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Seven years of atmospheric spectrometry with MIPAS: Lessons learned on atmospheric composition and radiative transfer

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MIPAS (Michelson Interferometer for Passive Atmospheric Sounding) is a Fourier-Transform Limb emission spectrometer covering the infra-red (14.6 to 4.15 μm) with high spectral resolution (0.025 to 0.0625 cm^{-1}). It has been launched into a polar sun-syncroneous Earth orbit on 1 March 2002 and has been measuring, since then, the atmospheric emission by taking 1000 to 1500 vertical scans through the atmosphere per day, from pole to pole during day and night. The measurements cover the altitude range from about 6 to 70 km in nominal observation mode, and up to 170 km in special observation modes. While starting its operation with a spectral resolution of 0.025 cm^{-1} (20 cm maximum optical path difference), an instrument failure forced the spectral resolution towards 0.0625 cm^{-1} (8.2 cm maximum optical path difference). However, simultaneously, the spatial sampling was improved. A processing system for retrieval of distributions of trace gases and other atmospheric parameters (temperature, clouds) from the geo-located and radiance-calibrated spectral data of MIPAS has been developed and operated by IMK and IAA, and some 30 species have been retrieved from MIPAS spectra. In this talk we will present results from this work covering species which are relevant from the upper troposphere to the thermosphere, and focus on lessons learned on atmospheric radiative transfer and the spectroscopic data used within the retrievals.