Geophysical Research Abstracts,
Vol. 11, EGU2009-11045, 2009
EGU General Assembly 2009

Freshwater Flux Through Nares Strait, West of Greenland, From a Three-Year Moored Array

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Nares Strait is a 40-km wide and 500-km long channel to the west of Greenland, that facilitates the exchange of heat and freshwater between the Arctic and Atlantic Oceans. The Canadian Archipelago Throughflow Study and its ongoing International Polar Year extension focus on the dynamics in Nares Strait for the 2003 - 2006 and 2007 - 2009 periods, respectively. A moored array measures currents, temperature, conductivity, ice thickness and subsurface pressure near 80.5º N, and resolves the internal Rossby radius of deformation in the dynamically wide strait. These measurements are the first of their kind, and constitute a valuable baseline from which to monitor change, as well for constraining ocean and climate models.

This analysis focuses on the CT-mooring data from the first three-year deployment period, from August 2003 - August 2006. An innovative new mooring design uses the pull-down of the six moorings (each with four instruments at nominal depths of 30, 80, 130 and 180m) to profile the water column down to 210m. We use a regression analysis to reconstruct temperature, salinity and density across the section every two days at high vertical resolution. This allows us to calculate the geostrophic flow through the strait as well as the freshwater and heat fluxes. The fresh outflow from the Arctic Ocean varies in salinity by 2 psu on timescales as short as a few days. The time-mean geostrophic velocity shows a surface-intensified southward flow adjacent to the western side of the strait. A comparison of this geostrophic velocity with available ADCP mooring data will be discussed, together with preliminary estimates of the geostrophic freshwater flux through Nares Strait.