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First comparison of different cloud products for S5P/TROPOMI data

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Abstract

The first European Sentinel satellite for monitoring the composition of the Earth's atmosphere, the Sentinel 5 Precursor (S5p), carries the TROPOspheric Monitoring Instrument (TROPOMI) on board to map trace species of the global atmosphere at high spatial resolution. Retrievals of tropospheric trace gas columns from satellite measurements are strongly influenced by clouds. Thus, cloud retrieval algorithms were developed and implemented in the trace gas processing chain to consider this impact.

In this study, different cloud products available for NO_2 retrievals from TROPOMI data are analyzed: the TROPOMI level 2 OCRA/ROCINN (Optical Cloud Recognition Algorithm/Retrieval of Cloud Information using Neural Networks) cloud products CRB (cloud as reflecting boundaries) and CAL (clouds as layers), the FRESCO (Fast Retrieval Scheme for Clouds from Oxygen absorption bands) cloud product, the VIIRS (Visible Infrared Imaging Radiometer Suite) cloud product, and the MICRU (Mainz Iterative Cloud Retrieval Utilities) cloud fraction. The cloud products are compared with regard to cloud fraction, cloud height, cloud albedo/optical thickness, flagging and quality indicators. In particular, difficult situations such as snow or ice, sun glint, and high aerosol load are investigated.

The eventual aim of this study is to better understand TROPOMI cloud products and their quantitative impacts on trace gas retrievals. Here, we present first results of a statistical analysis on a limited data set (one first test day) comparing currently existing cloud products and their approaches focusing on NO_2.