



Reactive chlorine and nitrogen compounds observed by MIPAS-B around sunrise inside the strong January 2010 Arctic vortex

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The winter 2009/2010 was characterized by a strong Arctic vortex with extremely cold temperatures in the lower stratosphere above northern Scandinavia in January 2010. Hence, the occurrence of widespread polar stratospheric clouds enabled a strong activation of chlorine compounds (ClO_x) which can rapidly destroy ozone when sunlight returns in the polar winter.

Arctic stratospheric limb emission spectra were recorded during a flight of the balloon version of the Michelson Interferometer for Passive Atmospheric Sounding (MIPAS-B) from Kiruna (Sweden) on 24 January 2010 inside the polar vortex. The balloon floated for 8 hours at a ceiling altitude of about 34 km. Around sunrise, several fast sequences of spectra (in time steps of about 10 min.) were measured to allow the retrieval of chlorine- and nitrogen-containing species which change quickly their concentration around the terminator between night and day. For this purpose the line of sight of the instrument was aligned perpendicular to the azimuth direction of the sun to allow for a symmetric illumination of the sounded air mass before and beyond the tangent point. As expected, mixing ratios of species like ClO , NO_2 , and N_2O_5 show significant changes under twilight conditions. Observations are compared and discussed with calculations performed with the 3-dimensional Chemistry Climate Model EMAC (ECHAM5/MESSy Atmospheric Chemistry).