

# Numerical Simulation of the December 26, 2004: Indian Ocean Tsunami

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**Abstract:** The December 26, 2004 tsunami is one of the most devastating tsunami in recorded history. It was generated in the Indian Ocean off the western coast of northern Sumatra, Indonesia at 0:58:53 (GMT) by one of the largest earthquake of the century with a moment magnitude of  $M_w = 9.3$ .

In the study, we focus on a best-fitted tsunami source for tsunami modeling based on geophysical and seismological data, and the use of accurate bathymetry and topography data. Then, we simulate the large scale features of the tsunami propagation, runup and inundation. The numerical simulation is performed using GEOWAVE model. GEOWAVE consists of two components: the modeling of the tsunami source (Okada, 1985) and the initial tsunami surface elevation, and the computation of the wave propagation and inundation based on a fully nonlinear Boussinesq scheme. The tsunami source is used as initial condition in the tsunami propagation and inundation model. The tsunami source model is calibrated by using available tide gauge data and anomalous water elevations in the Indian Ocean during the tsunami event, recorded by JASON's altimeter (pass 129, cycle 109). The simulated maximum wave heights for the Indian Ocean are displayed and compared with observations with a special focus on the Thailand coast line.

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