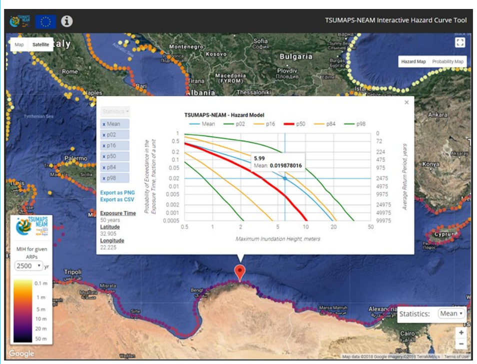
*A website (**www.tsumaps-neam.eu**) with all the project results, documents, news, and updates, and most of all…*

… a direct link with an interactive user tool to get seamless access to the hazard assessment, navigate hazard and probability maps, and display as well as download hazard curves for more than 2,000 points of interest in the whole NEAM region.



PROJECT PARTNERSHIP

Istituto Nazionale di Geofisica e Vulcanologia, INGV, ITALY (coordinator)

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Instituto Português do Mar e da Atmosfera, IPMA, PORTUGAL

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Universitat de Barcelona, UB, SPAIN

National Observatory of Athens, NOA, GREECE

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TSUMAPS NEAM

Probabilistic TSUnami Hazard MAPS for the NEAM Region

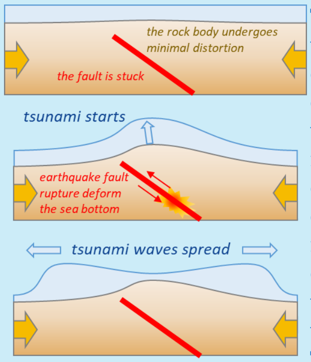
Probabilistic Hazard Assessment and Maps for Tsunamis of Seismic Origin in the coastlines of the North-Eastern Atlantic, the Mediterranean and Connected Seas (NEAM)

Funded by
European Union
Humanitarian Aid
and Civil Protection

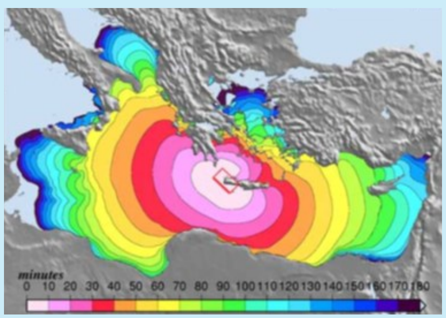
ECHO/SUB/2015/718568/PREV26

TSUNAMI GENERATION AND PROPAGATION

Tsunamis are most frequently caused by earthquakes, but can also result from landslides, volcanic eruptions, and very infrequently by meteorites or other impacts upon the ocean surface. In the case of earthquakes, tsunamis are generated by the dislocation of the sea floor caused by the movement along crustal faults or subduction zones, driven by tectonic forces.



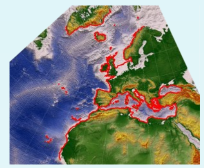
The movement of the upthrown and downthrown blocks on either sides of the fault mpart potential energy into the overlying water mass with drastic changes in the sea level over the affected region. The energy imparted onto the water mass results in tsunami generation, i.e. energy radiating away from the source region in the form of long-period waves.



These waves then travel across the open sea very quickly. This computer simulation shows that a tsunami generated near Crete reaches the coast of Libya in about 30 minutes and spreads across the whole eastern Mediterranean Sea in less than three hours.

WHAT DID WE DO?

Tsunami risk assessments and warning systems need probabilistic tsunami hazard assessment (PTHA) as input and reference. TSUMAPS-NEAM has developed the first homogeneous long-term PTHA for earthquake-induced tsunamis, which was unavailable, until now, for the coastlines of the NEAM region.



The NEAM is one part of the subdivision of the World's oceans made by the Intergovernmental Oceanographic Commission of UNESCO for implementing tsunami warning systems around the globe. The NEAM includes the North-Eastern Atlantic, the Mediterranean, and the connected Seas.

HOW DID WE DO IT?

Getting the hazard assessment in four steps...

STEP1: Probabilistic earthquake model

- *definition of the parameters of all the possible representative seismic sources that may generate tsunamigenic earthquakes in the future;*
- *quantification of their long-term frequency (mean annual rates).*

STEP2: Tsunami generation & modeling in deep water

- *simulation of the sea floor displacement;*
- *simulation of the tsunami generation and propagation from the source to the target area, up to a given bathymetric depth.*

STEP3: Shoaling and inundation

- *simulation of the last phases of the tsunami impact;*
- *stochastic simulation of the associated uncertainty (including uncertainty deriving both from simplified source modelling and simplified tsunami modelling);*

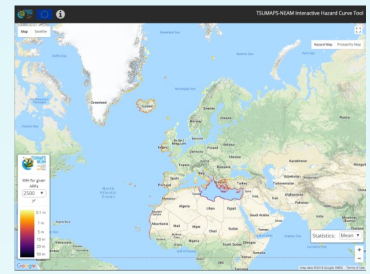
STEP4: Hazard aggregation & uncertainty quantification

- *quantification of the hazard curves at the target sites;*
- *disaggregation analyses.*

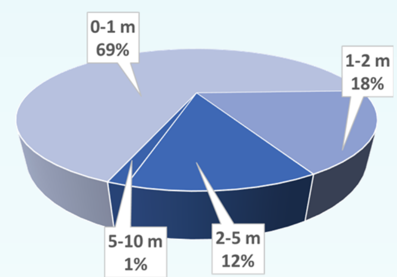
RESULTS

A rich portfolio of maps

Our online mapper offers 30 different probabilistic tsunami hazard displays. Five hazard maps for average return periods of 500, 1,000, 2,500, 5,000, and 10,000 years, and five probability maps for maximum inundation heights of 1, 2, 5, 10, and 20 meters. For each map, the mean, 16th, and 84th percentiles can be shown to explore the uncertainty on the reported values.



The colors in these maps corresponds to the hazard or probability level at the "points of interest (POI)", i.e. the locations where hazard curves were calculated. There are more than two thousands POIs distributed along the NEAM coastlines, spaced at about 20 km from one another. There are 1,076 POIs in the North-East Atlantic; 1,130 POIs in the Mediterranean Sea; and 137 POIs in the Black Sea.



Over 30% of NEAM coastlines can be affected by a maximum inundation height larger than one meter with an average return period of 2,500 years. Notice that locally, the maximum runup values may be 3-4 times larger than the maximum inundation height.