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Impact of cirrus on retrieval of UTLS ozone and chlorine compounds from SMILES data

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The Superconducting Submillimeter-Wave Limb Emission Sounder SMILES, planned to be operated on the Japanese Experimental Module (JEM) of the International Space Station (ISS) from the year 2008, has been designed to measure various trace gases that are important for a detailed understanding of atmospheric chemistry related to ozone destruction. JEM/SMILES will be characterized by an exceptionally low noise. Its high sensitivity will allow the observation of trace gases having weak spetroscopic signatures and may furthermore facilitate the detection of even thin ice clouds in the upper troposphere and lower stratosphere (UTLS), which are supposed to increase the efficiency of chemical processes leading to ozone loss. On the other hand, when not taken into account in the retrieval, the change in broadband spectral signal caused by ice clouds introduces further uncertainty in the estimation of background continuum and retrieved trace gas profiles around the UTLS. Within this work we analyse the error budget, that is introduced by not accounting for ice clouds in the retrieval of UTLS profiles of ozone and chlorine compounds like ClO, HOCl and HCl. For that, SMILES observations of a wide variety of cirrus clouds are simulated by the radiative transfer model SARTre, which is capable to model scattering of microwave radiation in a spherical atmosphere. From the simulated measurements profile retrievals of ozone and chlorine compounds are performed using MOLIERE. The error budget introduced by cirrus is evaluated and compared to other error sources (like instrumental effects, spectroscopic errors, etc.), that have been analysed within previous studies. Furthermore we discuss possibilities of deriving cloud properties in order to improve trace gas retrievals from measurements in occurence of thin ice clouds.