

## Ocean OSSEs: System Development and Applications

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In collaboration with RSMAS colleagues through the Joint AOML/CIMAS/RSMAS Ocean Modeling and OSSE Center (OMOC), ongoing development of, and new applications for, the OMOC ocean OSE/OSSE system continue to be realized. Observing System Experiments (OSEs) use data denial to determine the impact of existing observing systems while Observing System Simulation Experiments (OSSEs) use data denial to determine the impact of new observing systems and alternate deployment strategies for existing systems. The OSSE system was originally validated and successfully applied in the Gulf of Mexico to evaluate alternate airborne ocean profile survey strategies during the DeepWater Horizon oil spill. The system has now been successfully validated in a larger Atlantic Ocean domain spanning 5°S to 45°N east to 20°W and used to evaluate ocean observing systems for improving coupled hurricane intensity prediction. The Atlantic region Nature Run realistically reproduces mean ocean climatology and synoptic variability (see Figure). Validation by OSE-OSSE comparisons demonstrates that realistic OSSE impact assessments are realized with a small (~10-15%) tendency to overestimate intensity based on skill score analysis. Initial application in the Atlantic has evaluated observing system impacts based on their contribution to error reduction in ocean analyses used to initialize the ocean component of coupled prediction systems. Ocean analyses produced by the OSSE system can now be used to initialize the HYCOM-HWRF coupled forecast model at EMC, enabling the impact of ocean observations on intensity forecasts to be quantitatively assessed. Planned development includes evaluating impacts with regard to other oceanographic applications and expanding to larger ocean domains.

