

Coastal Circulation West of Thule, Greenland

Lauren M. Brown

College of Marine and Earth Studies, University of Delaware, Newark, DE, U.S.A.

ABSTRACT – The West Greenland Current (WGC) carries relatively warm, saline water north into Baffin Bay through Davis Strait. Bourke et al. (1989)¹ suggest that while the majority of the current follows the 500 m isobath and turns cyclonically in northern Baffin Bay, an indeterminate amount continues into the southern part of Smith Sound. During July and August of 2003, *USCGC Healy* collected data from a shipboard acoustic Doppler current profiler (ADCP) and several conductivity-temperature-depth (CTD) stations as a part of the Canadian Archipelago Through flow Study between Greenland and Ellesmere Island. This study details findings specifically within an area located near the coast of Thule, Greenland. This area is of particular importance when one considers the location, existence and intensity of the WGC in northern Baffin Bay. To date, little is known about the WGC in this area from direct observation or data collection in part because it is difficult to reach this region during certain months of the year.

After removal of the dominant semidiurnal tidal signal from the depth-averaged velocity vectors, the volume flux through the region is calculated. The horizontal interpolation method of Bretherton et al. (1976)² is employed to obtain the transport stream functions from the array of measured velocities. Using the stream function, the flow rate is computed between points on consecutive streamlines. Additionally, vertical velocity shear and barotropic flow are calculated using the thermal wind balance and measured density. We compare the results of these different methods to gain additional information about the nature of the flow through this region and to verify the existence of the WGC. Furthermore, we seek a buoyancy-driven coastal current similar to the jet discovered by Bacon et al. (2002)³ on the east Greenland shelf.

¹ Bourke, R. H., Addison, V. G., Paquette, R. G., 1989: Oceanography of Nares Strait and northern Baffin Bay in 1986 with emphasis on deep and bottom water formation. *J. Geophys. Res.*, **94**, 8289-8302.

² Bretherton, F. P., Davis, R. E., and Fandry, C. B., 1976: A technique for objective analysis and design of oceanographic experiments applied to MODE-73. *Deep Sea Res.*, **23**, 559-582.

³ Bacon, S., G. Reverdin, I. G. Rigor, and H. M. Snaith, 2002: A freshwater jet on the east Greenland shelf. *J. Geophys. Res.*, **107**, C7,10.1029/2001JC000935.