

Campanian-Maastrichtian clay-rich sequences along North Pacific Margin: Early Cooling History of Cretaceous Greenhouse

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Cretaceous shelf and fore-arc basin sandstone and mudstone are preserved in the coastal regions of Japan, Far East Russia, and the Pacific coast of Canada and USA. Several of these sequences have been variously assessed in terms of their biostratigraphy and chemostratigraphy, and correlated to the Aptian through Maastrichtian. In addition to macro- and microfossil biostratigraphy, carbon isotope ($\delta^{13}\text{C}$) stratigraphy has also identified some important event horizons within these successions, such as OAE2. Owing to the clay-rich nature of the strata, parts of the sequences yield excellently preserved calcareous fossils available for oxygen isotope thermometry (Moriya et al., 2003).

This study examines the Campanian-Maastrichtian interval. Its chronostratigraphy, including detailed $\delta^{13}\text{C}$ stratigraphy, has been summarized recently (Voigt et al., 2012) and it records the initial phase of global cooling of the Cretaceous greenhouse Earth (Moriya, 2011; Friedrich et al., 2012). As the northern paleo-Pacific Ocean had a large heat capacity, its paleoceanography should provide insights for understanding the subsequent environmental transition from greenhouse to ice house Earth.

The Yezo Group and its equivalent in Hokkaido (Japan) and Sakhalin (Russian Far East), as well as the Nanaimo Group of the Canadian Pacific coast (British Columbia), are examined in this study. From the Yezo Group, a clear negative $\delta^{13}\text{C}$ excursion as large as 1.4‰ has been identified. On Sakhalin, its Campanian-Maastrichtian boundary age is constrained by local bio- and magnetostratigraphy, and the excursion is thus identified as the Campanian Maastrichtian Boundary Event (CMBE), associated with some subevents.

Carbon isotopic event, CMBE, suggested from magneto- and biostratigraphy (Haggart et al., 2011; Ward et al., 2012) of the Nanaimo Group near the top of the Northumberland Formation is well observed at the expected mudstone-dominated interval of the formation with negative 1.5‰ excursion. These progresses of stratigraphic correlational potential enable us to correlate CMBE interval between NW and NE Pacific with higher resolution.

Friedrich, et al., 2012, *Geology*, 40, 107-110; Haggart et al., 2011, *Can. Paleont. Conf., Field Trip Guidebook No. 16*, 31-62; Hasegawa et al., 2003, *Palaeo-3*, 189, 97-115; Moriya, 2011, *Paleont. Res*, 15, 77-88; Moriya et al., 2003, *Geology*, 31, 167-170; Voigt et al., 2012, *Newsl. Str.*, 45, 25-53; Ward et al., 2012, *GSA Bull.*, 124, 957-974.

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