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Tsunami potential assessment based on rupture zones, focal mechanisms and repeat times of strong earthquakes in the major Atlantic-Mediterranean seismic fracture zone

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In the major Atlantic-Mediterranean seismic fracture zone, extended from Azores islands in the west to the easternmost Mediterranean Sea in the east, including the Marmara and Black Seas, a number of 22 tsunamigenic zones have been determined from historical and instrumental tsunami documentation. Although some tsunamis were produced by volcanic activity or landslides, the majority of them was generated by strong earthquakes. Since the generation of seismic tsunamis depends on several factors, like the earthquake size, focal depth and focal mechanism, the study of such parameters is of particular importance for the assessment of the potential for the generation of future tsunamis. However, one may not rule out the possibility for tsunami generation in areas outside of the 22 zones determined so far. For the Atlantic-Mediterranean seismic fracture zone we have compiled a catalogue of strong, potentially tsunamigenic (focal depth less than 100 km) historical earthquakes from various data bases and other sources. The lateral areas of rupture zones of these earthquakes were determined. Rupture zone is the area where the strain after the earthquake has dropped substantially with respect the strain before the earthquake. Aftershock areas were assumed to determine areas of rupture zones for instrumental earthquakes. For historical earthquakes macroseismic criteria were used such as spots of higher-degree seismic intensity and of important ground failures. For the period of instrumental seismicity, focal mechanism solutions from CMT, EMMA and other data bases were selected for strong earthquakes. From the geographical distribution of seismic rupture zones and the corresponding focal mechanisms in the entire Atlantic-Mediterranean seismic fracture zone we determined potentially tsunamigenic zones regardless they are known to have produced seismic tsunamis in the past or not. An attempt has been made to calculate in each one of such zones the repeat times of strong earthquakes from earthquake catalogue data sets.