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Exchanges of Arctic Intermediate Water and SF_6 between the Nordic Seas and the Arctic Ocean

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In spring 2002, the Swedish icebreaker Oden, as part of the Arctic Ocean 2002 programme to study the water mass circulation in the Nordic Seas, operated in the ice covered areas in and north of Fram Strait and in the western margins of Greenland and Iceland Seas. Because of the strong recirculation the exchanges in Fram Strait are difficult to determine in the strait, and especially the amount of Arctic Intermediate Waters transported from the Nordic Seas into the Arctic Ocean is little known. As part of ESOP2 project to study the mixing and circulation of the Arctic Intermediate water 320 kg of $SF_6$was released in the Greenland Sea Gyre in August 1996, and its spreading has been followed ever since. On Arctic Ocean 2002 expedition hydrographic sections were obtained in the inflow region north of Svalbard reaching across the Yermak Plateau and in the outflow area west of the Yermak Plateau extending to the Greenland shelf, well beyond the recirculation. Geostrophic velocities have been calculated for the two sections and the exchanges of water masses as well as the transport of SF_6 into the Arctic Ocean have been estimated. Most of the SF_6 was found in the intermediate water on the eastern inflow section and a transport of 3kg/year into the Arctic Ocean was obtained. Little SF_6 was found on the western section, confirming the dominance of the Arctic Ocean water masses and the near absence of recirculation. The total inflow was estimated to 3.2 Sv and the amount of Arctic Intermediate Water entering the Arctic Ocean was 0.8 Sv. The southward outflow on the western section was around 5 Sv, indicating an inflow to the Arctic Ocean over the Barents Sea on the order of 2 Sv.