Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Predicting regions of ocean vertical transport via surface coherent structures[1] MICHAEL ALLSHOUSE, H M ARAVIND, Northeastern University — Vertical transport in the upper ocean impacts the surface mixing, advection of nutrients, and the ocean energy budget. Observing regions of significant vertical transport is difficult because vertical velocities in the ocean are often orders of magnitude smaller than horizontal velocities. Some tools for predicting where large vertical velocities will occur include HF radar, satellite altimetry, and modeled horizontal velocity fields, which all provide ocean surface velocities. While Eulerian analysis of these fields can yield some information, Lagrangian coherent structures are more robust to noisy observational data and model parameter uncertainty. We correlate surface coherent structures to vertical transport below the surface to evaluate their capacity to predict regions of strong vertical transport. In particular, we compute the finite-time Lyapunov exponent field from the surface velocity and compare this with the corresponding local vertical subduction. This correlation is tested on a high-fidelity simulation of a sheared submesoscale flow and an operational ocean forecast. The identification of coherent structures provides a target zone for anticipated vertical transport that could be observed via Lagrangian floats.

[1]Support provided by ONR N00014-18-1-2790

Michael Allshouse
Northeastern University

Date submitted: 01 Aug 2019 Electronic form version 1.4