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A Study for Predicting Tsunami Impact Based on Source and Topographic Condition in Padang, Indonesia

Abdul Muhari[1*], Fumihiko Imamura[1], Shunichi Koshimura[1], Subandono Diposaptono[2], Febrin Anas Ismail[3]

[1]DCRC, Tohoku University, [2]Ministry of Marine Affairs and Fisheries, [3]Andalas University, Indonesia

Recent progress on geosciences especially about crustal deformation measurement gives an opportunity to get more realistic tsunami source either for determining past tsunami source or for predicting future tsunami source. In the other hand, the advance methodology on remote sensing and geographic information system provide more accurate topographic data and its land cover such building, vegetation, road, etc. The use of this current update in order to predict the future tsunami event and its impact on land is presented. The effort is directing to assess the future reliable worst case scenario in study area, in order to get the official hazard map for disaster management planning purpose. Padang city hit by a 7.6 Mw earthquake in September 2009 and took nearly 1,200 casualties is selected as a study area, where seismic gap still remains offshore. Several scenarios from geological perspectives are reviewed. Single and multi slip distributed fault in study area was calculated to determine the worst in term of arrival time and observed tsunami wave height at the given tide gauges. We then modeled the tsunami run up with three conditions which are run up model with similar roughness, run up model with building mask, and run up model with distributed equivalent roughness. This step is to propose the methodology and its limitation to predict the worst inundation parameters such inundation length, flow depth, wave pressure distribution, flow velocity direction, and etc. Finally, we propose the most reliable worst case for tsunami source and methodology on predicting its potential impact in study area.
The result showing that multi slip scenario gives a faster arrival time, while single fault scenario gave the biggest tsunami waves height at the tide gauges. Run up model with similar roughness coefficient gave the maximum inundation length and run up height. While run up model with building mask gave more realistic tsunami flow through the buildings.

Keywords: tsunami source, run up model, roughness coefficient