Geophysical Research Abstracts
Vol. 15, EGU2013-7591, 2013
EGU General Assembly 2013

Polar Stratospheric Clouds and heterogeneous chemistry: Comparison between a 3D-CTM with detailed online PSC microphysics and CALIPSO observations

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A 3-D Chemical Transport Model (CTM), with full stratospheric chemistry and driven by the ECMWF temperature and wind fields, has been coupled to a detailed PSC microphysical model to simulate polar winters. The formation and evolution of four types of PSC particles (STS, SAT, NAT, and ice) are described through relevant microphysical processes which alter interactively the nitric acid and water vapor concentrations of the atmosphere. Each particle type is described by a binned size distribution for the number density and chemical composition. This set-up allows for detailed calculation of optical properties and surface area densities used to compute the heterogeneous reaction rates.

After comparing the evolution of the stratospheric chemical structure to satellite observations, we will investigate how the model reproduces the PSC coverage detected by CALIPSO. A comparison between the model and CALIPSO optical properties will be used to discuss the PSC composition. Finally, we aim at estimating the contribution of each PSC particle type to the chlorine activation.