

Abstract

To get an overall understanding of the thermohaline circulation in the Arctic Ocean the processes and transports related to the freshwater balance play an important part. A large part of the southward freshwater transport occurs in the form of ice and liquid water within the East Greenland Current.

In 2000 a new type of mooring, where a long tube prevents damage of the instruments due to ice, was designed and deployed in two locations (63°N and 74°N) on the shelf in the East Greenland Current. The mooring consisted of a 40 m long PVC tube that had floatation and two microcats built into. The microcats recorded the seasonal cycle of salinities and temperatures of the surface waters of the East Greenland Current (EGC).

After the first year of deployment, the design of the tube was altered (smaller diameter and different bolting) and deployed at nearly the same spot together with a second tube mooring. In this work the two different mooring types were compared and their behaviour in the currents analysed and computed. The simulations of all three moorings in the currents show the lowest flow resistance was achieved by the one with a small diameter and the shortest ropes that connect the anchor stone with the tube. Low flow resistance prevents large tilting of the moorings at high current speeds.

The two year long records of temperature and salinity measurements shows how the stratification near the surface at 74°N changes during the course of the year and how it relates to the changing ice distribution. Seasonal changes in the EGC were visible in the upper 50 m of the water column. A relatively fresh, warm surface layer is formed by the melting of the ice during the summer, which is cooled down towards the freezing point in winter. Convection induced by the cooling mixes the whole water column on the shelf before the formation of the ice begins again. Due to brine release during the ice formation the surface salinity on the shelf rises and is nearly evenly distributed throughout the whole water column. Comparisons with the hydrographic sections obtained in September 2000, 2001 and 2002 show that all three tube moorings were deployed within the EGC, although its spreading across the shelf varied from year to year. The lowest CTD sensor (117 m) of the tube closest to the shelf break caught the edge of the recirculating Atlantic Water (rAW). The core of the rAW is located at the shelf break and lies below the tail of the EGC.

In September 2000 during the first deployment of the tube moorings, an ice coverage of 25% was observed, which was not apparent during the following two summers. The upper CTD sensor of the mooring registered only a weak/thin surface layer in the first year of deployment. This strong surface layer was restored in the two following ice free summers. Investigations on the relation between the seasonal cycle of the EGC's surface temperatures and salinities and the ice coverage revealed the strong influence the ice coverage has on the building of the summerly surface layer.