

Observational study of Davis Strait transports

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Davis Strait is a primary gateway for freshwater exchange between the Arctic and North Atlantic Oceans and is the upstream boundary condition for the Labrador Sea. Measurements of volume and freshwater transports are necessary to close Arctic budgets and assess Atlantic meridional overturning circulation sensitivity to freshwater inputs.

An ongoing observational program to quantify volume, freshwater and heat transports through Davis Strait has been operational since September 2004. The year-round program consists of velocity, temperature and salinity measurements from 15 moorings spanning the full width (330 km) of the strait. Autonomous gliders improve the spatial resolution of the array and have provided sections across the central strait for all calendar months.

Interannual variability is large and there are no clear trends in the 2004-10 net transports. Average volume, liquid freshwater and heat transports are -1.6 ± 0.5 Sv (negative indicates southward transport), -93 ± 6 mSv and 23 ± 2 TW, respectively. Freshwater outflow through Davis Strait into the Labrador Sea contains contributions from the Canadian Arctic Archipelago, West Greenland Current and runoff from West Greenland and CAA glaciers. Reanalysis of Davis Strait mooring data from 1987-90 reveals a decrease in freshwater outflow and an increase in warm, salty North Atlantic inflow through Davis Strait during 2004-10 as compared to the earlier period. Transport through Davis Strait is controlled primarily by regional atmospheric mechanical and buoyancy forcing.