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Modeling the relative importance of blowing snow and surface snow in Arctic bromine activation and ozone depletion using WRF-Chem

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Halogen chemistry, including bromine, is very active in the Arctic during spring after polar sunrise. The presence of atmospheric bromine is well known to be correlated with near or total loss of boundary layer ozone. At present, the processes that control release of reactive halogens from the Arctic ocean into active forms in the atmosphere are uncertain. Recent debate has centered on the role of blowing snow versus surface snow in releasing and recycling photochemically active bromine, which is responsible for atmospheric ozone depletion. We have implemented these two halogen activation mechanisms, along with gas phase and heterogeneous reactions on aerosol involving bromine and chlorine, within the 3D regional Weather Research and Forecasting model with Chemistry (WRF-Chem). We have tested different model setups to ensure accurate prediction of boundary layer meteorology, an essential component of accurately describing Arctic boundary layer chemistry. We then compare model predictions using these two proposed bromine activation mechanisms to measurements of ozone throughout the Arctic during spring 2012. We also compare with springtime measurements of BrO at Utqiaġvik, Alaska during the BROMEX campaign. Our results show that some ozone depletion events are initiated by blowing snow, and other by surface snow, indicating that both mechanisms need to be taken into account in order to reproduce observed events.

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Refreshments 2:00 p.m
NCAR Foothills Laboratory
3450 Mitchell Lane, Boulder, CO 80301
FL2-1022, large seminar room
Live webcast: http://ucarconnect.ucar.edu/live

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