Geophysical Research Abstracts, Vol. 7, 01004, 2005
SRef-ID: 1607-7962/gra/EGU05-A-01004

Holocene sea ice variability in the Barents Sea

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The seasonal ice zone (SIZ) within the Arctic region is defined as the region between the winter maximum and summer minimum sea ice limits. The SIZ reflects interactions between the sea-ice, atmospheric and oceanic systems. The expansion or shrinkage of the sea ice cover may therefore have a range of feedback effects. The reconstruction of sea ice cover (1580-2002) by Vinje (1999, 2001) has indicated a decreased expansion of the sea ice southwards from approximately 1830. This pattern may lie within the expected natural warming trend and/or it may be the result of an anthropogenic forcing. The Vinje study has therefore been compared to the Holocene temperature series from a proxy record from Malangen fjord (69°29.9'N and 18°23.6'E) and an instrumental record of the Kola Profile, W. Barents Sea (70°30'N to 72°30'N along the 33°30'E meridian). Both datasets show a general increasing temperature trend over the last 100 years. We use these records to elucidate to what extent the ice retreat in the Barents Sea SIZ was forced by temperature. In addition, comparisons are made with a range of additional climatic variables, for example, the NAO indices, to determine the possible factors influencing, or being influenced by, the change in sea ice expansion rates. The study will also provide important information on how the SIZ responded to past climate changes before instrumental observations were available. We are currently developing a transfer function for reconstructing sea ice based on modern benthic foraminifera from the Barents Sea. This transfer function will be applied to both new and existing benthic foraminiferal records for the last millennium.

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