



## **Boundary-layer ozone loss near the poles - why spring and not autumn?**

**L. Kaleschke** (1), J. Hollwedel (2), A. Richter (1), J. Burrows (1), O. Afe (1), G. Heygster (1), J. Notholt (1), H.K. Roscoe (3), E. W. Wolff (3), X. Yang (4)

(1) Institute of Environmental Physics, University of Bremen, Germany, (2) Institute of Environmental Physics, University of Heidelberg, Germany, (3) British Antarctic Survey, Natural Environment Research Council, Cambridge, UK, (4) Centre for Atmospheric Science, University of Cambridge, UK (lkalesch@iup.physik.uni-bremen.de)

The springtime depletion events of ozone in the polar atmospheric boundary layer have been widely discussed since their discovery twenty years ago. The question of why this phenomenon occurs in spring and not in autumn still lacks explanation. Bromine released from sea salt, which is then photolysed and reacts to bromine monoxide, is very likely responsible for this tropospheric ozone destruction. It seems that highly saline frost flowers on newly formed sea ice enhance the flux of sea salt from the ocean to the atmosphere. A model to calculate the potential frost flower coverage from the sea ice concentration and the surface air temperature was recently proposed. Here we show that the frost flower model explains the seasonal cycle of tropospheric bromine monoxide to be a springtime maximum, in agreement with observations. This arises because two conditions have to be fulfilled simultaneously. There has to be new ice production and frost flowers growth which requires cold air temperatures, and sunlight is needed to photolyse bromine. This coincidence occurs when sea ice extent is a maximum in early spring rather than autumn or midwinter.

References: Kaleschke, L., et al. (2004), Frost flowers on sea ice as a source of sea salt and their influence on tropospheric halogen chemistry, *Geophys. Res. Lett.*, 31, L16114, doi:10.1029/2004GL020655.