Geophysical Research Abstracts
Vol. 14, EGU2012-6668, 2012
EGU General Assembly 2012

Variations of ion concentrations in the deep ice core and surface snow at NEEM, Greenland

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Discrete samples were collected from the CFA (Continuous Flow Analysis) melt fractions during the field campaign carried out at NEEM, Greenland in 2009-2011, and were distributed to different laboratories. Ionic species were analyzed at National Institute of Polar Research (Japan) and Alfred Wegener Institute for Polar and Marine Research (Germany). Here we present and compare the ion concentration data obtained by both institutes. Most of the ions show good agreement between the two institutes. As is indicated with the CFA data (Bigler and the NEEM Aerosol Consortium members, EGU 2012), ion chromatograph data also display that calcium and sodium, mainly originated from terrestrial dust and sea-salt, respectively, show large variations associated with Dansgaard-Oeschger (DO) events. Chloride, fluoride, sulfate, sodium, potassium and magnesium also show such variations, as has been already reported for other Greenland ice cores. New ion data obtained from the NEEM deep core also show large variability of oxalate and phosphate concentrations during DO events. Acetate, which is thought to be mainly derived from biomass burning, as is oxalate, appears to show variability associated with DO events, but to a lesser extent. On the other hand, nitrate, ammonium and methanesulfonate do not show such variations. Together with ion data from the deep ice core, we present those from the pits dug during the NEEM field campaign to discuss seasonal variations of ionic species. The seasonal and millennial scale variations of ions are thought to be caused by changes in atmospheric circulation and source strength.