Geophysical Research Abstracts
Vol. 21, EGU2019-10516, 2019
EGU General Assembly 2019
© Author(s) 2019. CC Attribution 4.0 license.

New insights into the atmospheric oxidising capacity above the Antarctic Plateau

Markus Frey (1), Holly Winton (1), Neil Brough (1), Jan-Marcus Nasse (2), Udo Friess (2), Joel Savarino (3), and Rolf Weller (4)

(1) British Antarctic Survey, Natural Environment Research Council, Cambridge, United Kingdom (maey@bas.ac.uk), (2) Inst. für Umweltphysik, Universität Heidelberg, Heidelberg, Germany, (3) Institut des Géosciences de l'Environnement/CNRS, Grenoble, France, (4) Alfred Wegener Institute, Bremerhaven, Germany

Field studies in the high and mid latitudes have demonstrated that snowpack emissions of reactive trace gases driven by photolysis alter regional atmospheric composition, the fate of pollutants and the polar ice core archive of past environmental change. Of particular interest are reactive nitrogen and halogen species released by surface snow, which in turn influence the atmospheric oxidixing capacity that is concentrations of ozone and hdyroxyl radicals. Previous field campaigns at South Pole and Dome C showed that air above the high East Antarctic Plateau in summer is highly oxidising due to the interplay of photolytic snow emissions, a shallow atmospheric boundary layer and cold temperatures. However open questions remain regarding the atmospheric oxidant budget above snow.

Here we present new observations carried out at Kohnen Station (75ºS 0ºW) in austral summer 2017, located at the same latitude as Dome C. Measurements included nitrogen oxides (NO and NO_2), atmospheric nitrate collected on filters, ozone, slant-column BrO, actinic flux and atmospheric turbulence as well as snow chemistry. In contrast to Dome C a distinct and suprisingly strong diurnal cycle of ozone with an amplitude of more than 10 ppbv was observed. Ozone night time minima coincided with a shallow atmospheric boundary layer and increased BrO in the lower atmosphere suggesting halogen driven ozone loss linked to local air-snow exchange. We discuss these new data with respect to the local atmospheric oxidant budget as well as wider implications for air chemistry above the Antarctic Plateau.