



Reconstruction of temperature and oceanography through the last 1000 years north of Iceland

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There is a considerable interest in paleoclimate reconstructions of the last millennium, particularly in the context of rapid climate changes during the 20th century. To distinguish natural climate variability from anthropogenic influence on the climate, it is essential to study high resolution natural archives that capture at least decadal to centennial climate variability. Sedimentary basins on the North Icelandic Shelf include high sedimentation rate areas, allowing a sufficient temporal resolution for important information about past oceanographic and climatic changes. They also have the advantage of being located close to source volcanoes of tephra, often deposited on the shelf north of Iceland. These tephra markers provide an excellent dating control for the sediment cores from the area.

High-resolution oceanographic and temperature records from the North Icelandic Shelf reveal moderate amplitude variability in the climate during the last 1000 years. Benthic and planktonic foraminiferal assemblages and stable isotopes were investigated in a sediment sequence from the Eyjafjardaráll trough on the North Icelandic Shelf. Sea-surface and bottom-water temperatures have been reconstructed based on the oxygen isotopes of the planktonic *Neogloboquadrina pachyderma* (sinistral) and the benthic *Melonis barleeanus* and *Islandiella norcrossi* foraminifera. A detailed proxy record for the last ca. 60 years reproduces the main features of the instrumental climate data, demonstrating their reliability as proxies for palaeoreconstructions. Thus, distinct cooling events during the 1960s (Great Salinity Anomaly, GSA) and 1990s are manifested in the sediments off North Iceland. A propagation and advection of cold arctic water masses and sea-ice penetration to the North Icelandic shelf

occurred during those events, and a weakening of the North Atlantic Current may well have occurred both during the GSA and the Little Ice Age (LIA). In our record, the LIA was characterized by low $\delta^{18}\text{O}$ -SST and high concentration of foraminiferal species related to arctic waters. The Maunder Minimum (around AD 1700) was the coldest interval during the last millennium. A correlation between our climatic record and the oxygen isotope record from GISP2 ice core shows a strong regional connection between the oceanic and the atmospheric climatic system.

The 20th century warming is clearly seen in the North Icelandic Shelf record, and work in progress will provide an answer to the question whether changes of the same scale and rate have occurred previously in the area during the last millennium. This is a key question to be answered on a regional scale by the 6th framework European project: MILLENNIUM. The present study is a contribution to that project.