Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS25-14 Room:101B Time:May 20 14:00-14:15

Applicability of sediment transport model to paleotsunami deposit: preliminary examination for the 869 Jogan tsunami

SUGAWARA, Daisuke[1*], Fumihiko Imamura[1], TAKAHASHI, Tomoyuki[2]

[1]Tohoku University, [2]Kansai University

In general, inundation area and wave source of a paleotsunami are estimated numerically based on the maximum inland extend of the tsunami deposit[1][2], although the field observation of the 2011 Tohoku-oki tsunami reported a significant gap between the maximum inland extent of the deposit and inundation limit of the tsunami[3]. The inundation area and fault parameters of the paleotsunami can be estimated more adequately if sediment transport modeling can explain the field data of the tsunami deposit. In this study, the sediment transport model by Takahasi et al.[4] is applied to the 869 Jogan tsunami in the Sendai Plain. The modeling requires careful consideration of sand and hydraulic parameters, such as grain size and roughness coefficient. In this presentation, the sensitivity of these parameters against the modeling result is examined, and the applicability of the modeling to the Jogan tsunami is discussed through a comparison of the field data and modeling results.

The tsunami propagation in the open sea and inundation on land were calculated using the Mw 8.4 Jogan earthquake model, which was proposed previously[1][2]. The numerical result showed that most of the deposition on land is accounted by the erosion of the coastal dune. The deposition depends on the topographic undulations; it is thicker within the topographic depression. Total amount of erosion and deposition varies 2-3 times depending on in particular the grain size and roughness coefficient. The comparison of the modeling result and the field data[5] showed that the general trend of landward thinning of the Jogan tsunami deposit was well reproduced by the modeling, although the deposition near the coast was overestimated. Direct comparison of the field data and the modeling results showed both considerable underestimate (1%) and overestimate over the land. This may be accounted by the sensitivity of the modeling parameters, as well as the precision of the reconstructed paleo-topography used for the calculation. Field observation of modern tsunami deposits reported significant the local variation of the thickness of the tsunami deposit. Direct comparison of the field data and the modeling results may be inadequate unless the field data is obtained densely. Further consideration is needed for the survey method and data analysis of the pleotsunami deposit.

References

[1] Satake et al. (2008), Annual Report of Active Fault and Paleoearthquake Researches, 8, 71-89. (in Japanese, with English Abstr.)

[2] Sugawara, D., Imamura, F., Matsumoto, H., Goto, K., Minoura K., 2011. Reconstruction of the AD 869 Jogan earthquake induced tsunami by using the geological data. J. Japan Soc. Natur. Disast. Sci. 29 (4), 501-516. (in Japanese, with English Abstr.)

[3] Goto et al. (2011), Marine Geology 290, 46-50.

[4] Takahashi et al. (1999), Proceedings of Coastal Engineering, JSCE 46, 606-610.

[5] Sugawara et al. (2010), DCRC Tsunami Engineering 27, 103-132.

Keywords: tsunami deposit, numerical simulation, sediment transport modeling, Jogan earthquake tsunami