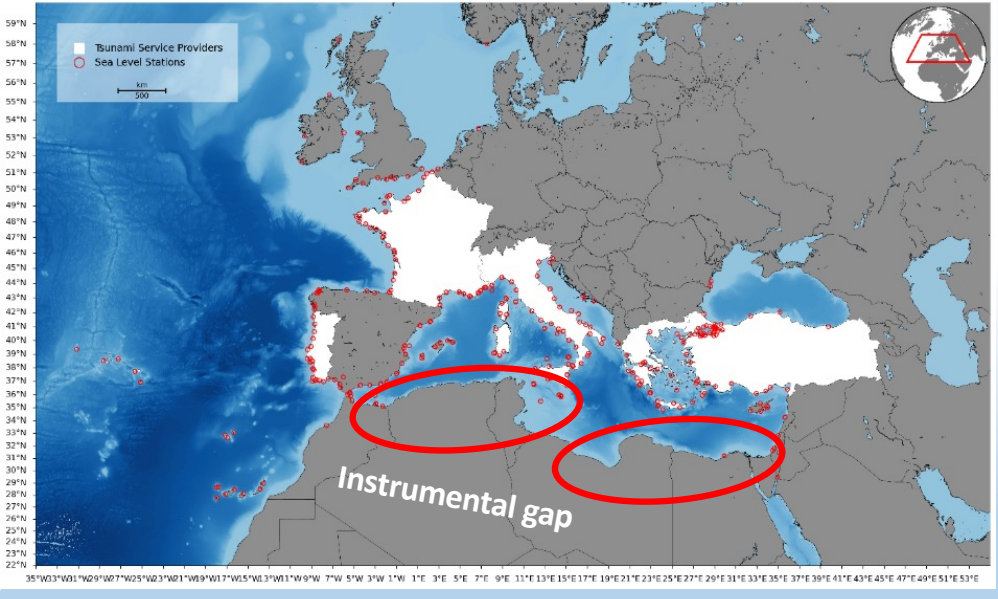
Seismic, Geophysical and Sea Level measurements

Seismic and Sea Level Data Base in NEAM REGION (2024)

Seismic Stations Monitored by TSP

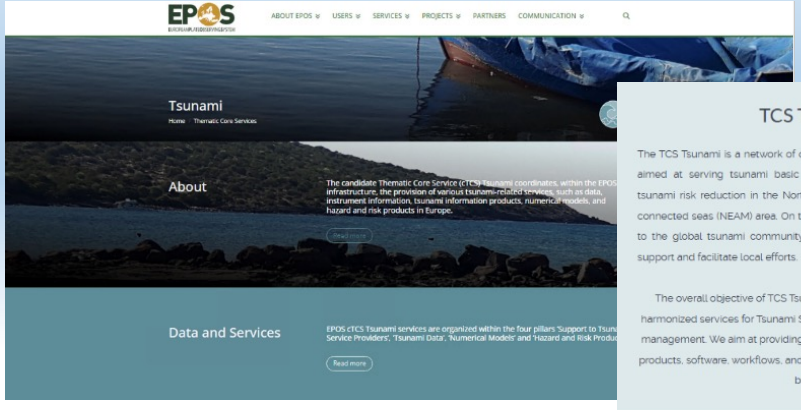


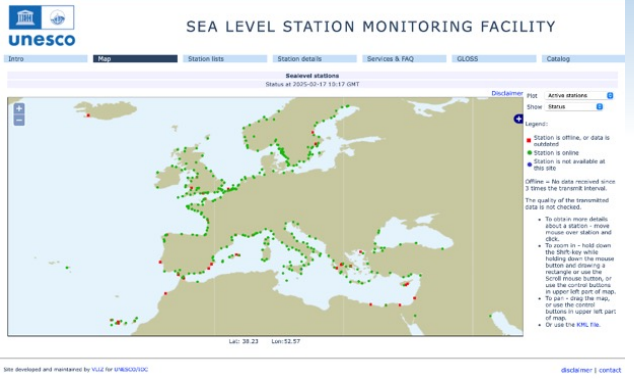
Sea-Level Stations Monitored by TSP



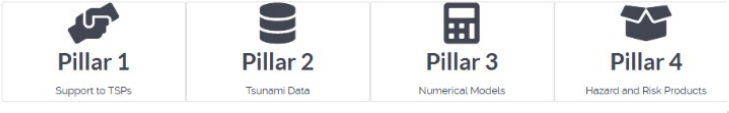
ONGOING ACTIVITIES: EPOS EU Research Infrastructure

– **Establishment of the Technical Core Service (TCS) Tsunami (February 2024)**





tsunamidata.org



(Started September 2024)

EPOS-ON Horizon Europe project funds the development of the TSP-IOT prototype

This service is a **virtual access** to a web service including a **common database** (forecast points, sensor locations, bathymetry and topography models, etc.) that, along with **additional tools** will help warning centres to make their **early warning operations interoperable** and consistent, and to increase redundancy and fall-back solutions during event processing.

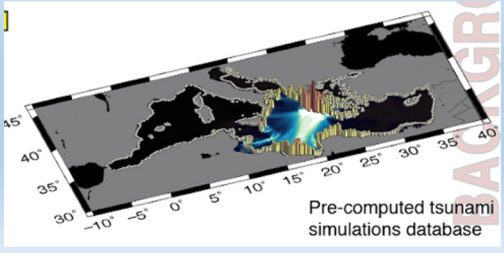
This activity is supported in the framework of EPOS (European Plate Observing System) – The European distributed Research Infrastructure for solid Earth science

ONGOING ACTIVITIES: PROBABILISTIC TSUNAMI FORECASTING

PRE-CALCULATED SCENARIOS EARLY WARNING VERSION

It works in near-real time at the INGV Tsunami Warning Centre

It is in the Calibration/Validation + Threshold defiinition phase towards the fully Operational Phase



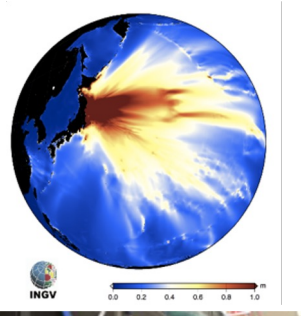
Targeting few to tens of seconds execution time.

Using hundreds to thousands pre-calculated scenarios

On-the-fly SCENARIOS (Urgent Computing) POST-EVENT ASSESSMENT VERSION

Prototype for event analysis at INGV and potentially other Tsunami Service Providers worldwide. Global scope.

Simulation ensembles to be run from scratch on large enough HPC clusters in urgent computing mode.

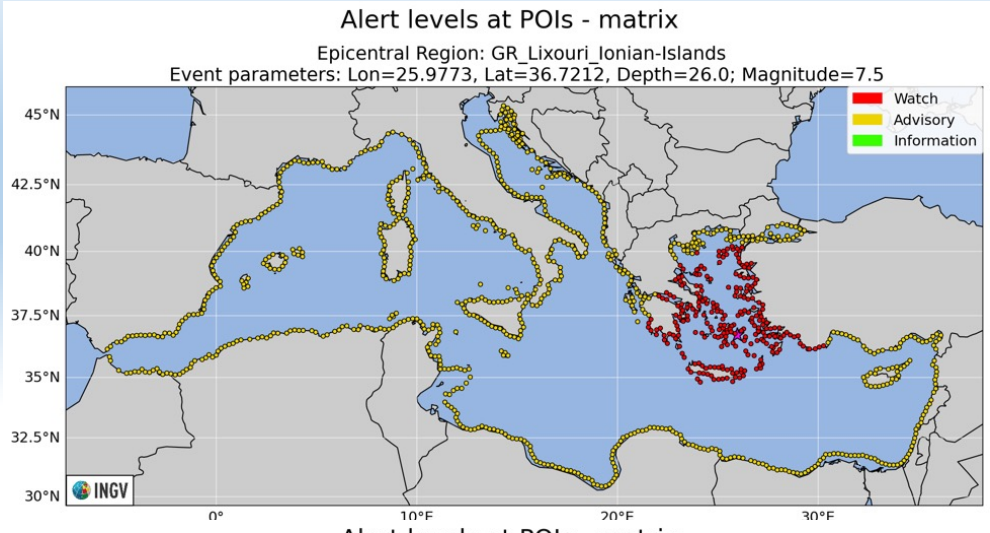


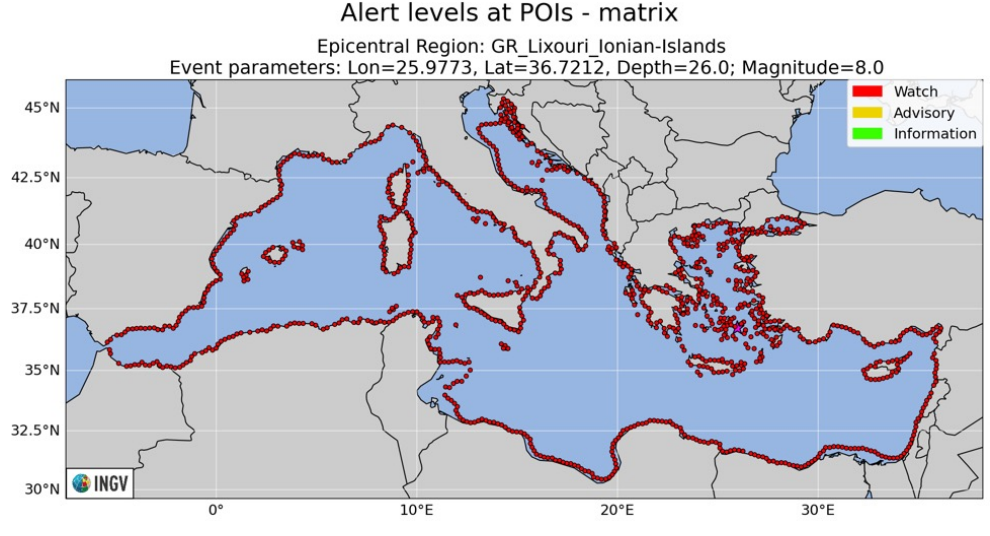
Targeting minutes to tens of minutes execution time

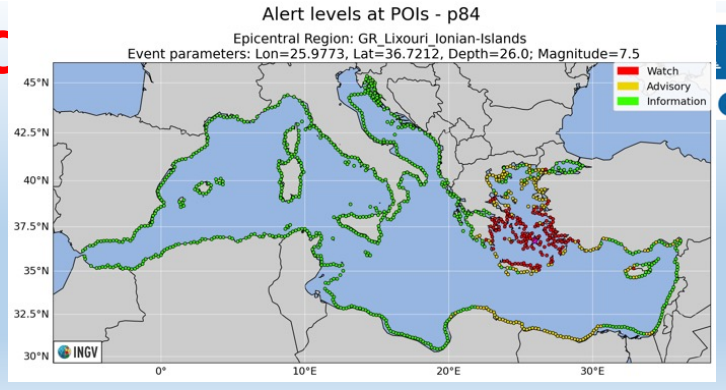
DT-GEO

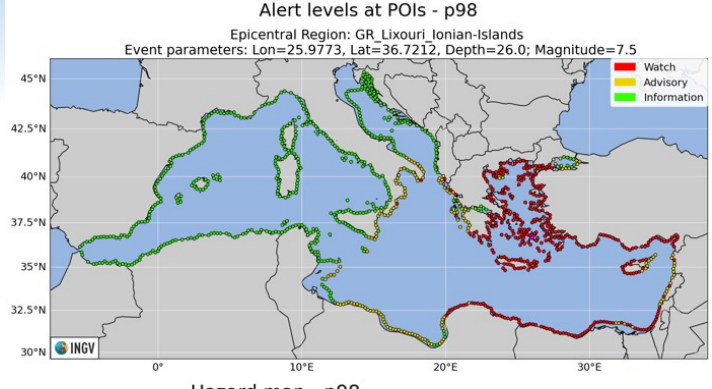
ChEESE

TESTING PROBABILISTIC TSUNAMI FOREC

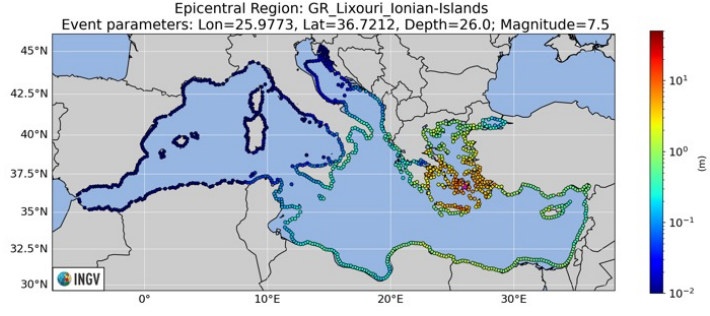






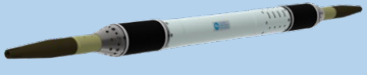


Hazard map - p98



ONGOING ACTIVITIES: SMART CABLES

- New Submarine Cable Ring connecting Portugal Mainland-Azores-Madeira
- Supported by Portugal
- Operational in second half of 2026



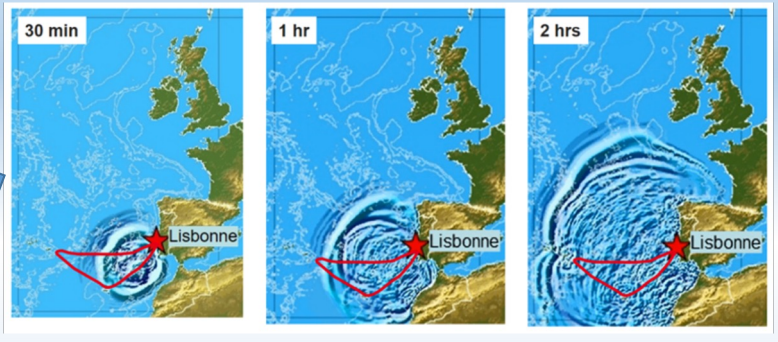
CC Node (ASN)

Accelerometer & Digitiser (Nanometrics)

Pressure sensor (RBR)

Temperature sensor (RBR)

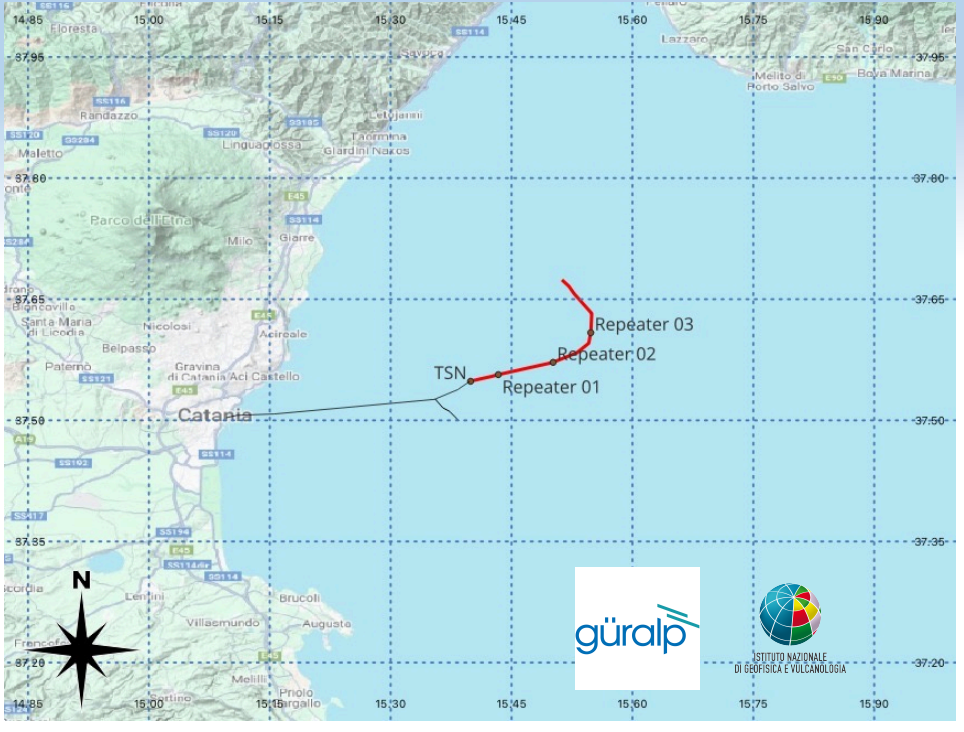
Timeline of 1755-like tsunami propagation in NE Atlantic



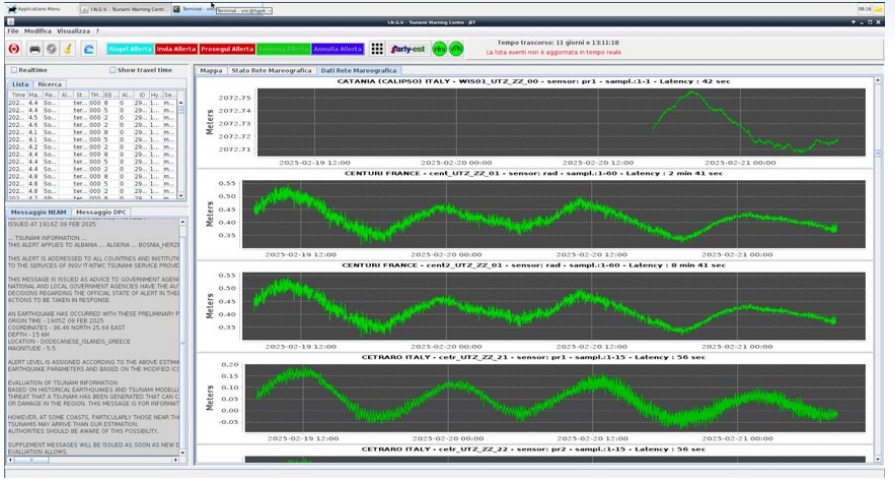
MISTS: Mediterranean Integrated Science and Telecom System

European Initiative: Pacific Peering and ASN Partnership / Scientific Community
Integrating telecommunications and climate monitoring in Europe

WESTERN IONIAN SEA INFRASTRUCTURE/1
Deployed December 2023

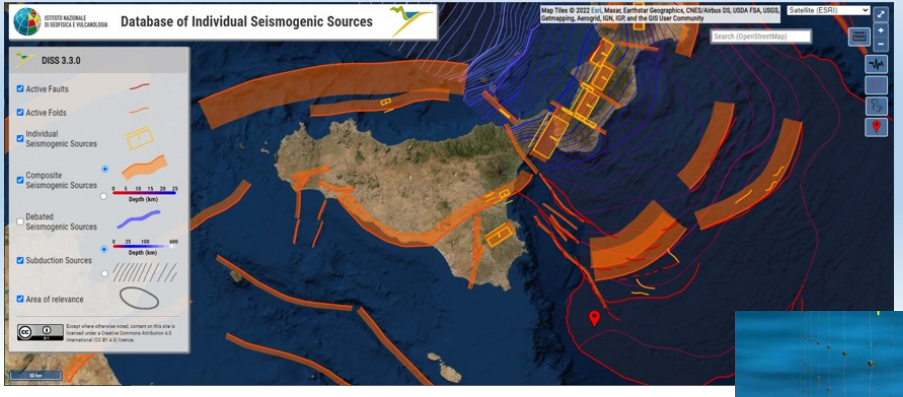


- Technical problems at the Repeaters
- At the moment we receive data from the pressure sensor at the Calypso Observatory (- 2039 m)



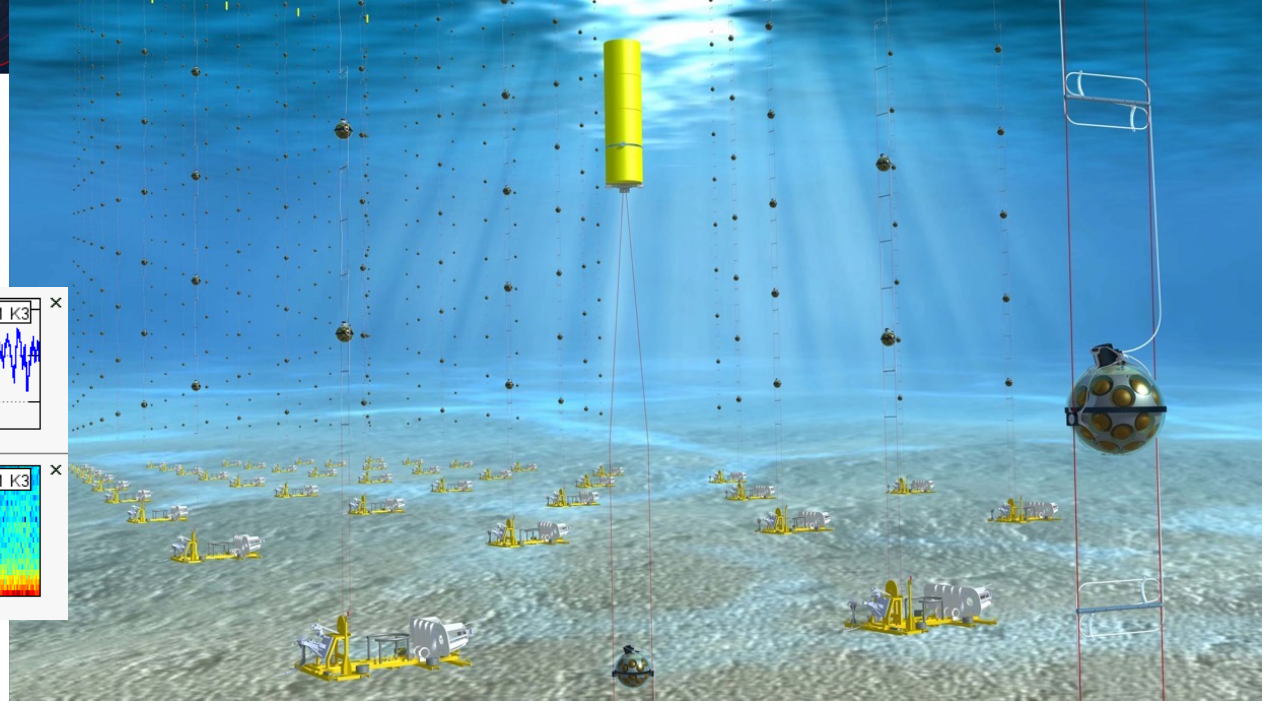
G.Marinaro, EMSO - INGV

WESTERN IONIAN SEA INFRASTRUCTURE/2

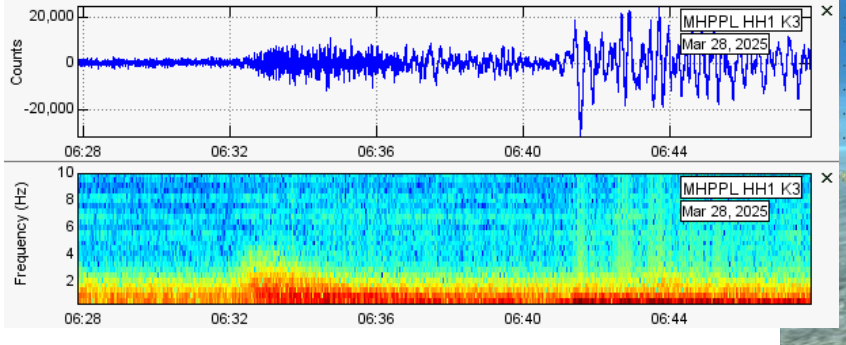


3500 m depth

A deep sea-floor Observatory for neutrinos
BB seismometer, P-T sensors
Courtesy of Sergio Scirè, INGV-Palermo
INGV-PA, INFN-LNS, INFN-RM1, INFN-BA



Myanmar M7.7 earthquake March 28



ONGOING ACTIVITIES: NON-SEISMIC TSUNAMI SOURCES

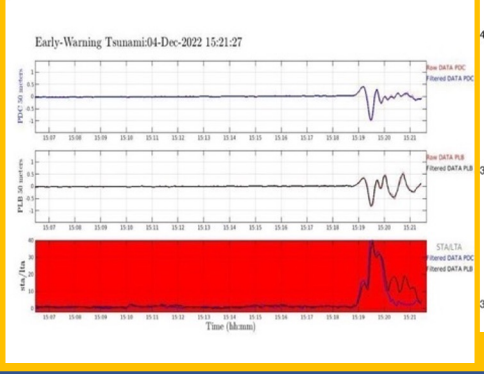
The local TEWS is based on the combination of 2 elastic beacons equipped with 2 pressure sensors each at -14 and -50m depth
The system was designed and managed by the LGS of the University of Florence.

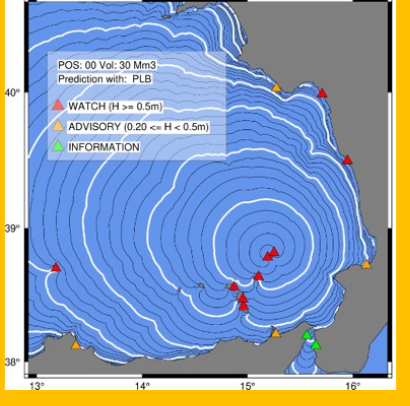
In Dec. 2024 one of the beacons disappeared.

Soon (May-June 2025) we will install a cabled buoy in a close area (then reinstall the elastic beacon).

A new offshore pressure sensor was installed in Panarea (Nov. 2024).

Local TEWS for Stromboli volcano, Italy





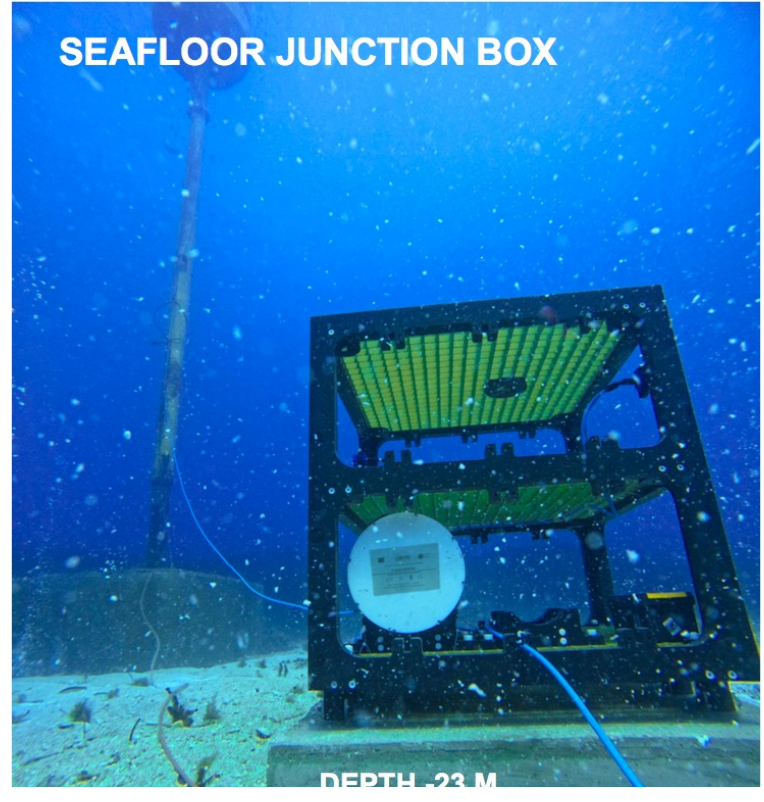
Stromboli natural laboratory for non-seismic (volcanic) tsunami warning

December 2002 tsunami (>10m runup)

MULTIDISCIPLINARY SEAFLOOR OBSERVATORY

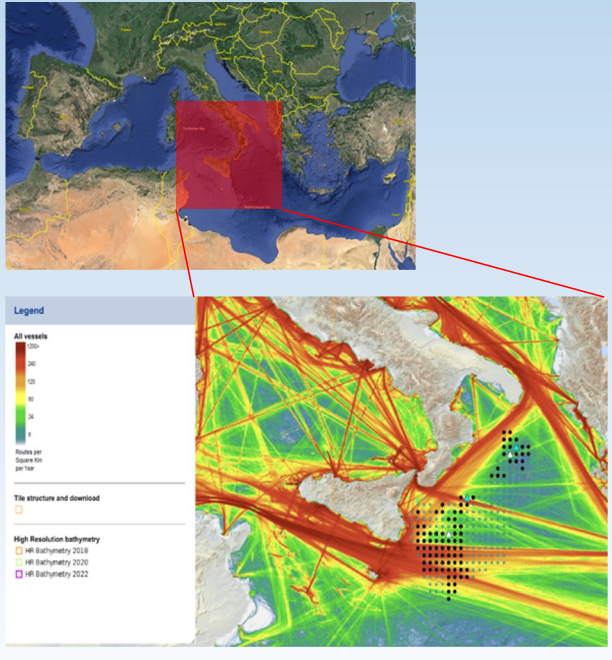
PANAREA

INGV
SEZIONE DI PALERMO



ONGOING ACTIVITIES: TSUNAMI BUOYS

- 2 tsunami buoys will be installed in the Ionian sea in July 2025 (INGV with MSM-Sonardyne), at 2600 and 3200 m depth, first in NEAM region (PNRR-MEET project)



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NEAMTWS

PILLAR 3 - MITIGATION
2023-2024

Tsunami Ready Implementation in NEAM REGION

11 Countries
15+ Communities

6 Recognized in 2024

...more coming!

Chipiona

El Jadida

Loulé

Büyükçekmece

Cannes

Marzamemi

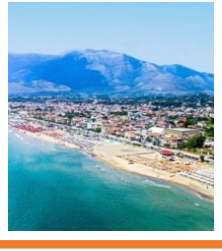
Otranto

Marsaxlokk

Israel

Palmi

Minturno



Stromboli

Larnaca

Samos

Alexandria

TRS/Chang Seng /Amato 2024

International, National, Local Engagements

City Mayors and Governor

Cannes, France

Büyükçekmece, Itanbul, Turkeye

Alexandria, Egypt

Chipiona, Spain

Samos, Greece

Minturno, Italy

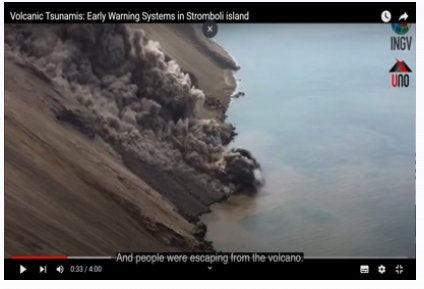
Communication and Outreach

Technical Documents

1. ICG/NEAMTWS -XVIII Summary Report
2. Evaluation of IDSL
3. IDSL Manual, User Guides and Maintenance Plan
4. Sea Level Related Coastal Multi-Hazard Risk Perceptions of the Communities in Alexandria, Büyükçekmece, Chipiona, El Jadida, Larnaca, Marsaxlokk, and Samos, IOC. Technical series
5. Final CoastWAVE Project Report
6. Final Project Evaluation Report
7. NEAMWave 23 Evaluation report (in progress)
8. NEAM Operational User Guide (in progress)
9. Best Practices, Guidance, Challenges, Lessons Learned in Implementing UNESCO IOC Tsunami Ready (in progress)

➢ Videos Produced and Published

- ➢ 2 Stromboli Volcano - Tsunami Warning System documentary, 3 min, 10 min versions) (launched in November 2024)
- ➢ 2 Malta videos



➢ Story Maps:

- ➢ Traveling through Mediterranean tsunamis
- ➢ Indian Ocean Tsunami 2004 twenty years after

➢ Meny videos and News/posts on TSPs websites

Including **a 5 million views** on 2020 SAMOS tsunami:

Communication and Outreach

Explaining Stromboli tsunami alert system in Sign Language
INGV Open Day, February 2025

Virtual tsunami pool (CAT-INGV)
Genova Science Festival, Octobrer 2024

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THANK YOU