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Characterization of MIPAS elevation pointing

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Abstract. Sufficient knowledge of the pointing is essential for analyses of limb emission measurements. The scientific retrieval processor for MIPAS on ENVISAT operated at IMK allows the retrieval of pointing information in terms of tangent altitudes along with temperature. The retrieved tangent altitudes are independent of systematic offsets in the engineering Line-Of-Sight (LOS) information delivered with the ESA Level 1b product. The difference of pointing retrieved from the reprocessed high resolution MIPAS spectra and the engineering pointing information was examined with respect to spatial/temporal behaviour. Among others the following characteristics of MIPAS pointing could be identified: Generally the engineering tangent altitudes are too high by 0–1.8 km with conspicuous variations in this range over time. Prior to December of 2003 there was a drift of about 50–100 m/h, which was due to a slow change in the satellite attitude. A correction of this attitude is done twice a day, which leads to discontinuities in the order of 1–1.5 km in the tangent altitudes. Occasionally discontinuities up to 2.5 km are found, as already reported from MIPAS and SCIAMACHY observations. After an update of the orbit position software in December 2003 values of drift and jumps are much reduced. There is a systematic difference in the mispointing between the poles which amounts to 1.5–2 km, i.e. there is a conspicuous orbit-periodic feature. The analysis of the correlation between the instrument's viewing angle azimuth and differential mispointing supports the hypotheses that a major part of this latter phenomenon can be attributed to an error in the roll angle of the satellite/instrument system of approximately 42 mdeg. One conclusion is that ESA level 2 data should be compared to other data exclusively on tangent pressure levels. Complementary to IMK data, ESA operational LOS calibration results were used to characterize MIPAS pointing. For this purpose MIPAS is used as a radiometer while the passage of infrared bright stars through the instrument's field of view is recorded. Deviation from expected time of passage gives information about mispointing. Results are: a pronounced seasonal variation of the LOS is seen before a correction of on-board software took place in December of 2003. Further a pitch bias of 26 mdeg with respect to the platform attitude information is found, which corresponds to 1.45 km tangent altitude offset towards low altitudes.

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