Holocene paleo-environmental changes of coastal freshwater lakes in Soya Coast, East Antarctica using fossil diatom assemblages

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The East Antarctic Ice Sheet (EAIS) is the largest glacial system on Earth, and documenting its changes is important to understand and estimate its future behavior. Antarctic coastal lakes are invaluable archives of paleoclimate and paleoenvironment changes caused by the retreat of Antarctic Ice Sheet. In Soya Kaigan (Coast) of Lutzow-Holm Bay region, many coastal lakes are located in ice-free areas. Some costal lakes located below 20m ASL are marine relict lakes resulted from the recession of glaciers and subsequent isostatic uplift (Igarashi et al., 1995, Miura et al., 1998). This study discussed the environmental change inferred from microscopic observation of fossil diatom assemblages in a sediment cores from such coastal freshwater lakes, Lake Oyako-ike, Lake Maruwanminami-ike and Lake Maruwan-Oike, in Soya Coast along with biomarkers and microscopic observation of microalgae and cyanobacteria, sedimentary facies and AMS ^{14}C dating.
Diatoms are one of the most common phytoplankton (Class: Bacilllariophyceae), and it is used as powerful and reliable environmental indicators (Cholnoky, 1968; Lowe, 1974) which can be attributed to their high abundance and species diversity. Also, they are distributed among most aquatic environment. Additionally, their cell wall is made of silica (hydrated silicon dioxide) called as frustule, so that their remains are highly durable and well preserved in accumulated sediments as fossils (Smol, J. P., & Stoermer, E. F. (Eds.). 2010). In this study, Diatom analysis was conducted in order to understand past water quality such as salinity when they live on.
The Ok4C-01 core (length 135 cm) from Lake Oyako-ike was divided in 5 zones according to the diatom assemblage changes. This lake has changed from costal marine to freshwater lake at ca. 1100 cal yr BP (core depth 60 cm). The MwS4C-01 core (length 147 cm) from Lake Maruwanminami-ike was also divided in 4 zones. This lake has changed from coastal marine to freshwater lake at ca. 2400 cal yr BP (core depth 65 cm). The Mw4C-01 core (length 226 cm) from Lake Maruwan-Oike was divided in 4 zones as well. This lake has changed from coastal marine to freshwater lake at ca. 2800 cal yr BP (core depth 22 cm). Diatom assemblage changes in these sediment cores show similar pattern with other results such as sediment facies and elemental analyses (TC, TS, TN contents). However, to compare the environmental changes between these lakes, we need more examine the age model.

Keywords: Antarctic coastal lakes, Paleolimnology, Holocene

