

Numerical estimation of paleotsunami size at southern part of Japan Trench based on geological records

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In the coastal area facing to the northern and central Japan Trench, many researchers have conducted paleotsunami surveys to estimate the size and frequency of tsunamis in the past several thousand years. In contrast, the area facing to the southern part of Japan Trench has poorly been studied due to the coastal urbanization. Therefore, the elucidation of tsunami size and frequency in the southern part of Japan Trench has not been well understood in comparison with the northern and central Japan Trench. It is reported that deposits in Kobatake-ike pond in Choshi City, Chiba Prefecture, record three large tsunami events during past three thousand years; tsunami were probably triggered by the subduction zone earthquakes at southern part of Japan Trench (Yanagisawa et al., 2016). The thickness and grain size of these tsunami deposits have different in characteristics and may be important factors for constraining the tsunami size in the southern part of Japan Trench. This study applies coupled tsunami hydrodynamic and sediment transport modeling to paleotsunami deposits at Kobatake-ike pond in order to estimate the fault parameters of earthquakes and tsunamis in the southern part of Japan Trench. Source parameters of each paleotsunami events were investigated by comparing numerical simulations with thicknesses of tsunami deposits in the Kobatake-ike pond in addition to historical records of tsunami inundation, if available. Numerical simulation results revealed that the tsunami caused by the earthquake with the fault slip of 11 to 16 m and Mw of 8.34 to 8.43 repeatedly and constantly occurred in the southern part of Japan Trench. Sediment transport modeling results suggest that modeled thicknesses of the tsunami deposits in the Kobatake-ike pond sensitively reflect changes of the grain size of deposit and the fault slips. Therefore, the thickness and grain size of the tsunami deposits may provide the effective constraints for estimating fault parameters of the historic/prehistoric tsunami which has no detailed historical records.

Keywords: tsunami deposits, sediment transport modelling, southern part of Japan Trench