Tsunami Warning System for the Indian Ocean

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Abstract

Tsunami is a system of ocean gravity waves formed as a result of large-scale disturbance of sea-floor that occurs in a relatively short duration of time. The Indian Ocean is likely to be affected by tsunamis generated mainly by earthquakes from the two potential source regions, the Andaman-Nicobar-Sumatra Island Arc and the Makran Subduction Zone. A state-of-the-art warning system has been established in India with all the necessary computational and communication infrastructure that enables reception of real-time data from the network of national and international seismic stations, tide gauges and bottom pressure recorders (BPRs). Earthquake parameters are computed in less than 15 minutes of its occurrence. A database of pre-run scenarios for travel times and run-up height has been created using TUNAMI N2 model. At the time of event, the closest scenario is picked from the database for generating advisories. The accuracy of model predictions depends on quality of bathymetry and topography data. Detailed topographic information has been generated using Cartosat-I stereo. Water-level data from the BPRs and tide gauges enables confirmation or cancellation of a tsunami. Tsunami bulletins are generated based on decision support rules and disseminated to the concerned authorities for action, following a standard operating procedure. The criteria for generation of advisories (warning/alert/watch) are based on the tsunamigenic potential of an earthquake, travel time (i.e. time taken by the tsunami wave to reach the particular coast) and likely inundation. The dissemination is done through mail, fax, SMS, as well as phone. Detailed coastal vulnerability maps have been prepared on 1:25000 and 1:5000 SCALE. It is possible to provide information about earthquake, estimated travel time and run-up and areas likely to be inundated is provided within minutes. Such preparedness will facilitate to mitigate impact of such hazard.