



Investigation of Bromine Explosion Events in McMurdo Sound, Antarctica

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Springtime ozone depletion events in the Arctic and Antarctic marine boundary layer have been reported since the mid-1980s. These events occur over periods of hours and days with ozone concentrations as low as 0.05 ppb compared to non-depleted values of about 25-40 ppb. The involvement of bromine compounds in ozone depletion was confirmed by observations of BrO (Bromine Oxide) in the Arctic as well as in the Antarctic boundary layer. Though it is now widely accepted that the mechanism for these rapid depletion events involves autocatalytic release of halogens by heterogeneous reactions on sea-salt surfaces (referred to as 'bromine explosions'), many aspects of the chemistry involved in this process are not fully understood. Satellite measurements by GOME (Global Ozone Monitoring Experiment) and SCIAMACHY (Scanning Imaging Absorption Spectrometer for Atmospheric Cartography) show that extensive areas of BrO enriched air masses, which are clearly associated with certain sea ice zones, repeatedly form during the austral spring. The conditions that trigger these events are not fully understood, but the presence of young sea ice and an inversion layer, which acts as a barrier permitting little exchange with the air above, are known to be important. Further research is required to more accurately describe the sources and conditions required for bromine explosion events. To this end, an initial field campaign to measure ground-based Max-DOAS (Multi-Axis Differential Optical Absorption Spectroscopy) BrO and surface ozone observations on the sea ice in McMurdo Sound was undertaken. Two ozone depletion events associated with bromine

release on the sea ice below Arrival Heights and one period of elevated bromine at Cape Bird were detected during the first field campaign from September to November 2006. These first results are discussed along with plans for the IPY (International Polar Year) field campaign in 2007.