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TUNER compliant error reporting for IMK/IAA MIPAS Envisat V8 retrieval

We present the implementation and results of the error estimation for temperature and trace gas mixing ratios retrieved with the IMK/IAA MIPAS L2 processor in the framework of the TUNER (Towards UNified Error Reporting) project. Several error sources are taken into account: spectral noise, propagated temperature and pointing noise, uncertainties of spectrally interfering species' abundances, instrument line shape errors, and spectroscopic data uncertainties (line intensities, broadening coefficients). Both the direct impact of volatile and persistent gain calibration uncertainties, offset calibration, and spectral calibration uncertainties, as well as their impact through propagated calibration-related temperature and pointing uncertainties, are considered. If a retrieval is done with non-local thermodynamic equilibrium modelling, the related kinetic constants and mixing ratios of species involved in the modelling of populations of excitational states also contribute to the error budget. Generalized Gaussian error propagation and sensitivity analyses are used to estimate the error components. Error correlations are taken into account. Some error sources contribute to both, the random and the systematic error components. The sequential nature of the MIPAS retrievals gives rise to entangled errors. These are caused by error sources that affect the uncertainty in the final data product via multiple pathways, i.e., on the one hand, directly, and, on the other hand, via errors caused in a preceding retrieval step. These errors tend to partly compensate for each other. Estimated uncertainties are calculated for 34 typical atmospheric conditions. Error budgets for T, H2O, O3, HNO3Ch4, N2O, ClONO2, CFC-11, CFC-12, HCFC-22, ClO, HNO4, C2H(2,4,6), N2O5, COCl2, and NO will be presented and discussed.

Topic

Current and past limb and occultation instruments: algorithms, products, validation

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