Geophysical Research Abstracts
Vol. 16, EGU2014-15426, 2014
EGU General Assembly 2014

Meteorology and vertical structure of plumes of enhanced bromine monoxide as detected by satellite remote sensing during Arctic spring

Holger Sihler (1,2), Steffen Dörner (1), Andrea Pozzer (1), Udo Frieß (2), Ulrich Platt (2), and Thomas Wagner (1)

(1) Max Planck Institute for Chemistry, Mainz, Germany (holger.sihler@mpic.de), (2) Institute of Environmental Physics, Heidelberg, Germany

Each year during spring, near-surface ozone in the polar troposphere is periodically depleted by catalytic processes involving reactive halogen species (RHS). The periods of decreased surface ozone mixing ratios are known as ozone depletion events (ODEs) lasting between hours and several days. One particular tracer for active halogen chemistry is bromine monoxide (BrO) which may be reliably detected using differential optical absorption spectroscopy (DOAS). Satellite observations show plumes of enhanced BrO up to several thousand square kilometres large. Additionally, ground-based measurements, reveal strong vertical BrO gradients controlled by boundary-layer meteorology. However, the processes leading to atmospheric bromine activation are not well understood yet. Furthermore, the influence of synoptic meteorology and the consequences for the tropospheric ozone budget need to be quantified.

In this presentation, the evolution of BrO plumes observed from satellite is investigated based on case studies. Complementary information about the vertical structure of meteorology and tracers distribution are offered by ground-based measurements, also used in this study. The comparison between BrO distribution and ozone sonde as well as weather model data indicates that the distribution of BrO is mainly controlled by meteorology, and especially the evolution of the BrO plumes is strongly correlated to the dynamics of low-pressure weather systems Finally, most of the ozone destruction occurs in fronts; therefore, a modification in the Arctic dynamic caused by climate change will also produce a change in the strength of this important sink for tropospheric ozone.