

Reincrease of total columns of HCl and HF observed with FTIR at Tsukuba

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The vertical column densities of HCl and HF have been observed with high-resolution Fourier transform spectrometer at Tsukuba, Japan since 1998. SFIT1 spectral fitting program was used to derive the vertical column densities.

HCl and HF are the reservoir species of Chlorine and Fluorine, respectively. Chlorofluorocarbons are the main sources of both of them.

Daily averaged HCl column increased from 1999 to 2001, decreased from 2003 to 2006 and again increased after 2007. Daily averaged HF column increased from 1999 to 2002, level off from 2003 to 2006 and again increased after 2007. The trend fitting shows -1.8%/yr (2001-2006) and +1.0%/yr (2007-2013) for HCl, and +0.3%/yr (2001-2006) and +2.5%/yr (2007-2013) for HF.

The reason why HCl and HF increase again has not been investigated yet but this increase may lead to the delay of ozone recovery. One possible reason is the change of atmospheric circulation. Simulation result of chemical transport model with observed meteorological data (ERA-interim) shows stop of decrease of HCl at around 2008 while the result without observed meteorological data shows continuous decrease. Another possible reason is the increase in emissions of HCFCs and HFCs which increased the input of Cl and F to the stratosphere but there is no observational evidence.

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