



Chlorine partitioning in the lowermost Arctic vortex during the cold winter 2015/2016

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Reactive chlorine compounds in the polar winter stratosphere are central to the formation of the Arctic ozone hole. To study the distribution and partitioning of active chlorine and reservoir species in the lower stratosphere, we performed in-situ measurements of HCl and ClONO₂ with the mass spectrometer AIMS during the POLSTRACC aircraft campaign in the Arctic winter 2015/2016 between 320 K and 410 K.

In addition to chlorine reservoir gases, in-situ measurements of chemically stable tracers provide means to identify vortex air masses and to infer total inorganic chlorine (Cl_y).

The distribution of chlorine and the degree of activation during the winter, as well as the reformation of the reservoir species at the end of the polar winter vary with altitude and potential temperature.

Using trajectory calculations, we demonstrate transport pathways that distribute high amounts of previously activated chlorine into the lowermost stratosphere. Here, active chlorine may have a large oxidation capacity with respect to climate relevant trace gases.