Environmental Studies Program: Ongoing Study

Study Area(s): Gulf of Mexico

Administered By: Gulf of Mexico, OCS

Title: Enhancing the Capability of a New Meteorological Model for Air Quality and Other BOEM Applications in the Gulf of Mexico (NSL #GM-13-04)

BOEM Information Need(s) to be Addressed: The National Center for Atmospheric Research (NCAR) has been developing a new and advanced meteorological model (The Weather Research and Forecasting Model (WRF)) to replace the existing MM5 meteorological model. BOEM uses air dispersion model as a tool to assess the impact of OCS sources on the onshore air quality. Meteorological fields are required as inputs to the air-quality models. And the air quality model is needed for the assessment of the environmental impact on the onshore air quality; this information is needed in NEPA documents. Therefore, the accuracy of an improved meteorological modeling is critical to the air quality modeling. BOEM also needs to use the WRF model for air quality and other BOEM applications such as alternative energy, oil spill and climate change. WRF model is the only tool that can be used for assessing the impact of air quality on the environment.

Total BOEM Cost: $500,000 **Period of Performance:** FY 2014–2017

Conducting Organization(s): The National Center for Atmospheric Research (NCAR)

Principal Investigator(s): Dr. Chris Snyder (chriss@ucar.edu)

BOEM Contact(s): Dr. Chester Huang (chester.huang@boem.gov)

Description:

Background: Recently, the Bureau of Ocean Energy Management (BOEM) has funded a number of studies including air quality and meteorological modeling and the atmospheric boundary layer study (ABL) in the Gulf of Mexico, including a study for wind-wave measurements. The information and results obtained from these studies can be used to improve the WRF meteorological model for air quality application and other applications such as oil spill, oil and gas platform design, alternative energy, and hurricane forecast etc. The accuracy of the concentration estimates obtained from the air quality model is also dependent on the accuracy of the meteorological model output. In recent years, EPA has set more stringent air quality standards. Therefore, BOEM needs to develop the improved air quality and meteorological model.

Objectives: The objectives of this study are to improve the capability of the WRF model for air quality applications over the ocean in the Gulf of Mexico and to leverage the state-of-science and up-to-date modeling information developed by the scientific community, and to produce a better working WRF model for the application to OCS and

a high resolution meteorological dataset. This information is also needed for obtaining the better concentration estimates obtained from an air quality model for environmental impact assessment and other BOEM applications.

Methods: This study will utilize the information and results obtained from the atmospheric boundary layer study and other BOEM studies, and leverage the NCAR studies for improving the meteorological model, improving the parameterization scheme for surface fluxes, providing better science in the areas of air-sea interaction and initial conditions, and performing three-dimensional data assimilation for the model. The WRF model will be used for this study. The BOEM-funded observational data will be used for model sensitivity study and verification.

Current Status: The work for the development of an improved WRF model and model simulations, including satellite data assimilation, has been completed. It is in the process of producing the final draft report.

Final Report Due: July 31, 2017

Publications Completed: Data assimilation and diagnosis of bias for WRF over the Gulf of Mexico. Presented at 95th AMS Annual Meeting, 4–8 January 2015. Phoenix, Arizona.

Affiliated WWW Sites: https://marinecadastre.gov/espis/#/search/study/14539
http://www.boem.gov/Environmental-Stewardship/GOMR

Revised Date: June 14, 2017