## Abstract:

We analyze multi-point velocity and position statistics obtained from the near simultaneous release of over 300 GPS-tracked surface drifters deployed in the DeSoto Canyon region of the Gulf of Mexico during the GLAD observational program in July 2012. The goal of the program was to provide detailed synoptic information on spatial and temporal variability in the surface velocity field in the submesoscale (0.1-10 km) regime where rotation and stratification effects are present but not dominant. The Lagrangian observations provide, perhaps for the first time in the surface ocean, sufficient densities of two-point measurements to test classical turbulence similarity theories at these spatial scales. All observations show clear evidence of local dispersion persisting to scales $\sim$200m, inconsistent with a steep enstrophy cascade in the underlying velocity field. Longitudinal velocity structure functions obtained from two in-canyon launches are entirely consistent with Kolmogorov/Richardson scaling for a forward energy cascade. For one launch, examination of the third-order structure function provides evidence of a well defined, scale-independent dissipation rate for separation scales 200m $< l <$ $\sim$3km.