Geophysical Research Abstracts
Vol. 15, EGU2013-**PREVIEW**, 2013
EGU General Assembly 2013

Observations and modeling of bromine induced mercury oxidation in the tropical free troposphere during TORERO

Sean Coburn (1,2), Siyuan Wang (1,2), Arnout terSchure (3), Matt Evans (4), Rainer Volkamer (1,2), and the TORERO Science Team

(1) Chemistry and Biochemistry, University of Colorado at Boulder, Boulder, CO United States (sean.coburn@colorado.edu), (2) CIRES, University of Colorado at Boulder, Boulder, CO United States , (3) EPRI, Palo Alto, CA, United States, (4) University of York, York, United Kingdom

The Tropical Ocean tRoposphere Exchange experiment TORERO (Jan/Feb 2012) probed air-sea exchange of very short lived halogens and organic carbon species over the full tropospheric air column above the eastern tropical Pacific Ocean. It is well known that halogens influence the oxidative capacity in the marine boundary layer, but their distribution and abundance is less clear in the tropical free troposphere, where most of tropospheric ozone mass resides, and about 80% of the global methane destruction occurs. The oxidation of elemental mercury (GEM) by halogens (i.e. bromine) further forms gaseous oxidized mercury (GOM), and this oxidation is accelerated at the low temperatures in the free troposphere compared to the boundary layer. Free tropospheric halogen radical abundances are thus of particular importance to understand the entry pathways for GOM deposition from the free troposphere to ecosystem, and the subsequent bio-accumulation of this neurotoxin. This presentation summarizes new observational evidence for halogen vertical distributions over the full tropospheric air column, and their abundance in the tropical troposphere, at mid-latitudes in the Northern and Southern hemisphere. BrO and IO were measured simultaneously by the CU Airborne MAX-DOAS instrument, and organic halogen precursors were measured by online GC-MS (TOGA) during 22 research flights aboard the NSF/NCAR GV aircraft. We employ atmospheric box modeling constrained by observations of gas-phase hydrocarbons, aerosols, photolysis frequencies, and meterological parameters measured aboard the plane to test the observed BrO and IO abundances, and evaluate the rate of GEM oxidation in light of recent updates about the stability of the Hg-Br adduct, and it's fate (Goodsite et al., 2012; Dibble et al., 2012). Finally, we compare our measurements with output from the GEOS-Chem model for selected case studies.