



Lunar and solar FTIR Nitric acid measurements at Eureka in winter 2001/2002: Comparisons with observations at Thule and Kiruna and with CMAM and SLIMCAT model calculations

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For the first time, vertical column measurements of HNO_3 above the Arctic Stratospheric Ozone Observatory (AStrO) at Eureka (80N, 86W), Canada, have been made during polar night using lunar atmospheric absorption spectra recorded with a Fourier Transform Infrared (FTIR) spectrometer, from the end of October 2001 to the beginning of March 2002. This was accomplished by means of a modified solar tracking system with increased light sensitivity capable of tracking the Moon as the light source. AStrO is part of the primary Arctic station of the Network for the Detection of Stratospheric Change (NDSC) and these measurements were compared with FTIR measurements at two other NDSC Arctic sites: Thule, Greenland (76.5N, 68.8W) and Kiruna, Sweden (67.8N, 20.4E). The measurements were also compared with two atmospheric models: the Canadian Middle Atmosphere Model (CMAM), a free-running Chemistry-Climate Model, and with SLIMCAT, an offline 3D Chemical Transport Model driven by analysed winds and temperature. Here we present the first inter-comparison of HNO_3 columns measured at the three NDSC Arctic sites, Eureka,

Thule and Kiruna, together with the first comparison of the Canadian Middle Atmosphere Model (CMAM) chemical fields with observations in the polar regions, at Eureka and Kiruna. The 2001-2002 winter was relatively warm, with two major stratospheric warmings occurring in December 2001 and February 2002 and with the daily average area for PSCs of near zero throughout the winter. Thus the meteorological conditions provide an excellent opportunity to compare and test the CMAM version 7 warm climate against observations to assess the seasonal increase of HNO_3 under PSC-free conditions.