4.142 Air-sea exchange of acetone and acetaldehyde and the impacts on their global atmospheric budget.

Early Career Scientist

Presenting Author:
Siyuan Wang, National Center for Atmospheric Research (NCAR), Boulder, CO, USA, siyuan@ucar.edu

Co-Authors:
Rebecca Schwantes, National Center for Atmospheric Research (NCAR), Boulder, CO, USA
Eric Apel, National Center for Atmospheric Research (NCAR), Boulder, CO, USA
Jean-François Lamarque, National Center for Atmospheric Research (NCAR), Boulder, CO, USA
Louisa Emmons, National Center for Atmospheric Research (NCAR), Boulder, CO, USA
Simone Tilmes, National Center for Atmospheric Research (NCAR), Boulder, CO, USA
Rebecca Hornbrook, National Center for Atmospheric Research (NCAR), Boulder, CO, USA
Douglas Kinnison, National Center for Atmospheric Research (NCAR), Boulder, CO, USA

Abstract:

Oxygenated volatile organic compounds (OVOCs) greatly affect the tropospheric oxidative capacity, which largely controls the chemical lifetime of methane (a greenhouse gas) and the self-cleaning capacity of the atmosphere. The ocean plays a key role in the budget of OVOCs in the atmosphere, especially in remote regions, yet the air-sea exchange of these OVOCs remains poorly understood. In this work, we present an online air-sea exchange framework newly developed for the Community Earth System Model (CESM). The model framework has been tested with previously derived ship-based measurements of seawater concentrations and fluxes. The oceanic influence on acetaldehyde and acetone in the remote marine boundary layer and free troposphere has been evaluated using airborne measurements obtained during the recent multi-year, nearly pole-to-pole airborne campaign, Atomospheric Tomography Mission (ATom). We show that the air-sea exchange module greatly improves the model-measurement agreements of acetaldehyde and acetone, leading to a better understanding of the global budget of these OVOCs.