Community compositions in Late Cretaceous methane-seeps in the Nakagawa area, Hokkaido

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Many Late Cretaceous seep deposits and associated chemosyntheic communities have been distributed in the Nakagawa Town, Hokkaido, Japan. Faunal composition of the communities can be categorized into several types, e.g. ?vestimentiferan-provannid community, and thyasirid-solemyid community. To reveal reason of the faunal differences, we have investigated four seep deposits, Omagari, Gakkonosawa, Yasukawa-E and Tannno-sawa, using comprehensive approaches, such as detailed lithological observations, carbon isotope analyses, and biomarker analyses. The Omagari and Gakkonosawa yield numerous ?vestimentiferans with seep restricted gastropods such as *Provanna* sp. and *Hikidea* sp., Yasukawa-Eyield *Acharax cretacea* and *Thyasira* sp., and Tannno-sawa seep, and Tannno-sawa seep yoled no obvious chemosynthetic taxa but background fauna such as inoceramid bivalves. Lithological observations indicate that the Omagari and Gakkonosawa seep carbonate were partially formed above the seafloor whereas the Yasukawa-E and Tannno-sawa seep carbonates were formed within sediments entirely. The carbon isotopic compositions of earlier precipitated carbonate minerals in each site ranges from -40 to -50 per mil (VPDB). The biomarker analysis detected following characteristic molecules; PMI, biomarker of anaerobic methane-oxidizing archaea and 8,14-secohexahydrobenzohopanes, biomarkers of aerobic methane-oxidizing bacteria, from all investigated sites. In addition, amounts of 8,14-secohexahydrobenzohopanes are higher in the Omagari and Gakkonosawa sites compared to Yasukawa-E and Tannno-sawa sites. These lines of evidence strongly suggested that the Omagari and Gakkonosawa sites had strong methane fluids (high methane concentrations) compared to Yasukawa-E and Tanno-sawa sites. This flux (or methane concentrations) differences caused the faunal differences as like in modern seeps.

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