Geophysical Research Abstracts,
Vol. 11, EGU2009-10734-1, 2009
EGU General Assembly 2009

Lagrangian analysis of circulation at different depths in the Caribbean Sea and Gulf of Mexico

F. Andrade, J. Sheinbaum, O. Velasco, and L. Zavala
CICESE, Ensenada,Baja California, Mexico (fandrade@cicese.mx)

We analyze the horizontal mixing and transport structures at different depths in the Caribbean Sea and Gulf of Mexico, using velocities from OPA (Ocean PAralleilise) model and three different methods. First, we use the Okubo-Weiss criterion to identify regions where either strain or vorticity dominate. Then, the finite scale Lyapunov exponent (FSLE) technique is applied to determine regions of maximum mixing and identify Lagrangian structures as stable and unstable manifolds. Finally, time-slice and lobe dynamics methods are applied to the problem for quantification of mass exchange between different regions of the flow. A hyperbolic point is found in the Gulf of Mexico at different depths, and the stable and unstable manifolds associated with it are identified. Both manifolds approach the hyperbolic point which suggests the existence of a hyperbolic trajectory in the Gulf of Mexico. The percentage of particles coming or leaving the eddies, and their interaction with currents at different depths is quantified using lobe dynamics.

Keywords: Lagrangian Structures,
Caribbean Sea, Lagrangian analysis.