



Water Transport and Freshwater Fluxes through Davis Strait: Initial Results from a new Measurement Program

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Davis Strait is a critical site for investigating freshwater exchange between the Arctic and North Atlantic Oceans and an ideal location for monitoring temporal and spatial variability of the critical upstream boundary condition for Labrador Sea convection. Fluxes through the Strait represent the net integrated Canadian Archipelago through-flow, modified by terrestrial inputs and oceanic processes during its southward transit through Baffin Bay. By the time they reach Davis Strait, Arctic waters already embody most of the transformations they undergo prior to exerting their influence on the deepwater formation sites in the Labrador Sea.

Hydrographic sections occupied during ship-based surveys and by an autonomous underwater glider supplement year-round current, temperature and salinity measurements collected by an extensive moored array that characterize watermass variability, currents and transport (already have year-round). Sections occupied in autumn 2004 and 2005 reveal a southward-flowing, surface-intensified layer of Arctic water ($S \sim 31$) that stretches from the Baffin coast to the Greenland shelfbreak. The West Greenland current carries fresh Arctic waters northward in a 50 m thick layer over the Greenland shelf. Deeper (200–600 m), a core of high salinity Irminger water moves northward along the Greenland shelfbreak. High-resolution sections occupied by an autonomous Seaglider capture deformation scale variability, resolving small-scale recirculation to provide volume and freshwater transport estimates between the Strait's 400 m isobaths. Between the Baffin and Greenland shelves, velocity records from 6 subsurface moorings with separations ranging from 16 to 62 km show only weak lateral correlation. Southward flow persisted year-round at all sites except the two situated over the Greenland slope, which captured the northward West Greenland current

punctuated by periods of southward flow. Bottom-mounted instruments and a prototype shallow float collected the first year-round measurements over the narrow Baffin and broad West Greenland shelves. Instruments mounted on four bottom landers and a 20 m float recorded variability at short lateral scales over the Baffin shelf, revealing a narrow, fresh jet flowing within a kilometer of the coast. During the ice-free period, a surface-intensified Arctic water layer moved southward over the Baffin shelf. Four landers deployed over the West Greenland shelf suggest that variability at larger lateral scales dominates this broad region.