Mid-and far-field chemistry, including formation of regional oxidants, hydrocarbon oxidation products, NO_y partitioning

Proposed working groups

Trace gas and aerosol chemistry
Source apportionment
Spatial distribution of trace gases and aerosols

Tasks

Identification of major themes
Major preliminary findings
Identification of collaborative opportunities

- Major Themes
- Model verification of plume propagation (Flocke, Hostetler, Skamarock, McKenna, Wallace, WRF… Voss et al)
- Plume evolution case studies (multiple platforms) to examine ozone formation efficiency and rate, reactive nitrogen partitioning, VOC evolution, aerosol (Kleinman, Weinheimer, Crawford, Ferrare, McKenna, Huey, Perring)
- Importance of MCMA versus regional inputs on Gulf of Mexico. Is Mexico City distinguishable downwind? What tracers provide a good fingerprint? Look at tracers and ratios as a function of distance downwind of MCMA (Yokelson, DBlake, Apel, Sasha)
- Should examine precursors and oxidation products (e.g., propane, butane versus acetone, MEK, organic nitrates) to examine dominant oxidation pathways (Blake, Apel, Atlas, Sasha, Crawford/Cantrell, Singh)
- AMS data for C-130 demonstrate the dominance of organics, but other relationships (sulfate/nitrate) are evident as well. HCN correlation with organic aerosol needs to be examined. (Jimenez, Wennberg, Crounse)

- Major Themes (cont.)
- Need to examine the spatial and temporal distribution of MCMA outflow over the Gulf. Preliminary perception is that pollution over the Gulf from the DC-8 was limited to lower altitudes (< 4km). In contrast, C-130 plume encounters on 19 and 23 March were above 4 km. (Weibring, DIALgroup)
- Satellite observations need to be integrated into far-field interpretation (Wallace, Emmons, Boersma, MODIS, J-31…)
- Gulf of Mexico appears to be a diverse mixture from SE US, Mexico, Central American fires, etc. (Fried, Huey, Heikes, Dibb, Avery) For example, persistence of elevated CH2O (and other oxidation products) far downwind over Gulf of Mexico. Is it MCMA? How much does it contribute versus regional burning? Look at C-130 plume on 19 March to convincingly show far-field influence of MCMA (need to examine DC-8 data for same day). Also, high SO2 up to 4 km across entire Gulf. Source attribution problem

- Major Themes (cont.)
- Does MCMA contribute to coastal plain pollution to the northeast? (WRF, DC8, C130)

- Specific Tasks
- Danny McKenna will provide a geographical and trajectory-based flag system to associate aircraft merge data with specific source locations
- Identify 1-day/2-day old encounters on consecutive flights (C-130-FFL, DC-8-Fuelberg)
- Need to tabulate “pseudo-lagrangian” encounters between all aircraft (Frank will distribute his list).
- Bill Skamarock will provide a flight path overlay for WRF-Chem for each aircraft
- Examine strong partitioning of reactive nitrogen into aerosol phase (important role for dust). Calcium was dominant positive ion for PILS observations at T1. (Weber, Jimenez, Weinheimer, Dibb Perring)
- Determine how to link near and far-field observations. Identify the key linking observations. (Blake, Huey, Brune)

- Preliminary Findings
- Pollution over the Gulf of Mexico is persistent and is apparently derived from diverse sources over the SE US, Mexico, and Central America
- Propane and toluene are good tracers for MCMA. Tracers of biomass burning (e.g., HCN and CH3Cl) are enhanced both within MCMA and the surrounding region.
- H-1211, previously thought to indicate Asian origin, was detected in MCMA.
- Several MCMA plume encounters over the Gulf exhibited enhanced ozone and continued to produce ozone well downstream.
- Sulfate aerosol increased relative to HNO3 in older polluted air.
- AMS data for C-130 demonstrate the dominance of organics