Geophysical Research Abstracts,
Vol. 11, EGU2009-6371-3, 2009
EGU General Assembly 2009

Late-Holocene climate and ocean variability from tree-rings and high-resolution marine archives in North Norway

A. J. Kirchhefer (1), W. Ambrose (2), M. Carroll (3), M. Hald (4), S. Helama (5), K. Husum (4), and B. R. Schöne (6)

(1) University of Tromsø, Department of Biology, Tromsø, Norway (andreas.kirchhefer@ib.uit.no), (2) Bates College, Department of Biology, Lewiston Maine, USA, (3) Akvaplan-niva, Polar Environmental Centre, Tromsø, Norway , (4) University of Tromsø, Department of Geology, Tromsø, Norway, (5) University of Helsinki, Department of Geology, Helsinki, Finland, (6) University of Mainz, Institute of Geosciences, Mainz, Germany

Tree-rings of Scots pine, *Pinus sylvestris* L., at the arctic-alpine tree-line in North Norway provide information on summer air temperatures for the past 1500 years. When accounting for tree-ring autocorrelation, July temperatures explain up to 75 % of the main regional growth variability 1895-1992 extracted from 16 site chronologies between the Vesterålen Archipelago and the inland peneplain of Finnmarksvidda. The longest individual chronologies provide reconstructed July temperatures since AD 1100 and 500 for the coast (Forfjorddalen, $R^2_{adj} \approx 40$ %) and the intra-alpine valleys (Dividalen, $R^2_{adj} \approx 30$ %), respectively. However, the response patterns vary in space and time: The coastal chronologies reflect a longer period affecting cambial activity, i.e. (May-) July-August. In the mid 20th century, with certain differences between coast and inland, a change occurred towards earlier, positive temperature responses, with June replacing August and March replacing April. Simultaneously, the negative effect of July precipitation faded out. Apparently, this is a response to changes in the atmospheric circulation pattern as described by the Arctic Oscillation AO.

The coastal mean pine chronology correlates reasonably well with July-August sea surface temperatures (SST) of the entire North-Norwegian coast (r = 0.4, HadlSST1 1870-1994). Together with first results from shell growth increments (SGI) of *Arctica islandica* L., this opens for future multiproxy reconstructions of coastal SSTs. SGIs of young shells from the northern shore of the Vestfjorden contain a signal of mean air temperatures (r = 0.66, 1976-2004), and four specimens collected near Tromsø cross-date with local pine chronologies (r = 0.50, 1806-1868). Furthermore, high-resolution marine sediments of the Malangen fjord and Andfjorden allow comparisons of tree-ring derived summer temperatures with bottom water temperatures (BWT) derived from $\delta^{18}O$ of benthic foraminiferae. Challenges faced when integrating terrestrial and marine climate proxies are related to differences in time scales and dating accuracy as well as in the time windows and climate parameters captured by the respective archives.