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Active ClO_x species and $ClONO_2$ as measured by MIPAS-B inside the Arctic vortex in winters 2001 and 2003

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Active chlorine species play a dominant role in the catalytic destruction of stratospheric ozone in the polar vortices during the late winter and early spring seasons. Under this aspect, arctic stratospheric limb emission measurements carried out by the balloon version of the Michelson Interferometer for Passive Atmospheric Sounding (MIPAS-B) from Kiruna (Sweden) on 11 January 2001 and 20/21 March 2003 have been analyzed with regard to the chlorine reservoir species $ClONO_2$ and the active species ClO and ClOOCl (Cl_2O_2). High values of active chlorine (ClO_x) of roughly 2.3 ppbv at 20 km were observed by MIPAS-B in the arctic vortex on 11 January 2001. While nighttime ClOOCl shows enhanced values of up to 1.1 ppbv at 20 km, $ClONO_2$ mixing ratios are less than 0.1 ppbv at this altitude. In contrast, high $ClONO_2$ mixing ratios of nearly 2.4 ppbv at 20 km have been observed in the late winter arctic vortex on 20 March 2003. No significant ClO_x amounts are visible on this date. Calculations with the 3-dimensional Karlsruhe Simulation model of the Middle Atmosphere (KASIMA) show less chlorine activation compared to the measurements in January 2001. The model generally underestimates $ClONO_2$ mixing ratios in favour of HCl.