Probability of Tsunami Inundation Estimated from Tsunami Database and G-R law

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Studies on probabilistic hazard assessments considering uncertainties such as the timing and magnitude of earthquake occurrence, diversity of heterogeneous slip, etc. are common in recent years. For tsunami, probabilistic tsunami height assessments along the coast were shown. But probabilistic tsunami inundation assessments are not shown yet because tsunami inundation modeling needs highly resolved topographic data (~10m) and probabilistic approach needs calculations from huge number of earthquake scenarios. Recent development of high-performance computers enables us to make a probabilistic tsunami inundation map if the study area narrowed down. In this study, we attempt to probabilistically assess tsunami inundation in an area of the Nankai subduction zone using a tsunami database and G-R law.

In the creation of the tsunami database, we used the Nankai earthquake slip models shown by Hirata et al. (2017). The propagation and inundation of the tsunami generated by each fault model were carried out by the nonlinear shallow water equations. A nesting algorism was applied to improve the spatial resolution in the study area. Coastal structures such as seawall were defined in the tsunami calculations, but they were disable if the tsunami height is higher than the height of seawall. We defined the relative weights among the earthquake fault models using the G-R law. The weights were used in superimposing of the all inundation maps to estimate probabilities of tsunami inundation.

As a result, it was confirmed that the probability of inundation depends on the topographic features, such as the region where the probability is high in the area end of the V-shaped bay and around the upstream area of the river. We will carry out an analysis that takes into consideration the uncertainty in earthquake occurrence and tsunami height estimations. We also investigate effects of costal structures on the inundation probability.

Keywords: probabilistically assess tsunami inundation, G-R law

