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Version 8 IMK/IAA MIPAS measurements of ClO

We present global distributions of chlorine monoxide (ClO) retrieved from infrared limb emission spectra measured with the Michelson Interferometer for Passive Atmospheric Sounding (MIPAS), covering the time period 2002–2012. The retrieval was performed using spectral lines in the fundamental band of ClO around 844 cm-1. The vertical resolution of V8 ClO is 4 km at 18–20 km and 7.5–9.5 km at 40 km altitude. The considerable improvement at 40 km with respect to the previous V5 data version was achieved by extension of the spectral range for retrieval of upper stratospheric ClO. Retrieval errors are dominated by measurement noise and increase from 0.4 ppbv at 20 km to 0.8 ppbv at 50 km altitude. Thus, profile averaging has to be performed for analysis of the upper stratospheric ClO maximum. However, strongly enhanced lower stratospheric ClO amounts of more than 1.5 ppbv during polar winter can well be detected in single measurements. Along with the standard data product, an alternative coarse grid representation is provided, which can be used without consideration of averaging kernels. Due to improved modelling of the atmospheric continuum and of the instrumental offset, the high bias of upper stratospheric ClO, which had affected measurements between 2005 and 2012 in the previous data version, has disappeared. A comparison with ClO measurements of the Microwave Limb Sounder on the Aura satellite shows a fairly good agreement for the lower stratospheric enhancements observed in polar winter. With the aid of simulations by the ECHAM/Messy Atmospheric Chemistry model, deviations between the upper stratospheric maxima, especially occurring at southern mid- and high latitudes during winter, can be explained by the different local times of the measurements.

Topic

Current and past limb and occultation instruments: algorithms, products, validation

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