

**Forecast Ecosystem Conditions in Gulf of Mexico OCS Habitats  
Using Coupled Modeling and Climate Scenarios**

**Quarterly Report (Y5Q4 – Jul 1-Sep 30, 2021)  
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Sergio deRada  
Naval Research Laboratory, Stennis Space Center, MS 39529

This quarterly report is filed per requirements of BOEM-NRL IAA # M16PG00027 with respect to our research project focused on climate-scale ocean model simulations for the Gulf of Mexico. The focus of this study is to forecast, through year 2050, marine ecosystem conditions in the Gulf of Mexico (GoM) using RCP climate scenarios prescribed by the NCAR CESM Large Ensemble (LE) atmospheric forcing.

### **1. WORK ACCOMPLISHED**

During this quarter analysis of the two baseline simulations continued, and several related results were placed on the project webpage. A summer student helped with the processing and plotting of the many figures. The results showed insightful understanding of the sensitivity of the ocean model to the atmospheric forcing products, leading to the conclusion that a continuous and consistent simulation must be rerun with ERA5 because NAVGEM, being an operational model, has discontinuities and biases that make it not suitable for long-term simulations. ERA5 data had corruption and gaps; once these are rectified, another ERA5-forced simulation will be conducted as the final baseline/control simulation.

Several discussions with BOEM COR and John Fasullo, NCAR, ensued, mostly discussing the results and materials to present at the upcoming BOEM webinar.

Completed and submitted a one-year no-cost extension that was approved during this quarter. There has been discussion to extend the project a few more months with funding for NCAR's increased involvement in the project.

### **2. PROBLEMS**

Nothing to report.

### **3. PLANNED ACTIONS FOR NEXT QUARTER**

The initial period of the quarter will be spent preparing for the BOEM webinar scheduled for Oct 20, 2021. Afterwards, NCAR will prepare and download a continuous set of all atmospheric fields from ERA5 from 1990-2020, and NRL will download, QC, and prepare the respective model forcing products. In-depth discussions with NCAR and BOEM are planned to discuss the projection simulations and shape the final year of the project.

### **4. BUDGET**

The project amount of \$390K has been received in full.  
Expenditures to date: ~\$291K.