Geophysical Research Abstracts,
Vol. 10, EGU2008-A-12398, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-12398
EGU General Assembly 2008

Tsunami wave propagation in Indian Ocean due to earthquakes in Sumatra and Makran subduction zones

V.P. Dimri, Kirti Srivatava, V. Swaroopa and D.Srinagesh
National Geophysical Research Institute, Hyderabad 500007, India

Large earthquakes in the Sumatra and Makran subduction zone have generated destructive Tsunamis in the past and caused severe damage to property and life in the Indian Subcontinent. The 1945 Makran Earthquake generated Tsunamis that traveled all along the west coast of India and the recent 2004 Sumatra earthquake generated Tsunamis which traveled all along the East coast of India and the Andaman region causing large scale destruction. These two great earthquakes have been analyzed for its seismicity and the Tsunami wave propagation and its impact on the Indian region.

The seismicity pattern of the fault zone beneath the Burmese platelet in the Sunda trench has been modeled and it is seen that the fault rupture can be divided into three segments. These three segments have been studied individually and fractal analysis of the aftershock sequence done. The first segment of 500 km long is the zone of the fastest rupture and has the largest fractal dimension of about 2.10 implying that the fault rupture is two dimensional. The b value for this segment is around 0.946. Simulating the tsunami waves was carried out and the Tsunami heights have been estimated at different gauge locations on the East coast of i.e at Chennai and Vishakapatnam.

The 27th November 1945, Makran earthquake of magnitude Mw 8.1 occurred in seismically active eastern segment of the Makran subduction zone. The variation in b-value can be related to the stress distribution after the main-shock, as well as the history of previous ruptures. The regions with lower values of b are probably the regions under higher applied shear stress whereas the regions with higher values of b are the areas that experienced the slip or having lower stresses. It is seen from the b-values that the eastern segment has a lower b-value and a higher fractal dimension whilst

the western is in contrast with the b-value higher and lower fractal dimension. The absence of notable interplate seismicity in western Makran could be due to varying alternatives like the plate boundary is locked or the subduction is aseismic in nature.

Earthquake of southern Sumatra, Indonesia on 12 Sept, 2007, was threatening event and thus based on the observations of previous earthquakes in that region (Sumatra, 2004 EQ and Nias 2005 EQ) we immediately started assessing whether this earthquake has the potential to generate a widely destructive tsunami in the ocean or seas. Our preliminary results at 5:40 pm (IST), one hour after the Bengkulu earthquake showed that the directivity of the tsunami was towards the open ocean in the south west direction and that India would be safe from tsunami.