# Reconstruction of submarine environment based on the quantity estimation of the opaque mineral in the diatom frustules

# Jiro Komori[1], Hitoshi Fukusawa[2]

[1] Dept. of Geography

Tokyo Metropolitan Univ., [2] Dept. of Geography, Tokyo Metropolitan Univ.

Microfossil assemblage, geochemical composition and mineral component are used as the proxy data for paleoenvironmental reconstruction of marine and lacustrine sediments. On the other hand, decomposition and resedimentation of the precipitation particle at the water column, sediment-water interface, and the upper part of the sediment has been obstacle to the paleoenvironmental study. In this presentation, we show the tentative results of sedimentological investigation for the submarine sediment based on the variation of the mineral and geochemical property.

Sample

The sediment cores were recovered by the 12 cm diameter gravity corer in the research cruise of the Geological Survey of Japan, AIST.

Off Abashiri core (GH00-1006) - Core length: 372 cm, Location: 44 deg. 35.5408' N, 144 deg. 26.1118' E. Water Depth: 1348 m. Massive silty clay, olive black. Laminae scattered in the middle part.

Off Shiretoko core (GH01-1011) - Core length: 506.5 cm, Location: 44 deg. 16.5084' N, 144 deg. 58.4989' E. Water Depth: 778 m. Massive silty clay, olive gray. Intercalated with the sandy silt layers.

Off Tokachi core (GH02-1023) - Core length: 218 cm, Location: 42 deg. 29.1873' N, 144 deg. 22.5614' E. Water Depth: 1056 m. Upper and middle part: massive silty clay. The lower part: sand contented clayey silt, olive gray.

Method

Smear slide observation were carried out for each core sample every 2.3 - 10 cm alternately after the visual observation by the soft X-ray images and naked eye. Spherical opaque mineral were detected by microscope, and the number of the shell in perfect condition that holds the opaque mineral were counted in this observation. Furthermore, opaque mineral holding rate were obtained as follows,

[Holding rate]= number of opaque mineral holding frustules / total number of frustules

The major chemical compositions were determined by XRF analyses(Shimadzu XRF-700) for the entire core. The detailed structure of opaque mineral was observed by scanning electric microscope (SEM, JSM-5200).

Discussion

The variation of opaque mineral holding rate in off Abashiri and off Siretoko core show good relation with sulfur content by XRF analyses. This result means the semi-quantitative analysis of opaque minerals by smear slide observation has potential to estimate sulfur content. From the observation of the surface structure of opaque mineral under SEM revealed that the bunch (5 - 15 micron) was composed by countless microcrystal (0.5 - 1 micron). Hence, the spherical opaque minerals were regarded as sulfide mineral, particularly framboidal pyrite. On the other hand, however the good correlation appear in the middle and upper part of off Tokachi core, whereas the lower part of the core showed negative correlation with the holding rate and sulfur content. Thus, opaque minerals in the lower part may be other than sulfide mineral, and reflects different sedimentological condition in the upper part and the other core. Furthermore, this estimation has some problem to the using for obtaining the sulfur content and quantity of the sulfide mineral. This problem will be investigated with the better counting method, and obtaining the size distribution pattern of bunch and microcrystal (Wilkin et al., 1996), as future course of the study.