

Analysis of tsunami generated by the Great 1977 Sumba Earthquake occurred in Indonesia

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Two tide gauges in Australia recorded tsunami generated by a normal-faulting earthquake on August 19, 1977 located in South of Lesser Sunda Islands near the Sunda trench. Both analog tide gauges record and eyewitness account at Dampier specify that sea level initially rising-up. The earthquake has been extensively studied, and satisfied a rupture model with total length at least 200 km long extending to 30-50 km depth. We use earthquake mechanism of strike= 270° , Dip= 45° and Rake= -70° which indicates the rupture has a 70 km of width as the source for simulation of tsunami propagation.

Using the above rupture model, we numerically computed tsunami, and the observed tsunami waveforms at two tide gauges are compared with the computed ones. The slip amount is estimated to be 3 m from the comparison. The total seismic moment calculated to be 1.7×10^{21} Nm ($M_w=8.1$) which is similar to the estimation based on long-period waves and free oscillations. The 1977 Sumba earthquake is the recorded intraplate earthquake on the Java trench region that generates tsunamis which killed 107 human lives, even that exposed coastal region near the epicenter did not have a high population density. Post tsunami survey team assembled immediately after the event, measures that highest tsunami high of 8 meters witnessed in Lunyuk on Sumbawa Island and tsunami penetrate almost 500 m inland on the plain coastal region at mouth of a bay located 290 km from the epicenter. We use tsunami inundation model to explain the flooding phenomena at Lunyuk.