



Water vapour trends from GOME and SCIAMACHY satellite measurements

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Satellite observations provide us today with high quality and high resolution global data and are well suited for monitoring of environmental parameters.

Global water vapour total column amounts have been retrieved from spectral data provided by the Global Ozone Monitoring Experiment (GOME) flying on ERS-2 which was launched in April 1995 and the SCanning Imaging Absorption spectroMeter for Atmospheric CHartographY (SCIAMACHY) onboard ENVISAT launched in March 2002. For this purpose the Air Mass Corrected Differential Optical Absorption Spectroscopy (AMC-DOAS) approach is used. The combination of the data from both instruments, which requires special treatment at the interchange, provides us with a long-term global dataset spanning already now more than 10 years with the possibility of extension up to 2020 by GOME-2 on Metop. Thus this dataset is well suited for a trend analysis.

Using linear and nonlinear methods from time series analysis as well as standard statistics the trends of water vapour contents and their errors are calculated. Several factors affecting the trend such as the length of the time series, the magnitude of the variability of the noise and the autocorrelation of the noise are investigated. Special emphasis lies on the calculation of the significance of the observed trends which reveal local significant changes (decrease as well as increase) of water vapour concentrations distributed over the whole globe. An alternative view on the significant trends is the analysis of the number of years of data which are needed to detect significant trends. This information suggests the continuation of satellite measurements which

are for the time being realised by the GOME-2 project.

The derived water vapour trends can be used as tracers for several climatic problems connected with the greenhouse effect; warming, drying, glacier melting, groundwater consumption, agricultural irrigation etc..