



Sensitivity study on ozone depletion events (ode) during arctic spring

M. Piot, R. v. Glasow

Institut fuer Umweltphysik, Universitaet Heidelberg, Germany
(mpiot@iup.uni-heidelberg.de)

For more than 20 years, events with almost complete loss of ozone have been observed in the Arctic in springtime. Reactive halogens play a major role in these ozone depletion events (ODE): the reaction of bromine atoms with ozone, followed by the self-reaction of bromine oxides (BrO) represents a catalytic loss mechanism for ozone in the polar boundary layer (PBL). However, the triggering of the so-called “bromine explosion” remains unclear. We used the chemical and microphysical model MISTRA-MPIC in the box-model mode to study the mechanisms leading to these observed depletions in the boundary layer. We will present model results where we used prescribed bromine fluxes as trigger for ODEs. For this sensitivity study, we ran a set of four-day runs where we changed initial mixing ratios and fluxes of 31 different species (including halogens, NO_x, NO_y, DMS, H₂O₂, HCHO...) and compared the results with a base run. We investigated the importance of these compounds for the chemistry of the PBL and focused on species which influence the occurrence of an ODE using two thresholds: Depletion from a typical background O₃ mixing ratio of 40 ppb to 20 ppb (“partial ODE”) and to 4 ppb (“major ODE”), respectively. This study allows us to better understand which species are important in the process of depleting ozone.