

5.143 Recent aircraft- and ground-based observations of longer-lived VOCs and comparisons to CAM-chem model simulations .

Presenting Author:

Eric Apel, NCAR, ACOM, Boulder, CO, USA, apel@ucar.edu

Co-Authors:

Rebecca Hornbrook, NCAR, ACOM, Boulder, CO, USA

Alan Hills, NCAR, ACOM, Boulder, CO, USA

Nicola Blake, UCI, Irvine, CA, USA

Louisa Emmons, NCAR, ACOM, Boulder, CO, USA

Donald Blake, UCI, Irvine, CA, USA

Daniel Riemer, Independent, Miami, FL, USA

Elliot Atlas, UM-RSMAS, Miami, FL, USA

Detelv Helmig, University of Colorado, Boulder, CO, USA

Abstract:

Volatile Organic Compounds (VOCs) play an important role in tropospheric chemistry and ozone formation. A primary sink for these species is through reaction with the hydroxyl radical (OH) and as such these species help determine the OH budget. The recent NSF/NCAR DC3, TORERO, CONTRAST and ORCAS campaigns have provided aircraft observations of longer-lived VOC species such as ethane, propane, acetone, 2-butanone, and methanol as well as other shorter-lived alkanes over a relatively large spatial extent. Observations are from the Trace Organic Gas Analyzer (TOGA) and the Advanced Whole Air Sampler (AWAS). These trace gases have long enough lifetimes to be transported over large distances, providing the opportunity to test our understanding and representation of global emissions, transport, and chemistry in the global chemistry climate model CAM-chem (Community Atmosphere Model with Chemistry, a component of the Community Earth System Model). The model was run with specified dynamics to represent the specific dates of the campaigns allowing for quantitative comparison between model results and observations. We also compare the aircraft data, where possible, to ground-based networks such as the NOAA Global Greenhouse Gas Reference Network and the UCI Global Monitoring network. We find that current emissions inventories used in global models underestimate hydrocarbon emissions in the Northern Hemisphere and new insights are gained on VOC distributions in the much less well studied Southern Hemisphere.