



Seasonality of Peroxyacetyl nitrate (PAN) in the upper troposphere and lower stratosphere using the MIPAS-E instrument

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The Michelson Interferometer for Passive Atmospheric Sounding onboard ENVISAT (MIPAS-E) offers the opportunity to detect and spectrally resolve many atmospheric minor constituents affecting atmospheric chemistry. In this paper, we retrieve global, seasonal PAN volume mixing ratio (vmr) data from MIPAS-E measurements made in January, March, August and October 2003 and present results from this scheme between approximately 300 and 150 hPa. The total error on a single PAN retrieval is better than 20% outside the tropics and better than 50% in the tropics where uncertainties in water vapor dominate the total error budget. We observe clear differences in the seasonal cycle of PAN in our data, linked closely to biomass burning regions and growing seasons. Highest Northern Hemisphere mid-latitude PAN vmrs were observed in August (300–600 pptv on average) compared with the January and October data (less than 250 pptv on average). In the March 2003 data we observe highest PAN vmrs in the tropics with evidence of vmrs between 600 and 1000 pptv over Eastern Asia and over the Central Pacific at 333 hPa. The vertical distribution of PAN as a function of latitude (i.e. the zonal mean) highlights the strong inter-annual variability of PAN in the upper troposphere and lower stratosphere (UTLS), most pronounced poleward of 40° N (up to 400 pptv over the year). The variability of PAN in the tropical UTLS is also significant and we derive a variability of up to 250 pptv in the averages between January and October 2003. These results represent the first seasonal observations of PAN in the UTLS.

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