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The NEEM record of aeolian dust: Contributions from Coulter counter measurements

Jean Robert Petit (1), Anna Wegner (2), Bianca Narsici (3), Anders Svensson (4), Mathias Bigler (4,5), and Jorgen Peder Steffensen (4)

(1) LGGE, UJF-Grenoble 1, CNRS, St Martin d'Hères, France (petit@lgge.obs.ujf-grenoble.fr), (2) Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany , (3) ENEA, Roma, Italy, (4) Centre for Ice and Climate, Niels Bohr Institute, University of Copenhagen, 2100 Copenhagen, Denmark, (5) Climate and Environmental Physics, Physics Institute & Oeschger Centre for Climate Change Research, 3012 Bern, Switzerland;

The 2500 m NEEM deep ice core was continuously processed with a CFA system. A set water aliquots have been dedicated for dust concentration and size distribution measurements by using a Coulter counter. The data set is done for calibration of the laser detectors for high resolution analysis set on-line the CFA system.

The water samples are represented by 15 ml water over 1.10 m (length of two ice core bags). The CFA operations have been conducted in the scientific trench during three summer seasons. The brittle zone ($\sim$400 to 1200 m depth) of the ice core has not been sampled. The water aliquots have been stored in pre-cleaned and sterile 50ml Corning® tube, and then refrozen until their analysis at LGGE. A total of 1246 samples from the deep ice core and 73 samples of snow collected from a pit dug from surface nearby the site have been measured. The Coulter Counter Multisizer IIe which was used is sensitive and has a threshold for particle diameter as low as 0.7 microns.

Over the ice core profile, the dust concentrations vary within a factor up to 100 between Holocene (70 ppb) and the last glacial period (up to 7ppm). The contamination from the drilling fluid is negligible, except for a few samples from the Holocene period. As already observed on previous Greenland records the correlation between dust and climate (stable isotope) remain very tighten and especially at the time of the Dansgaard Oeschger events. The dust-climate correlation holds for the deepest layers of the NEEM record which are disturbed by the ice dynamics. All discontinuities in isotope have a corresponding dust counterpart. These come in support to the proposed climate reconstruction. The dust size distributions have a mode around between 2 and 3 microns, a little larger than for inland sites, whatever the climatic period.
The samples analyses from the pit indicate a strong seasonal (summer) dust input, while tephra fallout of 2010 Icelandic Eyjafjöll eruption which are detected are under geochemical analysis.