

A preliminary report on a flume experiment of Tsunami-generated turbidity currents and sediment transport

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Tsunami-generated turbidity currents occurred associated with the great earthquake, Mw9.0, 2011 Tohokuoki-oki event off shore Japan (Arai et al., 2013). After the earthquake and the tsunami, "turbidity currents" were recorded by the ocean-bottom pressure recorders and seismometers, and freshly emplaced turbidites were collected from a wide area of seafloor off the Tohoku coast. These records showed the tsunami entrained the large amount of sediment in the coastal region to yield the turbidity currents. These turbidity currents transport a large amount of sediment into the deep seafloor, thus are important to evaluate the tsunami-related sediment transport and the effect on ecological environment on the seafloor. There have been, however, very few experimental studies about tsunami-generated turbidity currents (e.g., Niitani et al., 2013). This is the preliminary report on a flume experiment on the tsunami-generated turbidity currents and their sediment transport.

The experiment was conducted using 7.2 m long, 1.2 m deep, and 0.3 m wide flume in Osaka Institute of Technology. We made two terrain models, one referred the profile of Kumano-Nada region which has a steeper slope, and the other referred the profile of Tokachi-oki region which has a shallower slope. The models were made of very coarse sand and granule, and mantled by fine to very fine sand about 5 cm in thickness. The horizontal and vertical ratio of the profiles is 1:100. We generated "tsunami" by the acrylic plate, in the way as same as that of Niitani et al. (2013), and repeated "tsunami" 10 times for each profile.

As the results, turbidity currents occurred in both cases. The amount of entrainment of sediment by the "tsunami" was larger in the steeper "Kumano-nada" model, and the velocity of the turbidity currents was larger for and total amount of sediment transport was larger for the steeper model. The relict bedforms, however, showed more wave-dominated features in the case of steeper "Kumano-nada" model.

References cited

Arai, K., Naruse, H., Miura, R, Kawamura, K., Hino, R., Ito, Y., Inazu, D., Yokokawa, M., Izumi, N., Murayama M. and Kasaya, T., 2013, Tsunami-generated turbidity current of the 2011 Tohoku-Oki earthquake, *Geology*, 41, 1195-1198, doi: 10.1130/G34777.1.

Niitani, S., Masuda, F., and Naruse, H., 2013, Tsunami-induced gravity currents generated in an experimental flume. *Journal of Sedimentary Society of Japan*, 72, 109-113. (in Japanese with English abstract)

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