



The SPARC water vapour assessment II: Comparison of stratospheric and lower mesospheric water vapour time series observed from satellites

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Time series of stratospheric and lower mesospheric water vapour using 33 data sets from 15 different satellite instruments were compared in the framework of the second SPARC (Stratosphere-troposphere Processes And their Role in Climate) water vapour assessment (WAVAS-II). This comparison aimed to provide a comprehensive overview of the typical uncertainties in the observational database that can be considered in the future in observational and modelling studies addressing e.g. stratospheric water vapour trends. The time series comparisons are presented for the three latitude bands, the Antarctic (80° – 70° S), the tropics (15° S– 15° N) and the northern hemisphere mid-latitudes (50° – 60° N) at four different altitudes (0.1, 3, 10 and 80 hPa) covering the stratosphere and lower mesosphere. The combined temporal coverage of the 15 satellite instruments allowed considering the time period 1986–2014. In addition to the qualitative comparison of the time series, the agreement of the data sets is assessed quantitatively in the form of the spread (i.e. the difference between the maximum and minimum volume mixing ratio among the data sets), the (Pearson) correlation coefficient and the drift (i.e. linear changes of the difference between time series over time). Generally, good agreement between the time series was found in the middle stratosphere while larger differences were found in the lower mesosphere and near the tropopause. Concerning the latitude bands, the largest differences were found in the Antarctic while the best agreement was found for the tropics.