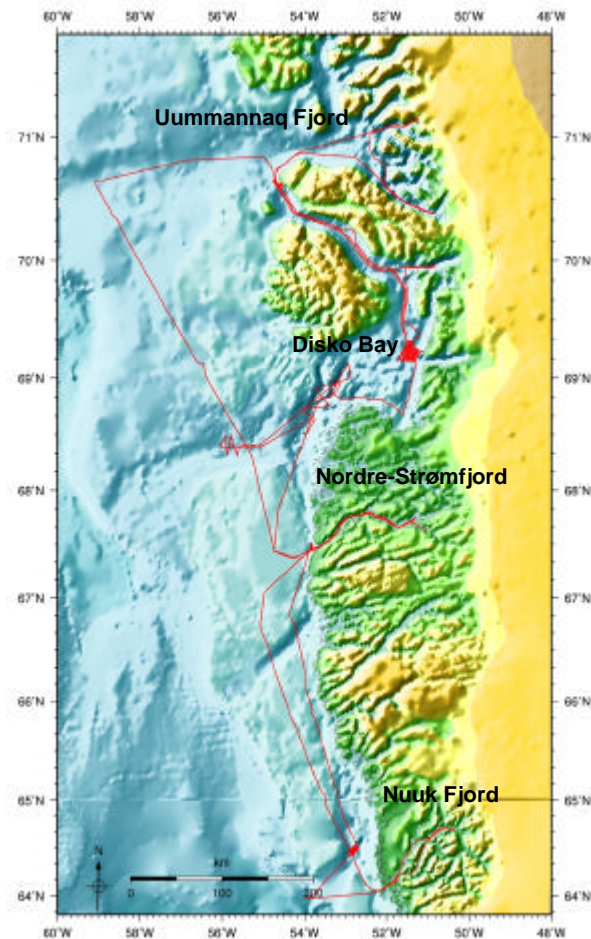


## Merian-Expedition MSM 05/03

15.06. – 04.07.2007

Nuuk – Nuuk

Chief Scientist: Jan Harff



### 1. Targets

The study aimed at the interrelation between hydrosphere, geosphere and climate in the western Greenland coastal waters and the impact to environmental change during the Late Quaternary. An international team of geologists, geophysicists, geodesists, and paleo-oceanographers contributed to three topics by interdisciplinary studies along of three transects from the origin of three Fjords (Nuuk Fjord, Nordre Strømfjord, Uumannaq Fjord) to the shelf edge, in Disko Bay and Vaigat:

- (1.) Reconstruction of climate and ice dynamics in western Greenland during the late Pleistocene and Holocene.

- (2.) Influence of climate change and anthropogenic forcing on biogeochemical cycles during the Holocene.
- (3.) Glacio-istostatic deformation of the Earth crust and its influence on coastal processes.

## **2. Work program**

The measuring program has been focused on east-west profiles running from inner fjords to the shelf edge which shall reflect the South-North gradient of the parameters to be measured between 64° and 72° N. Figure 1 shows the route of the expedition. We have worked in four areas:

- A: Nordre Strømfjord
- B: Disko Bay
- C: Vaigat and Ummannaq
- D: Nuuk Fjord

The following methods have been deployed:

**Hydrography:** The currents in the water column have been observed continuously using the ship mounted Acoustic Doppler Current Profiler (ADCP). Within the fjords and outside the fjords on the shelf average CTD stations (20 nm distance) have been executed. CTD-measurements have been also carried out for each of the coring stations selected on the base of seismo-acoustic data.

**Geophysical methods:** For the identification of sedimentary basins we have used multibeam echo sounder and the new parametric echo sounder PARASOUND DS3 mounted at the R/V M. S. Merian. In addition, multi-beam bathymetric data acquisition has been deployed for the interpretation of the origin of various seabed features (e.g. iceberg drift).

**Sedimentological sampling:** In order to investigate the environmental and climate change during the last thousands years we have sampled the uppermost 12 m sedimentary column by gravity corer. Sampling for the investigation on biochemical cycles and anthropogenic impacts during the past decades has been carried out with a MUC (multi-corer). For surface sediment sampling a box-corer have been used in selected areas.

**Geodesy:** To measure the recent vertical crustal deformations a GPS network established in the frame of previous research of the researchers has been extended. This includes the installation and a first observation of new GPS stations located along the Nordre Strømfjord, the Vaigat and the Qaumarujuk Fjord, as well as a re-observation of one site of the already existing network. From the repeated observation of this GPS network, the detailed spatial pattern of the present-day uplift rates in the area of investigation can be deduced.

### 3. Results

The following results have been achieved during the cruise:

1. The geodetical network for measurements glacio-isostatic adjustment in Western Greenland has been completed. It is possible now to measure vertical dislocations of the earth's crust in Western Greenland for model parameterization and comparison with the Baltic coast.
2. Sediment cores have been sampled from the West Greenland shelf. Geochemical and sediment-physical parameters have been measured on board. These data form the first data records describing the history of Holocene climate and the Western Greenland current in a high resolution.
3. The technical equipment of the MSM did allow sampling of sediments within the Ice-Fjords. These cores describe the climatically controlled ice-dynamics of the feeding glaciers.
4. Using the multibeam echosounder the sea floor closed to the ice-fjord's mouths and along the drift tracks has been mapped. Ploughmarks show different drift directions of icebergs pointing at variations of transporting marine currents,
5. Traces of anthropogenic impact have been identified through geochemical proxies within sediments of the Qaumarujuk Fjord. Here, the lead/zink mining closed to Maarmorilik in the seventies of the last century had lead to dramitc pressure on the aquatic ecosystem.