

## On deactivation and re-activation of chlorine nitrate in the polar lower stratosphere

# Sachiko Hayashida[1]; Nao Ikeda[1]; Yoko Toda[1]; Takafumi Sugita[2]; Hideaki Nakajima[2]; Hitoshi Irie[3]

[1] Faculty of Sci., Nara Women's Univ.; [2] NIES; [3] FRCGC/JAMSTEC

<http://www.ics.nara-wu.ac.jp/lab/ozonegroup/index.html>

Improved Limb Atmospheric Spectrometer (ILAS) observed ClONO<sub>2</sub> "reactivation" in the Arctic stratosphere from space. ClONO<sub>2</sub> volume mixing ratios (VMR) over the polar Northern Hemisphere increased significantly in February and March. The VMR of ClONO<sub>2</sub> inside the vortex reached a maximum value of 2 ppbv in late March 1997 on the 475-K isentropic surface and in mid-March at 550 K. The VMR of ClONO<sub>2</sub> scattered significantly with an increasing trend. Temperature histories for the air masses containing low VMR values of ClONO<sub>2</sub> suggested "reactivation" of ClONO<sub>2</sub> on newly formed polar stratospheric clouds (PSCs). Correlations between simultaneously observed ClONO<sub>2</sub> and NO<sub>2</sub> data suggest that ClONO<sub>2</sub> is clearly controlled by NO<sub>2</sub>. HCl data observed by the Halogen Occultation Experiment (HALOE) onboard the Upper Atmosphere Research Satellite (UARS) showed a significant decrease in late winter and early spring, times corresponding to ClONO<sub>2</sub> enhancement. The reactivation of ClONO<sub>2</sub> in heterogeneous reactions with HCl, coupled with simultaneous deactivation of activated chlorines into ClONO<sub>2</sub>, could effectively convert HCl into active chlorines.