Conceptual design of forecasting-technology development over the next decade for improvement of JMA tsunami warning

*Hiroaki Tsushima[1], Yuji Nishimae[1], Yutaka Hayashi[2], Takeyasu Yamamoto[3], Kenji Nakata[3], Shigeki Aoki[1]

1. Japan Meteorological Agency, 2. Ministry of Education, Culture, Sports, Science and Technology, 3. Meteorological Research Institute, Japan Meteorological Agency

In Japan, Japan Meteorological Agency (JMA) has responsibility for operational tsunami forecast and warning. When a tsunamigenic earthquake occurs around Japan, JMA issues tsunami warning within three minutes after the earthquake occurrence using seismic-wave data (estimation of hypocenter and earthquake magnitude) and pre-computed tsunami-scenario database. Then, warnings are then updated based on more detailed analysis: e.g. CMT analysis to estimate moment magnitude, monitoring of offshore and coastal tsunami data, and real-time source estimation from offshore tsunami data (Tsushima and Yamamoto, 2020, this meeting). Then those warnings will be canceled by monitoring tsunami data at coastal tide gauges. In the present operation, JMA provide arrival times of the first tsunami waves and the maximum tsunami height at coastal sites of Japan.

In about 10 years to come, JMA aims to forecast not only the present tsunami parameters shown above, but also overview of tsunami (i.e. first wave, maximum wave and decay process) towards provision of information such as timing of maximum tsunami hit and view of cancellation of tsunami warning. To achieve the goal, we consider that development and improvement of tsunami-forecasting technologies is required, such as real-time tsunami simulation with high-resolution bathymetric data for update of tsunami warning, revision of tsunami-scenario database for prompt tsunami warning, and stochastic approach for prediction of tsunami-decay process. In this paper, we will show these technologies we are discussing and the related concerns. Also, as one of the examples, results of feasibility study related to real-time tsunami numerical simulation will be presented.

Keywords: Tsunami, Tsunami warning, Real-time forecast