

The uncertainties in the probabilistic tsunami hazard evaluation

Mariko Korenaga^{1*}, Yuta Abe¹, Norihiko Hashimoto¹, Shinichi Akiyama¹, Hiroyuki Fujiwara²

¹ITochu Techno-Solutions Corporation, ²NIED

In this study, we discuss the approach to several types of uncertainties in the probabilistic tsunami hazard for the whole of Japan.

We estimate peak of coastal tsunami heights by numerical simulations, and integrate for probabilistic model considering many kinds of uncertainties. In the numerical calculations for coastal tsunami heights, the initial sea surface displacements are set to be the same as vertical crustal deformations associated with earthquakes, and then a series of numerical simulations of tsunami propagation are carried out. The calculated peak tsunami height allows for a certain margin of uncertainties, in the value of the applied tsunami source model setting parameters, seafloor topography data, discrete topography of the grid-map and two-dimensional methodology of tsunami simulation scheme. Our goal is to treat these uncertainties during calculating hazard curve, so we quantitatively examine the probabilistic variability.

It is also essential to consider the variability associated with the uncertainty depend on an observation point and on tsunami source. In order to examine the uncertainty quantification, we need records of historical tsunami heights observed at same points by equivalent repeating earthquakes, but amount of high reliability observations is not enough.

In this study, we attempt to adopt the difference between the residual error from the numerical model and the observed data in the historical tsunamis, with concerning the ergodic hypothesis, as an acceptable spatial variability for analysis. Because of amount of observation data and its quality, we select 2011 off the pacific coast of Tohoku earthquake event, and decide the variability in ratio of historical data to computational value from estimated source model by previous study.

Acknowledgment:

This study was conducted by a part of research project in NIED for tsunami hazard assessment for the whole of Japan.

Keywords: Tsunami, Probability, Uncertainty