



IHO/CIESM Collaboration

Strengthening scientific and technical synergies in research and monitoring of marine waters in the Mediterranean Region



Renewal of the 24, March 2017 IHO/CIESM MoU in Monaco, 23 March 2021.

Objectives:

Contribute to the development, production, and publication of a variety of **maps on risks associated to seabed geological features** in the Mediterranean Basin.

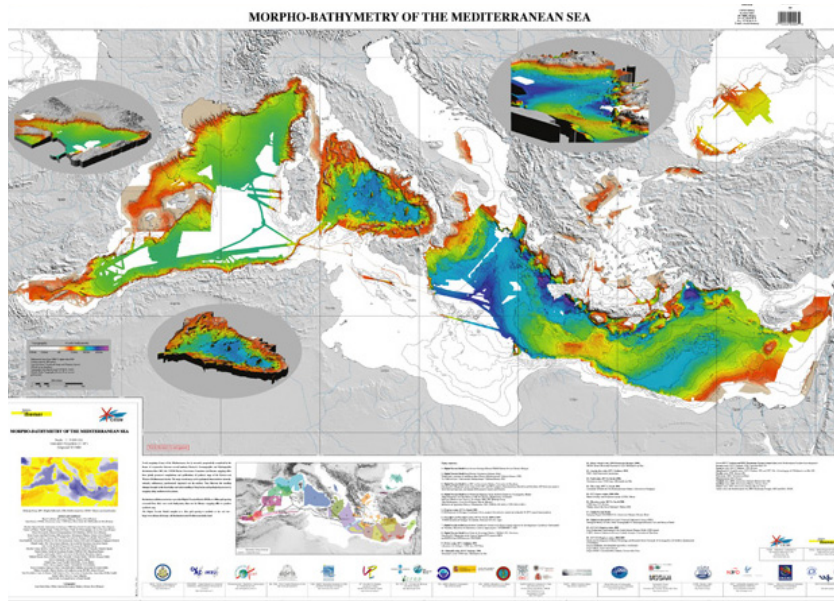
Facilitate reasonable estimates of the **most serious geo-hazards** all around the Mediterranean basin as a basis for **risk management**.

Relevance:

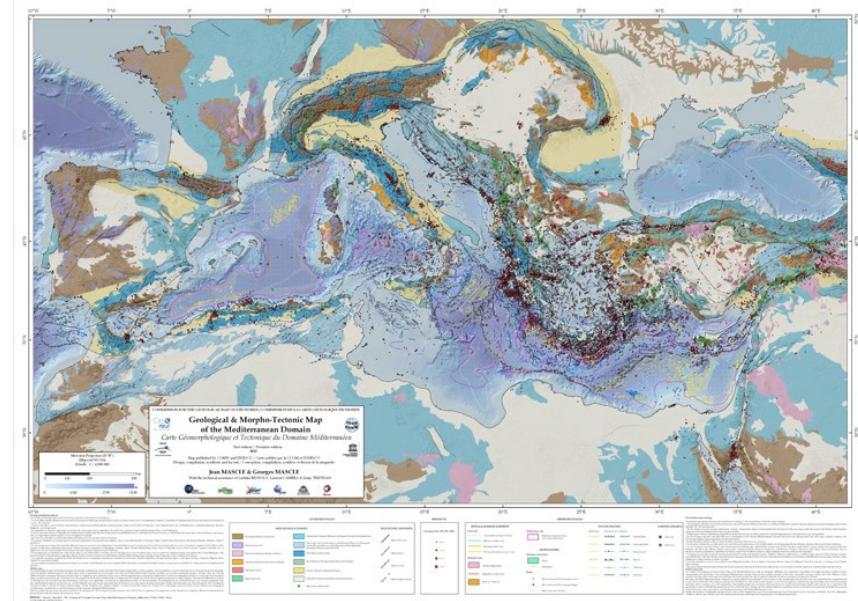
United Nations Decade of Ocean Science for Sustainable Development (2021 – 2030)

Seabed 2030, EmoDNet, ...

Mining and Assembling data of relevance



CIESM Morpho-Bathymetric map of the Mediterranean Sea



CIESM Geological and Morpho-Tectonic Map of the Mediterranean Sea (2012)

Mining and assembling data of relevance for geological hazards analysis

Follow-up of *CIESM Morpho-Bathymetric and the Geological and Morpho-Tectonic Map of the Mediterranean Sea* (2012). Data mining.

Implementation of high resolution bathymetry maps, and updated seismic and tectonic maps of the Mediterranean region

Why?

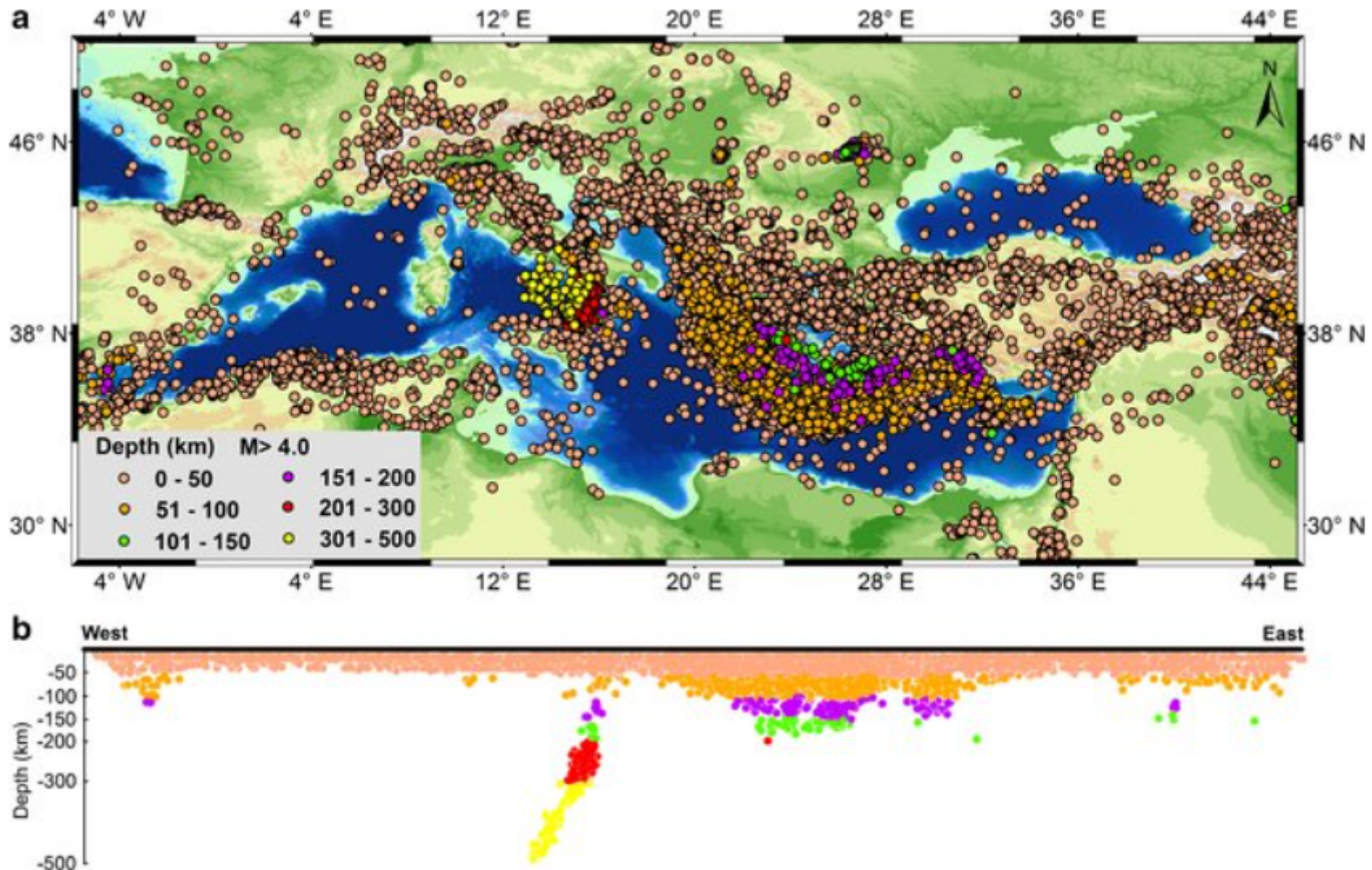
Approximately 10% of all tsunamis worldwide happen in the Mediterranean.

On average, one large tsunami occurs once a century.

The risk to coastal areas is high because of the **high population density** - some 130 million people live along the sea's coastline

Biggest concern is that **tsunami waves in the Mediterranean need to travel only a very short** distance before hitting the coast, reaching it with little advance warning. Also volcanic eruptions.

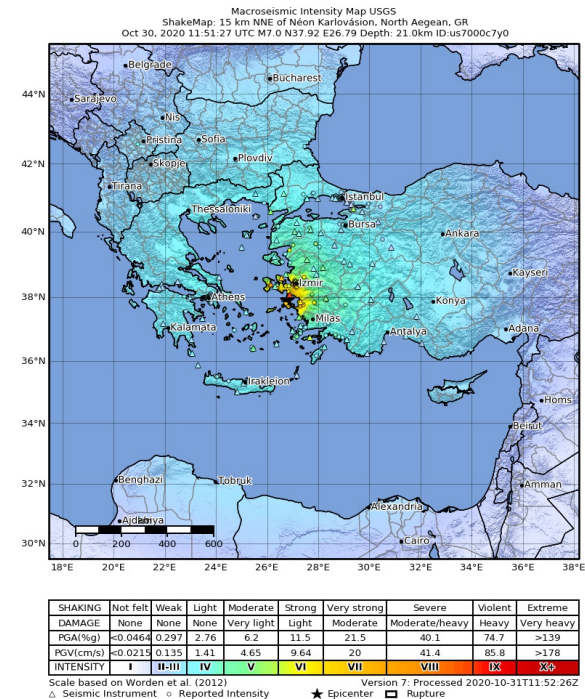
Why?



Seismic activity of the Mediterranean region with location of earthquake epicenters between 1900 and 2018 and depth of the earthquakes (Ulutaş, 2000).

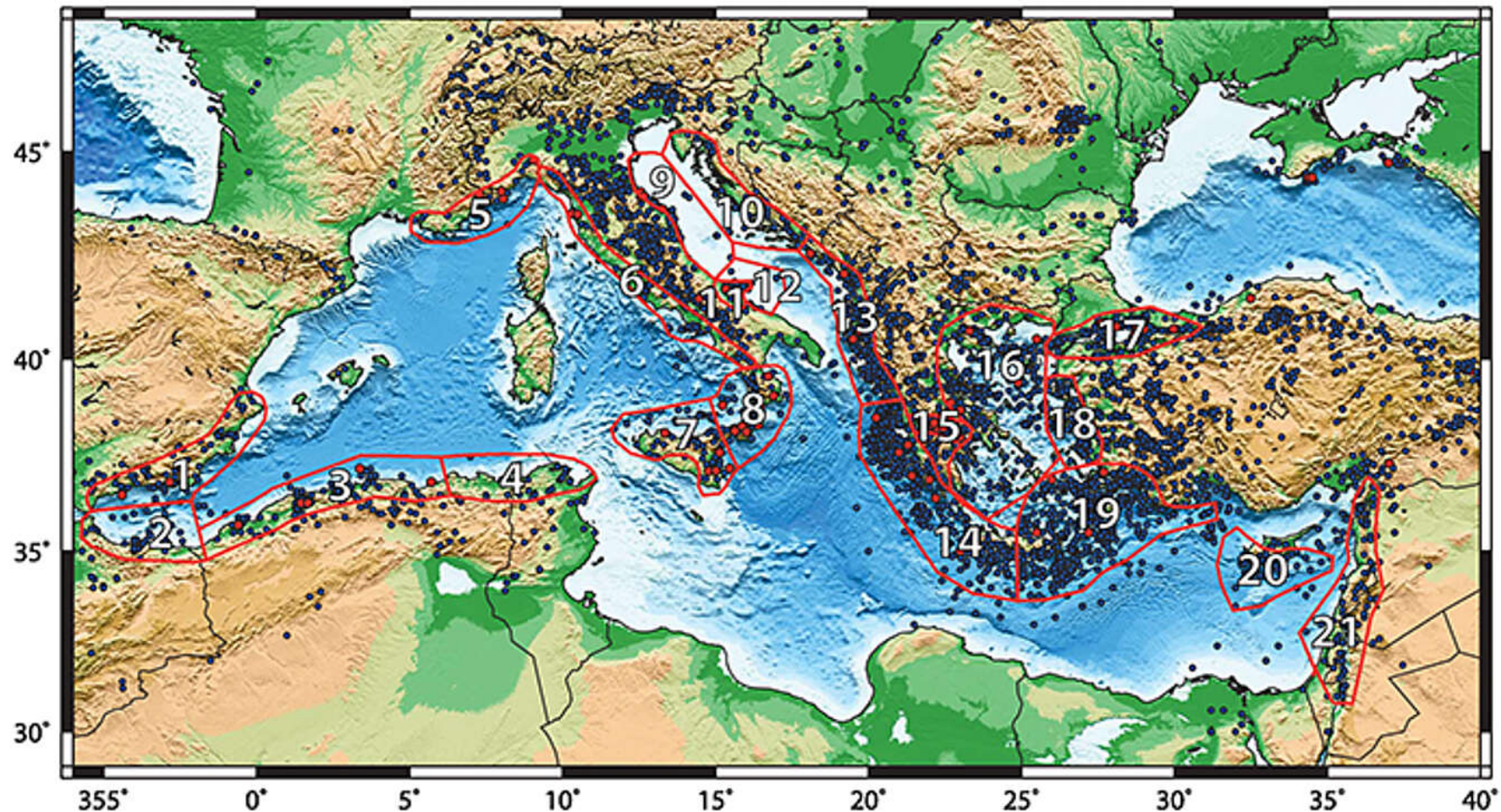
Why?

- **1650 B.C.**, the eruption of the Thera volcano, **Santorini** triggered a tsunami
- **Crete, 8-8.5 magnitude event 365 CE (AD)**, tens of thousands of lives
-
- 1956, earth-quake in the Aegean Sea.
- 2003, Algerian Coast
- **Mag. 7.0** occurred on **30 October 2020** about 14 km (8.7 mi) northeast of Samos (Greek islands). Tsunami hit Turkey 10-15min after main shock.



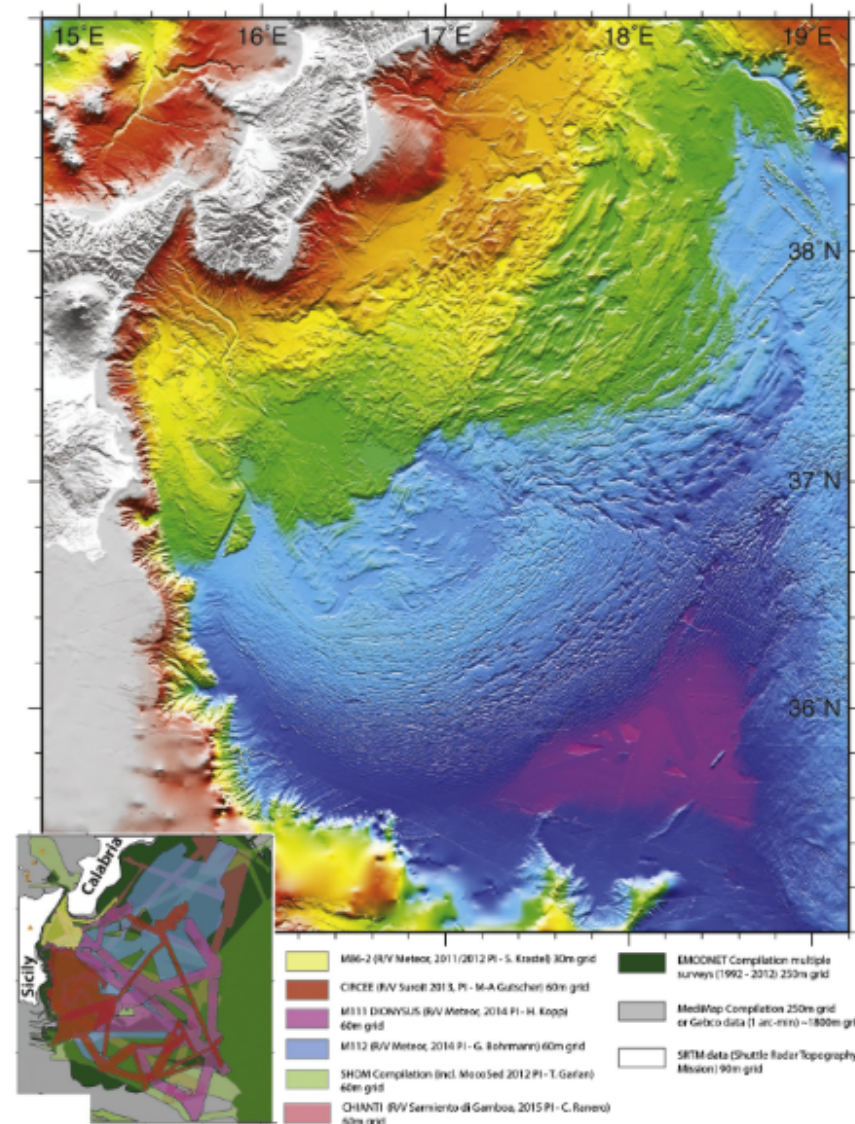
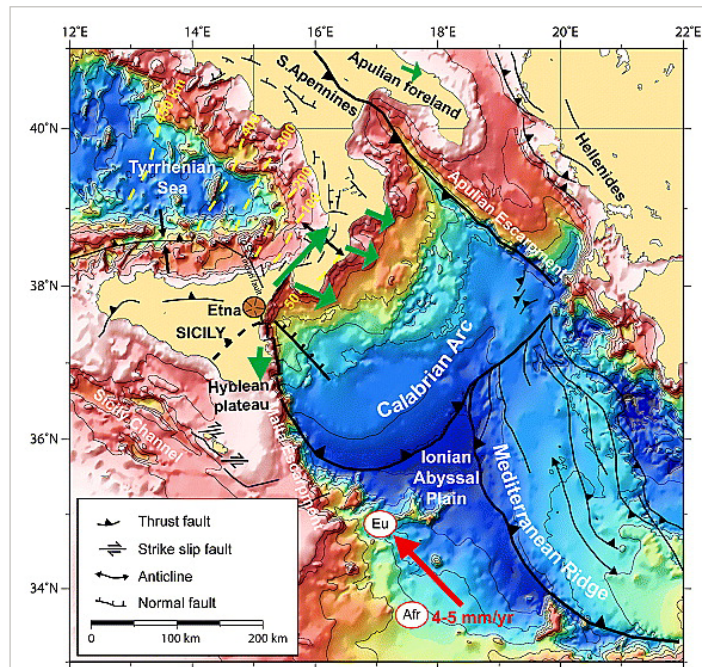
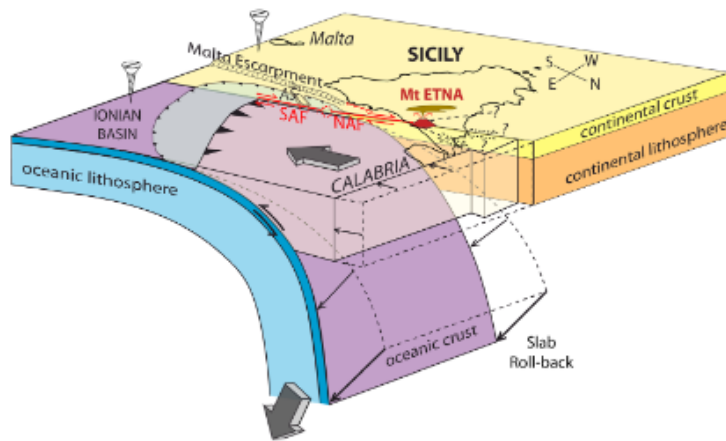
Samaras et al., 2015)

Tsunami Hazard Regions in the Mediterranean



Overview map of **historical earthquakes and tsunami in the Mediterranean region** (blue dots = earthquakes, red dots = tsunami). The different regions are shown by numbers (Tinti et al., 2001; Sorensen et al., 2012).

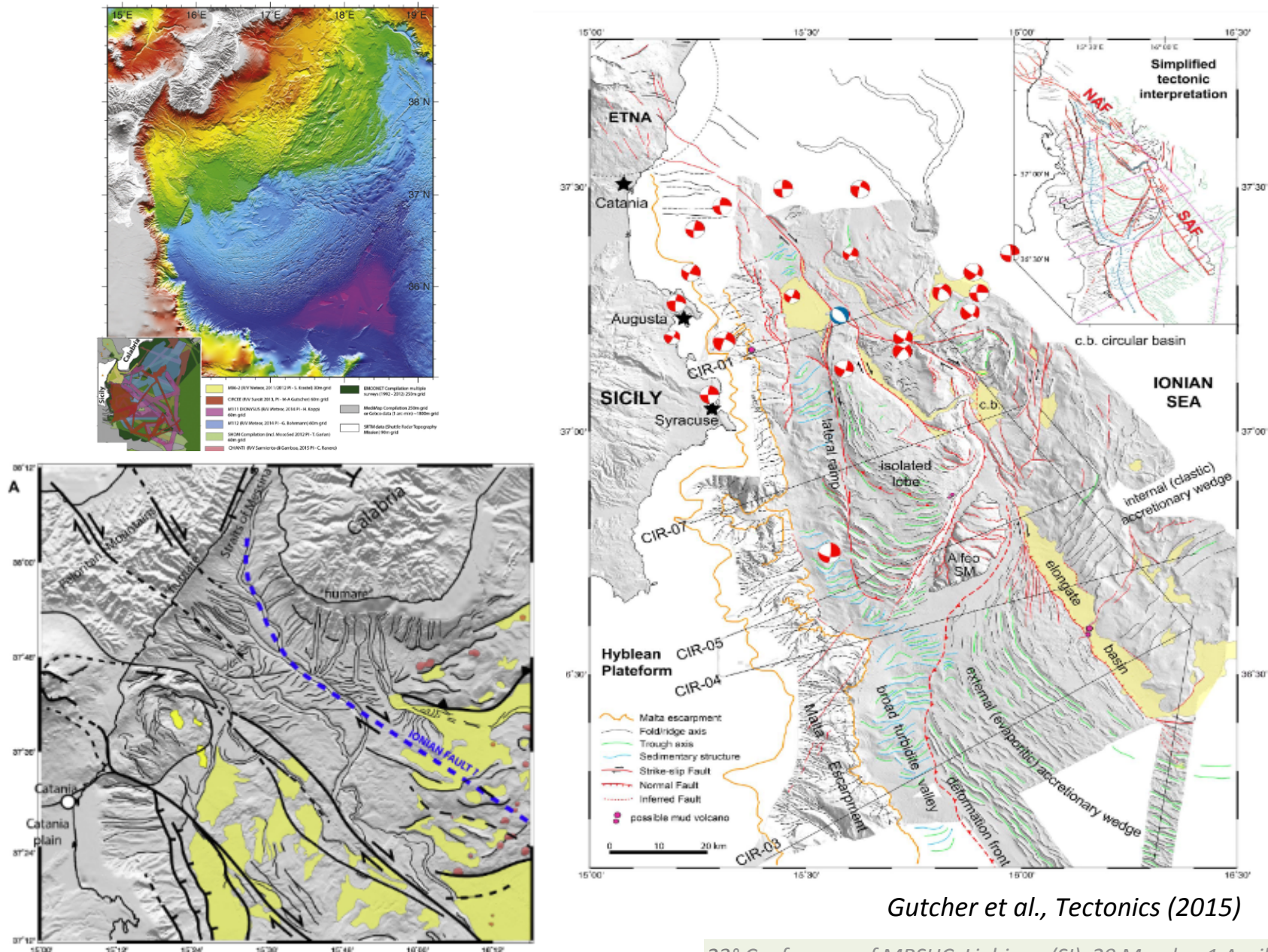
Contribution of high resolution Bathymetric Data



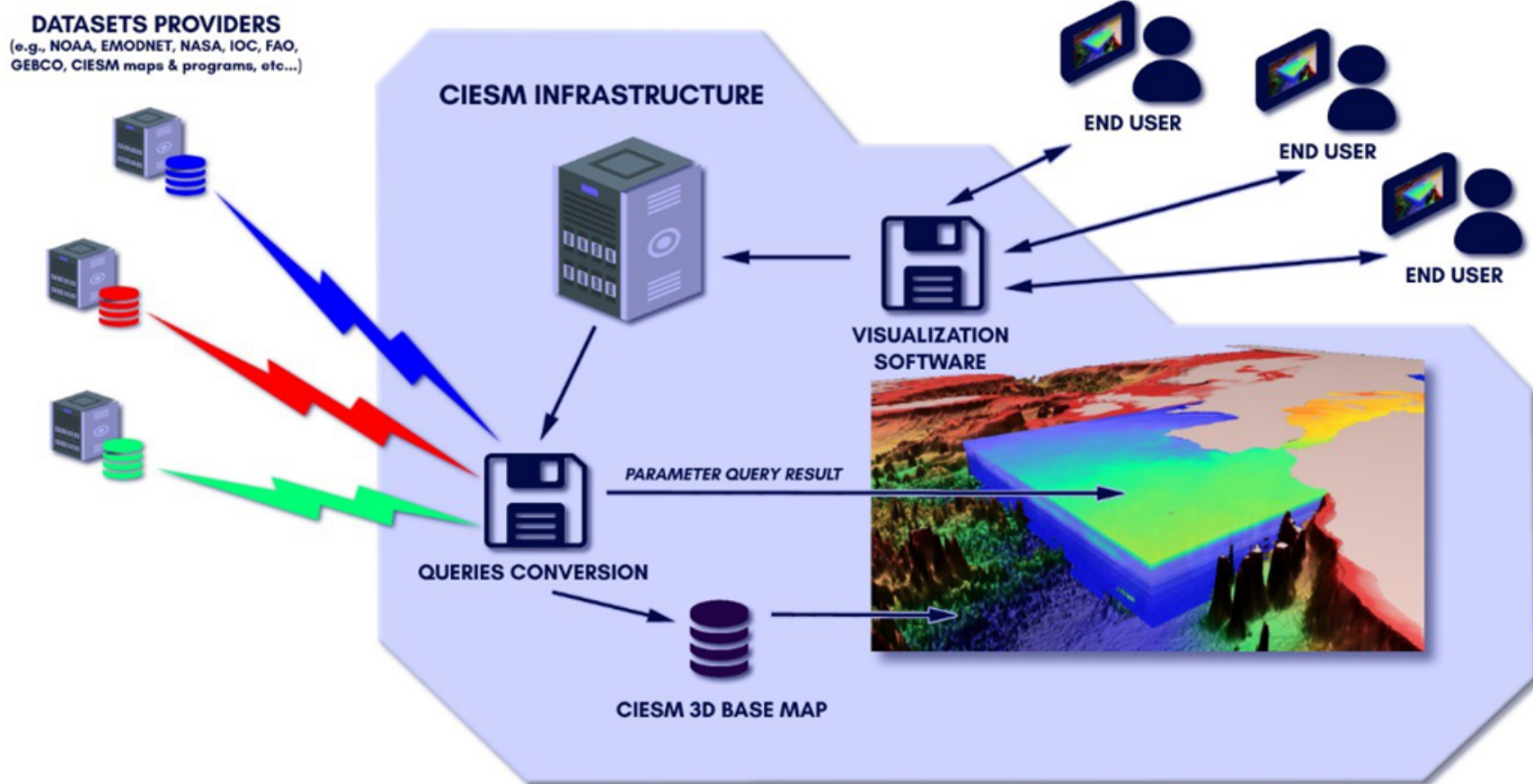
Gutcher et al., Tectonics (2015); EPSL, 2017

23rd Conference of MBSHC, Ljubljana (SI), 29 March – 1 April 2022

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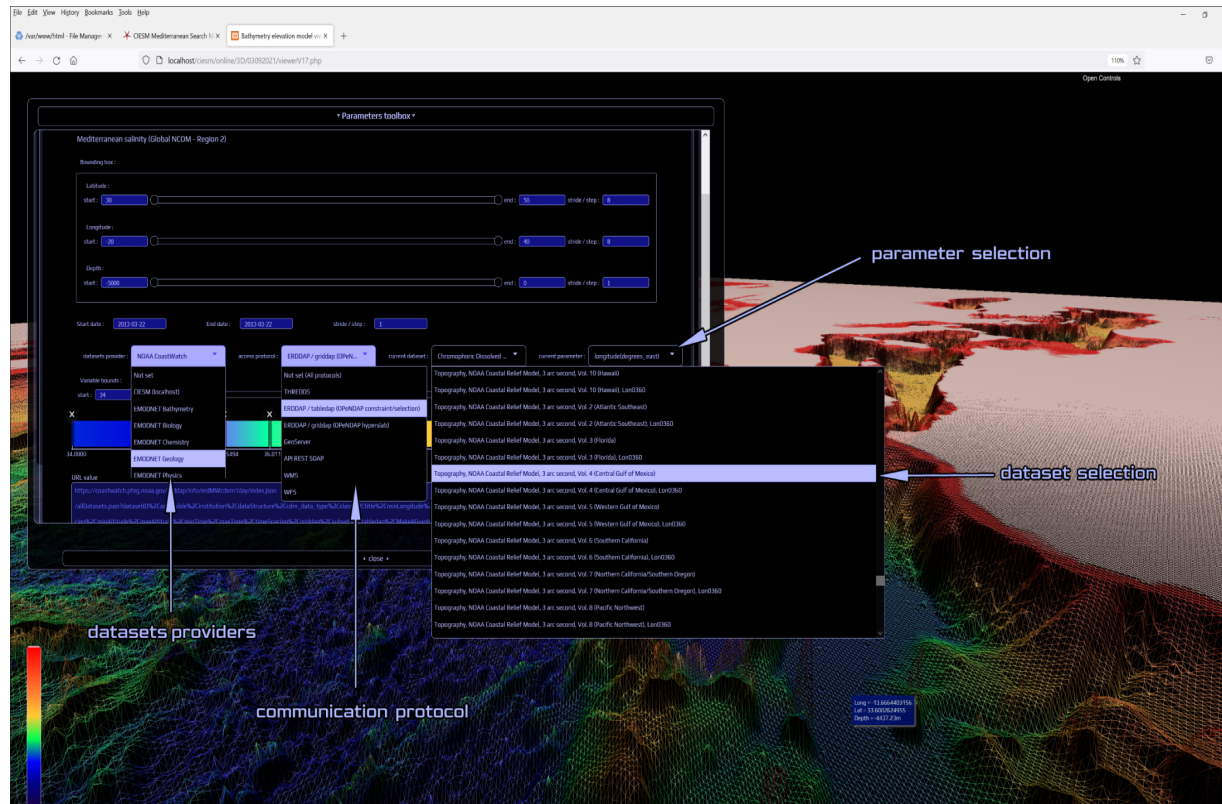
3D warning maps for vulnerable areas



Optimizing access to remote scientific databases of relevance to the Basin, taking into account the different servers' standards and data transfer Specifications (NOAA, EMODNET, NASA, IOC, GEBCO, etc..).

High-resolution bathymetry, morpho-tectonic information, active faults, earthquakes, volcanoes, mud volcanoes, seeps deep structure...

CIESM online data visualization platform



- User select the most suitable primitives to plot georeferenced data (with depth, when available), independently of their storage and transfer standards/formats, all on the same graph.
- The temporal dimension allows analysis of time series (ex. by specific time-range requests), and could be used for future animation exercises.
- Fast rendering of graphs and imaging of heavy data loads.
- Queries facilities

Strategic plan



- Create **holistic databases** of raw data and homogeneous interpretations in support of marine geohazard studies
- Implement **automated solutions to access constantly evolving data sets.**
- Develop new information tools (CIESM **3D mapping tool**, in progress)

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(IHO input welcome)



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- Data Query software in progress
(IHO Databases could be used as a standard reference for optimizing search tool) 

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- 3D mapping tool – *in progress* 
- *(Animated evolution of Historical Datasets through time- IHO, other...)*

Looking Forward

Production of “**Geo-risks**” maps, incorporating high resolution hydrographical information.

Contribute to the **improvement of tsunami modeling capacity** and run-up estimates using high resolution bathymetry and geological interpretations, in particular in the shallower areas near the coasts.

CIESM Data Visualisation Platform can be used for **Capacity Building / Education programs**.



Thank you for your attention!