1070-00-37 **Mary-Louise E Timmermans*** (mary-louise.timmermans@yale.edu), Dept. of Geology and Geophysics, Yale University, PO Box 208109, New Haven, CT 06520. *Observing and Characterizing Submesoscale Dynamics in the Upper Arctic Ocean.*

The Arctic Ocean links to sea ice and climate at scales ranging from the large-scale circulation, to mesoscale motions (characterized by horizontal length scales between about 10 and 100 km), to the submesoscale flow field (order 1 km scales). Theoretical, observational and numerical studies on the mid-latitude, ice-free oceans have demonstrated that submesoscale processes play a significant role in upper-ocean lateral and vertical fluxes of heat and mass, and in setting upper-ocean stratification. Here, we present Ice-Tethered Profiler temperature and salinity measurements that show a sub-ice Arctic Ocean mixed layer with a complicated submesoscale structure evolving in the presence of lateral buoyancy gradients (fronts). Surface fronts can become baroclinically unstable to small instabilities (or eddies, with scales on the order of 1 km and growth rates on the order of 1 day) that restratify the mixed layer and enhance buoyancy transport. These submesoscale dynamics are not resolved or parameterized in existing regional and global numerical models of the Arctic – understanding the physics at these scales is necessary for accurate parameterizations, vital for modeling and predicting the state of the Arctic Ocean and climate. (Received February 01, 2011)