

Terrestrial environmental reconstruction by biomarker analyses of coaly sediments in the Cretaceous Hakobuchi Formation, Yezo Group, Hokkaido, Japan

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Paleoenvironmental studies were extensively carried out in Cretaceous marine sediments in Hokkaido, Japan. However, there have been few paleoenvironmental investigations for Cretaceous terrestrial area. We focus coal and coaly sediments in terrestrial formations distributed in Hokkaido to reconstruct the variations in terrestrial environment and climate. The Hakobuchi Formation belongs to the Yezo Group in Hokkaido, Japan. This formation consists of sandstones and sandy siltstones in the Campanian to Maastrichtian. Some thin coal beds are lying the formation. Each coal bed thickness is about 2 m so the information about a cycle of the peat bog formation is preserved in narrow area. In the present study, we analysed biomarkers in the coal beds and the upper or lower sediments from the Hakobuchi Formation in the Campanian to Maastrichtian to improve the analyses for peat bog formation and coalification process and to examine variations of terrestrial environments.

Biomarkers such as *n*-alkane, hopanoid, steroid, sesquiterpenoid, and diterpenoid are mainly detected. Organic matter in coals in the Hakobuchi Formation are confirmed to be immature (sub-bituminous coal). The distribution patterns of *n*-alkanes show strong odd carbon number preferences. Each samples indicate different distribution patterns which maximising at *n*-C25, *n*-C27 or *n*-C29, and their averaged chain length (ACL) values are 26.7 - 28.4. Short chain *n*-alkanes (*n*-C23, *n*-C25) are known to be related to the aquatic ecosystem. The sample showing low ACL may have been deposited under strong aquatic ecosystem. Most samples indicate α - and β -hopanes distribution maximising at C31. We found that C31/C30 and C31/C32 hopane ratios are well linearly correlated to ACL values. The relationships suggest that microbial degradation causes important role for peat bog ecosystem and coalification processes. Sesquiterpenoids and diterpenoids, which are derived from gymnosperm, are mainly detected. However, triterpenoids, which are originated from angiosperm, are not much detected. Thus, it is possible that gymnospermous plants were dominant in the paleovegetation in Hokkaido Island during the Campanian to Maastrichtian.

Keywords: terrestrial paleoenvironment, biomarker, Cretaceous, coal