



Partitioning and budget of inorganic and organic chlorine observed by MIPAS-B and TELIS in the Arctic in January 2010 and March 2011

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Arctic winters 2009/2010 and 2010/2011 were characterized by strong vortices with extremely cold temperatures in the lower stratosphere above northern Scandinavia. Hence, the occurrence of widespread polar stratospheric clouds enabled a strong activation of chlorine compounds (ClO_x) which rapidly destroyed ozone when sunlight returned after winter solstice.

MIPAS (Michelson Interferometer for Passive Atmospheric Sounding) balloon measurements obtained in northern Sweden on 24 January 2010 and 31 March 2011 inside the polar vortices have provided vertical profiles of inorganic and organic chlorine species as well as diurnal variations of ClO around sunrise over the whole altitude range in which chlorine is undergoing activation and deactivation. The first flight was carried out in very cold chlorine-activated air with widespread polar stratospheric clouds. The second one was performed at the end of the winter during the last phase of ClO_x deactivation.

The Terahertz and submillimeter Limb Sounder TELIS was mounted on the MIPAS balloon gondola. TELIS is able to detect the chlorine species ClO and HCl. The complete inorganic and organic chlorine partitioning and budget in the stratosphere has been derived by combining MIPAS-B and TELIS simultaneously observed molecules.

Observations are compared and discussed with calculations performed with the 3-dimensional Chemistry Climate Model EMAC (ECHAM5/MESSy Atmospheric Chemistry).