

Global Cl species climatologies from measurements and modelling

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We present an evaluation of the distribution of chlorine-containing species, focusing on ClO, HCl, and ClONO₂, in the upper troposphere and stratosphere using climatologies created with measurements from satellite-based remote sounders and output from a chemistry-climate model (CCM). The Atmospheric Chemistry Experiment - Fourier Transform Spectrometer (ACE-FTS) measures several chlorine-containing species including HCl and ClONO₂. ClO measurements from the Microwave Limb Sounder (MLS) are interpolated to the location of ACE-FTS measurements and, due to its diurnal variation, scaled to the local solar time of ACE-FTS measurements using a chemical box model. Global, zonally averaged climatologies are created using these combined satellite measurements and are compared to climatologies created using the Canadian Middle-Atmosphere Model with Specified Dynamics (CMAM-SD). CMAM-SD is also sampled at the locations of ACE-FTS measurements and scaled to the local solar time using the chemical box model.

This work will lead to the first global, multi-year Cl_y climatologies from satellite means. The resulting datasets will help to aid our understanding of the interaction between climate and chemical processes so that observed changes in the ozone layer can be attributed to changes in ozone-depleting substances, thus helping to predict the rate at which the ozone layer will recover. The work is also performed with a view to evaluating the representation of Cl_y and the partitioning of atmospheric chlorine in CMAM.

Key words: climatology, chlorine-containing species, ACE-FTS, CMAM