ICES CM 2000/L:20

TRANSPORT OF ATLANTIC WATER THROUGH THE BARENTS SEA

by

Randi Ingvaldsen, Lars Asplin & Harald Loeng

Institute of Marine Research

(Randi.Ingvaldsen@imr.no, Lars.Asplin@imr.no, Harald.Loeng@imr.no)

The Barents Sea is a shallow (less than 450 m deep) continental shelf sea defining a pathway between the Norwegian Sea and the Arctic Ocean. The Norwegian Atlantic Current flows north along the Norwegian coast with a branch into the Barents Sea. Thus, the water temperature is relatively high in the Barents Sea, being one reason for the extremely high biological productivity of the area.

The Institute of Marine Research (IMR) is a Norwegian Governmental institution being responsible for giving scientific advice on matters concerning fish stocks and marine environment. IMR was participating in the European VEINS project with the responsibility of investigating the water exchange between the Barents Sea and the Norwegian Sea.

As scientific methods for our investigations, we use both field observations and 3D numerical modelling. The field observations consist of 2 years of current observations from 5 moorings (Aanderaa RCM7) and hydrographical observations 6 times a year at the section between Norway and Bear Island. The numerical modelling was perfomed with a version of the Princeton Ocean Model.

The following is a brief summary of some results from our investigations:

- During the winter of 1999-2000 the water temperatures in the western parts of the Barents Sea was the highest observed since 1983.

  The currents in the section between Norway and Bear Island are predominantly barotropic.

  The flow across the section between Norway and Bear Island may occur as a wide Atlantic inflow, an outflow covering an area of width ~150 km, or in two narrower cores of inflow with a weaker inflow or a return flow between.

  Mean volume flux across the section is 1.5 - 2 Sv.

  On monthly basis the volume transport fluctuates over a range of almost 8 Sv.

  During two subsequent days the absolute volume flux may change by almost 10 Sv.

  In periods the flow is reversed and there is a net volume flux from the Barents Sea towards the Norwegian Sea.

  Particle tracking experiments based on daily mean currents from the numerical model indicates a period of 2-4 years for the Atlantic water to flow through the Barents Sea and into the Arctic Ocean.

Institute of Marine Research,
P. B. 1870 Nordnes
N 5817 Bergen, Norway