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# A nested model of the West Florida Shelf: assimilation of high-frequency radar currents and study of Loop Current generated flow

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High-Frequency Radar Currents are assimilated in a West Florida Shelf (WFS) model based on the Regional Ocean Model System (ROMS) which is nested in the Atlantic Hybrid Coordinate Ocean Model (HYCOM) to include both local and deep-ocean forcing, particularly the Gulf of Mexico Loop Current (LC). An ensemble simulation of the WFS ROMS model is carried out under different wind forcings in order to estimate the error covariance of the model state vector and the covariance between ocean currents and winds. Radial currents measured by HF-Radar antennas near St. Petersburg and Venice, FL, are assimilated using this ensemble-based error covariance. Different assimilation techniques using a time-average ensemble, a filter to reduce surface-gravity waves and an extended state vector including wind stress were tested. Results of WFS ROMS model assimilating surface currents show an improvement of the model currents not only at the surface but also at depth.

The LC is a highly unstable current which generates large anticyclones traveling to the West but also a series of smaller anticyclones and filaments moving to the East and affecting the West Florida shelf. An additional tracer is included in the model simulation to track the presence of LC water. With this tracer, the total amount of LC water reaching the shelf and its mechanism is studied.