

Atmos. Meas. Tech. Discuss., referee comment RC1
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RC: Comment on amt-2022-152

Chris Boone (Referee)

Referee comment on "TUNER-compliant error estimation for MIPAS: methodology" by
Thomas von Clarmann et al., Atmos. Meas. Tech. Discuss.,
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This paper offers a detailed accounting of error estimates for retrievals from the MIPAS instrument. The analysis is rigorous and is as complete as can be expected. There will always be error sources that cannot be estimated because there is insufficient information in the measurement system, such as the impact of measuring from a moving platform. Retrievals always implicitly assume a vertical column, but measurements are smeared geographically, which could cause problems if measuring something with high variability or moving across the polar vortex boundary partway through an altitude scan. Note that a changing scene over the course of a single FTS measurement (e.g., when moving through a region of high variability in H₂O) would give rise to a contribution to the imaginary component in the Fourier transform, which is the source of the noise information in the analysis, but perhaps the effect would be negligible compared to the noise level for an instrument measuring in emission.

There will be systematic errors from using Voigt profiles in the calculated spectrum rather than more accurate line shapes, but one would hope the available uncertainties on the Voigt parameters would encompass this effect.

Some of the labels are a bit whimsical (e.g., headache errors), but their meanings are clear. I had to look up some of the Latin phrases, not being familiar with the language.

I have no suggestions for changes, other than a few typos and minor changes, listed below:

>Line 51: variable definitions

Every variable is defined except for y (unless you count it as being defined by the phrase "the signal y " on line 94, well after the fact).

>Line 67: ...denotes the errors source

errors -> error

>Line 325: witht

with

>Line 358: ...between to independent measurement systems

to -> two

>Line 378: The component of the instrument line shape error related to the phase does not need to be considered explicitly, because it affects the frequency shift only and thus is implicitly included in $\hat{\omega}$ shift

A non-zero phase in the modulation function would imply a physical asymmetry in the ILS (unless it is just a straight line as a function of optical path difference), the effect of which is not just a frequency shift; it affects the shape of the calculated line.

>Table B1: CFC-22

CFC-12