

Towards understanding the seismic history of the Nankai Trough using fine-grained turbidites

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Turbidites are deposits of a turbidity current triggered by slope failure, earthquakes and floods. To obtain paleoseismic records using marine sediments, the extent of the turbidite distribution area and age are generally used. Characteristics and sedimentary process of turbidites assumed to be varied by the scale of seismic motion, seafloor topography and composition of sediments. Therefore, understanding and compiling the characteristics of turbidites distributed in each sea region is important to estimate paleoseismic records using turbidites. However, in the Nankai Trough, much less work has been done on paleoseismology using turbidites. This study aims to obtain the fundamental data of fine-grained turbidites, and apply it to reconstruct the seismic history in the Nankai Trough.

Samples are multi-cores and piston cores collected from off Kumano and Hyuga, the Nankai Trough. Main samples are obtained from small slope-basins with pin-point accuracy. Based on its sedimentary structure and magnetic susceptibility, fine-grained turbidites are identified in off Kumano sample and in off Hyuga. In off Kumano sample, coarse silt layer (we named this KL2 unit), silt layer (KL3, KL4) and a thick homogeneous clay layer from the bottom to the top of the upper unit can be identified as fine-grained turbidites. More specifically, KL2 unit shows low CT value, which cannot be shown in X-ray CT image and has Fe peak in XRF core scanner profile. KL3, KL4 unit shows high CT value and has Ca peak in XRF core scanner profile. Although X-ray CT image can be useful tool to identify the fine-grained turbidites, it may lead to misunderstanding the basement of fine-grained turbidites. C-14 radiocarbon dating of the foraminifera, the individual sediment layer interval is 160 years, which is almost agreed with past earthquake recurrence intervals. Also some obtained ages matches with historical earthquake age. In off Hyuga sample, characteristics of XRF core scanner profile such as Ca, Fe are different from that of Kumano, which can be affected by volcanic products. Since one of the sampling sites off Hyuga is located at the terrace of the foot of the Oyodo Knoll and topographically isolated from direct sediment path through river, the turbidite deposition is inferred to be triggered by seismic shaking. The youngest C-14 age obtained from this sample was 11,000 cal yr BP, it cannot be compared to historical earthquake age. Average earthquake recurrence is estimated to be 700 years, which is longer than other regions in the Nankai Trough.

Keywords: turbidites, turbidity currents, The Nankai Trough