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A climatology of PSC composition for the northern and southern hemisphere observed between 2002 and 2012 by MIPAS/Envisat

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The MIPAS instrument onboard the ESA Envisat satellite operated from July 2002 until April 2012. The infrared limb emission measurements represent a unique dataset of day and night observations of polar stratospheric clouds (PSCs) up to both poles. Cloud detection sensitivity is comparable to spaceborne lidars, and it is possible to classify different cloud types from the spectral measurements in different atmospheric window regions.

We present a new PSC classification scheme based on the combination of a well-established two-colour ratio method and multiple 2D brightness temperature difference probability density functions. The method is a simple probabilistic classifier based on Bayes' theorem with a strong independence assumption. The Bayesian classifier distinguishes between solid particles of ice and nitric acid trihydrate (NAT), as well as liquid droplets of supercooled ternary solution (STS). The classification results have been compared to coincident measurements from the space borne lidar CALIOP instrument covering the temporal overlap of both satellite missions (June 2006 to March 2012). Both datasets show a good agreement for the specific PSC classes, in spite of the fact that viewing geometries, vertical and horizontal resolution are quite different.

Observations on mountain wave (MW) induced formation of NAT clouds in conjunction with analyses of AIRS temperature fluctuation as an indicator for MW activity will be presented in more detail focusing on both hemispheres, different years, and the complete season of PSC activity.

Finally, the MIPAS PSC climatology can be used to validate the PSC schemes of chemical transport and chemistry climate models. Higher level data products retrieved from the climatology, like Volume and Area PSC (V_{PSC} and A_{PSC}) frequently used as a proxy for ozone depletion, will be investigated in comparison with model results of the Chemical Lagrangian Model for the Stratosphere (CLaMS) and the UK Unified Model.