

Imprints of huge tsunamis in Miocene, upper bathyal sedimentary rocks

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The Indian Ocean Tsunami induced by the 2004 Sumatra Earthquake widely showed that a multi-segments earthquake caused a huge tsunami (e.g. Tsuji et al., 2006). In the studies of tsunami sediments, a huge tsunami much larger than ordinary one has been indicated (e.g. Nanayana et al., 2003).

The Miocene conglomerates of main objects in this study (following we call them Tsubutegaura Conglomerates) have been thought as tsunamiites by some studies (e.g. Shiki and Yamazaki, 1996), based on sedimentary structures of the conglomerates and sedimentary environments (upper bathyal) interpreted by fossils.

We described the details of the conglomerates and simulated the tsunami which would form the conglomerates. The tsunami simulation is based on the paleogeography of Sibata and Itoigawa (1980) and the reconstructed tectonic setting by Shiki et al.(2002). The purposes of the simulation are 1) the estimation of maximum gravel size which were able to move at the deposited place; 2) the examination of the possibility to transport gigantic gravels from coastal area to upper bathyal area. These estimation and examination need the threshold velocity of a gravel. We also estimate the velocity.

The parameters of the earthquake inputted in our simulation are the same as the Sumatora Earthquake analyzed by Tanioka and Iwasaki (2006). We also simulated a tsunami using ordinary Tokai Earthquake. Results of the simulation using the Sumatora Earthquake showed that a gigantic gravel is able to be transported by tsunami currents from coastal area to upper bathyal area, while results using ordinary Tokai Earthquake show the impossibility of the transportation of a gigantic gravel.

Characteristics and environments of the conglomerates show no possible agents but tsunamis. However, a tsunami caused by an ordinary plate boundary earthquake seems to have no enough power to transport gigantic gravels. In this study, the sedimentary processes of the conglomerates, and the scales of tsunamis forming the conglomerates become clear by the simulation of a huge tsunami like the Indian Ocean Tsunami.

Upper bathyal sediments would be good recorder of tsunami imprints in appropriate condition like Tsubutegaura Conglomerates.

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