Spatial distributions of trace organic species: Results from TORERO and CONTRAST

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Introduction
The CONvective Transport of Active Species in the Tropics (CONTRAST) field campaign, was conducted using the NSF/NCAR research aircraft (WRFV) to investigate the role of convective transport in TTL chemistry and the vertical distribution of the short-lived species in the western Pacific region. The flights were based in Guam (13.48°N, 144.8°E) and occurred during January-February 2014. These days were designed to coordinate with flights of the Global Hawk (GH) as part of the NASA Atlantic Tropical Tropopause Experiment (ATTREX) program and of the BAe-146 as part of the NERC Coordinated Airborne Studies in the Tropics (CAST) program.

The scientific objective of the TORERO project, conducted out of San Jose Costa Rica and Antofagasta, Chile was to study the release and transport of halogenated gases and oxidized VOCs in the Eastern Tropical Pacific during the season of high biologic productivity.

Setting the Scene
More than 50 VOCs were targeted during the field campaigns but only a few select species are shown here

• NCAR Trace Organic Gas Analyzer (TOGA) measured VOCs on board the NSF GV

VOC Spatial Distributions
- Short-lived compounds can only reach the upper atmosphere via fast transport through deep convection
- Longer-lived species are ubiquitous in the troposphere but show vertical gradients and can have North-South hemispheric gradients depending on sources.

NCAR Trace Organic Gas Analyzer (TOGA)
- 2 minute continuous analysis (35 second sample integration time)
- High Sensitivity: LODs of NMHCs & DVOCs to pptv, many VOCs to sub pptv

Species measured and lifetimes

Conclusions/Take Home
- Many trace gases measured over the eastern and western Pacific from sea level to 14+ km.
- NH SR gradients depend on location of sources.
- Measurements from TOGA are being compared to CAM-chem model results with a goal of better understanding sources, sinks, and distributions of NMHCs and DVOCs.
- Tropical connection can redistribute both short-lived and longer-lived species to the UT.

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