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Towards tsunami hazard assessment for Japan

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We have started a research project in NIED for tsunami hazard assessment for the whole of Japan, based on the lessons learned from the Great Tohoku earthquake. In this project, we are planning to carry out probabilistic tsunami hazard assessment in which we consider all earthquakes that could be tsunami sources and also we will study detailed tsunami analysis of scenario type for specified earthquakes.

For probabilistic tsunami hazard assessment for the whole of Japan, we will make tsunami source model for all possible earthquakes based on the long-term evaluation of earthquakes by the Headquarters for Earthquake Research Promotion, taking into account of the various types of uncertainty. Based on the model, using probabilistic assessment methods, we evaluate the height of tsunami at the coast. In the calculation for the nationwide tsunami hazard assessment, the minimum mesh size for the land side is 50m and set larger mesh size as 150m, 450m, 1350m for the ocean side. We conducted test calculation of probabilistic tsunami hazard assessment for earthquakes in the Japan Trench. In addition, by limiting the area, we calculate tsunami hazard by using the fine mesh (10m as minimum mesh size). We propose a new method to express probabilistic tsunami hazard information in a form of chart like medical records. By indicating probability of tsunami height, inundation depth, and the arrival time, we will consider how representation can show the regional tsunami risk in the form of chart for tsunami hazard.

In the tsunami analysis of scenario type, we will evaluate the height of the tsunami, inundation area and the inundation depth, for specified earthquakes that are assumed in each region. By comparison with the previous record, we are planning to examine the validity of the calculation results and tsunami source parameters.

In order to implement the tsunami hazard assessment, we make terrain model for sea area and coastal terrain model needed to calculate the tsunami for the whole of Japan. Summarized the concept of source model for tsunami hazard assessment, we organize materials on various surveys used in modeling into database. To strengthen regional cooperation and improving the reliability of the hazard assessment, we will collect and organize information about the tsunami hazard maps of local governments and we will reflect them into the model for calculation.

Based on these efforts on tsunami hazard assessment, we will summarize typical tsunami hazard assessment methods. We will consider the utilization of the information on tsunami hazard.

This study has been prepared as contributing to the consideration by the Tsunami Evaluation Subcommittee of Headquarters for Earthquake Research Promotion of Japan.

Keywords: Tsunami, Hazard Assessment, Probability