



Temporal evolution of chlorine and related species observed with ground-based FTIR at Syowa Station, Antarctica during late winter and spring in 2007 and 2011

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Vertical profiles of O_3 , HNO_3 , and HCl and vertical column of $ClONO_2$ were retrieved from solar spectra taken with a ground-based Fourier-Transform infrared spectrometer (FTIR) installed at Syowa Station, Antarctica (69.0S, 39.6E) from March to December, 2007 and September to November, 2011. We analyzed temporal variation of these species combined with ClO data taken by Aura/MLS (Microwave Limb Sounder) satellite sensor at 18 and 22 km over Syowa Station. In early July, polar stratospheric clouds (PSCs) started to be formed over Syowa Station. With the return of sunlight at Syowa Station in early July, $ClONO_2$ and HCl showed depleted values while ClO showed enhanced values. At two altitudes (18 and 22 km), when ClO concentrations started to decline in early September, HCl started to increase rapidly, while the increase in $ClONO_2$ was gradual. The Cl partitioning between HCl , $ClONO_2$, and ClO showed difference at different altitudes. At the altitudes of 18 km, where ozone was almost depleted, ClO and HNO_3 amounts are low, so conversion to HCl was favored rather than $ClONO_2$. Whereas, at 22 km, sufficient ozone still remained, at an amount that $ClONO_2$ formation from ClO and NO_y species continued to occur at this altitude.