

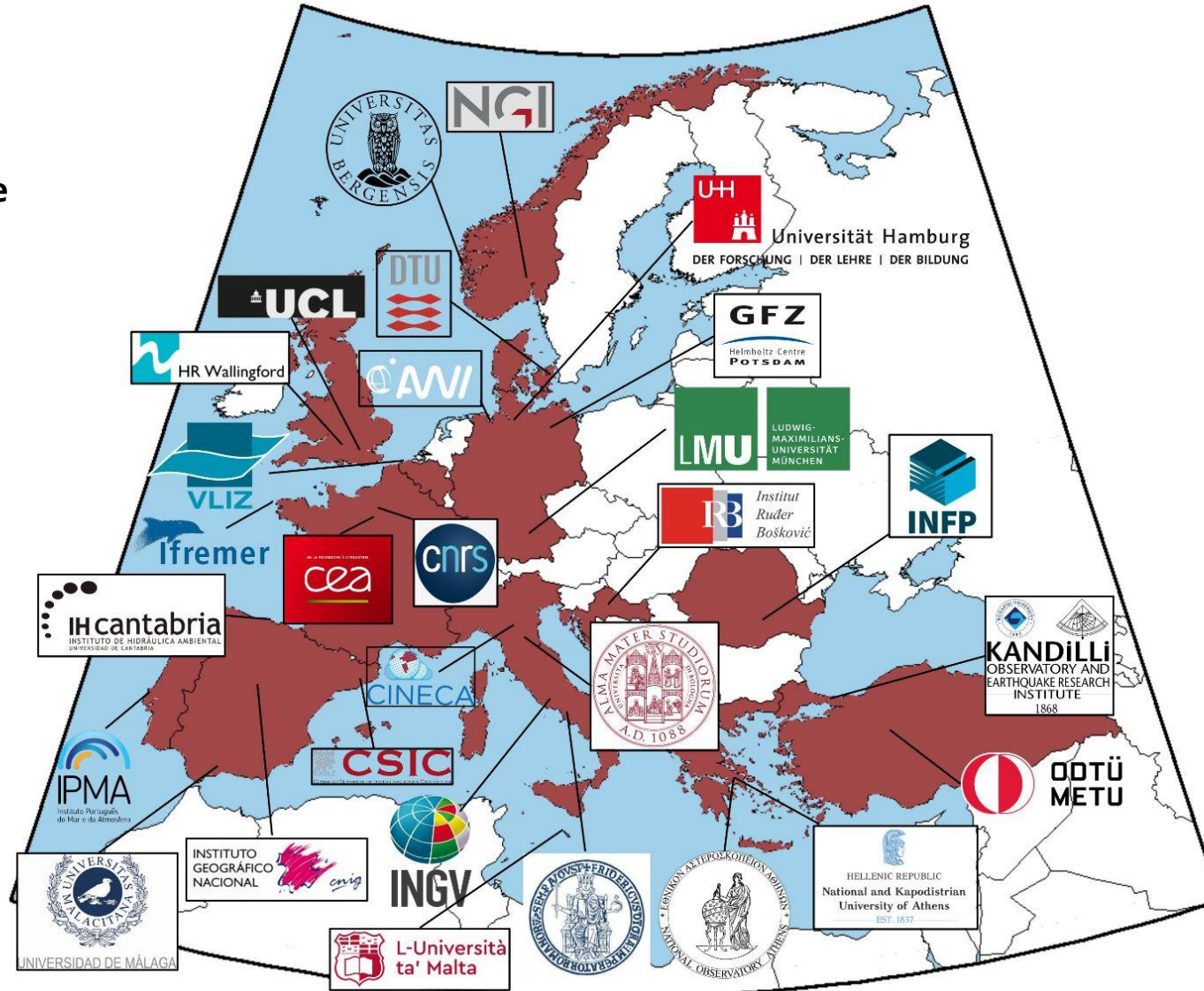


# Candidate TCS TSUNAMI

**A. Babeyko and cTCS Core-Team**

# Our geography

Currently 30 partner institutions across Europe from 14 countries



# Our history



- Started preparations for EPOS TCS since 2018; long track of networking activity and dedicated meetings in preparation
- Formal endorsement received by the Intergovernmental Coordination Group of the NEAMTWS, formed by the representative of the IOC/UNESCO Member States in the NEAM Region
- Received **12 Lols** for the constitution of the Tsunami TCS
- Involvement of about **30 partners** in the previous project proposal aimed at the constitution of the TCS
- **22 July 2021**: EPOS Candidate Thematic Core Service (TCS) granted for the Tsunami Community
- April 2022: Community White Paper published in the EPOS Special Issue of Annals of Geophysics (<https://doi.org/10.4401/ag-8762>)



# Our coverage



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The central logo for cTCS Tsunami, featuring a stylized wave inside a circle, with the text "cTCS Tsunami" below it.

Access to interoperable Tsunami Early Warning tools

Access to tsunami data and experimental facilities

Access to tsunami models and benchmarks

Access to tsunami hazard and risk analysis tools

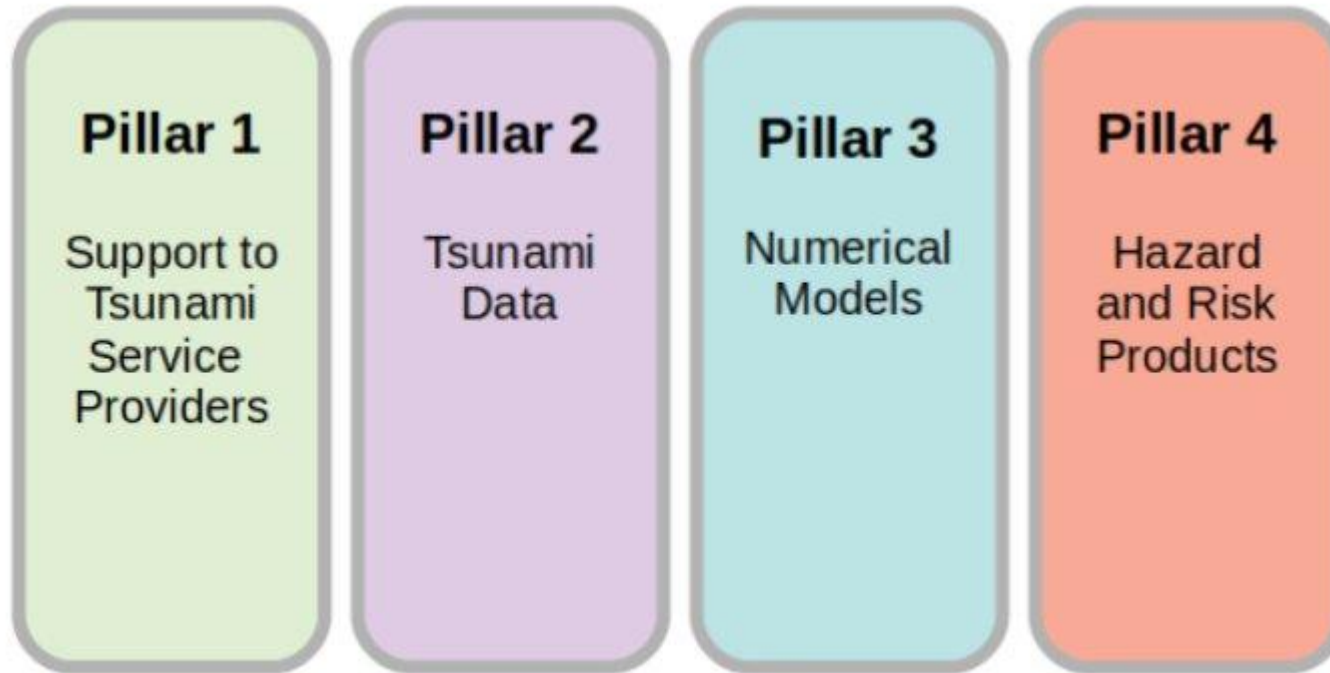
The central image is a collage of four panels. The top-left panel shows a map of the Mediterranean region with seismic activity markers and text: "Access to interoperable Tsunami Early Warning tools". The top-right panel shows a laboratory experiment with a large black ramp and water, with text: "Access to tsunami data and experimental facilities". The bottom-left panel shows a colorful tsunami wave simulation with text: "Access to tsunami models and benchmarks". The bottom-right panel shows a map of the Eastern Mediterranean with hazard markers and a photo of destroyed buildings, with text: "Access to tsunami hazard and risk analysis tools".



# Our organization



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# Our services

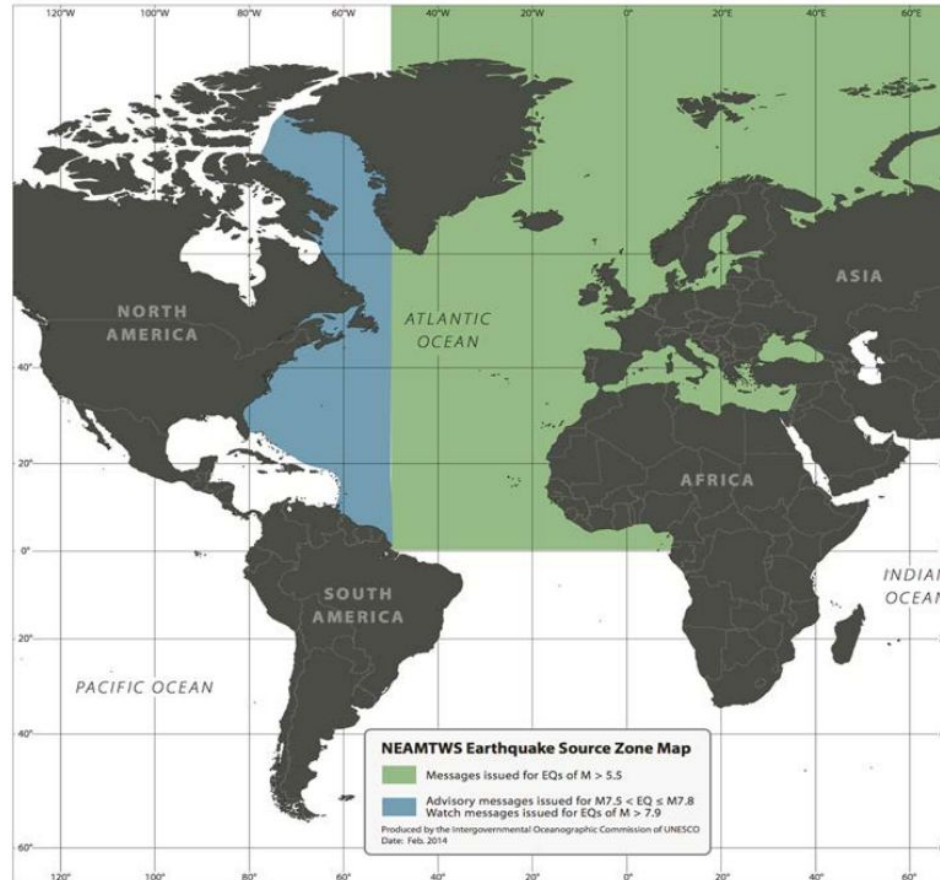
## TSP Interoperability Tool



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### ● Earthquake Source Zone Monitored by the NEAMTWS-TSPs

The map below shows the Area of Responsibility (AoR) of Tsunami Service Providers (TSPs) operating within the ICG/NEAMTWS.



Currently 5 NEAM Tsunami Service Providers:

- Portugal
- France
- Italy
- Greece
- Turkey

TSP-Interoperability tool to exchange warning and situation assessment information (in production)

Tsunami Warning and Mitigation Systems to Protect Coastal Communities: Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and Connected Seas (NEAMTWS) 2005–2020; Factsheet 2020.

<https://unesdoc.unesco.org/ark:/48223/pf0000373791.locale=en>

# Our services



## SEA LEVEL STATION MONITORING FACILITY



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Intro Map Station lists **Station details** Services & FAQ GLOSS Catalog

[previous station] Station **Catania** at GMT [next station]

[more details] [show data] [show on map] [monitor]

Station metadata	
Code	CT03
Country	Italy
Location	Catania
Status	Operational
Local Contact	Istituto Superiore per la Protezione e la Ricerca Ambientale ( Italy )
Long-term MSL data	PSMSL 102 (1896-1971) PSMSL 2094 (2001-2015)
Latitude	37.498
Longitude	15.0938
Connection	WEB service
Sensor 1	
Type of sensor	rad (radar)
Sampling rate (min)	1

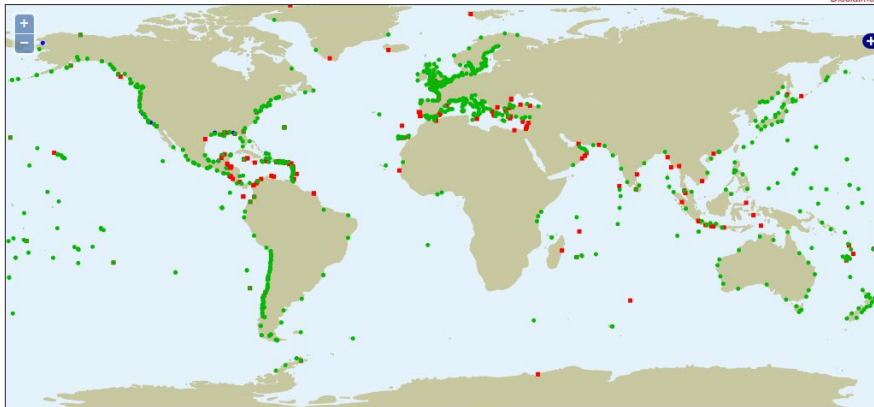
Sealevel at Catania station (offset: -0.209 m)

• rad (radar)

From 2022-03-27 11:04+00:00 to 2022-03-28 11:04+00:00 © IOC-VLIZ

Period	Signals	Data
<input type="radio"/> 12h	<input type="checkbox"/> Remove outliers	<input checked="" type="radio"/> Relative levels= signal - average over selected period
<input checked="" type="radio"/> day	<input type="checkbox"/> Remove spikes	<input type="radio"/> Absolute levels= as received
<input type="radio"/> 7 days		<input type="radio"/> Offset signals= relative signals + offset
<input type="radio"/> 30 days		

Tip:use left icons to zoom & scroll



ESCO/IOC

[disclaimer](#) | [contact](#)

<http://www.ioc-sealevelmonitoring.org>



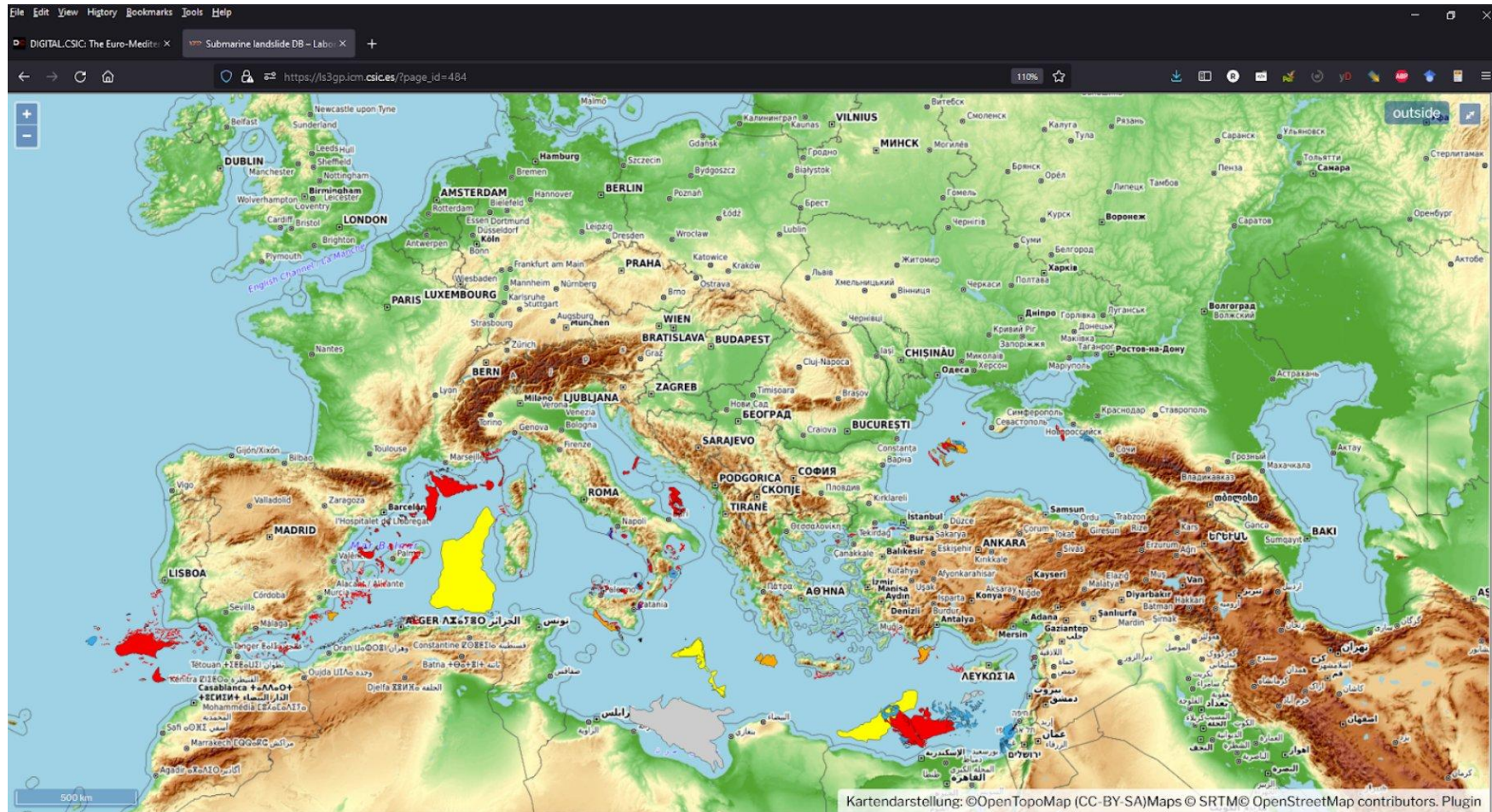
# Our services

## Databases

### Euro-Mediterranean Submarine landslide database (EMSS21)



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# Our services

## Access to Labs

HR Wallingford's Froud Modelling Hall (Fast Flow Facility)



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# Our services

## Numerical codes to simulate tsunami



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Source codes and (HPC-)workflows to simulate:

- complex sources of tsunami generation
- wave propagation
- coastal shoaling and inundation



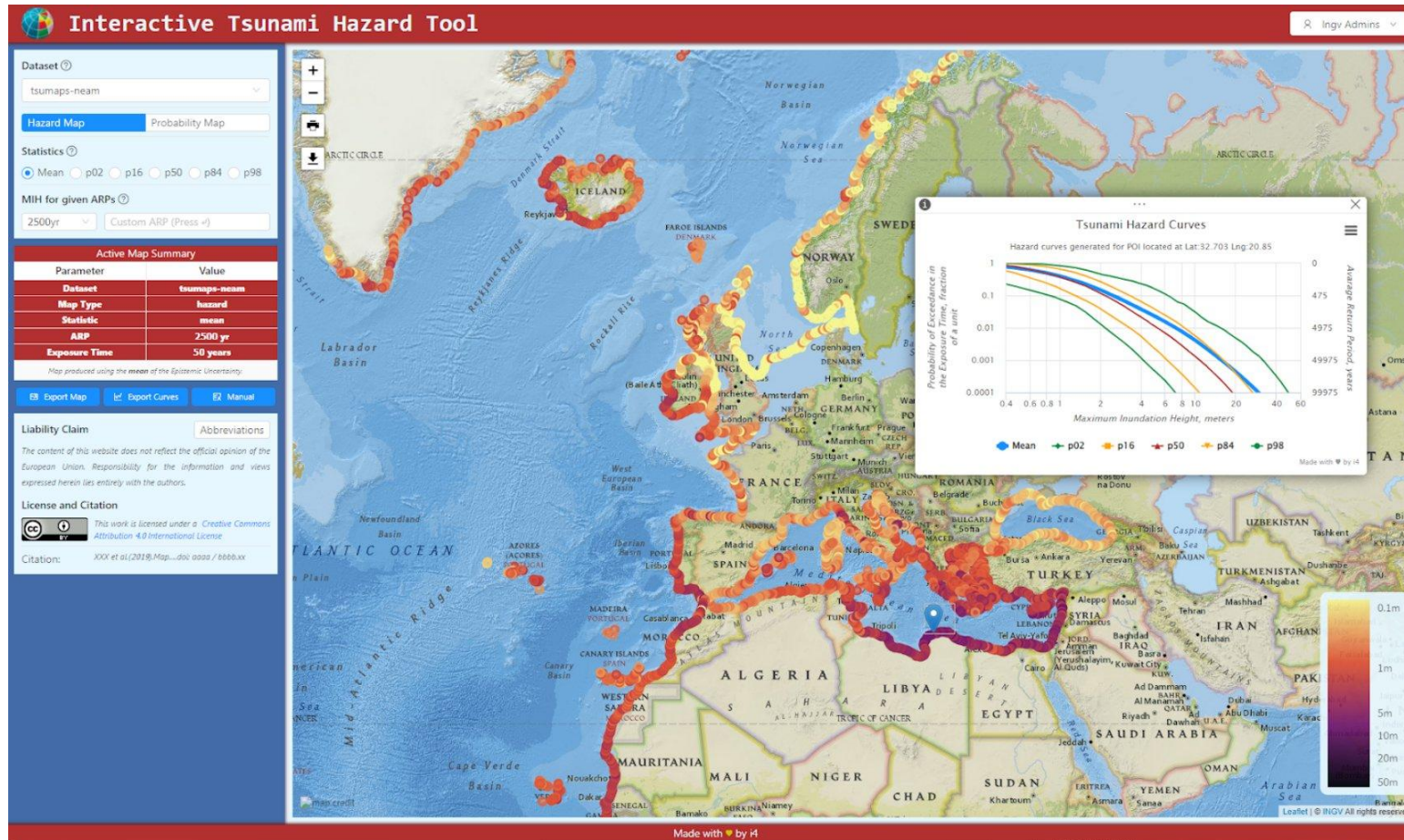
# Our services

## Hazard products

### European NEAMTHM18 probabilistic hazard model



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Basili et al. 2021

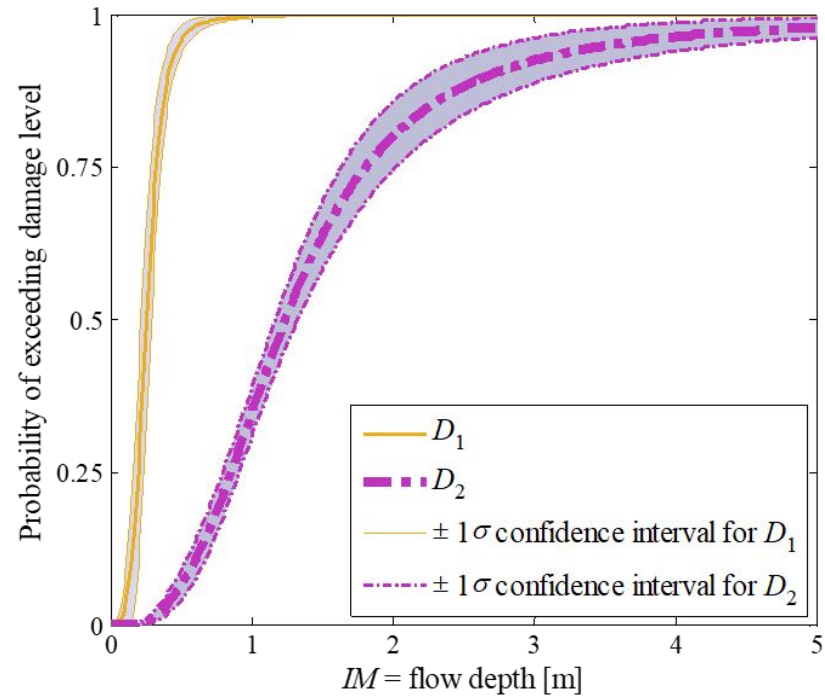
<http://tsumaps-neam.eu>

# Our services

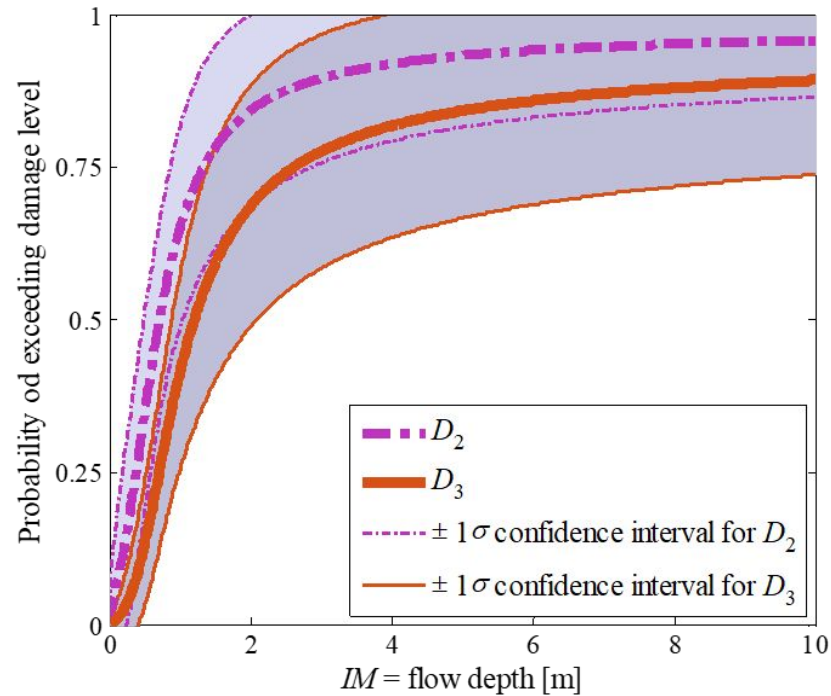
## Risk products



### Empirical fragility curves based on observed damage



Fragility curves for *Non engineered masonry, unreinforced with clay brick, 1 storey, Sulawesi Palu Tsunami 2018* (No. of data points: 279)

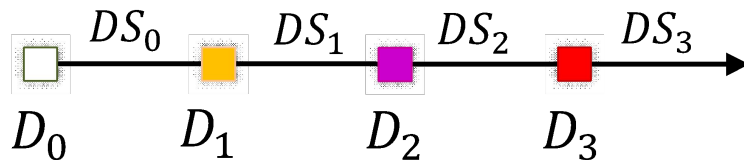


Fragility curves for *Non engineered light timber, Sulawesi Palu Tsunami 2018* (No. of data points: 14, the uncertainty band is thus larger)

**Relevance to African urban context:** Similar non-engineered building types could also be found in Africa. Sub-Saharan Africa has the highest proportion of urban population living in informal settlements (quality/durability of structure is one of the four informal housing criteria): 56% in 2018 according to the United Nations Human Settlements Programme (UN-Habitat).

Damage Level	Damage level description
D <sub>0</sub> None	no damage
D <sub>1</sub> Repairable	Partial damage, repairable
D <sub>2</sub> Unrepairable	Partial damage, unrepairable
D <sub>3</sub> Complete	Complete structural collapse

**Damage Scale and raw damage data: Paulik et al. 2019**



The workflow is available as software: [eurotsunamirisk/computeFrag](https://doi.org/10.5281/zenodo.5167276): <https://doi.org/10.5281/zenodo.5167276>

# Our Community web-site

<https://tsunamidata.org>



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The screenshot shows the homepage of the TsunamiData website. At the top, the site name 'TsunamiData' is on the left, and navigation links for 'Home', 'TCS Tsunami', and 'Services' are in the center. A search bar and a 'Sign In' link are on the right. The main banner is dark blue with the text 'Data, products, software, and services for science and coastal hazard management' and 'EPOS Tsunami Candidate Thematic Core Service (cTCS-Tsu)'. Below the banner are four pillars: Pillar 1 (Support to tsunami service providers), Pillar 2 (Tsunami Data), Pillar 3 (Numerical Models), and Pillar 4 (Hazard and risk products). Each pillar has an 'Access' button.



# Our relevance to other TCS



- Strong inter-disciplinarity: natural interaction with other TCSs
- Strong international (beyond Europe) network
- Rich portfolio of stakeholders: research, private sector, civil protection, early warning, policy makers
- State of the art numerical modeling and observing systems

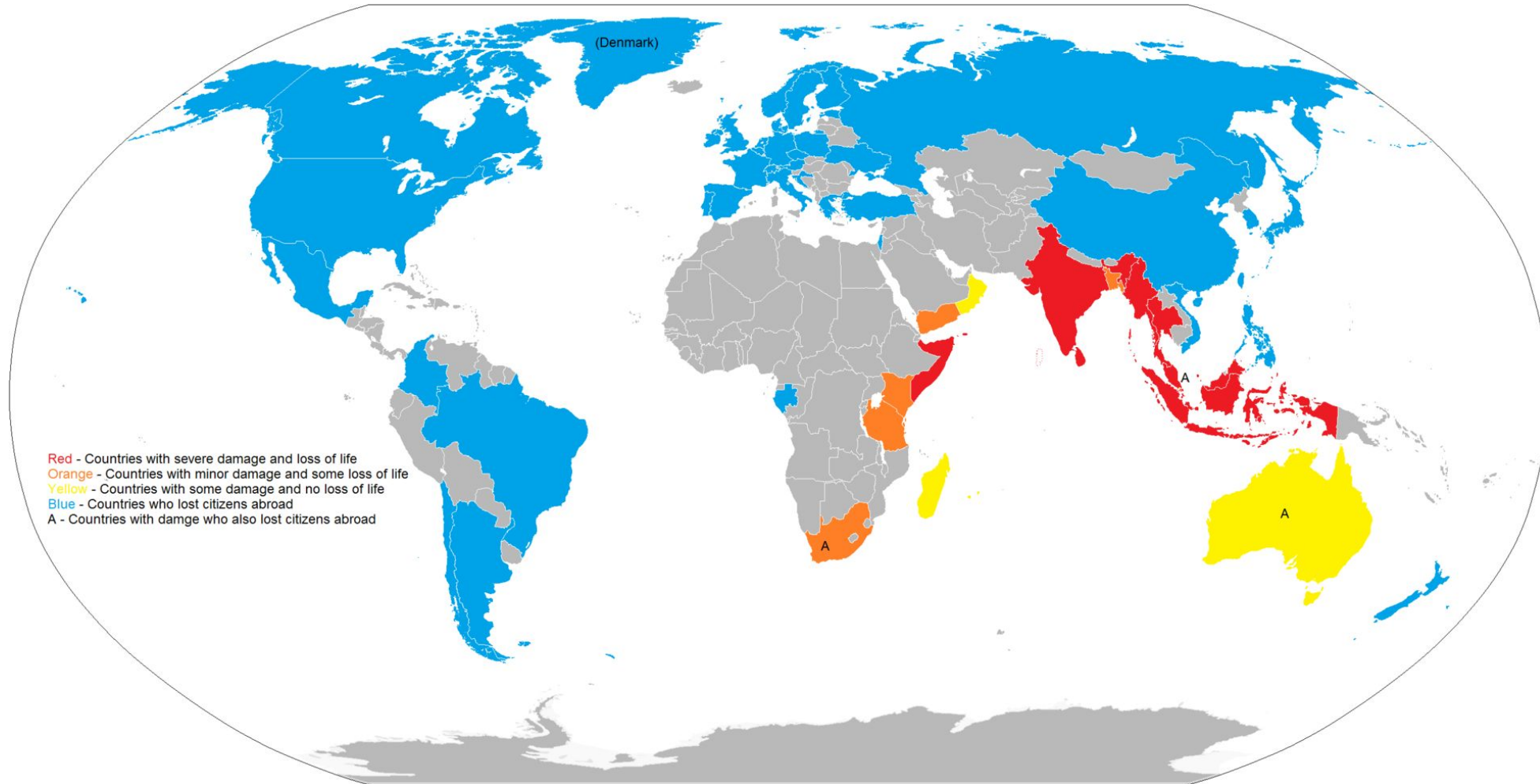


# Relevance to Africa

## Great 2004 Sumatra Earthquake and Tsunami



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Red - Countries with severe damage and loss of life  
Orange - Countries with minor damage and some loss of life  
Yellow - Countries with some damage and no loss of life  
Blue - Countries who lost citizens abroad  
A - Countries with damage who also lost citizens abroad

Image from wikipedia.org



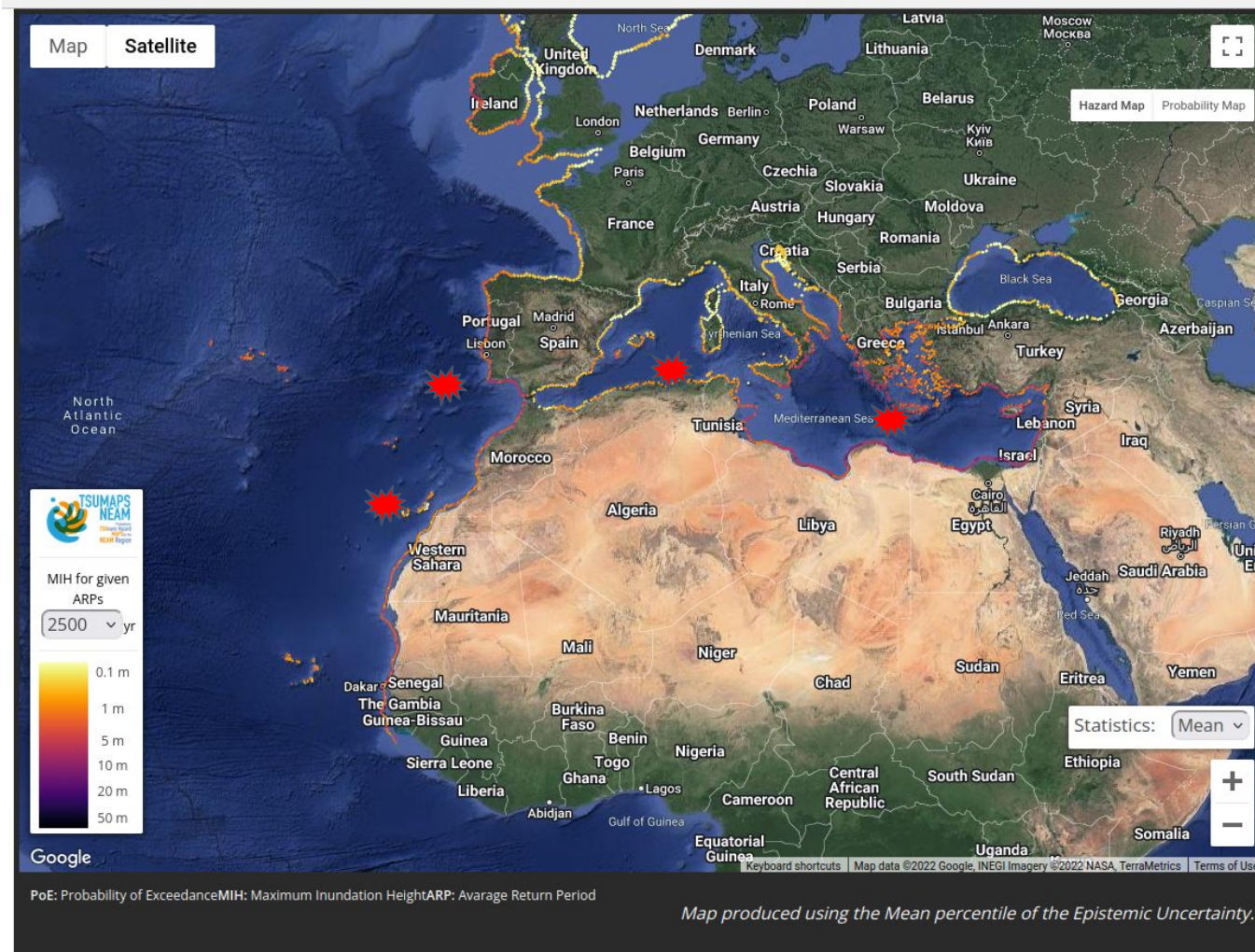
# Relevance to Africa

## European NEAMTHM18 probabilistic hazard model



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<http://tsumaps-neam.eu>



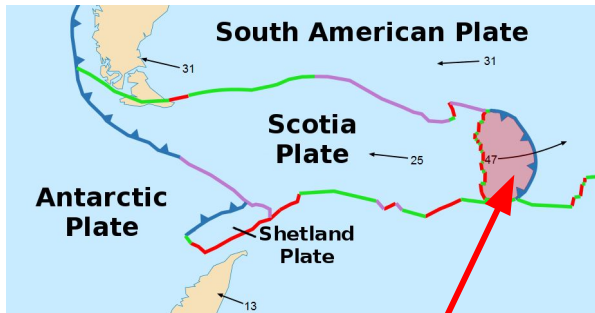


# Relevance to Africa

Okal and Hartnady (2009): The South Sandwich Islands Earthquake of 27 June 1929: Seismological Study and Inference on Tsunami Risk for the South Atlantic. (doi:10.2113/gssaaj.112.3-4.359)

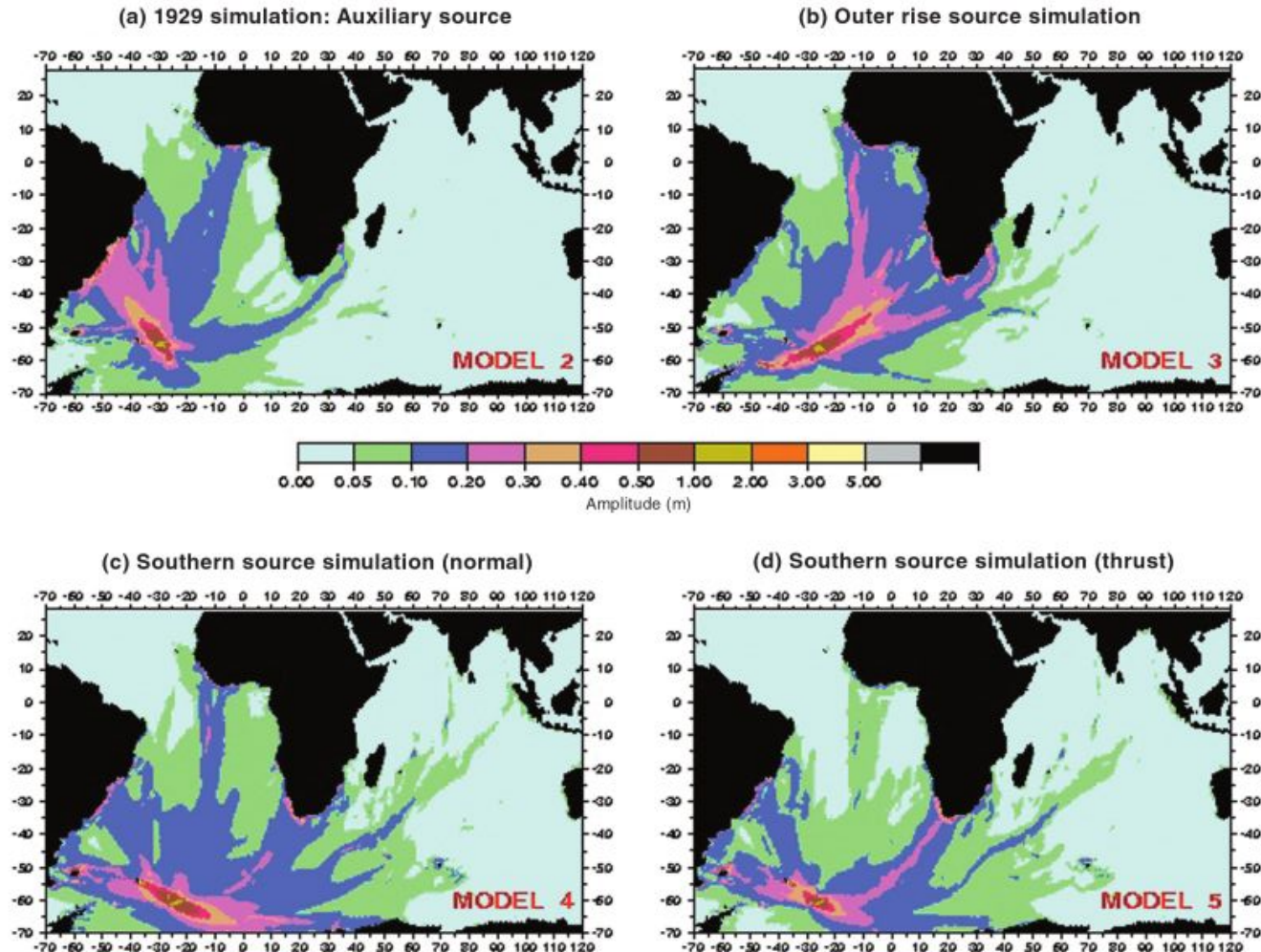


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Map: [www.wikiwand.com](http://www.wikiwand.com)

South Sandwich subduction



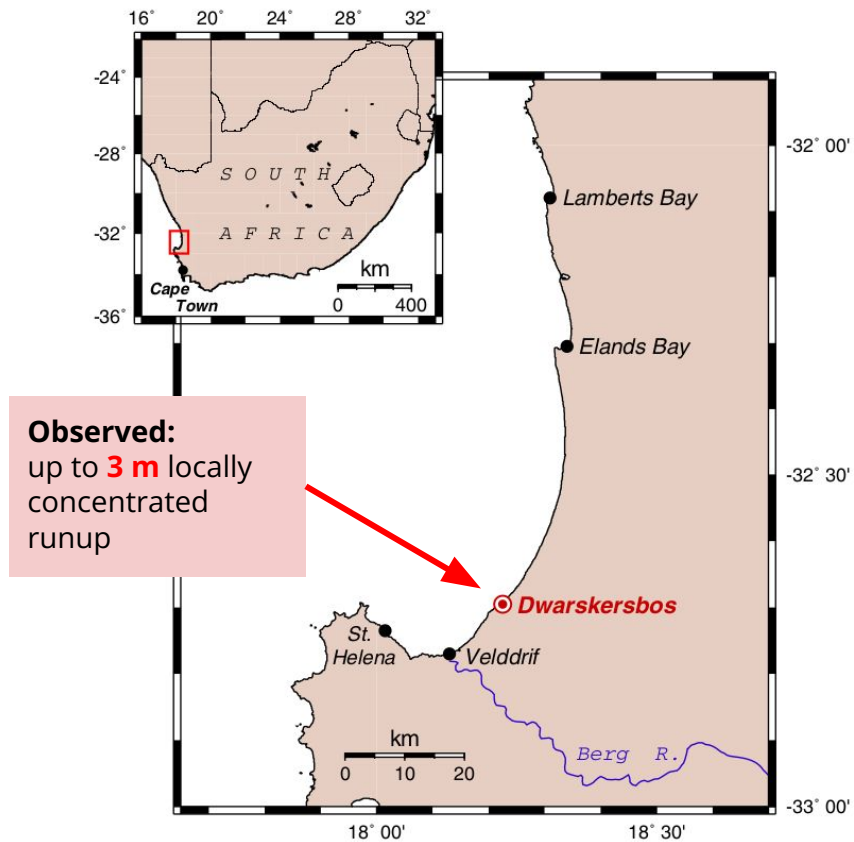
# Relevance to Africa

## Meteo-tsunamis

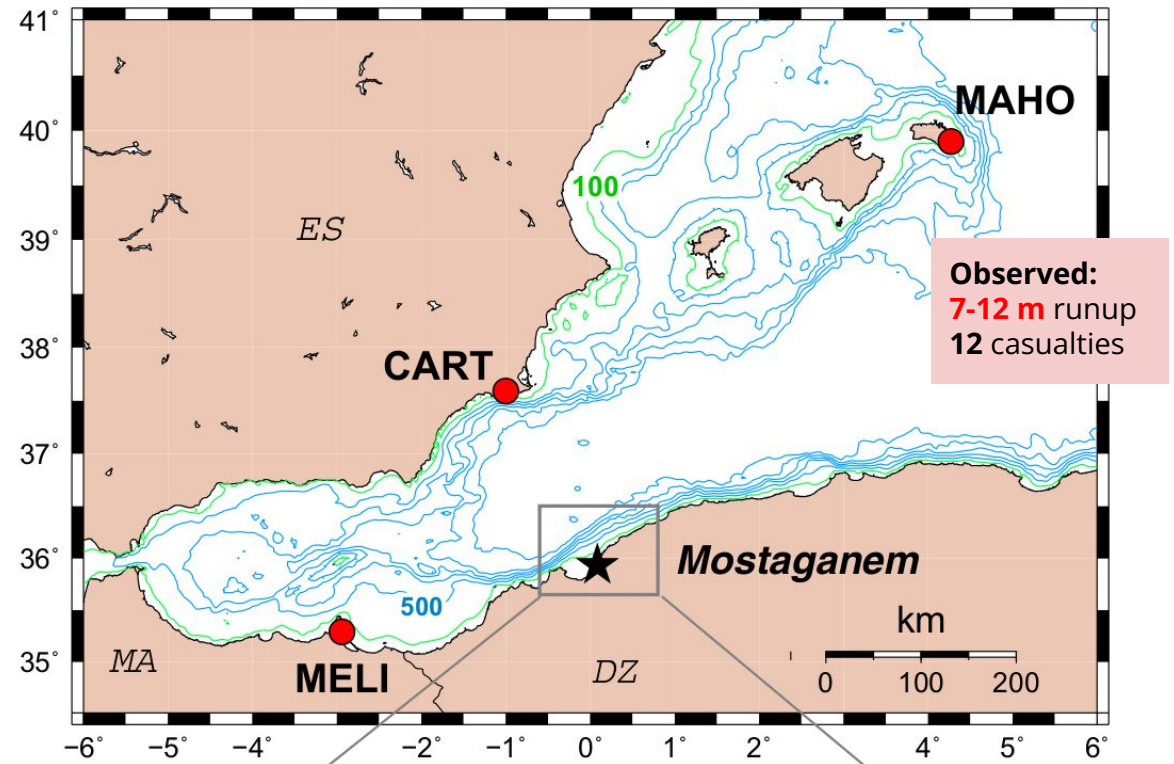


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**Okal et al. (2014):** The Dwarskersbos, South Africa local tsunami of August 27, 1969: field survey and simulation as a meteorological event. (doi:10.1007/s11069-014-1205-5)



**Okal (2021):** On the possibility of seismic recording of meteotsunamis (doi:10.1007/s11069-020-04146-x)





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# Thank you!

