



2011 Great East Japan tsunami in Okhotsk Sea region: numerical modelings and observation data

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The 11 March, 2011 Great East Japan Earthquake with Mw: 9.0 occurred at 05:46:23 UTC with its epicenter estimated at 38.322_N, 142.369_E, and focal depth of 32 km (USGS, 2011).

Tsunami waves propagated in Pacific Ocean to all directions. At Russian coast the highest waves were observed in the Kuril Islands (Malokurilskoye, Kunashir Island) which located in between Pacific ocean and the Okhotsk Sea. Kuril island provides limited transmission of tsunami waves from Pacific ocean. tsunami In 2011 Great East Japan Earthquake and Tsunami event, the maximum amplitude of the tsunami was observed as 3 m in Kuril islands. However, tsunami arrived Okhotsk Sea losing a significant amount of energy. Therefore the tsunami amplitudes at the coast of the Okhotsk Sea were smaller. In order to estimate the level of energy loss while passing through the narrow straits of the Kuril Islands, a series of numerical simulations was done by using tsunami numerical code NAMI DANCE. Ten largest earthquake shocks capable of generating tsunami were used as inputs of tsunami sources in the modeling. Hence the relation between the transmission of tsunami and the dimensions of the straits are compared and discussed. Finally the characteristics of tsunami propagation (arrival time and coastal amplification) at the coast in the Okhotsk Sea.

The varying grid structure is used in numerical modeling in order to make finer analysis of tsunami passing through narrow straits of the Kuril Islands. This allows to combine exactly the installation locations of stationary and computational gauges. The simulation results are compared with the observations. The linear form of shallow water equations are used in the deep ocean region offshore part of the Sea of Okhotsk. Boussinesq type equations were also used at the near shore area in simulations.

Since the Okhotsk Sea Results are a semi enclosed basin, the reflection characteristics at the coastal boundaries may be important. The numerical experiments are also extended to investigate the spectral characteristics of the time histories of water level fluctuations in Okhotsk Results is a semi enclosed basin, the reflection characteristics at the coastal boundaries by comparing with the instrumental data from coastal locations.

As the summary, the transmission characteristics of tsunami at Kuril islands, the propagation, coastal amplification and reflection characteristics of tsunamis in the Okhotsk Sea are investigated and presented.

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