

Effect of grain size on distribution of tsunami deposits in flume experiments

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We conducted flume experiments to examine the effects of grain size on tsunami deposit distribution. In the present experiments, tsunami-like bore of three different magnitudes passed through a fixed slope of 1/20 and 4-m-long flat terrestrial area, and transported sand from the upper part of the slope onto the terrestrial area. As the sediment source, we prepared well-sorted quartz sands in different grain sizes (median diameter: 0.20 mm, 0.15 mm, 0.10 mm, and 0.06 mm).

The results suggested that distribution pattern of tsunami deposits depends on sediment grain size. In the cases of coarser sands (0.20 mm and 0.15 mm), tsunami deposits tended to decrease landward across the whole terrestrial area as previous laboratory studies have reported. The amount of the deposit at a given site also decreased with the weakening of tsunami magnitude. By contrast, in the cases of finer sands (0.10 mm and 0.06 mm), tsunami deposits tended to be approximately constant or gradually increase to landward on the terrestrial area. The amount of the deposit at a given site did not always depend on tsunami magnitude on the terrestrial area.

Distribution patterns of tsunami deposits were completely different in each grain size although these experiment were conducted with same hydraulic condition of the tsunami flow. It suggests that grain size is a crucial factor to determine the distribution of tsunami deposit, and effect of grain size should be considered when we estimate tsunami magnitude from distribution of paleotsunami deposits.

Keywords: tsunami deposit, flume experiment, grain size