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Spatio-temporal patterns of (small) effective cloud fractions retrieved from GOME-2 measurements using the MICRU algorithm

Holger Sihler, Steffen Beirle, Christian Borger, Simon Warnach, and Thomas Wagner
Max Planck Institute for Chemistry, Mainz, Germany (holger.sihler@mpic.de)

We present results of effective cloud fractions retrieved from GOME-2 (Global Ozone Monitoring Experiment-2) measurements using the MICRU (Mainz Iterative Cloud Retrieval Utilities) algorithm, which has been developed to retrieve small cloud fractions (CF<20%) at high accuracy in order to improve retrievals of tropospheric trace gases (e.g., NO_2, HCHO) absorbing in the UV/vis wavelength region.

The most important feature of MICRU is the derivation of the minimum reflectance map for a certain satellite sensor and spectral range from the measurements themselves while minimising interferences from surface BRDF effects (mostly solar glitter and shadowing). The algorithm builds on the assumption that the surface is dark compared to clouds. Therefore, it is limited to regions not permanently covered by clouds, ice or snow. Our approach features a minimum LER map parametrised by time, viewing zenith angle, scattering angle, and reflection angle. Hence, a mean standard error smaller than 4% is achieved for small CF. The MICRU results are consistent over the entire swath and between different instrument channels. It is demonstrated that MICRU, compared to the operational cloud fraction algorithms OCRA and FRESCO, significantly improves the determination of cloud fractions with respect to reduced interferences from viewing angle, solar glitter, and shore lines.

In this presentation, we investigate the potential of this data set to study spatio-temporal patterns on a global scale, particularly of scenes with small cloud fractions (e.g. broken cloud fields). The correlation with teleconnection anomalies (e.g. El Niño Southern Oscillation) as well as trends of the latitudinal distribution of clouds are discussed.