

NORCLIM (IPY 120): Northern High Latitude Climate variability during the past 2000 years: implications for human settlement

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The Arctic is a region characterized by the presence of sea-ice, glaciers and permafrost. By its nature, it is particularly sensitive to climatic change. The last decennia of the 20th century have seen a rapid increase in mean temperatures, melting of glaciers, decrease of Arctic sea-ice coverage and thawing of permafrost areas. Continued warming will undoubtedly have strong consequences, not only for the arctic communities, but for the world as a whole.

The climatic history of the past two millennia with a (warm) Roman Period, (cold) Dark Ages, (warm) Medieval Optimum, (cold) Little Ice Age and 20th Century Warming shows that rapid shifts in the natural climate regime have occurred repeatedly. There are strong indications that these climate trends are not uni-directional for the entire Arctic, but that they show regional patterns, e.g. the recent contrast between SW Greenland cooling and NW European warming. Previously, sea surface temperatures offshore SW Greenland had been relatively high during the 1950's and 1960's, when northwest European winters were generally more severe (e.g. 1962-63).

Consequently, it is likely that for a given time interval patterns of human occupation and activities may also regionally have been different. In pre-historical times, around 2000 years ago, the Dorset (Inuit) Culture was about to disappear in Greenland, whereas it took several centuries before a new Inuit culture immigrated. In a historical context it includes the period during which the Vikings settled on the Faroe, Iceland and Greenland and also travelled to Newfoundland. The second part of the last millennium were the heydays for dutch whaling expeditions. The latter implies that a wealth of historical data (ship's logbooks) on climatic and sea ice conditions are available. Notable is the shift of whaling activities from Spitsbergen to Davis Strait during the later part of the Little Ice Age, a well known cooling period in NW Europe.



In the NORCLIM proposal we identified a nordic transect with three research areas:

1. Baffin Bay/Labrador Sea (main responsibility: Denmark, Canada, Greenland, the Netherlands)
2. the Iceland region (Iceland, Denmark, USA) and
3. the Spitsbergen area (Norway, Denmark).

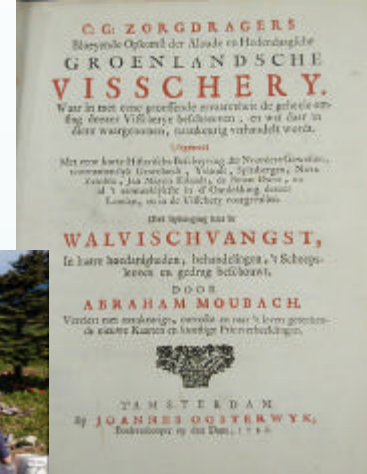
Responsibilities for the majority of research activities (additional coring, core-studies, chronology) will be with the different NORCLIM partners and are partly dependent on national IPY funding. Coordination of NORCLIM will be the responsibility of the Netherlands (VU). For each area a high resolution climatic framework (chronology, sedimentology, chemistry, biota) will be constructed based on marine/terrestrial cores.



F. Dalhoff, GEUS



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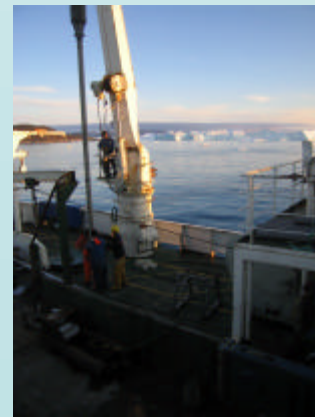
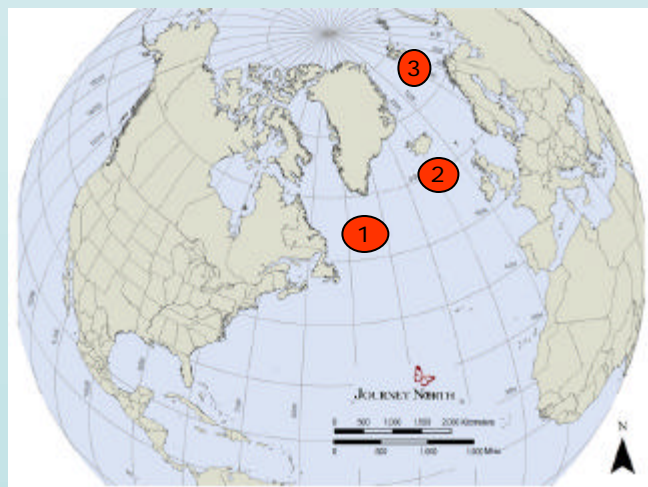
NORCLIM (IPY 120) is designed to provide constraints on pressing questions that address the nature of the 20th century Arctic warming. The proposal focuses on natural climate variability during the past 2000 years with special emphasis on the permafrost/sea-ice relation and on contrasting climatic trends (south)west off Greenland when compared with the NE Atlantic region.

The research is based on an integrated approach to reconstruct the changes in ocean surface currents, particularly the inflow of warm Atlantic water versus outflow of ice-loaded Polar water, terrestrial environments and evolution of glaciers and ice sheets in the study area.

Evidence for climatic variability will be gathered from marine/terrestrial sedimentary records (multi-proxy approach), molluscs, geomorphological and archeological evidence, and historical archives (e.g. whaling data).

The objectives of NORCLIM are:

- To correlate existing marine/terrestrial paleo-climate records
- To link existing marine/terrestrial paleo-climate records with archeological/historical information
- To identify gaps in our knowledge for the various key-areas
- To fill these gaps by collecting additional information onshore and offshore for all data sets
- To place archeological and historical data in a solid climatological framework
- To use the confirmed regional contrasts, if any, for improved regional climate prediction and societal/economic planning.



J. Boserup, GEUS

Partners in NORCLIM are:

Denmark (Geocenter Copenhagen, University of Aarhus), marine logistics, ice-dynamics, sedimentology, 14C/210Pb, foraminifera

Greenland (Greenland National Museum and Archives), archeology and historical data)

Norway (Norwegian Polar Institute, University of Tromsø, UNIS Svalbard), marine logistics, chronology, SST's, sea-ice reconstructions, permafrost, stable oxygen isotopes, diatoms, foraminifera, archeology

Iceland (University of Iceland), marine/terrestrial cores, chronology, archeology/historical records

Canada (Memorial University, Newfoundland, Canadian Museum of Civilization, Laval University), archeology/historical records, oceanography

United Kingdom (Durham University), foraminifera

USA (University of Colorado, Hunter College CUNY), anthropology, archeology/historical records

The Netherlands (Vrije Universiteit), coordination, stable oxygen and carbon isotopes on foraminifera and molluscs, sedimentology, archeology/historical records