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Rock type and mineral compositions of the tsunami deposit from the Otagawa lowland, western Shizuoka Prefecture

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Introduction:

Composition of mineral and rock type in the sand beds is an important criteria to identify the source area of the sediments. Roundness of grains reflects the transport and depositional process and is a useful indicator to distinguish the river and marine sediments. Here we adapt these criteria to the tsunami deposit reported by Fujiwara et al. (this meeting) from the Ota-gawa lowland, on the Enshu-nada coast, near the Nankai trough and discuss the source of the deposit.

The tsunami deposit:

The tsunami deposit, ˜70 cm in thickness, was found at the excavation site of river improvements ˜3.5 km inland from the present coastline. It consists of stratified and laminated sand beds with some sub-rounded pebbles and granules and can be traced over 200 m in the coast-normal direction. The tsunami deposit covers tidal flat mud with an erosion surface and is gradually overlain by brackish silt beds (Sato et al., this meeting). Fossil shells of brackish-marine species such as (Cyclina sinensis, Corbicula japonica) are also included in the tsunami deposit. Estimated age of the tsunami deposit ranges from the late of forth century to the end of seventh century (Fujiwara et al., this meeting).

Composition and roundness of gravel:

The composition of gravel was examined using 149 pieces of gravel. Accompanied with abundant gravels of sandstone and mudstone (˜90%), granite and crystalline schist (˜3%) characterize the tsunami deposit. Granite and crystalline schist are not distributed in the drainage of the Ota river (Shimanto belt), but in the drainage of the Tenryu river (Sanbagawa belt or the Ryoke belt). Beach deposits of the Enshu-nada coast are mainly supplied from the Tenryu river and then include ˜ 9% of granite and crystalline schist grains.

We calculated the values of roundness using Krumbein (1941)'s method for the gravels from the tsunami deposit, beach deposits on the Enshu-nada coast and river floor deposits of the Ota river near the study site. The values in the tsunami deposit are 0.72 for sandstone gravels (N=46) and 0.66 for mudstone gravels (N=45). Diameter of gravels ranges from 9.5 to 26.5mm. Values in the beach deposits are 0.70 for sandstone gravels and 0.62 for the mudstone gravels and similar to the values from the tsunami deposit. On the contrary, values of river floor deposits are 0.49 for the sandstone gravels and 0.44 for the mudstone and are clearly different from that of the tsunami deposit. According to the observation in the field, gravel content in the tsunami deposit (numbers of the gravels in the deposits of 1 kg) shows a landward decreasing trend.

Mineral composition of sand bed:

Mineral composition of the sand bed was examined using 266 sand grains (0.18mm-0.71mm in diameter) obtained from the lower part of the tsunami deposit (within 40 cm from the bottom surface). Component of sand grains is lithic fragment (38%), quartz (28%), feldspar (25%), and mica (4%). Occurrence of garnet (1%) characterizes the sand beds. This mineral composition in the sand beds is similar to that of dunes on the Enshu-nada coast and the river floor deposits of Tenryu river (Yosii and Sato, 2010). Garnet is an index mineral of the sediments derived from the Tenryu river, which has the outcrops of granitic rocks in its drainage (Aoshima, 2011).

Our data strongly suggest that the tsunami deposit was mainly transported from the Enshu-nada coast by tsunami run up.

Reference

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Keywords: Ota-gawa lowland, the tsunami deposit, the Tenryu river, the Enshunada coast, roundness, garnet