

6.073 Exploring the Vertical Extent of Reactive Halogen Chemistry in the Vicinity of Barrow, Alaska.

Early Career Scientist

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Abstract:

The return of sunlight to the polar regions is associated with the release of molecular halogens from the snowpack. The photolysis of these halogens produces halogen radicals, leading to depletion of boundary layer ozone to near-zero levels and altering oxidation of atmospheric pollutants, particularly gaseous elemental mercury. Despite measurements of ozone depletion events over several decades, our understanding of the vertical extent of this halogen chemistry remains limited. During the 2012 BRomine Ozone Mercury EXperiment (BROMEX), the Purdue Airborne Laboratory for Atmospheric Research (ALAR) conducted 8 flights to measure vertical profiles of BrO, ozone, and aerosol particle number concentrations. These flights showed ozone depleted regions and halogen enriched regions generally having similar vertical extents. BrO was observed both near the snowpack and aloft, sometimes independently. MODIS imagery of local sea

ice dynamics is used to investigate the influence of enhanced vertical mixing associated with open sea ice leads on the vertical distribution of reactive halogens and ozone. The role of aerosol particles in sustaining halogen activation aloft will also be discussed.