Geophysical Research Abstracts
Vol. 19, EGU2017-10065, 2017
EGU General Assembly 2017

A new scientific product of water vapor derived from GOME, SCHIAMACHY and GOME-2 based on look-up-table AMF approach

Yang Wang (1), Johannes Lampel (1), Margherita Grossi (2), Steffen Beirle (1), and Thomas Wagner (1)

(1) Max-Planck institute for Chemistry, satellite group, Mainz, Germany (y.wang@mpic.de), (2) Institut für Methodik der Fernerkundung (IMF) Deutsches Zentrum für Luft und Raumfahrt (DLR), Oberpfaffenhofen, Germany

Water vapour (H_2O) is a key component of the Earth atmosphere and has a strong impact on the Earth's radiative balance. Satellite observations offer the unique opportunity to study the spatial and temporal variability of H_2O on a global scale. The operational DLR H_2O total column products of GOME, SCIAMACHY and GOME-2 are retrieved using the absorptions of H_2O and of molecular oxygen (O_2) in the spectral range from 614-683.2 nm (http://atmos.eoc.dlr.de/gome/product_h2o.html). This algorithm is robust and easy to implement and is almost independent of external data sets. However the operational retrieval also has its limitations: 1) the differences in vertical profiles of H_2O and O_2 can lead to large errors for individual observations (especially if clouds are present); 2) the retrieval contains a number of corrections, which complicate a detailed error analysis; 3) the retrieval does not explicitly account for the impact of strong absorptions on the effective light path and terrain height variations. In order to overcome these limitations, a new H_2O retrieval has been developed based on a look-up-table (LUT) approach. The input to the LUT is the H_2O slant column densities (SCDs) as derived from the DOAS analysis as well as information about the cloud properties and the observation geometry. The output is the corresponding H_2O VCD. The LUT is computed for all relevant viewing geometries, H_2O VCD scenarios, terrain heights, surface albedos, and cloud scenarios using the Radiative Transfer Model LIDORT. In order to explicitly represent retrieved H_2O SCDs of real observations, the LUT is generated by retrieving a series of synthetic spectra covering all LUT scenarios. The synthetic spectra are generated at high spectral resolution (1pm) and then convoluted with the instrument slit function, and analysed in the same way as observed spectra to retrieve H_2O SCDs.