2 km resolution data-assimilative simulation of the Gulf of Mexico

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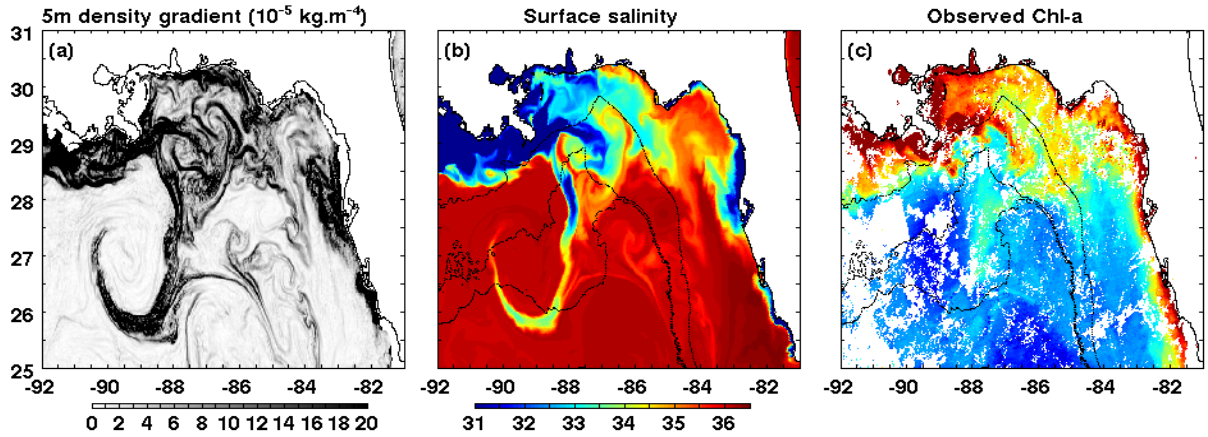
The development and implementation of a high resolution, data assimilative simulation of the Gulf of Mexico is part of the joint UM and NOAA/AOML "Ocean Modeling and OSSE Center" (OMOC) activities. This simulation uses the HYCOM model and combines the best practices of the group's modeling activities in subparts of the Gulf, in the Florida Straits and in the Northern Gulf especially, which it expands to the full Gulf region. In particular, it benefits from high-frequency nesting into the operational Navy HYCOM simulation, and from realistic daily river forcing. In addition, the simulation incorporates data-assimilative capabilities developed for HYCOM as part of the OMOC activities.

This new GoM-HYCOM modeling system has been used to study connectivity processes at the Gulf scale, for example during episodes of Mississippi River water export away from the Northern Gulf. It is employed in observing system experiments to study the impact of observations on the biology and ecosystem estimates in the Gulf of Mexico and the Florida Keys. It is the ocean physics component of oil spill modeling experiments that study the influence of river plume on oil slick evolution. The GoM-HYCOM modeling system is planned to soon deliver near-real time nowcast-forecast of the Gulf of Mexico state, as a demonstration. The free running high-resolution GoM-HYCOM simulation is planned to be used as the Nature Run in Observing System Simulation Experiments. The GoM-HYCOM modeling system can also be used to test data assimilation techniques, in the context of high-resolution, topographically driven regional processes, or of strong river influence.



Example of details from the high-resolution, data assimilative GoM-HYCOM in representing the interaction of Mississippi River plume with the Loop Current: (a) 5-m density gradients from the simulation (10^{-5} kg.m^{-4}) a proxy for submesoscale activity, on 24 July 2014. (b) Modeled surface salinity, on the same day. (c) Observed Chlorophyll-a, on the same day (data USF).