



What is the fault that has generated the earthquake on 8 September 1905 in Calabria, Italy? Source models compared by tsunami data

Gianluca Pagnoni (1), Alberto Armigliato (1), Stefano Tinti (1), Maria Filomena Loreto (2), and Lorenzo Facchin (3)

(1) Alma Mater Studiorum-Universita' di Bologna, Dipartimento di Fisica e Astronomia, Settore di Geofisica, Bologna, Italy (gianluca.pagnoni3@unibo.it, +39 051 2095165), (2) Istituto di Scienze Marine – C.N.R., U.O.S. Bologna, Italy, (3) Istituto Nazionale di Oceanografia e Geofisica Sperimentale, Sgonico-Trieste, Italy

The earthquake that the 8 September 1905 hit Calabria in southern Italy was the second Italian earthquake for magnitude in the last century. It destroyed many villages along the coast of the Gulf of Sant'Eufemia, caused more than 500 fatalities and has also generated a tsunami with non-destructive effects. The historical reports tell us that the tsunami caused major damage in the villages of Briatico, Bivona, Pizzo and Vibo Marina, located in the south part of the Sant'Eufemia gulf and minor damage to Tropea and to Scalea, this one being village located about 100 km far from the epicenter. Other reports include accounts of fishermen at sea during the tsunami. Further, the tsunami is visible on tide gauge records in Messina, Sicily, in Naples and in Civitavecchia, a harbour located to the north of Rome (Platania, 1907)

In spite of the attention devoted by researchers to this case, until now, like for other tsunamigenic Italian earthquakes, the genetic structure of the earthquake is still not identified and debate is still open. In this context, tsunami simulations can provide contributions useful to find the source model more consistent with observational data. This approach was already followed by Piatanesi and Tinti (2002), who carried out numerical simulations of tsunamis from a number of local sources. In the last decade studies on this seismogenic area were intensified resulting in new estimates for the 1905 earthquake magnitude (7.1 according to the CPTI11 catalogue) and in the suggestion of new source models. By using an improved tsunami simulation model, more accurate bathymetry data, this work tests the source models investigated by Piatanesi and Tinti (2002) and in addition the new fault models proposed by Cucci and Tertulliani (2010) and by Loreto et al. (2013). The simulations of the tsunami are calculated by means of the code, UBO-TSUFDF, that solves the linear equations of Navier-Stokes in approximation of shallow water with the finite-difference technique, while the initial conditions are calculated via Okada's formula. The key-result used to test the models against the data is the maximum height of the tsunami calculated close to the shore at a minimum depth of 5m corrected using the values of the initial coseismic field deformation.