



The large earthquake and tsunami of AD 365 in the Hellenic Arc revisited: implications for tsunami hazard assessment

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The large tsunamigenic earthquake that shook the eastern Mediterranean in the second half of the 4th century AD with a magnitude which is only roughly estimated as being of at least 8 has been considered as one of the largest earthquakes ever reported in the Mediterranean Sea. A general consensus exists that it occurred on 21 July 365 in the western Hellenic Arc causing a co-seismic uplift in western Crete up to c. 9 m. However, the rupture zone is not well constrained so far. From historical and geological documentation it has been supported that the tsunami inundated not only in near-field but also in remote coastal sites in the entire basin of the Mediterranean. We reexamine critically the available documentary sources and geological information, create an inventory of the most credible coastal sites to have inundated and conclude that the tsunami propagation zone very likely was less than what was considered so far. From dislocation modeling scenarios we reproduce several candidate seismic sources and simulate numerically the resulting tsunami. Then, calculated tsunami wave heights and runups are compared with the observed ones in credible coastal sites to determine the most candidate rupture zone of the earthquake. Implications of such a determination for the tsunami hazard assessment particularly for the West Hellenic Arc as well as for Alexandria is of great interest since there is the most reliable description of tsunami impact. Finally, by extending probabilistic hazard assessment from earthquakes to tsunamis we perform tsunami hazard assessment for Alexandria for a future 365-type tsunami by employing a combination of probability evaluation of earthquakes in the tectonic segment that generated the 365 event and of the tsunami numerical simulation.