IMPROVEMENTS IN THE MEASUREMENTS OF HEAT AND FRESH WATER THROUGH THE BERING STRAIT: A PRODUCT OF RUSALCA

R. WOODGATE, 2010

The oceanic flow into the Arctic from the Pacific passes through the Bering Strait. This strait consists of 2 channels, one in Russian waters, one is US waters. The volume flux is split roughly equally between the channels. The US channel carries more of the freshwater and heat fluxes since it contains also the seasonal Alaskan Coastal Current. The Russian channel sometimes contains the Siberian Coastal Current, but our scientific understanding of this current is only rudimentary.

In 2004, the NOAA-RUSALCA program enabled moorings to be placed in Russian waters in the strait, increasing our coverage of the strait by a factor of 2. (Between 1994 and 2004, only measurements in US waters had been possible.) Since 2007, a high resolution array of 8 moorings has been placed in the strait (US and Russian waters). Since previous sampling (1990-2004) was only by 3 moorings and those only generally only in US waters (1994-2004), this new array more than doubles our confidence in quantifying the fluxes through the strait.

A particularly important advance is the measurements in the upper water column, which allow us to sample the year-round stratification. The moorings and the CTD sections combined allow us to study the coastal currents far better than any previous measurements. These currents are order 0.1Sv each, i.e., about 10-20% of the flow. More importantly the coastal currents and stratification contribute an extra ~ 50% to previous estimates of the fluxes of heat and freshwater through the strait. For reference, note that the Bering Strait oceanic heat flux is comparable to heat flux into the ocean from the atmosphere in the Chukchi, and that the Bering Strait oceanic heat flux likely acts as a trigger for the onset of summer sea-ice melt in the Pacific Arctic. The Bering Strait freshwater flux is 1/3rd of all freshwater inputs to the Arctic and likely the input with the largest interannual variability. Recent publications citing these and other numbers are:
== Woodgate, R. A., T. Weingartner, and R. Lindsay (2010), The 2007 Bering Strait oceanic heat flux and anomalous Arctic sea-ice retreat, Geophys. Res. Lett., 37, L01602, doi:10.1029/2009GL041621. - this quantifies the heat flux and the effects of stratification
== Woodgate, R. A., K. Aagaard, and T. J. Weingartner (2006), Interannual changes in the Bering Strait fluxes of volume, heat and freshwater between 1991 and 2004, Geophys. Res. Lett., 33, L15609, doi:10.1029/2006GL026931. - this quantifies the interannual variability of fluxes of volume, heat and freshwater