Measurements of Oxygenated Volatile Organic Compound during MIRAGE-MEX

Eric Apel apel@ucar.edu (Principal Investigator)
NCAR/ACD

Daniel D. Riemer (Co-PI)
University of Miami RSMAS

We will deploy the TOGA (Trace Organic Gas Analyzer) to measure oxygenated volatile organic compounds (OVOCs), non-methane hydrocarbons (NMHCs), and halocarbons on the C130 during MIRAGE-MEX. The TOGA is the successor to the fast gas chromatograph/mass spectrometer (FGCMS) instrument that was deployed on previous NASA and NCAR missions. The instrument measures targeted species with a time response of 2.5 minutes, yielding up to 24 measurements per hour. Because of the improved time response, we expect to provide near real-time data for selected compounds during each flight, including information such as air mass age and origin. This will aid in charting or adjusting "on-the-fly" the course of individual sorties. The TOGA is based on a custom fast gas chromatograph coupled to an Agilent 5973 Mass Spectrometer. This technique provides unambiguous identification and quantification for a wide range of compounds including NMHCs, OVOCs, and halocarbons through chromatographic separation and mass selection. The limit of detection (LOD) is between 5 and 40 pptv depending on the compound and the instrument is calibrated *in situ* with highly accurate gas phase standards. The instrument package is fitted into a C130-ready rack consumes less than 2000W of power.

A number of scientific questions relevant to the MIRAGE-MEX being addressed with the TOGA measurements. Foremost are those related to science objectives #2 and #3, which seek to address the magnitude of regional oxidant production from the Mexico City plume as a result of the outflow and the fate of hydrocarbons originating in the plume as a function of time and space. The role of VOCs and their oxygenated by-products in the production of oxidants will be investigated with our measurements in concert with measurements of oxidants and oxidant precursors. TOGA will measure the important parent hydrocarbons as well as many of their oxidation products. In addition, TOGA will provide measurement of key urban (e.g., halocarbons) and biomass burning tracer species (e.g., methyl chloride and acetonitrile).