

Total Equivalent Chlorine in the Stratosphere: 1991-2003

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Since 1991, CMDL scientists have operated four airborne gas chromatographs on NASA airborne platforms, including the NASA Jet Propulsion Laboratory (JPL) balloon gondola and ER-2, WB-57F, and DC-8 aircraft. Using these in situ measurements and tracer-tracer correlations based on measurements of hydrochlorofluorocarbons (HCFCs) and methyl chloride and bromide by the National Center for Atmospheric Research (NCAR) whole air sampler, we have estimated trends of total chlorine (Figure 1) and bromine in the stratosphere. The determination of inorganic equivalent chlorine ($\text{Cl} + 45 \cdot \text{Br}$) requires the trend of tropospheric equivalent chlorine and the mean age of the parcel of stratospheric air. Tropospheric trends of the methyl halides have been recently compiled against stable standards. We operated a new airborne gas chromatograph on the SAGE (Stratospheric Aerosol and Gas Experiment) III Ozone Loss Validation Experiment (SOLVE) II mission from Kiruna, Sweden. It measures the major HCFCs and methyl halides, so these compounds will not have to be estimated from tracer-tracer correlations in the future. This presentation shows our estimates of total equivalent chlorine trends since 1991.

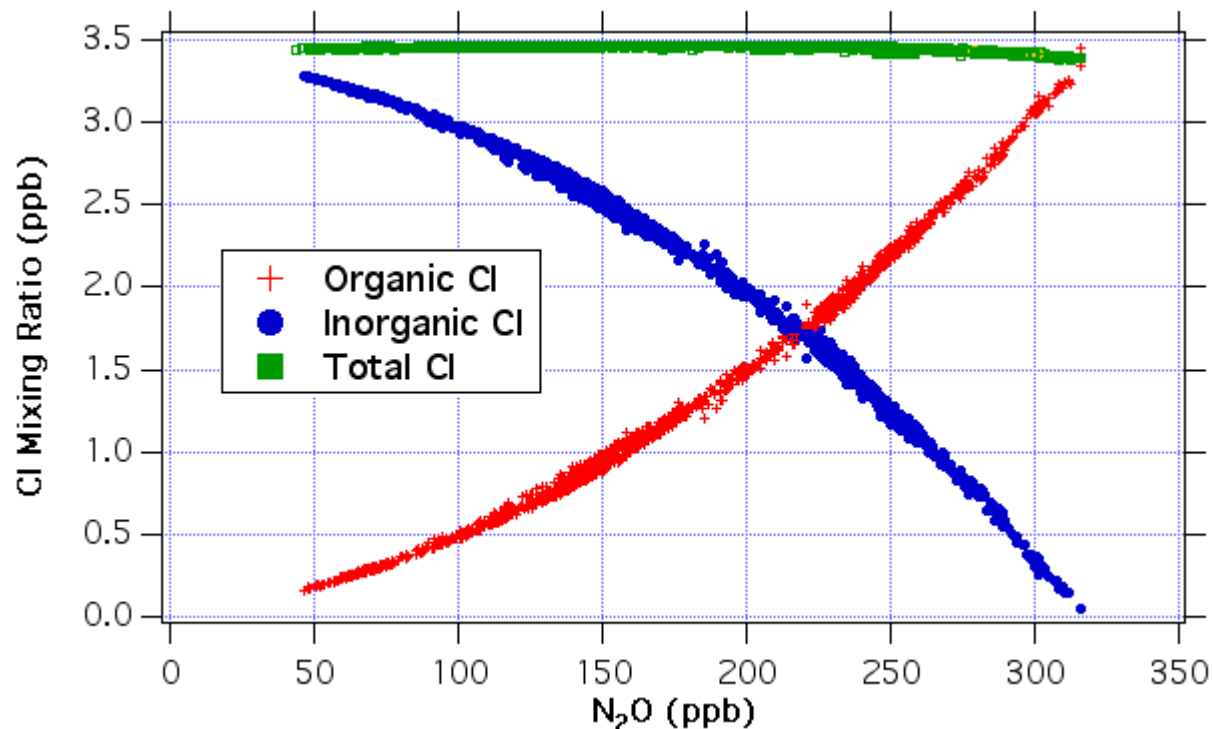


Figure 1. Speciation of total chlorine in the stratosphere.