

# Solar Variability and the State of the middle Atmosphere as observed by MIPAS

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MIPAS is a Fourier transform limb emission spectrometer on board of the Environmental satellite ENVISAT. MIPAS provides global, pole-to-pole, day and night observations of a wealth of atmospheric trace species, among them ozone, the  $\text{NO}_y$  family and important members of the  $\text{Cl}_y$  family, from the upper troposphere up to the mesosphere. Its mission lifetime falls into the transmission phase from solar maximum to solar minimum. During the high spectral resolution mission of MIPAS (July 2002 to late March 2004) several solar proton events, among them the fourth largest event in the last 40 years in Oct/Nov 2003, occurred. The solar storm in Oct/Nov 2003 severely affected the  $\text{NO}_y$  budget of the middle atmosphere over the poles and had impact on the polar winter ozone budget. The very first observations of a solar storm impact on the  $\text{NO}_y$  partitioning ( $\text{NO}_x$ ,  $\text{HNO}_3$ ,  $\text{N}_2\text{O}_5$ ,  $\text{ClONO}_2$ ) and chlorine partitioning ( $\text{ClO}$ ,  $\text{HOCl}$ ,  $\text{ClONO}_2$ ) were made by MIPAS, giving indirect experimental evidence of enhanced OH levels in the upper stratosphere. The observations are discussed and compared to model results, both studying short-term effects (within days after the solar storm), and long-term effects during the Northern polar winter until March 2004. They are also put into the context of the overall picture of a geomagnetically very active atmosphere during the complete observation period of MIPAS.