

2.094 VOC observations over the Southern Ocean during ORCAS.

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Abstract:

The 2016 O₂/N₂ Ratio and CO₂ Airborne Southern Ocean Study (ORCAS) provided a unique opportunity to investigate the behaviors of short-lived VOCs over the Southern Ocean during the biologically-productive summer months in the context of the global carbon cycle. The primary goal of the study was to investigate the air-sea exchange of O₂ and CO₂ over the Southern Ocean where the uptake of anthropogenic carbon is a key process that is poorly represented by models. Measurements of halocarbons, DMS, OVOCs and anthropogenic trace gases were made using the Trace Organic Gas Analyzer (TOGA) and the Advanced Whole Air Sampler (AWAS) alongside measurements of O₂ and CO₂ and other gases from the NSF/NCAR GV aircraft. The ORCAS research flights, conducted between southern South America and the Antarctic Peninsula, included multiple dips into the boundary layer and extended to 12 km in altitude. Preliminary results from the study indicate strong positive correlations between O₂ and several observed halogenated VOCs in the marine boundary layer and lower free troposphere, and inverse correlations between O₂ and acetone, HCN and CH₃CN. In addition, VOC observations can be used to investigate the transport of anthropogenic and continental trace gases from lower latitudes to the very pristine Southern Ocean atmosphere. We will explore our observations in the context of temporal and spatial variability, and highlight some of the key findings from the field campaign.