



Ground Based Measurements of BrO in the Lower Arctic During Spring 2004 by Differential Optical Absorption Spectroscopy (DOAS)

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Bromine catalyzed ozone depletion events were intensively studied in the polar boundary layer both, after polar sunrise at high latitude sites and at lower latitudes, where the Hudson Bay represents the southernmost ice-covered Arctic region. During March 2004 a field campaign took place in Kuujuarapik (N55.29, W77.75), in the lower Arctic in Canada at the Hudson Bay. We performed a combination of one active long-path and three passive MAX-DOAS measurements and detected BrO simultaneously with both types of systems. The three Multi-Axis instruments were operated with different viewing directions. One pointed to the ice covered Bay while the others were installed in the closed-by village. Several days with elevated BrO levels and correlated slight depletion in ozone could be detected at both locations. One of these days could be modeled by the radiative transfer model TRACY. Differences in the resulting concentration for different viewing directions are indicating an inhomogeneous distribution of the radical within the boundary layer. The most notable event occurred on March 23rd. Polar air masses reached the site in the late afternoon, just two hours before sunset. Few meters above the ground we detected a maximum of 35ppt of the BrO radical and simultaneously a complete loss of ozone. The MAX-DOAS measurements indicate a strong vertical gradient of the BrO distribution within the lowest kilometer of the atmosphere. Due to the high time resolution of the spectra, we found that the BrO disappeared within 30 minutes after sunset. The ozone stayed depleted for more than 5 hours and we observed that a smooth recovering process of the ozone level, during the following 24hours was strongly correlated to a change of wind direction and an increasing wind speed.