

Study Title	Response to Comments on <i>the Air Quality Modeling in the Gulf of Mexico Region</i> Report
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Report Number(s) (OCS Study)	BOEM 2022-066
Completion Date of Report	September 2022
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Award Number(s)	140M0120P0010
Sponsoring OCS Region or Office	Headquarters
Applicable Planning Area(s)	Gulf of Mexico OCS Region
Fiscal Year(s) of Study Funding	FY 2020: \$124,939
Costs by Fiscal Year	FY 2020: \$57,225.18; FY 2021: \$67,713.82
Cumulative Project Cost	\$124,939
Project Manager(s)	Darcy Wilson
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Principal Investigator(s)	Till Stoeckenius and Bart Brashers, Ramboll US Corporation
Keywords	Gulf of Mexico OCS, criteria pollutants, National Ambient Air Quality Standards (NAAQS), meteorological modeling, photochemical modeling, dispersion modeling, emissions inventory, emissions exemption threshold (EET), National Academies of Sciences, Engineering, and Medicine (NASEM), air quality modeling

ABSTRACT: In August 2019, the Bureau of Ocean Energy Management (BOEM) published the *Air Quality Modeling in the Gulf of Mexico Region* report. In accordance with BOEM’s Environmental Studies Program policy, the National Academies of Sciences, Engineering, and Medicine (NASEM) peer reviewed BOEM’s *Air Quality Modeling in the Gulf of Mexico Region* report because of its highly influential scientific information, which might be used to develop future air regulations. A formal NASEM Consensus Report based on independent peer reviewers was delivered to BOEM. In addition, the U.S. Environmental Protection Agency (USEPA), the Offshore Operator Committee (OOC), the American Petroleum Institute (API), and two individuals provided comments about the modeling study. This report is in response to all the comments received about the modeling study.

BACKGROUND: The *Air Quality Modeling in the Gulf of Mexico Region* study was conducted by a team consisting of Eastern Research Group, Inc. (ERG), Ramboll US Corporation, Inc. (Ramboll), and Alpine Geophysics, LLC (Alpine) to conduct meteorological modeling, develop emissions inventories, conduct photochemical modeling in support of the cumulative impact analyses, and conduct dispersion modeling and photochemical modeling in support of emission exemption threshold (EET) analyses. In the

original study, air quality modeling was conducted to assess the existing pre- and potential post-lease impacts from the Outer Continental Shelf (OCS) oil and gas development to the states, as required under the OCS Lands Act (OCSLA). BOEM has used this information in National Environmental Policy Act environmental impact statement cumulative and visibility analyses for pre-lease impacts. BOEM's goal was also to evaluate the use of this information to assess post-lease impacts using EET formula screening methods to determine whether a proposed source will cause or contribute to a violation of the National Ambient Air Quality Standards (NAAQS).

OBJECTIVES: 1) Review, summarize, and respond to comments on the *Air Quality Modeling in the Gulf of Mexico* study and report, which were provided in the NASEM Consensus Report, and respond to comments provided by the OOC, API, USEPA, and individual commenters. 2) Prepare a report containing all comment summaries, responses, and corrections.

METHODS: A meeting was held on July 16, 2019, to allow NASEM to describe their comments and for BOEM to ask NASEM questions about their comments. NASEM comments were published in the *Review of the BOEM "Air Quality Modeling in the Gulf of Mexico Region" Study* (<https://www.nationalacademies.org/our-work/review-of-the-boem-air-quality-modeling-in-the-gulf-of-mexico-study>).

RESULTS: The Response to Comments on the *Air Quality Modeling in the Gulf of Mexico Region* Report contains clarifications and editorial corrections and is intended to accompany the *Air Quality Modeling in the Gulf of Mexico* report that was published in 2019. The results of the *Air Quality Modeling in the Gulf of Mexico Region* remain unchanged.

CONCLUSIONS: In this report, BOEM provided editorial corrections to text and figures from the *Air Quality Modeling in the Gulf of Mexico* report (Wilson et al. 2019) and provided responses to questions and comments related to all components of the study and report. Aside from providing additional clarifications and making some corrections to the study report, the Response to Comments document notes a number of recommendations for future BOEM air quality modeling studies that were inspired by the comments provided by reviewers.

Recommendations that may be applicable to future meteorological modeling efforts include the following:

- Conduct a more comprehensive review of the literature of the Weather Research and Forecasting (WRF) meteorological model performance
- Conduct additional analyses of precipitation predictions and diurnal variation of bias and error
- Prepare WRF model performance summaries for key domain sub-regions
- Compare observed and modeled air-sea temperature differences, investigating the onshore data specific to minimum wind speed periods, and evaluating WRF performance data at Carpinteria and Pismo Beach relative to performance discrepancies between prognostic weather model output and tracer data.

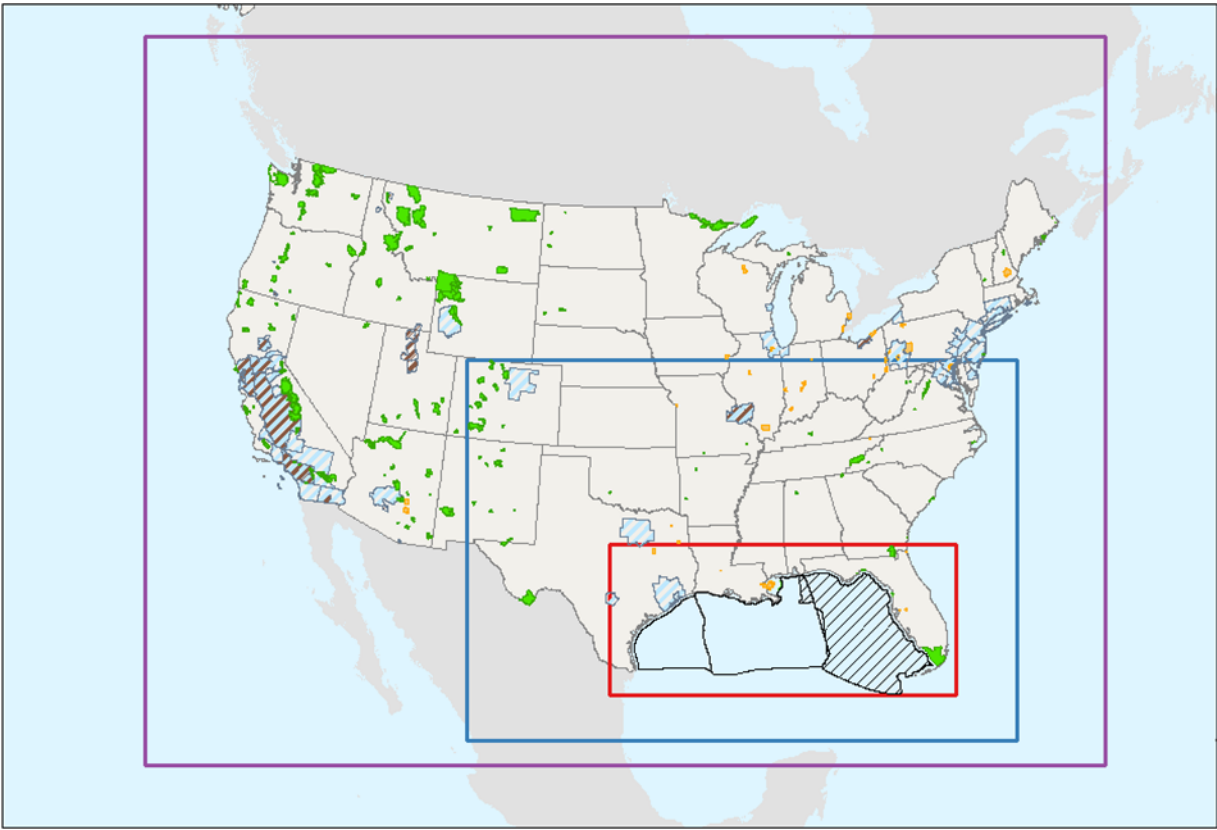
Specific to photochemical modeling, a sensitivity analyses of the nitrogen oxides (NO_x) mobile source emissions and associated biases that may result in overpredictions from this sector was recommended, as well as a sensitivity analysis of boundary conditions. Additional model performance evaluations focused on periods expected to have the greatest onshore impacts from OCS sources and comparison of visibility predictions against airport visual range data were also recommended along with other additional model performance evaluations. Other photochemical modeling recommendations potentially applicable to future studies include a more detailed inventory of chlorine emissions, and expansion of the local

modeling domain to include Central America and more of Mexico.

STUDY PRODUCT(S):

1. **BOEM study report:** Wilson D, Stoeckenius T, Brashers B. NT-20-07: Response to Comments on the *Air Quality Modeling in the Gulf of Mexico Region* Report. New Orleans (LA): U.S. Department of the Interior, Bureau of Ocean Energy Management. 96 p. OCS Study BOEM 2022-066.

MAP OF STUDY AREA: Cover of report OCS Study BOEM 2021-XXX



Legend

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|  Planning Areas |  O ₃ Nonattainment Areas |  4-km Modeling Domain |
|  Congressional Moratoria Area |  SO ₂ Nonattainment Areas |  12-km Modeling Domain |
|  Class I Areas |  PM _{2.5} Nonattainment Areas |  36-km Modeling Domain |