Geophysical Research Abstracts
Vol. 14, EGU2012-8301-1, 2012
EGU General Assembly 2012

Eurasian Arctic climate over the past two millennia as recorded in the Akademii Nauk ice core (Severnaya Zemlya, Russian Arctic)

D. Fritzsche (1), T. Opel (2), and H. Meyer (1)

(1) Alfred Wegener Institute for Polar and Marine Research, PO Box 600149, D-14473 Potsdam, Germany, (Diedrich.Fritzsche@awi.de), (2) Department of Geography, Humboldt-Universität zu Berlin, Unter den Linden 6, D-10099 Berlin, Germany

In the context of the ongoing and future strong warming of the Arctic detailed knowledge of past climate changes in particular on a regional scale is crucial. An ice core drilled on the Akademii Nauk (AN) ice cap (Severnaya Zemlya, 80.52˚N, 94.82˚E) at a relatively low altitude of about 750 m a.s.l. has shown to provide high-resolution climate proxy data from the Central Russian Arctic, although the ice cap is affected by melt-water infiltration.

Here for the first time, we present δ^{18}O and major ion records for the last about two millennia. The age-depth relationship of the core is based on annual layer counting and volcanic reference layers for cross-checking (Bezymianny 1956, Katmai 1912, Laki 1783, unknown volcano 1259, Eldgja 934). The multi-annual AN δ^{18}O data are highly correlated to instrumental temperature data from the Western Eurasian Arctic (e.g. Vardø/Northern Norway) and thus provide a valuable near-surface temperature proxy for this region, also underlined by the good coincidence with the Austfonna (Svalbard) ice core δ^{18}O data. The long-term decrease of AN δ^{18}O data does not solely reflect climate cooling but probably also a growing of AN ice cap. AN δ^{18}O record reveal major temperature changes over the last centuries, e.g. the absolute minimum around 1800 and the exceptional warming to a maximum in early 20^{th} century (Early Twentieth Century Warming – ETCW), representing the temperature maximum of the record. By comparison with meteorological data it can be shown that a double-peak structure of the ETCW is a peculiarity of the Barents and Kara Sea region.

Neither a pronounced Medieval Climate Anomaly nor a Little Ice Age could be identified. In contrast, AN ice-core records show evidence for several abrupt warming and cooling events such as in the 15^{th} and 16^{th} centuries. These abrupt changes might be analogous to the ETCW and probably caused by shifts in the atmospheric circulation patterns and accompanied sea-ice feedbacks in the Barents and Kara seas region that highlight the role of the internal variability of the Arctic climate system.