Abstract View

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Synoptic Flow and Density Observations near an Arctic She

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ABSTRACT

Analyses of data from three shipborne surveys describe the quasi-synoptic density and velocity fields near Barrow Canyon, Alaska. The canyon parallels the northwestern coast of Alaska and contains three different water masses. These are 1) warm and fresh Alaskan coastal waters that originate from the Bering Strait; 2) cold and moderately salty waters that originate from the Chukchi shelf; and 3) warm and salty waters that originate from the Atlantic layer of the Arctic Ocean. A halocline separates the Chukchi shelf and Atlantic layer waters. The halocline slopes upward into the canyon where it is then twisted to slope across the wide canyon. An intensification of the Beaufort gyre near the shelf break just seaward of Barrow Canyon raises the halocline more than 100 m toward the surface. Locally upwelling favorable winds raise the Arctic halocline, which thus is ventilated within Barrow Canyon adjacent to the coast. In the absence of winds the halocline slopes across-canyon in the thermal wind sense due to a northward flowing coastal current.

Velocity measurements from a towed acoustic Doppler current profiler reveal a northward flowing about 0.3 Sv (Sv $\equiv 10^6$ kg m^{-3}) of Bering Sea summer water into the Arctic Ocean at speeds that s^{-1}. Total northward transports through the canyon exceed 1.0 Sv. The warm waters of this coasta more than 100 W m^{-2} of heat to the atmosphere. The jet separates both from the bottom and from a laterally and vertically sheared jet forms, which breaks into three branches at about 71.8°N latitud