

High-resolution continuous lithostratigraphy of middle to upper Miocene in Yurihonjo, Akita

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The middle to late Miocene is the time of global cooling. According to Lear et al. (2000), who reconstructed changes in the volume of ice sheets during the past 50 My, expansion of the ice sheets occurred in three steps during Cenozoic, and the second step approximately at 14 Ma was significant one due to the growth of the east Antarctic ice sheet.

During the middle Miocene, the east Antarctic ice sheet expanded and stabilized, which probably caused the change in global deepwater circulation pattern. Simultaneously, the organic carbon-rich siliceous sediments including the Monterey Formation and the Onnagawa Formation started widely accumulating in the coastal area of the Pacific Rim region. Deposition of these organic carbon-rich sediments might have drawn down the atmospheric CO₂, thus acting as a positive feedback to accelerate global cooling. These sediments are also known as a petroleum source rock. Thus it is important to study the origin and nature of these sediments as well as the timing and extent of their deposition.

In the process of expansion of Antarctic ice sheet and global cooling during the Middle Miocene, orbital-scale changes in $\delta^{18}O$ have been amplified and associated with switches between dominance of 100 ky cycles and 41 ky cycles (e.g. Holbourn et al., 2007), suggesting instability of the climate system. Tada (1991) reported the occurrence of centimeter-scale black-white banding observed in the siliceous rocks of the Onnagawa Formation, which he interpreted as reflecting millennial-scale changes in paleoceanography that could have been related to instability of the climate system. Thus, it is important to study the origin and variability in the composition and texture of the Onnagawa and the overlying Funakawa formations. To study the orbital to millennial-scale variabilities in the Onnagawa and Funakawa Formations and their temporal changes during the middle to late Miocene, it is critical to reconstruct a continuous sequence of the Onnagawa and Funakawa formations.

To accomplish this objective, we established a nearly continuous sequence of the Onnagawa and Funakawa formations with 1 ky-scale resolution. The research was conducted on the Kubota-river north route in Yurihonjo city, Akita, on which parts of the sequence of the Onnagawa and Funakawa formations are exposed repeatedly. The result are integrated with columnar sections constructed at the Ushigoe and the Yagiyama routes 11 km to the southwest of the studied area by Kurokawa (2015MS). A composite columnar section is constructed, which revealed the occurrence of the black-white banding intervals and termination of the siliceous sediments deposition (the Onnagawa/Funakawa boundary). We also extracted microfossils from the sequences to develop the better age model. The result will be presented at the meeting.

Keywords: Miocene, Siliceous rocks, the Onnagawa Formation, the Funakawa Formation