

**Fifty-Seventh Session of the Executive Council
Paris, 25–28 June 2024**



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Intergovernmental
Oceanographic
Commission

**Report of the ICG/NEAMTWS
(2023-2024)**

**Alessandro Amato
Chair
ICG/NEAMTWS**

**Amr Hamouda and Ignacio Aguirre Ayerbe
(vice Chair)**

**Denis Chang Seng
Technical Secretary**

The ICG/NEAMTWS activities/advancements 2023-2024

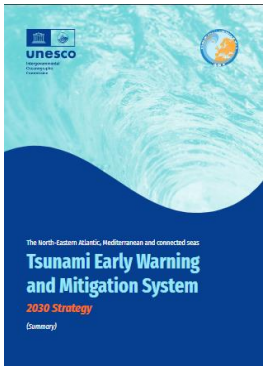
Several relevant activities and advancements in 2023-2024, including:

- Continued operations (monitoring, warning, meetings, etc.)
- 5 recognized **Tsunami Ready** communities (and others coming soon)
- Improved response in the **NEAMWave23** (+ local exercises)
- Closing of **CoastWave** project in Egypt (2022-2024), **Phase-2** starting July 2024 (DG-ECHO)
- New Task Team on **non-seismic tsunami sources**
- New developments and technologies:
 - New tide gauges in several MS (**20 in Marmara Sea, Türkiye**)
 - First cabled **deep-ocean sensors** connected to TSP (ec. 2023, others coming)
 - Two **DART-like buoys** coming in the Ionian sea (2025)
 - Probabilistic Tsunami Forecasting - **PTF**

ICG/NEAMTWS 2023/2024

Key Meetings & Events

Ceremony event with UNESCO Permanent Delegations of Tsunami Service Provider (TSP) countries to launch NEAMTWS 2030 Strategy, 12 April 2023, HQ, Paris, France



ICG NEAM Assembly 2023/
February 2024 at UNESCO HQ

Closing meeting of CoastWave project in Alexandria, Egypt, ... 2024



Tsunami Evacuation mapping and validation workshops in Larnaka, Cyprus, June and Sep 2023. First country in NEAM to conduct evacuation mapping using PTHA with support of partners (Italy, Greece and Spain) (CoastWAVE Project)



Regional workshop to set the benchmark for the development of Tsunami Standard Operating Procedures (SOPs), JRC, Ispra, 6 October 2023 (CoastWAVE Project)

Events in the NEAM region in 2017-2024

5 TSPs (France, Greece, Italy, Portugal, Turkey)

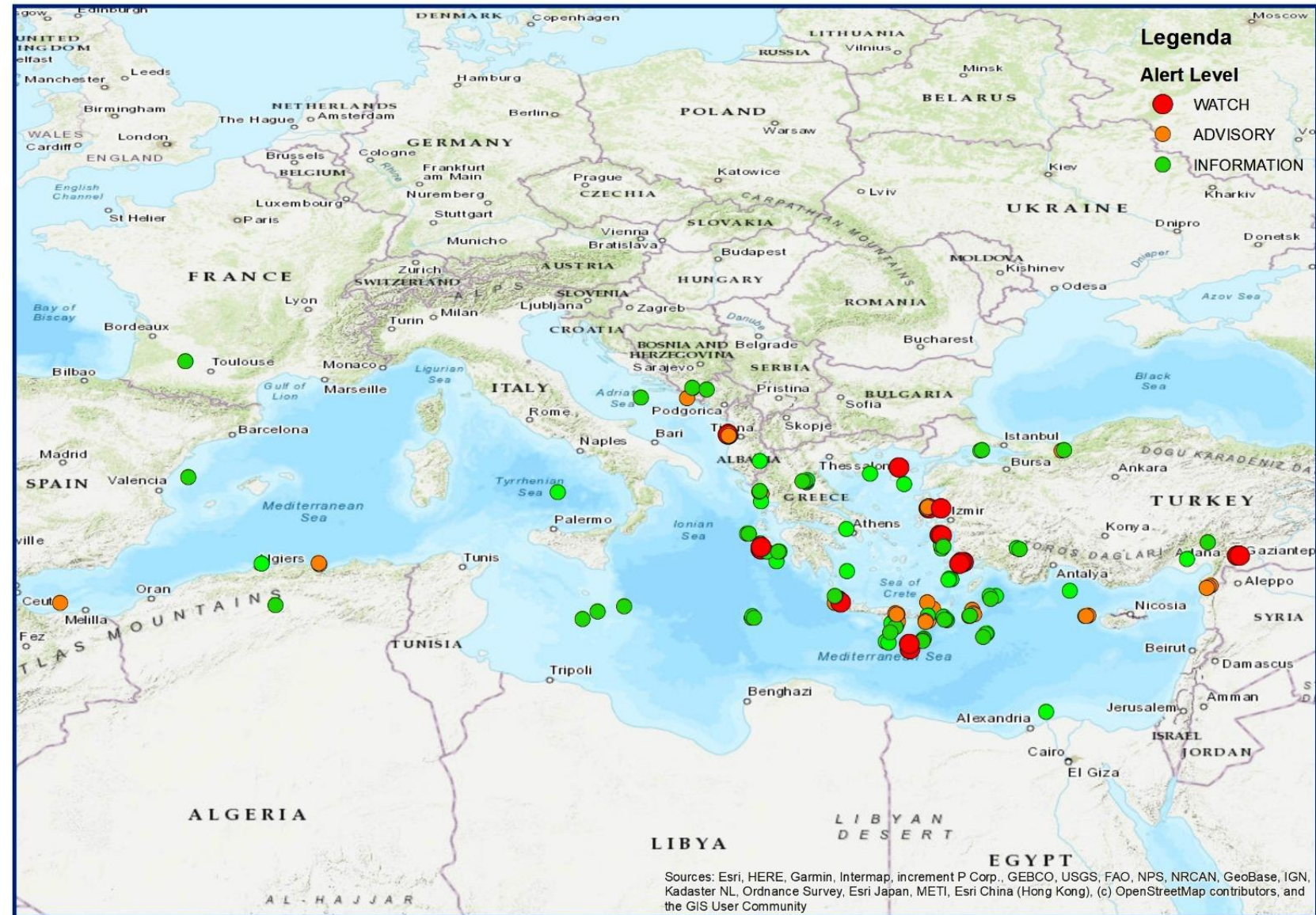
210 Events (activations)

Mag 5.5 to 7.8 (5'-10')

Mostly Information level

About 20 local Watch and Advisory (some of which confirmed)

1 basin-wide WATCH event (Mediterranean) in 2023 (February 6)



Tsunami Ready Implementation in the NEAM REGION

11 Countries
15+ Communities

5 Recognized in 2024

...more coming!

Chipiona



El Jadida



Loulé



Büyükçekmece



Cannes



Marzamemi



Otranto



Marsaxlokk



Israel



Palmi



Minturno



Stromboli



Larnaca



Samos



Alexandria



Tsunami Ready: International, National, Local Engagements

City Mayors and Governor



Cannes, France



Büyükçekmece, Itanbul, Turkeye



Alexandria, Egypt



Chipiona, Spain

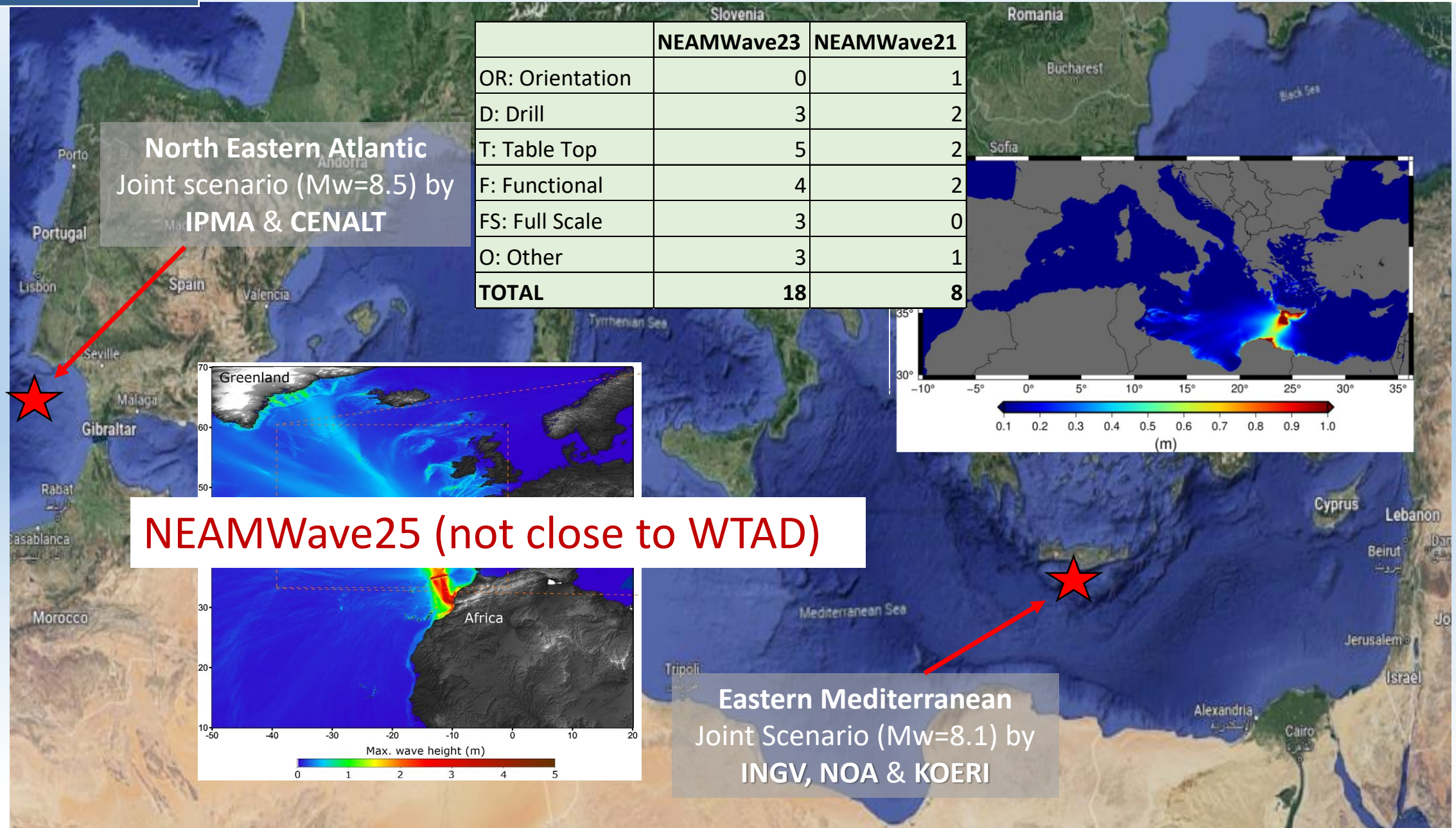


Samos, Greece



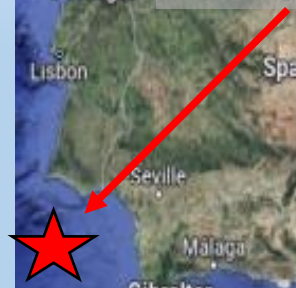
2024 Ocean Conference, Barcelona 11 April 2024

NEAMWave23 scenarios, Nov. 6-7, 2023

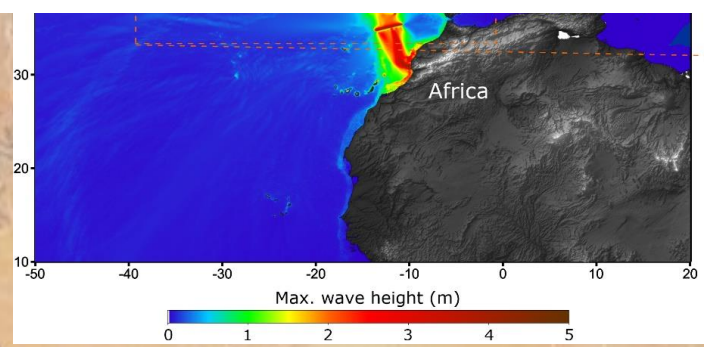


North Eastern Atlantic
Joint scenario (Mw=8.5) by
IPMA & CENALT

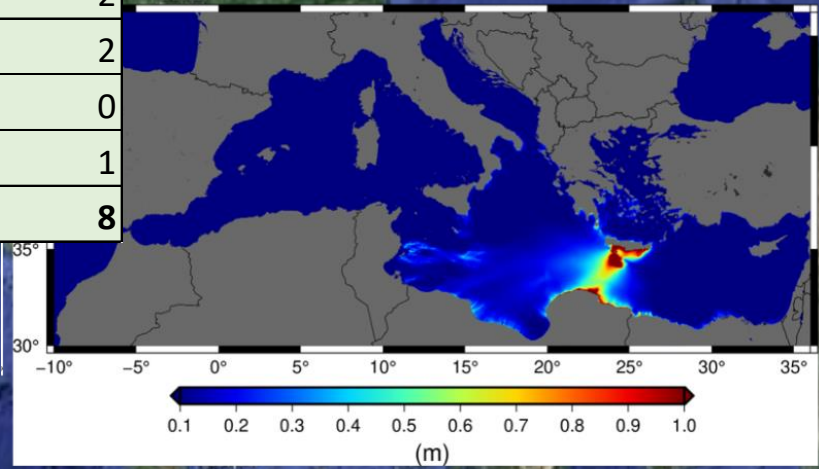
	NEAMWave23	NEAMWave21
OR: Orientation	0	1
D: Drill	3	2
T: Table Top	5	2
F: Functional	4	2
FS: Full Scale	3	0
O: Other	3	1
TOTAL	18	8



NEAMWave25 (not close to WTAD)



Eastern Mediterranean
Joint Scenario (Mw=8.1) by
INGV, NOA & KOERI

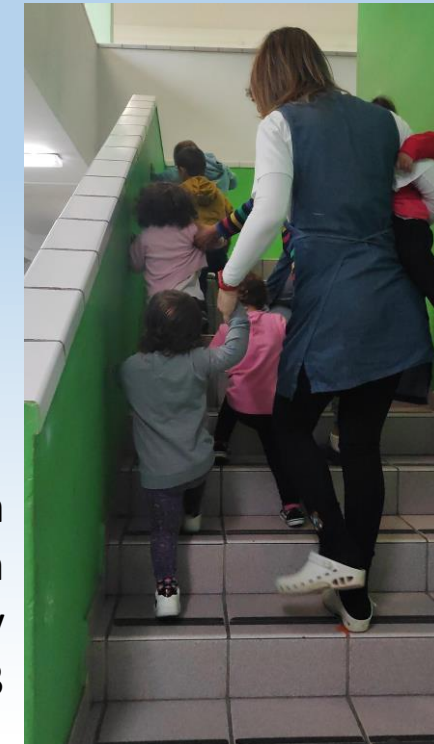


NEAMWave23 / WTAD

15 Tsunami Exercises Organised

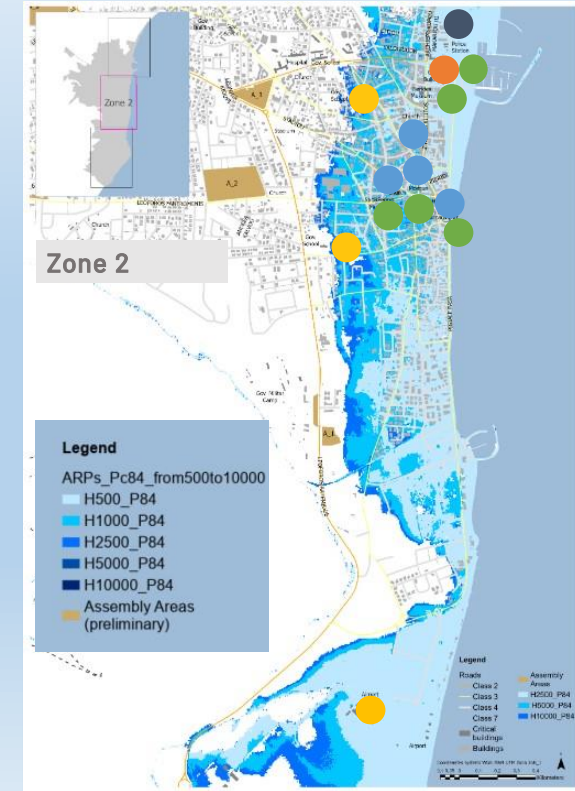
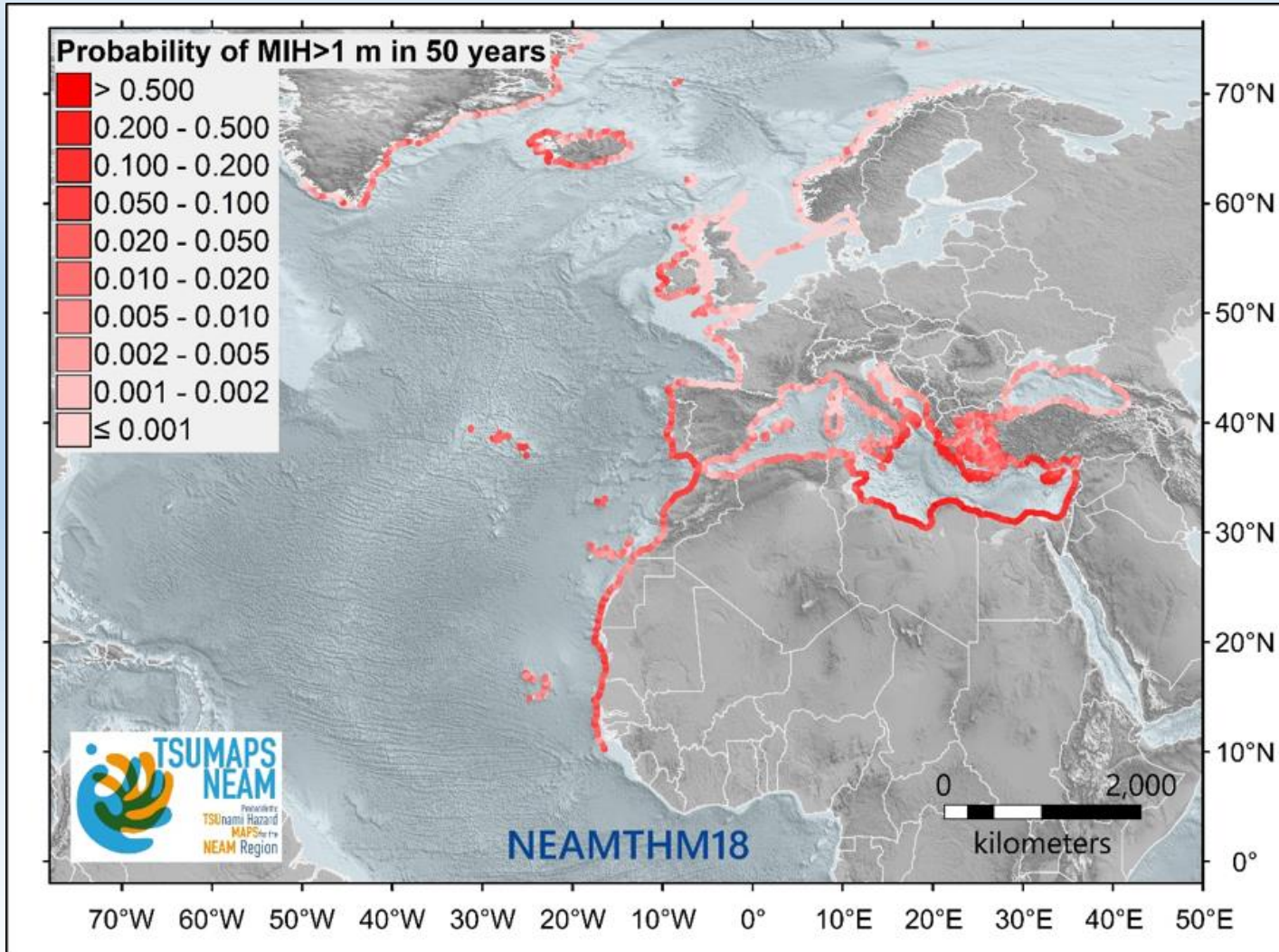
- ✓ Regional NEAMWave23 conducted on 6-7 November 2023
- ✓ For the first time, NEAMWave 23 exercises was also conducted at the local communities in several MS, many of them within the countries participating in the CoastWAVE project

School evacuation in Chipiona, Spain, 6 November 2023



Vertical evacuation
in a nursery in
Minturno, Italy
7 November 2023

S-PTHA assessment at various scales (global to local)

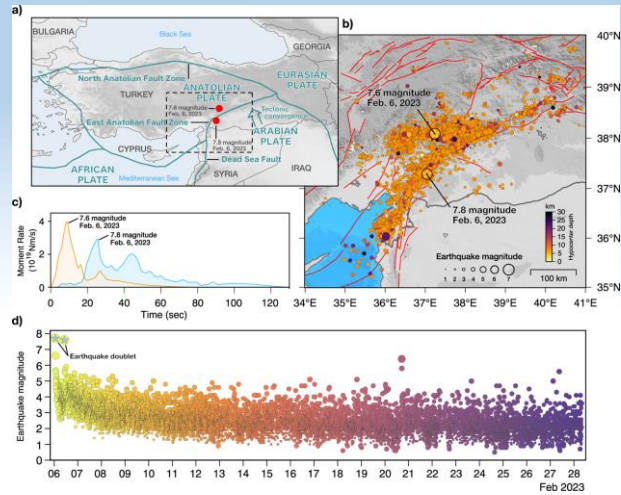


In some countries (e.g. Italy) the TSUMAPS-NEAM S-PTHA were used to define the inundation zones.

Other approaches at regional / local scale are being adopted (e.g. France, Larnaca/Cyprus)

ONGOING ACTIVITIES: **PROBABILISTIC TSUNAMI FORECAST**

The 2023 February 6 Mw 7.8 earthquake was the first event to have triggered a basin-wide watch level (max) for the Mediterraneanb.



Decision Matrix

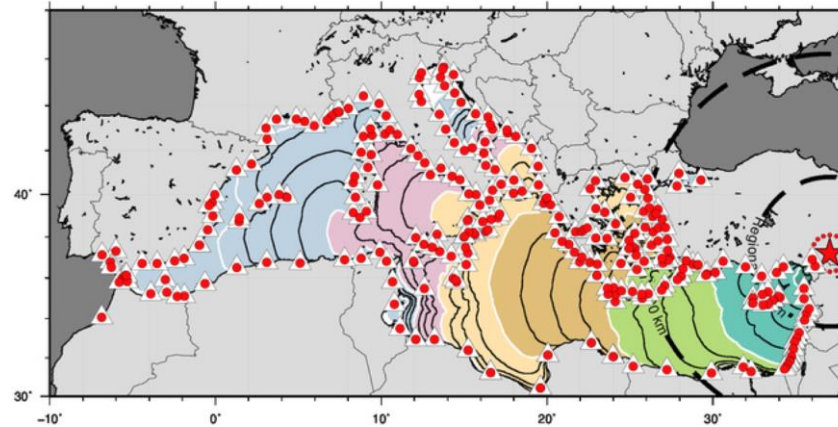
Depth	M	Epicenter Location	Tsunami Potential	ALERT LEVEL VS DISTANCE		
				$\Delta eq \leq 100$ km	$100 \text{ km} < \Delta eq \leq 400$ km	$\Delta eq > 400$ km
< 100 km	$5.5 \leq M \leq 6.0$	Offshore or Inland ≤ 100 km	Nil	Information Bulletin		
	$6.0 < M \leq 6.5$	Inland ($40 \text{ km} < \text{Inland} \leq 100 \text{ km}$)	Nil	Information Bulletin		
		Offshore or near the coast (Inland ≤ 40 km)	Potential of weak local tsunami $\Delta eq < 100$ km	LOCAL Tsunami ADVISORY	Information	
	$6.5 < M \leq 7.0$	Offshore or Inland ≤ 100 km	Potential of destructive local tsunami $\Delta eq < 100 \text{ km} \mid 400$ km	LOCAL Tsunami WATCH	REGIONAL Tsunami ADVISORY	Information
	$7.0 < M \leq 7.5$		Potential of destructive regional tsunami $\Delta eq < 400 \text{ km} \mid \text{basin}$	REGIONAL Tsunami WATCH		BASIN-WIDE Tsunami ADVISORY
$M > 7.5$		Potential of destructive tsunami in the whole basin any Δeq	BASIN-WIDE Tsunami WATCH			
≥ 100 km	$M \geq 5.5$	Offshore or Inland ≤ 100 km	Nil	Information Bulletin		
any	any	Inland > 100 km	Nil	Nil		
				LOCAL	REGIONAL	BASIN-WIDE



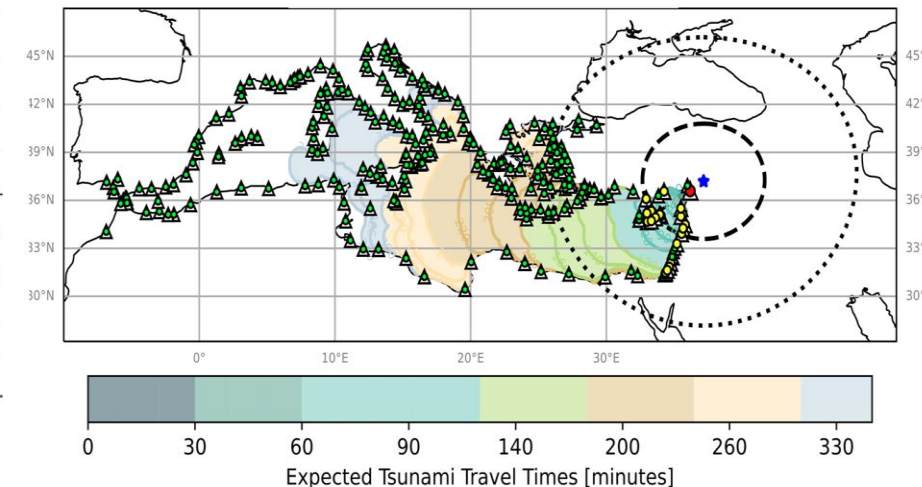
- In response to the tsunami warning, trains were stopped in different locations in Southern Italy for several hours, and evacuation of some coastal areas was enforced.
- However, only a relatively small tsunami was recorded by Turkish close-by tide-gauges in the Eastern Mediterranean, with a maximum recorded amplitude of less than 50 cm.



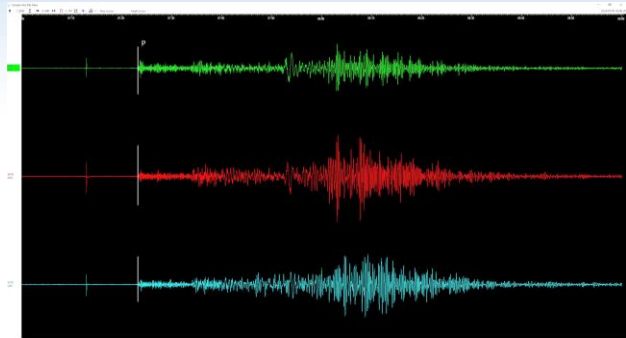
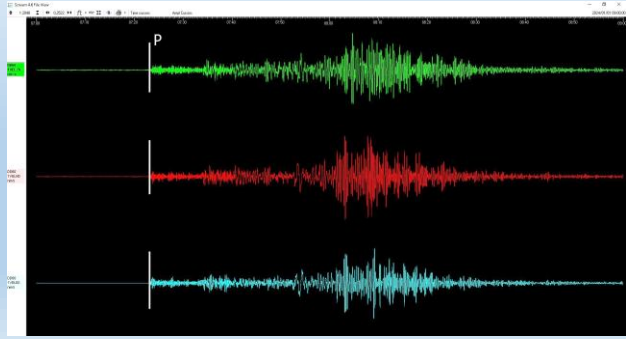
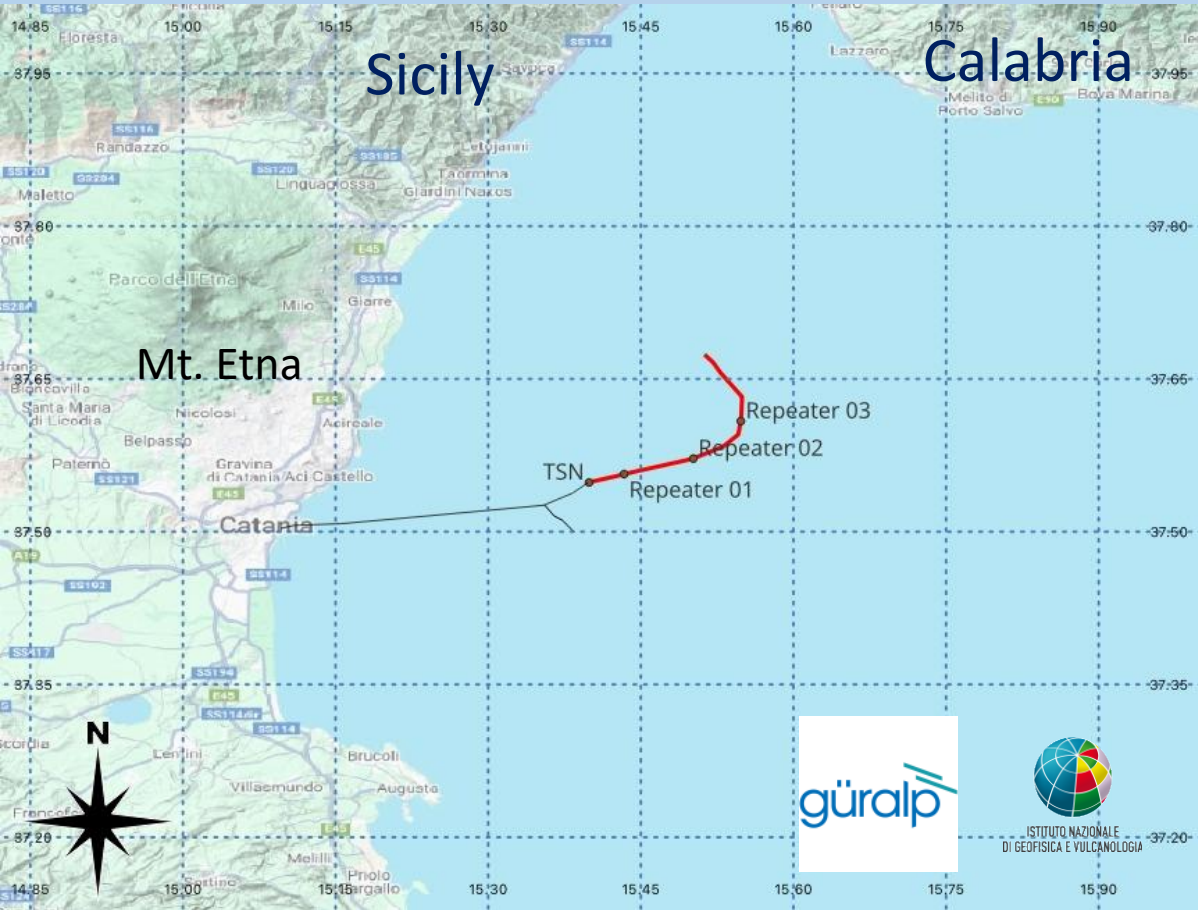
Tsunami Travel Times – Turkey 2023-02-06T01.17.36Z M=7.9



PTF Alert Level Map

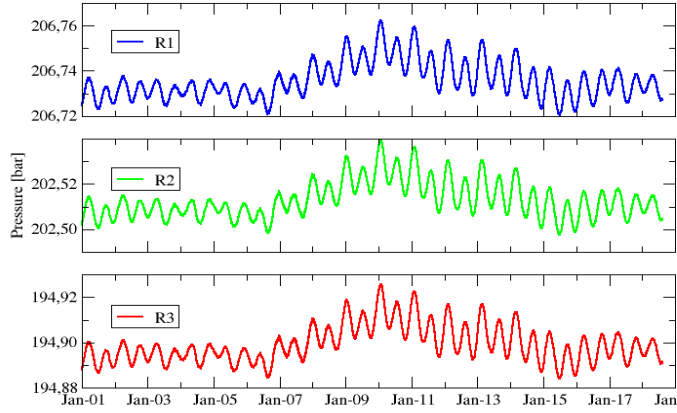


WESTERN IONIAN SEA INFRASTRUCTURE Deployed December 2023



- WEST COAST, EASTERN HONSHU, JAPAN

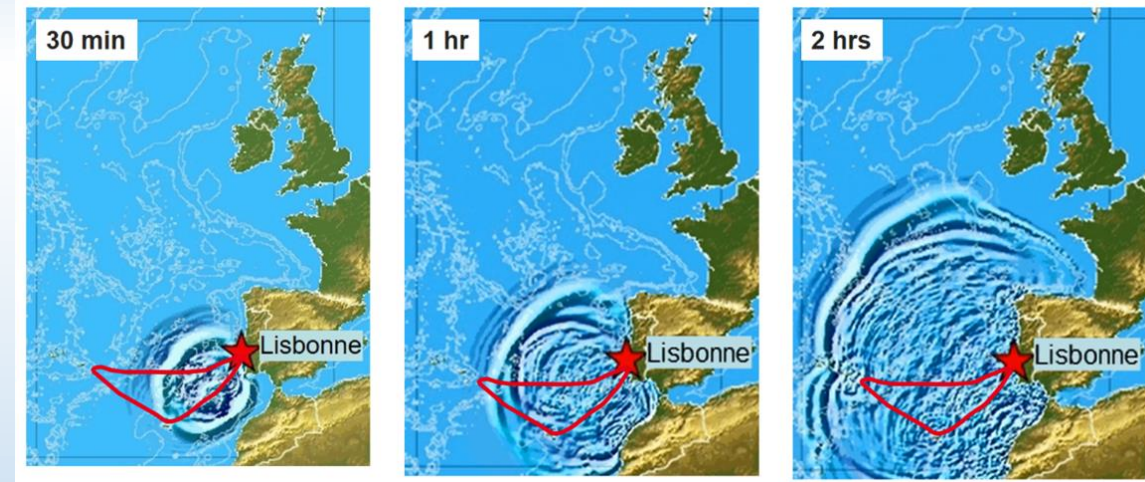
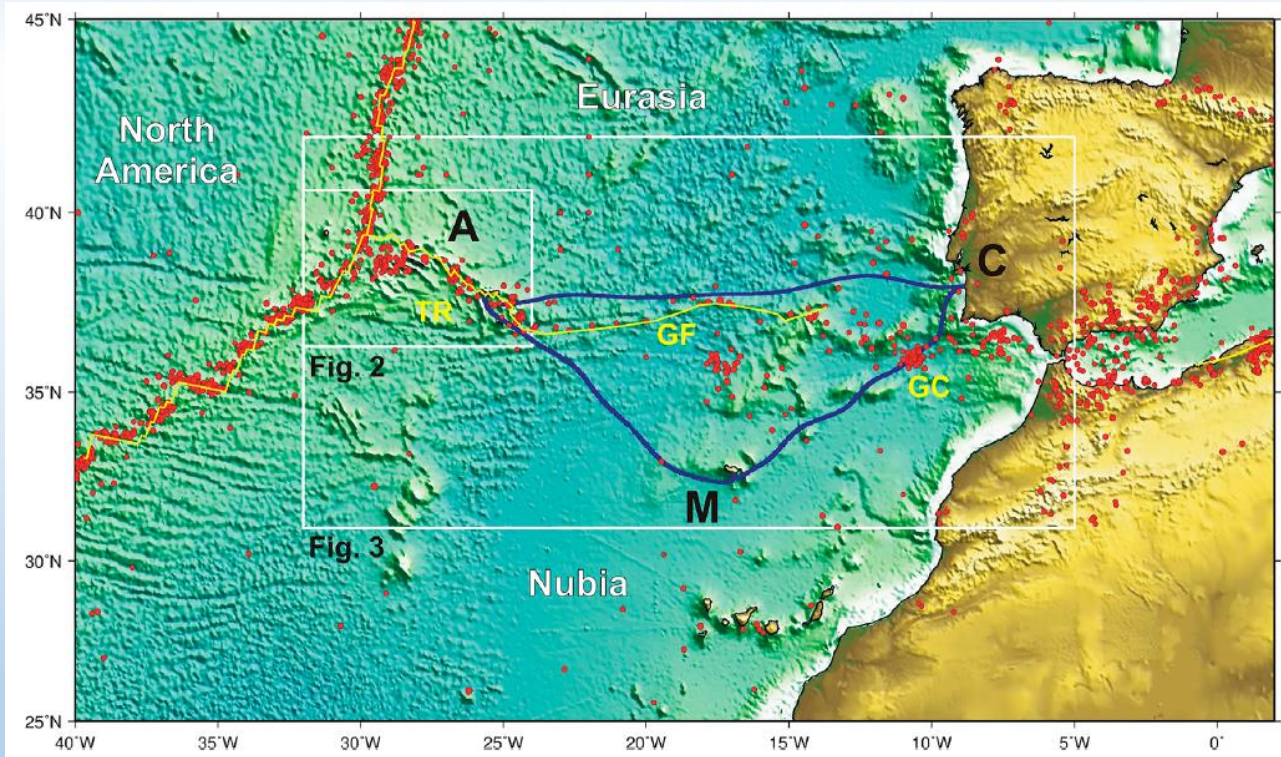
- 01/01/2024 07:10 M_{wpd} 7.4



Courtesy of G. Marinaro (INGV)

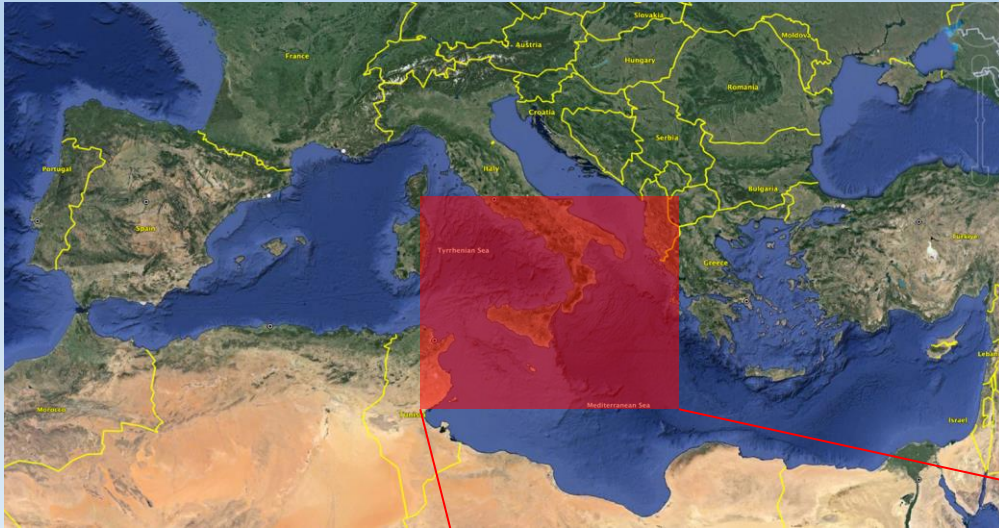
ONGOING ACTIVITIES: SMART CABLES

- New Submarine Cable Ring connecting Portugal Mainland-Azores-Madeira
- Opportunity for a SMART system (SMART CAM) supported by Portugal
- Operational in 2025-2026

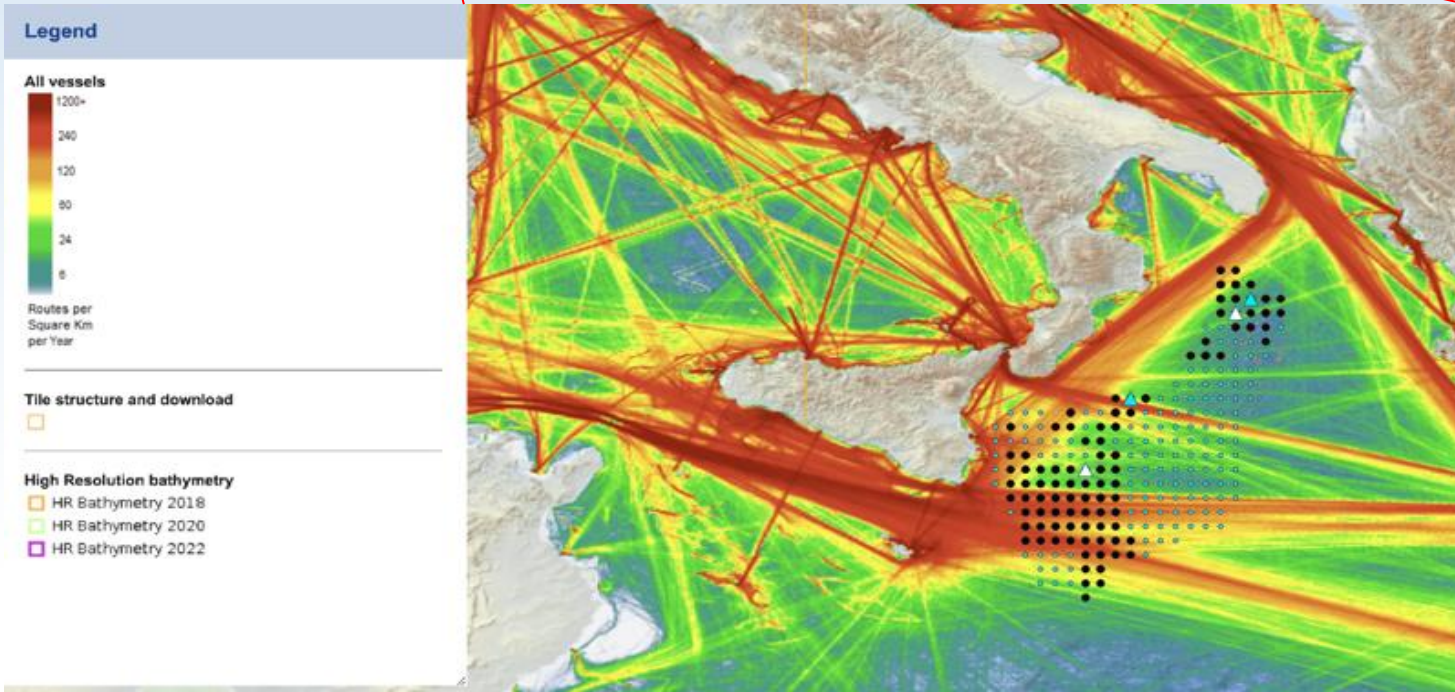


Timeline of 1755-like tsunami propagation in NE Atlantic

ONGOING ACTIVITIES: TSUNAMI BUOYS



- 2 tsunami buoys will be installed in the Ionian sea by 2025
- Location and technical requirements decided based on possible tsunami sources and ship traffic
- A European tender has been recently published by INGV (closing July 2024)



Funding (~2.8 M€) by the Italian Ministry of Research through the European contribution Next Generation EU - NRRP (National Recovery and Resilience Plan) “MEET”, coord. by INGV

ONGOING ACTIVITIES: **NON-SEISMIC TSUNAMI SOURCES**

The ICG/NEAMTWS at the February 2024 session DECIDED to establish a new

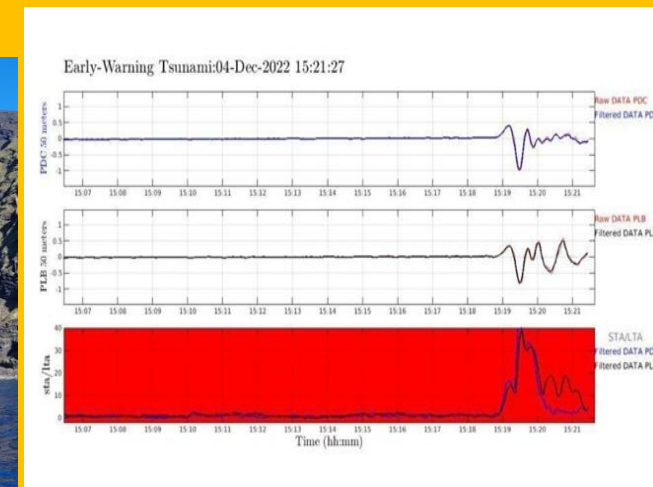
Task Team on Non-Seismic Tsunami

Among other issues, this TT will be important to foster the integration of TWS specifically conceived for non-seismic tsunami with those already operating for seismic tsunami



TEWS for Stromboli volcano, Italy

1.5m tsunami of Dec. 4, 2022



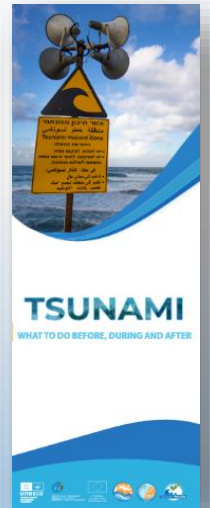
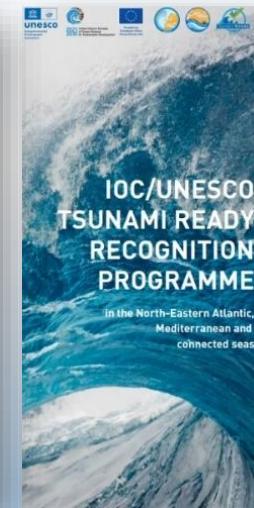
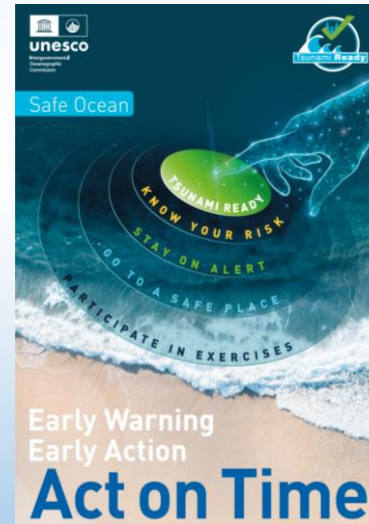
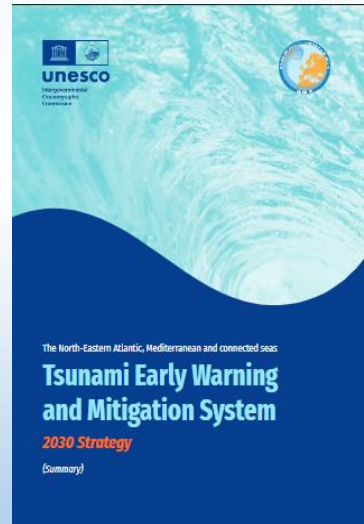
Communication and Outreach

28 Articles Produced and Published
+ others on TSPs websites



9 Brochures/Leaflets and Posters

- NEAMTWS 2030 Strategy Brochure
- NEAMWave Exercise – Information Brief
- NEAMWave23 Exercise – Information leaflet
- Tsunami Fact Sheet Brochure
- Tsunami What to do Brochure.
- Tsunami Ready Recognition Programme Brochure
- Tsunami Ready Poster
- Coastal Hazard Ready Poster
- ICG/NEAMTWS Poster update



Communication and Outreach

➤ 10 Videos Produced and Published

- 2 Stromboli Volcano - Tsunami Warning System documentary, 3 min, 10 min versions) (To be launched in Feb 2024)
- Tsunami Exercise in Chipiona, Spain, Dec 2023
- 2 Tsunami Risk in Malta (documentary, 3 min, 10 min versions), 5 Nov 2023
- Supporting Children Prepare, 5 Nov 2023
- Commemorating the Aegean Sea event, October 2023.
- Tsunami Evacuation Workshop in Cyprus, Sep 2023.
- CoastWAVE Project Standard Operating Procedures (SOPs) Workshop, Ispra, Italy.
- Tsunami Exercise, Istanbul during WTAD 2022



➤ + others on TSPs websites

Including a 3.7 million views on the 2020 SAMOS tsunami:
<https://www.youtube.com/watch?v=YM6hha4n5W4&t=5s>

➤ [Story Maps: Traveling through Mediterranean tsunamis](#)

<https://storymaps.arcgis.com/stories/32091c82e42a4d30a2f24b1e7b5955b6>

Current and future projects in NEAM ICG

- DG-ECHO '**CoastWAVE**' project in Cyprus, Egypt, Greece, Malta Morocco, Spain, and Türkiye on “Strengthening the Resilience of Coastal Communities in NEAM region...” (Phase 1) ended in 2024;
- **CoastWAVE Phase 2** approved and starting in July 2024 “Scaling up....”;
- New phase of COST Action **AGITHAR** - (Accelerating Global Science in Tsunami Hazard and Risk Analysis) to establish the **Global Tsunami Model (GTM)** organization;
- Formal recognition of the **TSUNAMI Thematic Core Service (TCS)** within **EPOS** The European Plate Observing System (EPOS General Assembly in Dec. 2023);
- Some other projects funded by EU contributing to the advancement of Tsunami science, including both R&D (**DT-GEO**) and warning-oriented (EPOS, **GeoInquire**)



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THANK YOU



The Stromboli MULE
carrying new warning
sirens around the volcano
(Dec. 2023)