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Incorporating a parameterization for cirrus formation in a global CTM to account for reversible uptake of trace gases in the upper troposphere

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Ice clouds play an important role in the atmosphere by introducing reactive surfaces upon which trace gas species may become absorbed in the upper troposphere/lower stratosphere (UTLS). By removing radical precursors such as HNO3 and H2O2 from the gas phase by reversible uptake processes ice particles have the potential to significantly alter both the HOx and NOx budgets of the UTLS, and thus perturb upper tropospheric O3 formation. Here we introduce a parameterization which has been tested in regional climate models (van zadelhoff et al, 2007) into the 3D global CTM TM4 for determining the effective radius of cirrus clouds in order to calculate the reactive surface available for uptake. As a first demonstration we perform a sensitivity run to examine the chemical effects of incorporating such a parameterization.

G.J.van Zadelhoff, E. van Meijgaard, D. P. Donovan, W. H. Knap and R Boers, Sensitivity of the short-wave radiative budget to the parameterization of ice crystal effective radius, J. Geophys. Res., 112, doi:10.1029/2006JD007791, 2007.