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Coherent structures and warm-core rings in the Gulf of Mexico DOUG LIPINSKI, KAMRAN MOHSENI, University of Florida — We use Lagrangian coherent structures (LCS) to investigate the three-dimensional structure of warm core rings shed from the loop current in the Gulf of Mexico. Using LCS allows for a precise computation of the eddies' depth that closely matches a model to predict eddy depth based on the geostrophic balance. Additionally, the LCS reveal a checkerboard pattern and interesting flow dynamics in the near surface boundary layer that causes fluid to be stretched and wrapped around the eddy. The flow behavior in this region is analyzed and compared to an analytically defined flow model where many properties may be proved directly. Notably, the relative strength of hyperbolic stretching and shear influences the transport and mixing properties of the flow.

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