

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2012-2014

Region: Headquarters

Planning Area(s): All

Testing and Evaluation of AERMOD Using AERCOARE and MMIF Meteorological Outputs Representative of the OCS (NT-12-04)

BOEM Cost: (in thousands) \$280

Period of Performance: FY 2012-2014

Conducting Organization(s): IAA with EPA Region 10 (M1200033) with Prime vendor: AMEC and Subcontractor ENVIRON.

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Description:

Background: The OCD model was developed in the early 1980's using observations primarily obtained off California. A number of meteorological monitoring programs have been conducted on platforms in the Gulf of Mexico using wind profilers and radio acoustic sounding (RASS) systems. Currently there is a monitoring study on a platform in the Gulf to obtain wind and temperature profiles, flux measurements, and wave measurements. The monitoring programs have provided data that can be used to better quantify marine boundary layer parameters (such as stability, turbulence, and mixing height) that are used in the OCD model. The American Meteorological Society and the Environmental Protection Agency (EPA) have developed AMS/EPA Regulatory Model (AERMOD) for air quality impact analyses. This model is not designed for offshore use, but it includes methodologies that were not available at the time OCD was developed. There is a need to investigate if any algorithms in AERMOD can be used to update OCD.

The OCD model is a Gaussian, steady-state model and is not appropriate for situations where the receptor points are located at larger (greater than 50 km) distances from the emission source. The model also does not effectively treat atmospheric chemistry and deposition. In order to better address the limitations of steady-state models, air quality modelers have used outputs from meteorological grid models and applied them to a regional air quality model such as CALPUFF or the Comprehensive Air Quality Model with extensions (CAMx). The most commonly used meteorological models are Mesoscale Model version 5 (MM5) and the more recently developed WRF (Weather Research & Forecasting (WRF)) model. These models use meteorological data generated by the NCEP (National Center for Atmospheric Prediction) and calculate meteorological variables on a more refined scale. The Environmental Protection Agency (EPA) has developed the CMAS (Community Modeling and Analysis System (CMAS)). The Community Multi-scale Air Quality Model (CMAQ) is one of the models in this system and is used to evaluate impacts for a number of different air pollutants.

Objectives: The objective of the study is to apply improved methodologies and recently collected data to update air quality models for evaluating air quality impacts from emission sources on the Outer Continental Shelf (OCS).

Methods: A review will be conducted of the newer EPA air quality models, such as AERMOD, to determine if certain methodologies can be incorporated into OCD. Meteorological data and analyses from the Gulf of Mexico will be examined to see if the information can be used to improve the OCD model. In particular the Coupled Ocean Atmosphere Response Experiment (COARE) algorithm will be examined for application in the model. Upon completion of these tasks appropriate modifications will be made to the OCD model and the updated model will be tested using existing data. Minor revisions may be made to the model if the testing results indicate that adjustments may be made to improve model performance.

A review will be conducted of algorithms in MM5, WRF, CMAQ and other models to characterize the atmospheric boundary layer and atmospheric transport and dispersion. A set of recommendations will be made regarding improved boundary layer treatment, including COARE that incorporates over water meteorology. BOEM will establish a working relationship with developers of MM5, WRF, and CMAQ with the goal of making appropriate changes in the model to better simulate over water conditions. The feasibility of BOEM applying these models for air quality impact analyses will be examined.

Importance to BOEM: Air quality models change with time as more information about atmospheric properties becomes available. New information is now available regarding the marine boundary layer. BOEM's official air quality model for use by the operators to analyze air quality impacts from OCS exploration and development/production is the Offshore and Coastal Dispersion (OCD) model. There is a need to update the model to make use of new methodologies and data so that it more correctly simulates dispersion of air pollutants in the marine and coastal environment.

In addition, considerable advances have been made in regional scale meteorological and air quality models. BOEM has a need to investigate how these models can be customized to assess air quality impacts from OCS emission sources. This would require investigating means of incorporating marine boundary layer properties and over water dispersion characteristics into the models.

Current Status: A first draft of the final report is currently being evaluated by a science review team, with a final report expected in April. Although BOEM funding for the project expires on January 31, 2015, EPA will be funding the final stages of the project. The output of this report, and the research conducted on AERMOD, will be used to support including AERMOD as an over-water air dispersion model in USEPA regulations.

Final Report Due: April 30, 2015.

Publications: none

Affiliated Web Sites: none

Revised Date: January 14, 2015

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http://www.data.boem.gov/homepg/data_center/other/espis/espisfront.asp