[JJ] Evening Poster | H (Human Geosciences) | H-DS Disaster geosciences

[H-DS10]Tsunami and Tsunami Forecast

convener:Naotaka YAMAMOTO CHIKASADA(National Research Institute for Earth Science and Disaster Resilience), Kentaro Imai(Japan Agency for Marine-Earth Science and Technology), Hiroaki Tsushima(気象庁気象研究所)

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This session discusses issues related to improving real-time and long-term prediction accuracy of tsunami from earthquakes, landslides, and volcanoes, which include such as a better understanding of tsunami dynamics, new real-time tsunami observing systems deployed in the open ocean and coastal waters, methodologies of more rapid and accurate prediction during tsunami emergencies, more extensive and accurate inundation maps, and long-term tsunami potential forecast.

[HDS10-P20]Tsunami simulations for probabilistic tsunami hazard assessment in the Kuril Trench

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NIED began a research project regarding probabilistic tsunami hazard assessment (PTHA) for Japan (Fujiwara et al., 2013, JpGU), and gave an overview of the assessment so far (Hirata et al., 2014, 2015, 2016, 2017, JpGU). In addition, we presented the simulation results using for the PTHA which showed tsunami height along shorelines of the Pacific Ocean where earthquake source regions along the Japan Trench, the Nankai Trough and the Sagami Trough locate (Takayama et al., 2016, JpGU; Saito et al., 2016, SSJ). In this study, we newly simulate tsunami propagation in the Pacific and the Sea of Okhotsk associated with earthquakes of the Kuril Trench, and aggregate the simulation results that are the tsunami height along the coastal regions in the four southern Kuril Islands, Hokkaido, eastern Honshu, the Izu Island chain and the Ogasawara Islands.

Local tsunamis are our research target that basically includes not only the subduction earthquakes that are mainly considered by the possible tsunami-genic earthquake derived from a seismic slip on a plate boundary in subduction zone but also unspecified fault sources such as small and medium scale earthquakes without offshore active faults, volcanic activity and landslides. To simulate the generation of the local tsunami by assuming many fault models for obtaining probabilistic tsunami hazard, we designed a few thousand of characterized earthquake fault models (CEFMs) along the Kuril Trench. A set of the 2665 CEFMs from Mw 7.0 to under 8.0 and 682 CEFMs from Mw 8.0 to 9.4 in 77 patterns of source regions along the Kuril Trench were constructed as unspecified source faults. Then, the total number of the CEFMs reaches 3347. Details are shown in Ohshima et al. in this meeting who introduces how to build up a set of the CEFMs on hypothesized earthquakes along the Kuril Trench, referring to “the Long-term Evaluation of seismic activity along Kuril Trench (Second edition, 2004)” that are published by the Headquarters for Earthquake Research Promotion (HERP) and to “the Earthquakes East of the Kuril Islands of 2006 and 2007 (Vol. 71, 2008)” by the Japan Meteorological Agency.

With these CEFMs, a tsunami run-up simulation estimates tsunami wave height along the Pacific and the Okhotsk coasts from Tokyo to Hokkaido prefectures, solved by the non-linear shallow-water equation using a leap-frog scheme. These simulations are configured by a nested grid system consisting of four sub-regions from outer 1350 m to inner 50 m in a horizontal, landward inundation keeping, and transparent at the seaward edges. Initial wave height follows vertical displacement driven by seafloor deformation via Okada’s equation (Okada, 1992). The seafloor deformation consists of vertical and horizontal deformation.

Toward research in the broad field of tsunami hazard we are planning to develop a database of coastal tsunami wave height provided in this study.

This study was done as a part of the research project “Research on evaluation of hazard and risk” that is carried out by NIED.