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Sediment transportation changes based on spatiotemporal variations of Ni and Cr in the Hida range and off-Joetsu area.

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Submarine sediments in the eastern margin of Japan Sea are presumed to contain materials originated from Japan islands substantially. It is important to clarify transportation and sedimentation processes of the land source materials for understanding formation of methane hydrate component layers. Because Ni and Cr in the submarine sediments in the eastern margin of Japan Sea are considered to be supplied by the Hime river basin (Imai et al., 2010), we can reconstruct the history of sediment transportation from the Hime river basin by the temporal change of Ni and Cr in the sediments. River fed sediments are supposed to deposit on not only submarine canyons but also submarine ridges. This study revealed the temporal changes of Ni and Cr since the last interglacial in three boring cores on submarine ridges. We analyzed MD179-3296 (approximately 45 km distant from Hime river mouth) and 3312 (61 km) cores (approximately depth is 1,000m) close to continental shelf in off-Joetsu area. RC1408 (284km) core drilled in off-Akita-Yamagata area was also examined for a comparison with the MD179 cores. And this study investigated spatial changes of sediment transportation between Hida range and Japan Sea by revealing spatial distribution of Ni and Cr in riverbed sediments of the main river among Hokuriku area and beach sediment of Joetsu area.

The samples were dried and powdered, and then pressed as tablets. Ni and Cr contents were measured by Wavelength Dispersive X-ray Spectrometry (Rigaku Primus II). Age models of 3296 and 3312 cores have been well-established by tephrochronology, radiometric dating, and oxygen isotope ratio of foraminifer (Nakamura et al., 2013; Takizawa et al., 2014, etc). Grain size of river bed sediments of Hime and Oumi river we analyzed by Laser diffraction particle size analyzer (Shimadzu SALD 3000S).

According to spatial distribution of Ni and Cr in geochemical map (Imai et al., 2010), clastic materials from Hime river appear to suspend and be transported by ocean current with gradually sinking within 20˜30km from Hime river mouth, and farther than 20˜30km, clastic materials appear to flow down by sediment gravity flow. Grain size analysis of river bed sediments of Hime and Oumi river indicates that Ni and Cr are included mainly in coarse grain, and suggests that Ni and Cr are mineral state. Ni and Cr show high concentration near the ultramafic rock, and it is suggested that origin of Ni and Cr is especially restricted in specific parts of Hime and Oumi rivers. Hime and Oumi rivers are steep and have extremely narrow continental shelf around their river mouths, and their source is the northern part of Hida range.

Concentration of Ni and Cr in 3296 and 3312 cores are very similar to each other, and tend to be high (low) during interglacial (glacial) age. However, peaks of Ni and Cr concentration in 3296 core are higher than the other cores. Ni and Cr content rate of RC1408 core is half or one third of 3296 core. Temporal changes of Ni and Cr shows close relation with temperature or rainfall of the Japan Alps estimated from total organic carbon proxy of sediments at the bottom of some lakes (Kumon et al., 2009). Considering topographical steep condition of Hime river, main factor to change concentration of Ni and Cr appear to be changing supply of the serpentine because of changing rainfall influenced by summer monsoon.

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References

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