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Consolidated trends of cloud top height from hyperspectral measurements in the O_2 A-band

Luca Lelli, Alexander A. Kokhanovsky, Vladimir V. Rozanov, Marco Vountas, and John P. Burrows

Bremen, Environmental Physics and Remote Sensing, Physics, Bremen, Germany (luca@iup.physik.uni-bremen.de, +49 421 218 4555)

Measurements by the hyperspectral spectrometer family GOME, SCIAMACHY, and GOME-2 are used to derive global cloud top height in the time window 1996 – 2012. The retrievals are obtained from top-of-atmosphere backscattered solar light in the oxygen A-band using the Semi-Analytical CloUd Retrieval Algorithm SACURA. The physical framework relies on the asymptotic equations of radiative transfer. It has been found that both spatial resolution and radiometric calibration of the instruments introduce spurious values in the time series in function of latitude and satellite viewing geometry, thus affecting the extraction of trends for low-, mid-, high-level and total clouds. After the application of appropriate corrections, cloud top height anomalies exhibit a negligible global change over time, while distinct trends are found on a regional scale, pointing to differing response mechanisms to climate variability and aerosol injection in the atmosphere. Moreover, due to the forthcoming launch of the TROPOMI spectrometer aboard Sentinel-5 Precursor (scheduled for 2015), the possibility of extending the cloud top height time series is investigated with synthetic data, at the nominal spectral specifications of the instrument.