## Main tsunamigenic seismic zones in the NEAM region - An overview

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#### Main tectonic units



## Pattern of stresses and tectonic features in the Alpine-Mediterranean area



Udias (1982)

#### Shallow instrumental seismicity





#### Focal mechanisms





#### Representative focal mechanisms





### Tectonics from Azores to western Mediterranean



Martinez Solares et al. (2004)

#### Focal mechanisms in central Mediterranean



#### Tectonics in the eastern Mediterranean



Triantafyllou et al., 2023

## Tsunami potential of large (M≥7) earthquakes

(preliminary results presented in EGU-2016 by Papadopoulos et al.)

- Seismic tsunamis are the most frequent and those having the largest size.
- Their generation depends on the earthquake
- magnitude
- focal depth
- focal mechanism
- We determined rupture zones, repeat times, and ratios of tsunamigenic earthquakes

Rupture zones, repeat times and ratios of large tsunamigenic earthquakes

- Large earthquakes (M<sub>w</sub>≥7)
- Time interval: 5<sup>th</sup> century BC 2024 AD
- Focal depth (≤100 km)
- Epicentral distance up to 40 km inland
- Catalogues: SHARE, GHEA, and others
- 92 earthquakes compiled
- Focal mechanisms: EMMA, GCMT
- Elliptical rupture zones: Aftershock areas & Empirical relationships (L/Mw, W/Mw)

### Tsunami size classification

- No standard tsunami magnitude scale has been established so far
- Tsunami intensity, K, was used as a proxy of tsunami size (Papadopoulos-Imamura 12-grade scale)
- Tsunami classification
  - small: K from 1 to 4
  - moderate: K from 5 to 7
  - large:  $K \ge 8$

## Rupture zones of large earthquakes (M≥7) in the Azores-Mediterranean fracture zone



Five very large tsunamigenic earthquakes ( $M \ge 8$ ):

- 365 and 1303 in the HA
- 1755, 1941 and 1975 in the Azores-Gibraltar fault zone

## Rupture zones of large earthquakes (M≥7) in the Azores- Western Mediterranean region



### Rupture zones of large earthquakes (M≥7) in the Eastern Mediterranean region



### Rupture zones of large earthquakes (M≥7) in the Marmara Sea



# Results about the tsunami potential of large earthquakes

- tsunamigenic earthquakes: 43 out of 92 (47%)
- 13 out of 92 earthquakes (14%) generated large tsunami of K≥ 8
- 5 out 5 (100%) very large earthquakes (M≥8) caused tsunamis (but only 3 of K≥ 8)
- Ratio of large tsunamigenic earthquakes (8>M≥7.0): 44%
- Repeat time is 330 yrs for M≥8 and 27 yrs 8>M≥7.0

## Thank you for your attention!

