

Tsunami casualty estimation method and risk to coastal population along the Indian Ocean and South China Sea coast

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Historical tsunamis indicate high tsunami hazard in the most of areas especially in the Indian Ocean and the South China Sea which is a part of Pacific Ocean. Potential tsunami case scenarios have been simulated and discussed in these regions by number of researchers only in order to know the hazard level as a wave height, inundation area, arrival time and so on. This study proposes a new method to quantify a risk to the coastal population and apply to this region. Tsunami propagation model in the spherical coordinates in linear terms with neglecting effect from bottom friction are performed together with bathymetry data of one minute grid size. Number of Potential Tsunami Exposure (PTE) based on the global population data is counted against wave height using our propose method in an estimated inundation zone. Earthquake related fault parameters is obtained for historical and potential tsunamigenic locations; namely Makran, Myanmar, Andaman, Sumatra, Java and Manila including the 2004 Indian Ocean. Tsunami death rate curve is then applied after calibrated with the 2004 tsunami result. Computed number of potential death shows that the 2004 Indian Ocean tsunami seemed to be the worst case scenario compared to the other potential tsunamis. However, some considerable number of deaths still occurs and should not be neglected. Generated tsunami around Myanmar, Andaman and south Sumatra cause low risk due to lower number of death (10,000 order) compared to those in Java and Makran that the number exceed to nearly 100,000 order. Reduction of the earthquake moment magnitude from 9.0 to 8.5 will cause in a decreasing of number of death approximately 10 to 100 times. On the other hand, China is the most affected country in the South China Sea region following by Vietnam and Philippines. However, this number will not be that large if a proper warning system and full evacuation process is done in a future.

Keywords: tsunami casualty, casualty estimation, Indian Ocean tsunami, South China Sea tsunami