

2016 Midwest and Central States Air Quality Workshop

Air Quality Modeling in the GOMR Study

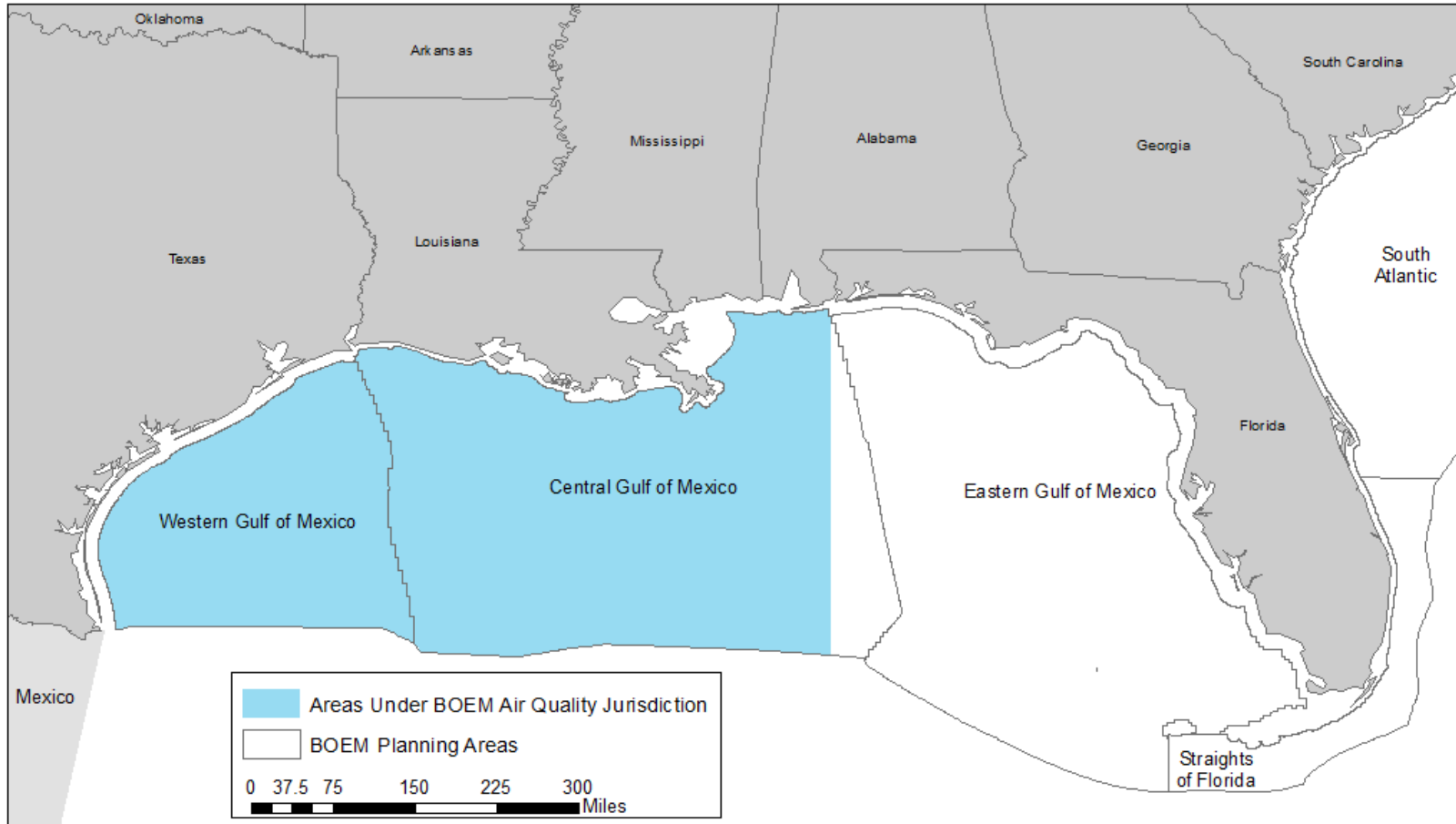


June 2016

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BOEM's Air Quality Jurisdiction in the Gulf of Mexico



Purposes:

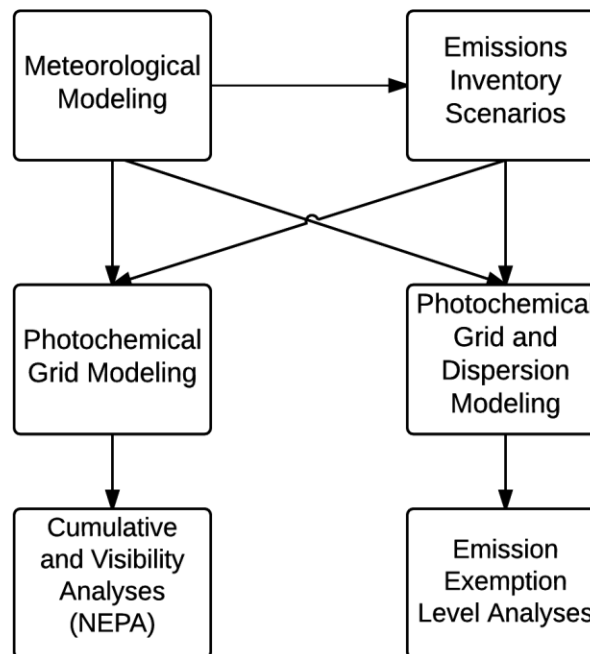
- A. Develop multi-year WRF meteorological database
- B. Develop Photochemical Grid Model (PGM) modeling database:
 - 1. 36/12/4 km modeling domains
 - 2. CAMx and CMAQ PGM modeling
- C. Assess AQ and AQRV impacts for Pre-lease NEPA analyses
 - 1. O&G and support vessels
 - 2. On-shore and state seaward boundary
- D. Conduct AERCOARE alternative model justification
- E. Calculate emission exemption thresholds (EETs) for regulatory Post-lease plan reviews



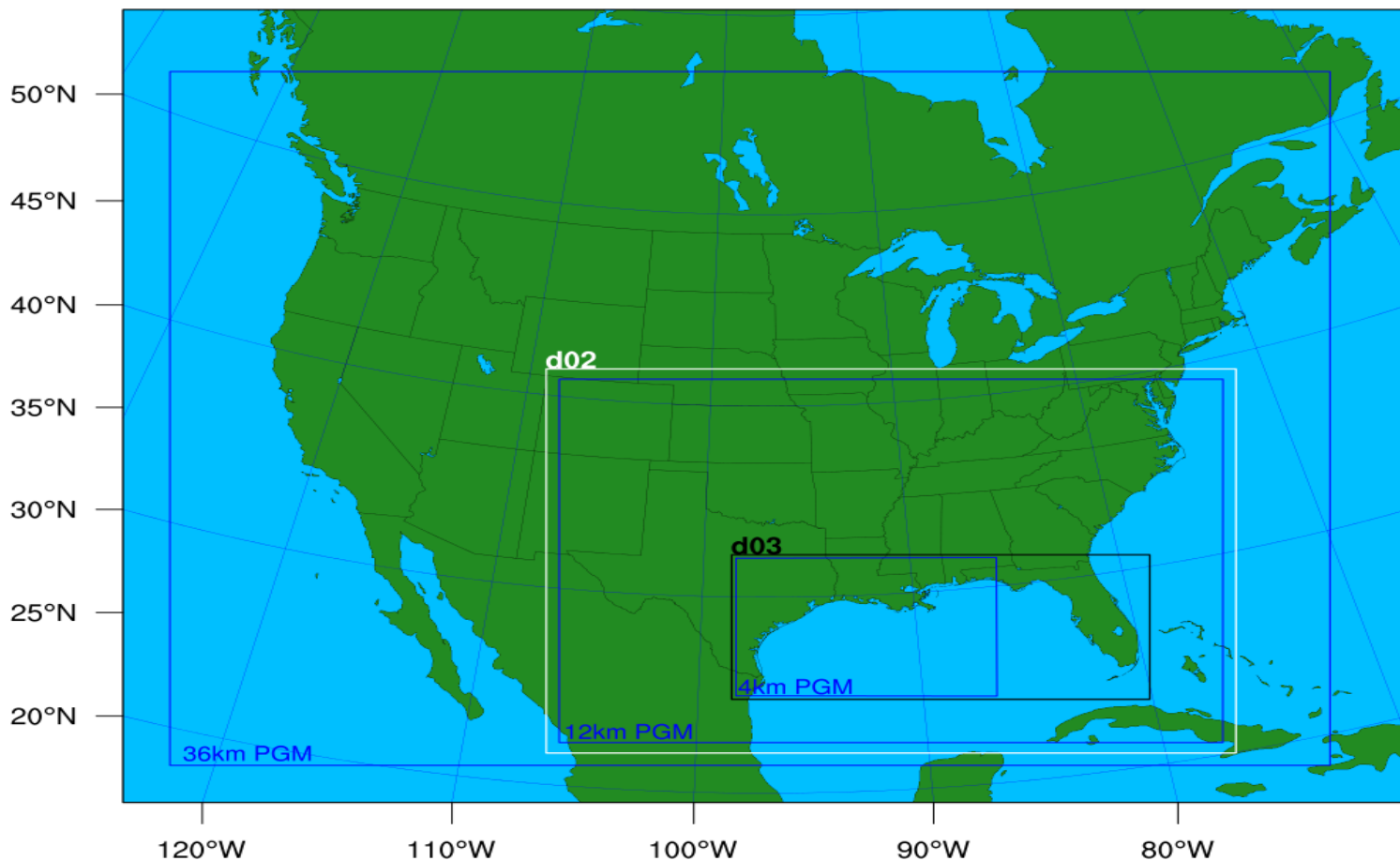
Contracting Team:

1. Eastern Research Group (Prime)
2. Ramboll ENVIRON
3. Alpine Geophysics
4. Science Review Group

Study Components:



Gulf of Mexico Modeling Domains:



Photochemical Modeling Impacts Analysis:

A. Air Quality

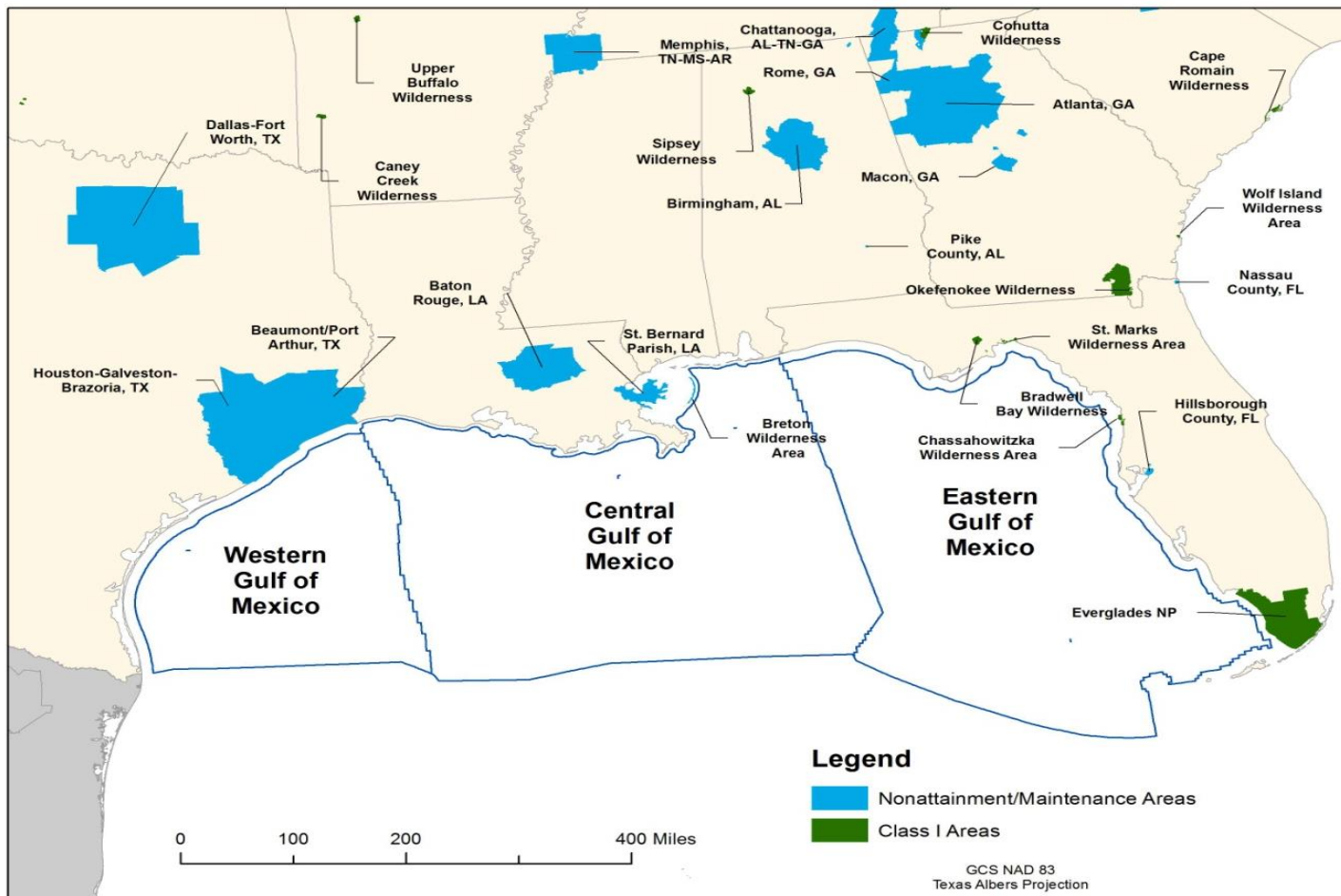
1. Criteria Pollutants (O_3 , $PM_{2.5}$, PM_{10} , SO_2 , CO , NO_2)
2. National Ambient Air Quality Standards (NAAQS)
3. Black Carbon (BC)
4. Emphasis on non-attainment areas and state seaward boundaries

B. Air Quality Related Values (AQRVs)

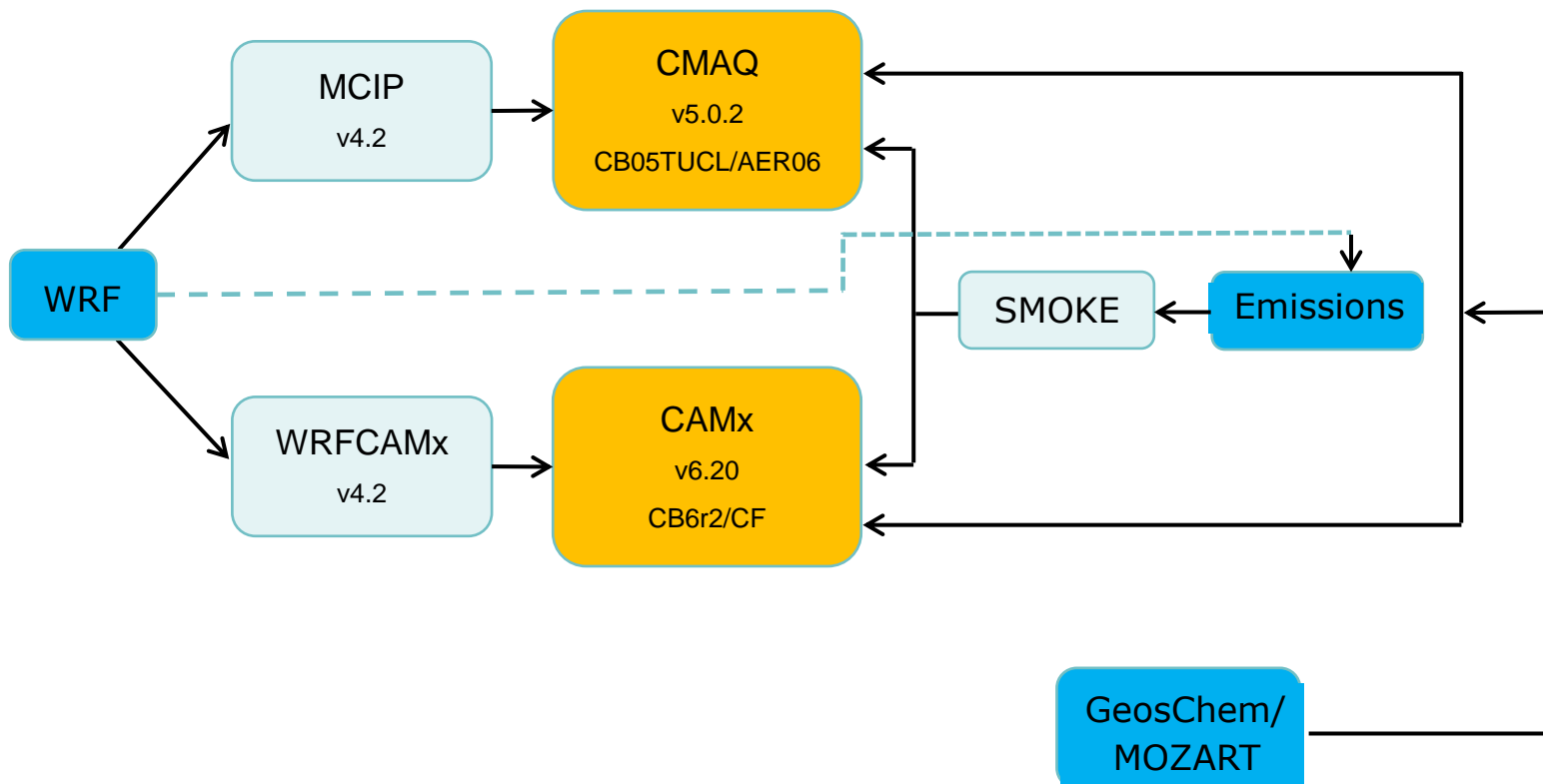
1. Visibility
2. Acid deposition
3. Acid neutralizing capacity
4. Emphasis on Class I and Sensitive Class II Area



Gulf of Mexico Non-attainment and Class I Areas:



Photochemical Modeling Process:



Emission Inventory Development:

A. Base Year 2012

1. OCS sources: 2011 Gulf-wide inventory projected
2. Other US, Canada: EPA 2012 modeling platform
3. Mexico: update of 2008 MNEI

B. Future Year Scenario

1. BOEM projected O&G
2. Other US: EPA 2012 modeling platform with 2017 projections for most source categories (e.g., point sources, on-road mobile)
3. Canada same as Base Year
4. Mexico: EPA 2012 modeling platform with 2017 projections, offshore production platforms



Meteorological Modeling:

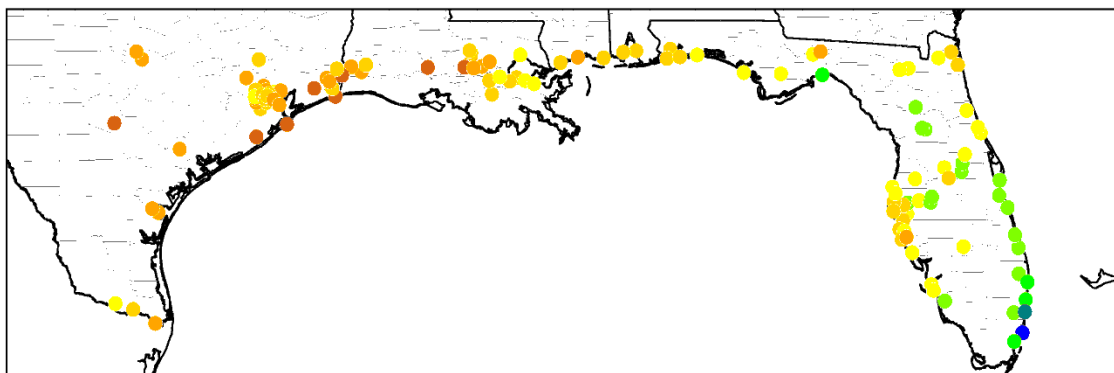
- A. WRF v3.6.1 for five years (2010-2014)
- B. 36/12/4 km nested grid
- C. Analysis and observational nudging

Photochemical Modeling:

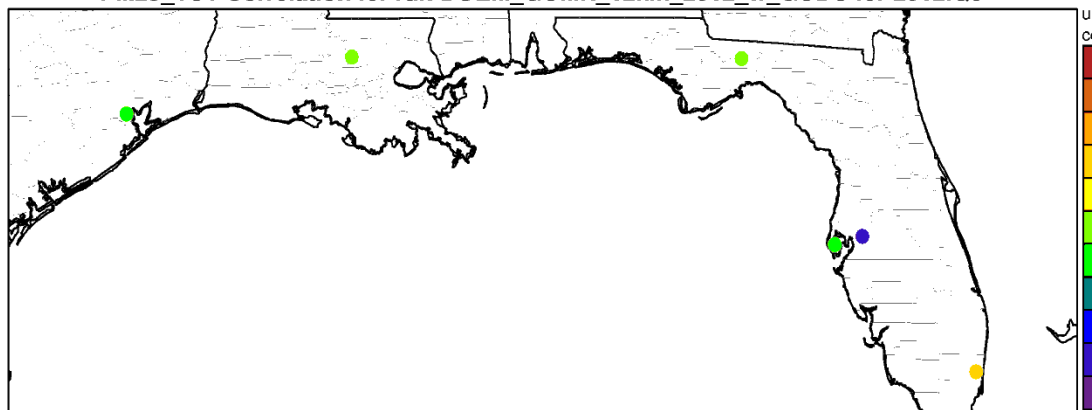
- A. CAMx 6.20 with CB6r2h gas phase chemistry and CF particle scheme
- B. CMAQ v5.0.2
- C. 36/12/4 km nested grid
- D. RPO 36km domain
- E. Comparison of GEOS-Chem and MOZART BCs



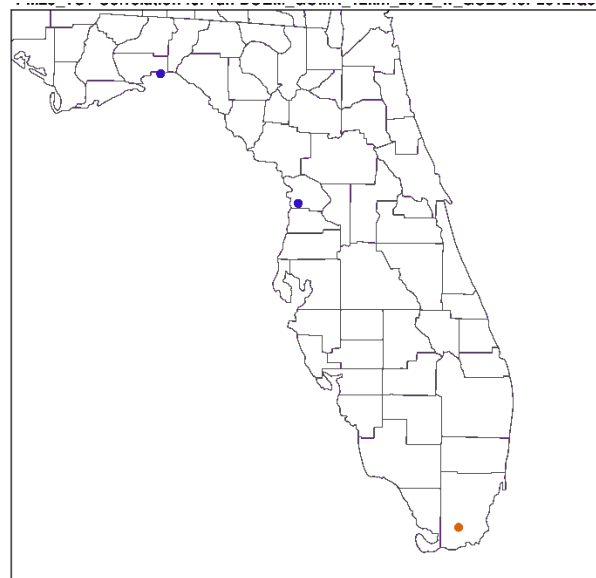
Gulf of Mexico Air Quality Monitoring Sites:



CIRCLE=AQS_O3_DAILY;



CIRCLE=CSN;



CIRCLE=IMPROVE;



Assessment of Future Year O&G AQ/AQRV Impacts:

- A. CAMx and CMAQ PGM models
 - 1. NAAQS
 - 2. CAMx Ozone and Particulate Source Apportionment
 - 1. Separate contributions of O&G production and support vessels
 - 2. Air Quality Related Values (AQRVs)
 - 1. Visibility and Acid Deposition
 - 2. Class I and Sensitive Class II Areas
 - 3. Ozone and secondary PM EETs
- B. Environmental Impact Statements (EIS) to disclose potential O&G AQ/AQRV impacts as part of National Environmental Policy Act (NEPA)



Emission Exemption Thresholds (EETs):

- A. Level of offshore O&G emissions distance D from key-receptors, onshore & state seaward boundary (SSB), such that source will not cause or contribute to violation of a NAAQS
- B. Current EETs developed in 1980s using the Offshore and Coastal Dispersion Model (OCD)
$$\text{EET (tpy)} = 33.3 \times D$$
- C. Update the EETs to account for current NAAQS and air quality modeling technology:
 - 1. Five years of WRF meteorology processed with MMIF
 - 2. AERMOD/OCD for primary pollutants < 50km from SSB
 - 1. Need justification for using AERMOD over OCD
 - 3. CALPUFF for primary pollutants > 50km from SSB
 - 4. CAMx with source apportionment for ozone and secondary PM (one year of WRF meteorology)

AERMOD OVERWATER JUSTIFICATION:

- A. OCD is current EPA-recommended (Appendix W) model for offshore
 - 1. OCD from 1980s & doesn't take advantage of newer technology (WRF, COARE overwater dispersion, etc.)
 - 2. Recent developments of MMIF processing tool for WRF meteorological data to feed overwater dispersion characteristics into AERMOD and AERCOARE processor
 - 3. Performing analysis to justify use of AERMOD instead of OCD
- B. Use of alternative model to OCD requires Section 3.2.2 alternative model demonstration
 - 1. Comparison of models using overwater tracer test data (Ventura, Santa Barbara, Louisiana)
 - 1. WRF-MMIF-AERCOARE-AERMOD
 - 2. WRF-MMIF-AERMOD
 - 3. WRF-MMIF-OCD
 - 2. Demonstrate new model produces equivalent or better results



Schedule:

Task	Gulf of Mexico
Emission Inventories	Completed
Met. Modeling Report	Completed
Photochemical Modeling Report	November 2016
Exemption Threshold Analysis Report	June 2017
Project Final Report	June 2017





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