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2D and 3D Visualizations of the Fault Areas, Initial Heights and Tsunami Simulations of Five Largest Historical Earthquakes in Mediterrenean Region.

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The aim of this study is the simulation and visualization of the initial and maximum tsunami wave heights in 2D and 3D along the Mediterranean coasts inferred from the five largest earthquakes in history in this region. The earthquakes considered in the study are 21 July 365 Crete, 8 August 1303 Crete, 3 May 1481 Rhodes, 28 December Messina and 21 May 2003 Algeria. All these earthquakes spawned tsunamis and inflicted damage in coastal regions. The study was conducted to explain which could be the potential Tsunami consequences caused by similar earthquakes occurring in the region in the future. The methodology used for the calculation of tsunami wave heights from the earthquakes includes the determination of earthquake parameters, modeling of the initial wave height, simulation of the wave propagation and calculation of the maximum wave heights near coastal areas. The parameters of the earthquakes are based on previously published fault mechanism solutions and known tectonic features of the regions. Static dislocation algorithm for the initial wave height is used from the parameters of focal mechanism solutions. The study was conducted also to understand the reliability of the previously published focal mechanism solutions for the earthquakes by using the principal stress axis in the regions.

The 2D and 3D visualized models of tsunamis from the earthquakes include isometric grid representing the sea surface for the purpose of a better understanding of the initial tsunami mechanism compared to 1D visualizations. In many studies, the earthquake locations, tectonic features of the regions, initial heights and tsunami simulations are shown on maps as bird's eye in 1D visualization. However these kinds of features are related in depths and bathymetric features. For that reason, our approaches will contribute to have better understanding where the uplift- subsidence of initial heights and crests-troughs of simulated wave heights and thus provide a better insight of the tsunami features.
The results of the simulations show the endangered coastal areas from the historically largest earthquakes in Mediterranean Region. Furthermore, these results may enable to construct early warning systems and may help to reduce the tsunami risk along the Mediterranean coasts.