



Ozone depletion events during OASIS 2009 in Barrow, Alaska

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As part of the OASIS (Ocean-Atmosphere-Sea Ice-Snowpack) project, a field campaign was carried out in Barrow, Alaska during spring 2009 to investigate the chemical cycles and the atmospheric conditions associated with ozone depletion events (ODEs) in the Arctic boundary layer. In this presentation, thermodynamic characteristics of the lower troposphere will be summarized and discussed for the most salient ODEs recorded at Barrow. ODEs were observed frequently in Barrow when the cold air masses moved in from the Arctic Ocean. These ODEs were less frequently formed locally in the Barrow boundary layer. Instead, ozone was depleted over the Beaufort Sea several days before the ozone-depleted air masses were advected over the Alaska North Slope. Field observations also showed that vertical mixing in the lower atmosphere frequently determined the demise of ODEs. Surface layer stability dictated how efficiently ozone was transported from aloft to the surface where heterogeneous reactions were responsible for ozone depletion, and how rapidly ozone-depleted air layers above the ground grew in depth. An increase in wind speed in the free troposphere eroded the stable, ozone-depleted boundary layer from aloft once airflow changed from laminar to turbulent regimes. This presentation will also summarize the chemical cycles associated with ODEs and their recovery in the Arctic boundary layer.