An examination of inorganic chlorine partitioning using balloon-borne measurements of stratospheric gases.

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Measurements of the concentration of a suite stratospheric gases from 16 to 38 km aquired by the MKIV FTIR interferometer during a series of midlatitude (35° N) balloon flights are used to examine our understanding of the partitioning of inorganic chlorine (Cl_y) species, $ClNO_3$ and HCl. In particular, we examine how changes in the level of stratospheric aerosol loading (due to the eruption of Mt. Pinatubo) affect the partitioning of the dominant chlorine reservoirs in the lower stratosphere. A photochemical model, constrained by MKIV measurements of precursors (e.g., O_3, H_2O, CH_4, Cl_y, NO_y) and SAGE II zonal monthly mean aerosol surface area, is used to investigate the importance of sulphate aerosol heterogeneous reactions on the concentration of $ClNO_3$ and HCl. The model is used to calculate the variation in HCl/Cl_y as a function of aerosol surface area, and model results are compared to measured values. For higher altitudes, we perform model/measurement comparisons to examine the altitude dependence of quantities such as the $ClNO_3$/HCl ratio up to 40 km, to further test our understanding of Cl_y partitioning.

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