

Evolution of the East Greenland Current from Fram Strait to Denmark Strait: Synoptic measurements from summer 2012

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The East Greenland Current (EGC) is a major pathway for freshwater from the Arctic to the North Atlantic, as well as a crucial supplier of dense overflow water to the Denmark Strait. Several measurement campaigns have focused on the EGC in both the Fram and the Denmark Straits; however, temporally and spatially the region in between has only been sparsely observed. We present data from two shipboard surveys conducted in summer 2012 that sampled the rim current in the Nordic Seas from upstream of the Fram Strait all the way to the Denmark Strait. Together, the hydrographic and absolute geostrophic velocity data provide a unique opportunity for analyzing the kinematics and the water masses of the current as it progresses along this pathway.

The data reveal that, along a portion of the western boundary of the Nordic Seas, the EGC has three distinct components. In addition to the well known shelfbreak branch, there is a branch on the continental shelf as well as a separate core well offshore of the shelfbreak. The strong velocities of the inner and outer branches contribute significantly to the overall transport of freshwater and Atlantic-origin water, respectively. We propose that the offshore core is a direct recirculation of the outer branch of the Norwegian Atlantic Current in Fram Strait. The data collected upstream of the strait along the eastern boundary of the Nordic Seas support this hypothesis. The bulk of the dense overflow waters are comprised of Atlantic-origin water in all of the sections, and the evolution along the pathway shows that little densification takes place in the main current core. In addition to the along-stream trends, the current system exhibited large variability from section to section, in particular in its kinematic structure.