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Organic geochemical aspects of hyperpicnite-like sedimentary sequence in the Neogene Kawabata Formation, Hokkaido, Japan

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The Neogene Kawabata Formation, which is located in Yubari area of central Hokkaido, is characterized by turbidite facies that consist of alternations of conglomerate, sand, and mud stones. The Ishikari Trough has been formed with N-S direction in Central Hokkaido region during 15 Ma in the Middle to Late Miocene. The Kawabata Formation is thick sediments filled with the Ishikari Trough. We perform sedimentological and geochemical investigations of the Kawabata Formation, in order to give understandings for transport and sedimentation of terrigenous materials as well as material cycling in neritic to hemipelagic environments. In this presentation, we focus organic geochemical results in the hyperpicnite-like sedimentary sequence described in the Kawabata Formation. Furthermore, we discuss the biogeochemical interaction between land and ocean such as the relationship between higher marine primary production and efficient transport of terrigenous materials by flood system.

We discovered a peculiar sedimentary sequence across about 50 cm depths in an outcrop of the Higashiyama-gawa route in Yubari. This sedimentary sequence consists of homogenous mudstone, coarsening-upward sandstone, sandstone intercalated thin layers of plant fragments, sandstone randomly contained plant fragments, fining-upward sandstone, sandstone with horizontal lamination, and homogenous mudstone, from lower to upper layers. This sequential pattern is almost similar to that in hyperpicnite. Total organic carbon content (TOC; %) was found to increase remarkably from sandstone layers with plant fragments to horizontal lamination layer, which is concordant with hyperpicnite(Yoshida et al., 2009). Organic geochemical characteristics for biomarker were followings, 1) concentrations of coniferous biomarker were remarkably higher in homogenous mudstone below the sandstones and coarsening-upward sandstone, 2) concentrations of degraded biomarkers originated from angiosperm were higher in sandstone layers with plant fragments, and 3) maturity levels were significantly lower in sandstone layers with plant fragments. From these results, we conclude that this sedimentary sequence was hyperpicnite. Furthermore, we found that concentrations of biomarkers derived from marine phytoplankton remarkably increased with increasing those of terrigenous biomarkers in homogenous mudstones above the sandstones. This fact suggests that marine primary production was activated by efficient transport of terrigenous materials by flood system in the Ishikari Trough during Late Miocene. These results are important for understanding material cycling and biogeochemical processes with Neogene-order time scale.

Keywords: Neogene paleoceanography, Sedimentary system, Hyperpicnal, Land-ocean interaction, supply of terrigenous material, material cycling in neritic environment