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Trends of O3, HF and chlorine species as measured by ground-based FTIR at Kiruna and modelled by the KASIMA and SLIMCAT model

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In the framework of the Network for the Detection of Atmospheric Composition Change (NDACC) a ground-based Fourier Transform Infrared (FTIR) spectrometer is operated in Kiruna (Sweden). Measurements started in winter 1989/90 on a campaign basis and since March 1996 a Bruker IFS 120HR FTIR spectrometer is operated continuously in collaboration with the IRF Kiruna and the University Nagoya (J). From individual absorption lines total and partial column abundances of several trace gases like O3, H2O, N2O, CH4, HF, HCl, ClONO2, NO, NO2, and HNO3 can be derived.

In this paper time series of O3, HF, HCl, and ClONO2 total columns starting in 1996 and derived trends will be presented. In addition, trends of partial columns of O3 are shown. These trend studies cover the period from 1996 to 2007. They are performed within the EU project GEOmon.

Using the same statistical approach and time period trends of O3, HF, HCl, and ClONO2 have been calculated from long term simulations made with the KASIMA (Karlsruhe Simulation model of the Middle Atmosphere) and SLIMCAT model. KASIMA and SLIMCAT are 3-D chemistry transport models with a full stratospheric chemistry scheme including processes on liquid aerosol and polar stratospheric cloud particles. Results from FTIR measurements and model calculations are compared and discussed in terms of chlorine loading and ozone recovery.