Boulder Fluid and Thermal Sciences Seminar Series

Tuesday, April 12, 2016
3:30pm-4:30pm (refreshments at 3:15pm)
Bechtel Collaboratory in the Discovery Learning Center (DLC)
University of Colorado, Boulder

Coherent structures in the ocean: manifestation, identification and applications

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Following the visualization of the ocean surface by satellites in the 1970's, and the surprise that coherent vortices dominated the mesoscale circulation, great progress has been made in understanding both the dynamics and biogeochemical/ecosystem effects of mesoscale ocean eddies. However, the role of these eddies in the global carbon cycle and how they impact ecosystem dynamics is highly uncertain, and the subject of much current observational and modeling effort. Here I report on recent advances in identifying eddies and their associated transport structures from applied dynamical systems theory, the so-called Lagrangian coherent structure (LCS) approach. Applications of this methodology using observations and models of the California Current system, as well as the implications for ecosystem effects of coastal transport will be highlighted. For this group, I will also include some unpublished work on quantifying mixing efficiency, how this relates to LCS, and the phenomenology of “unmixing” events for buoyant particles in a coastal ocean model.

Biography: Dr. Cheryl Harrison works on biophysical interactions spanning applied math, physical oceanography, ecology and biogeochemistry, focusing mostly on modeling. In the past she has studied the detection of coherent mesoscale circulation features (eddies, jets and filaments) and how they can affect transport of material, including marine larvae, in coastal upwelling systems. This led to studying coastal shelf circulation's effects on the development of hypoxia in upwelling systems. Currently she is a post-doc at NCAR working with Matt Long, studying the effects of resolving mesoscale circulation on carbon export in a global eddy resolving model, and working on simulating turtle migration weaving in robotic control theory.