Arctic-subarctic ocean flux-array for european climate: west

Results

Project Information

ASOF-W

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Coordinated by
UNIVERSITY OF HAMBURG
Germany

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Deliverables

Features and variability of water mass characteristics along the SE-Greenland slope

Historical hydrographic data and the data from the standard sections of the project between Denmark Strait and Kap Farvel were successfully used to quantify the changing water mass composition of the overflow boundary current, to identify alternative pathways for the dense water recruiting to the overflow across the Denmark Strait sill and to derive geostrophic transports which conforms to the directly measured transports through the moored current meter array at 64° N. The analysis of the standard section data furthermore suggest a revision of the prevailing views on the downstream evolution of the overflow plume towards a different entrainment process.

Salinity time series and freshwater fluxes on the SE-Greenland shelf

The freshwater flux from the Arctic reservoir of ice and freshwater to the North Atlantic is key to the ocean role for the European climate. The shelf off SE-Greenland is a critical location for time-series measurements of this flux. This project has managed for the first time continuous salinity and temperature measurements in the gradient layer underneath the seasonal ice cover by employing sensors protected against ice-damage by means of bouyant tubes. In combination with water transport estimates the freshwater flux over the shelf at 63° N was found to amount to 2000 km^3/year. This number was embedded in a revised map of freshwater fluxes for the Arctic and Subarctic Seas.

Development and testing of HOMER, the autonomous profiling temperature-salincity probe

To obtain time series of temperature and salinity profiles in ocean regions with high currents, seasonal ice cover and bottom trawl fisheries very well protected autonomous instrumentation has to be available.

This project has continued the development and sea-testing of HOMER, which is a bottom-mounted winch operating a bouyant recording capsule to profile the water column at a preset interval, here once a day for one year.

The project has significantly advanced this new type of ocean observing platform, but due to unfortunate losses in the pre-cruise testing phase and to pressure sensor malfunctions no scientifically useful data have resulted.

International coordination of programmes on Arctic-North Atlantic ocean fluxes

The overall aim of this project to measure and to model the variability of fluxes between the Arctic Ocean and the North Atlantic Ocean in order to understand the high-latitude ocean's steering role in decadal climate variability cannot be achieved on a regional basis.

It requires a study of the complete system of oceanic exchanges through the subarctic seas and therefore an international context was established with the following main successes:
- The three ASOF-EC projects (ASOF-W, ASOF-N and MOEN) were closely integrated among themselves and into the full international ASOF, including the relevant Northamerican projects and partners.

- ASOF-International was developed to the stage of full implementation and manages international thematic scientific meetings, a newsletter and a website.

- In anticipation of the upcoming International Polar Year 2007/9 a larger scale context for the ASOF-effort was achieved by compiling a Science Plan for a pan-Arctic integrated Arctic Ocean Observing System.

Dense overflow transport variability over the SE-Greenland slope

This project has maintained an array of 6 current meter moorings including temperature and salinity sensors, over the SE-Greenland slope at 64° N in the depth range from 1000 to 2500 m. It was designed to measure the transport-variability of water, heat and salt of the dense overflow, coming across the sill of the Denmark Strait and driving the North Atlantic overturning circulation. With these data a total of 18 years (10 years continuously) of overflow transports is now available for analyses of seasonal to interannual variability. A mean volume transport of 10.1 x 10^ 6 m^3/s was analysed with

an interannual variability of up to 30 %, but no trend over the period 1987-2005. Furthermore no obvious relationship between the Denmark Strait overflow and the Faroe Bank Channel overflow could be found.

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