Geophysical Research Abstracts
Vol. 15, EGU2013-10260, 2013
EGU General Assembly 2013

Investigations of the tropospheric halogen chemistry around Ross Island, Antarctica, during austral spring 2012

Johannes Zielcke (1), Denis Pöhler (1), Udo Frieß (1), Tim Hay (2), Karin Kreher (2), Lars Kalnajs (3), and Ulrich Platt (1)

(1) Institute of Environmental Physics, University of Heidelberg, Heidelberg, Germany (jzielcke@iup.uni-heidelberg.de), (2) National Institute for Water and Atmospheric Research, Lauder, New Zealand, (3) Department of Atmospheric & Oceanic Sciences, University of Colorado Boulder, Boulder, USA

A unique feature of the polar troposphere is the strong impact of halogen photochemistry, in which reactive halogen species (RHS) are responsible for ozone depletion as well as the oxidation of elemental mercury and dimethyl sulphide. The source, however, as well as release and recycling mechanisms of these halogen species are far from being completely understood, especially the role of chlorine and iodine compounds. Reactive chlorine, bromine and iodine compounds are thought to be released from sea salt particles or produced by the photolysis of halocarbons and I2 emitted by the ocean.
Here we present observations of halogen oxides, ozone and nitrogen dioxide conducted for three months during austral spring 2012 on Ross Island, Antarctica. Measurements were performed with a suite of remote sensing instruments. An active long-path differential optical absorption spectroscopy (LP-DOAS) system was set up, measuring several species (BrO, O_3, NO_2, OBrO, IO, OIO, I2, ClO, OClO, CHOCHO, HCHO, HONO) continuously for the whole period, with two light paths over first year sea ice. In addition, a passive MAX-DOAS as well as a new Cavity-Enhanced (CE)-DOAS system were used for mobile halogen oxide measurements on a variety of locations around Ross Island (sea ice, shelf ice, snow, coastal, etc.), with top surface layer pH measurements performed at the different measurement sites.
First results show highly variable ozone concentrations including partial Ozone Depletion Events (ODEs), as well as concentrations of BrO up to 16ppt and NO_2 up to 15ppb. Suprisingly, a high variation of ozone was observed without significant amounts of BrO, indicating already depleted air masses transported to the measurement site and/or NO_x chemistry inhibiting halogen radical reactions.