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# Precision validation of MIPAS-Envisat products

C. Piccolo and A. Dudhia
Atmospheric, Oceanic and Planetary Physics, University of Oxford, Oxford, UK

Abstract. This paper discusses the variation and validation of the precision, or estimated random error, associated with the ESA Level 2 products from the Michelson Interferometer for Passive Atmospheric Sounding (MIPAS).

This quantity represents the propagation of the radiometric noise from the spectra through the retrieval process into the Level 2 profile values. The noise itself varies with time, steadily rising between ice decontamination events, but the Level 2 precision has a greater variation due to the atmospheric temperature which controls the total radiance received. Hence, for all species, the precision varies latitudinally/seasonally with temperature, with a small superimposed temporal structure determined by the degree of ice contamination on the detectors.

The precision validation involves comparing two MIPAS retrievals at the intersections of ascending/descending orbits. For 5 days per month of full resolution MIPAS operation, the standard deviation of the matching profile pairs is computed and compared with the precision given in the MIPAS Level 2 data, except for $NO_2$ since it has a large diurnal variation between ascending/descending intersections. Even taking into account the propagation of the pressure-temperature retrieval errors into the VMR retrieval, the standard deviation of the matching pairs is usually a factor 1–2 larger than the precision. This is thought to be due to effects such as horizontal inhomogeneity of the atmosphere and instability of the retrieval.

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