

## Transformation of the Alaskan coastal current in Barrow Canyon

*Emily Shroyer, WHOI*

Pacific Ocean water passing through the Bering Strait is a source of heat, freshwater, nutrients, and carbon for the Arctic Ocean. As Pacific Water travels northward across the shallow Chukchi Sea, its water mass properties may be modified through air-sea interactions, the freeze/melt cycle of sea ice, and mixing. At the northeast corner of the Chukchi, Barrow Canyon funnels a substantial portion of Pacific water out of the Chukchi into the open Arctic basin. The Canyon is a region of complex geometry, where mean winds blow counter to the northward flowing current. These factors contribute to a dynamic physical environment, with the potential for significant water mass and current transformation. My research seeks to understand how physical processes influence coastal current structure and water mass properties in Barrow Canyon.

In this talk, I will discuss two processes active in the canyon, wind-driven across-shelf circulation and vertical mixing. The current response to a moderate upwelling wind event will be diagnosed using a combination of AUV observations and a simple process-oriented model. The model and observations suggest that during the event 1) winds were not sufficient to reverse poleward flow, 2) upwelling was most pronounced in the nearshore, and 3) onshore across-shelf circulation was primarily confined to the interior just beneath the surface Ekman layer. The observed transformation was such that the mean temperature of the current reduced by roughly  $1^{\circ}\text{C}$  during peak upwelling. In addition, different forcing conditions altered the stability characteristics of the current. Measurements of turbulent kinetic energy dissipation will also be presented; these data suggest that diapycnal mixing is substantial in the upper canyon. Large dissipation rates were observed both near the pycnocline, effectively mixing winter and summer water masses, as well as within the bottom boundary layer. The slopes of shear/stratification layers, combined with analysis of rotary spectra, suggest that near-inertial wave activity may be important in modulating the structure of dissipation near the bottom.

