



Chemical compositions of soluble aerosols around the last termination in the NEEM (Greenland) ice core

Ikumi Oyabu (1,2), Yoshinori Iizuka (2), Torbjorn Karlin (3), Manabu Fukui (2), Takeo Hondoh (2), and Margareta Hansson (3)

(1) Graduate school of Environmental Science, Hokkaido University, Japan (oyabu@lowtem.hokudai.ac.jp), (2) Institute of Low Temperature Science, Hokkaido University, Japan, (3) Department of Physical Geography and Quaternary Geology, Stockholm University, Sweden

The polar ice cores provide us with reconstruction of past atmospheric aerosols. Atmospheric aerosols such as dust and sea salt in both Arctic and Antarctic ice cores are well discussed by using the proxy of ion concentration/flux. Recently, studies on the chemical compositions of soluble aerosols in the ice cores have been carried out. The chemical compositions and transition of soluble aerosols in the Dome Fuji (Antarctica) has been revealed, however, there are few studies on those of soluble aerosols in Greenland ice cores. Using ice sublimation method #1, we analyzed the chemical compositions of soluble aerosols around the last termination in the NEEM (Greenland) ice core.

A total of 43 samples were distributed from NEEM ice core section from 1280 to 1580 m. Soluble aerosols were extracted from the samples by sublimation system. Constituent elements and diameter of each non-volatile particle were measured by scanning electron micro scope (SEM) and energy dispersive X-ray spectroscopy (EDS). By using a method in our recent paper #2, we assumed that particles containing Ca and S are calcium sulfate and particles containing Na and S are sodium sulfate.

We divided around the last termination into 4 stages by focusing on the temperature; Holocene, Younger Dryas (YD), Bølling-Allerød (B-A) and Last Glacial Period (LGP), and compared the mass ratio of sulfate and chloride aerosols in each stage. During the cold stage in YD and LGP, calcium sulfate accounted large percentage of soluble aerosols. On the other hand, during the warm stage in Holocene and B-A, sodium sulfate accounted large percentage of soluble aerosols. These relationships between chemical composition and temperature are probably related to non sea salt (nss)-calcium ion concentration. We will discuss the relationship between nss-calcium ion concentration and chemical compositions of soluble aerosols in the presentation.

References

- #1 Iizuka et al., J. Glaciol., 55(191), 58–64, 2009.
- #2 Iizuka, Y. et al. J. Geophys. Res. 117, D04308, 2012.