Detecting the seismo-turbidites of off Kumano, the Nankai Trough using ITRAX profile

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Paleoseismic studies using turbidite have been performed in various sea regions including off the west coast of North America. The characteristics and sedimentation process of turbidite may vary depending on the composition of sediments, the scale of seismic motion, and the seafloor topography. Therefore, for estimating the seismic history using turbidite, it is important to compile characteristics on sedimentary structures, physical properties, chemical compositions, etc. and extract features in each sea region. This study focuses on obtaining the fundamental data of fine-grained turbidites, and apply it to reconstruct the seismic history in the off Kumano, the Nankai subduction zone.

We analyzed multi-cores and piston cores collected from off Kumano, 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. We will mainly report its chemical characteristics based on XRF core scanner, ITRAX.

The first feature of fine-grained turbidite off Kumano is the stratigraphic change of Mn content. McHugh et al. (2016) show a sharp positive peak in Mn just below turbidite, which is different from the trend observed in this study. They suggest that it is due to the shift of the redox boundary just below turbidite. On the other hand, in this study Mn shows the minimum in the mud layer just below the turbidite and starts increasing from the base of the turbidite. High Mn value continues to the high CT value horizon. In the low CT value horizon above it, Mn decreases upward to the base of the next turbidite. The possible scenario for this Mn variation is as follows: when turbidite is deposited, the lower layers below turbidite are separated from the sea floor. This makes deposits reductive and decrease of Mn. On the other hand, the turbidite upper surface must be in contact with oxic seawater for a long time.

The second feature is the stratigraphic change of Ca and Fe. Coarse silt layer (hereinafter, this is called KLa unit), silt layer (KLb) 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, KLa unit shows low CT value, which cannot be shown in X-ray CT image and has Fe peak in ITRAX profile. KLb unit shows high CT value and has Ca positive 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 consistent with past earthquake recurrence intervals. Moreover, some C-14 ages agree with historical earthquake ages.

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