

Mid-and far-field chemistry

Purpose- To document progress on major themes identified during the last science meeting.

Major Themes-

- Model verification of plume propagation
- Plume evolution case studies, ozone formation efficiency and rate, reactive nitrogen partitioning, VOC evolution, aerosol evolution.
- Importance of MCMA vs regional inputs to Gulf of Mexico.

- Examination of organic precursors and oxidation products to determine dominant oxidation pathways.
- Sources of organic aerosols and other aerosol components over the Gulf of Mexico
- What is the apportionment of sources of pollutants observed over the Gulf of Mexico. MCMA? SE USA? Central American fires? Coastal Mexico?
- Does MCMA contribute pollution to the coastal plain to the northeast?
- Integration of satellite observations in far-field interpretation.

What is the apportionment of sources of pollutants observed over the Gulf of Mexico. MCMA? SE USA? Central American fires? Coastal Mexico?

No significant progress at this time, but tracer fingerprints to distinguish MCMA, N. America, BB, etc. are needed.

This question will ultimately be addressed by a combination of data analysis and models

Observations over the Gulf were polluted, but appeared to represent inputs from many regions

Pollution over the Gulf traceable to MCMA by trajectory was typically confined to the lower trop, but above the MBL.

- Model verification of plume propagation

Under strong forcing conditions, forecast models successfully directed the aircraft to the MC plume. There were some issues with accuracy in altitude of the plume.

In one instance, the plume location was accurately predicted 1000 km downwind and was sampled by the C-130.

A more rigorous assessment of forecast success in predicting the plume location is needed.

- Plume evolution case studies, ozone formation efficiency and rate, reactive nitrogen partitioning, VOC evolution, aerosol evolution.

March 18-19 represents a valuable case study in that the evolution of trace gases observed by the G-1 and C-130 follow expectations. Aerosols still need to be evaluated more closely.

March 22-23 is another case deserving attention

G-1 / C-130 connections need to be identified

Other questions:

Can methanol be used to trace MCMA?

- Does MCMA contribute pollution to the coastal plain to the northeast?

This question will be the subject of DC-8 analysis for flights between MCMA and the coast.

- Examination of organic precursors and oxidation products to determine dominant oxidation pathways.

This has been pursued in the near-field observations but needs to be extended to the far-field observations.

Need to determine the extent to which “missing” radical sources persist beyond MCMA. Do observed and modeled radicals agree better far downwind?

Relatively large concentrations of acetaldehyde persist downwind of MCMA. Can they be reconciled with local chemistry?

- Integration of satellite observations in far-field interpretation.

Observations are being used from MOPITT (CO), OMI (NO₂), MODIS and MISR (aerosol optical properties).

Access to satellite data in a useful form continues to be an issue.