

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2021-235

Anonymous Referee #2

Referee comment on "Level 2 processor and auxiliary data for ESA Version 8 final full mission analysis of MIPAS measurements on ENVISAT" by Piera Raspollini et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-235-RC2>, 2021

Review of amt-2021-235 "Level 2 processor and auxiliary data for ESA Version 8 final full mission analysis of MIPAS measurements on ENVISAT by Raspollini et al"

This paper describes the final ENVISAT/MIPAS reprocessing using ORM v8. Improvements from level-2 noted include the areas of line-of-sight-gradients, cloud contamination, data quality metrics, spectroscopic data, and a priori atmospheric data. Improvements from level-1b include reduced instrument drift and radiometric calibration. MIPAS v8 products include more atmospheric species with better accuracies and temporal stability than in previous versions.

I recommend publication with attention given to the following minor corrections / discussion points.

L11

IG2 not defined

L23

... could also mention pyroCb events arising from wildfires e.g. Australian New Year fires in 2020.

L23

[Taken together] these changes

L29

"of the atmospheric emission" ... perhaps you meant to say "of the infrared emission"
otherwise better to just say "of the atmosphere"

L30

Which is correct ... ENVISAT (as in the title and elsewhere) or Envisat?

L33 probably should jam "infrared" in this line before "emitting"

L34

10 years is a long time... CO2 increased quite a bit - how was that handled for the retrieval
of temperature?

L67

I'm sure you have stories of "what not to do" that would be similarly helpful!

L80

10 hour => 10:00

L97

maximum [interferometric] path ?

L100

reducing the spectral resolution to

L107

MIPAS was not operating routinely for a long period. Since a 20cm path was causing mechanical problems, what was the largest path thought to still be safe? Was a new max path limit determined from in-orbit testing?

L108

In the OR scan the lowest tangent height was increased from 6 to 7 km. Was that for an engineering mechanism reason or was it decided to trade-off the the 6-7 km region in order to add 4km in the mesosphere?

L139

non-LTE

L145

What about the (approximate) reference height so you can vertically locate the limb scan. Where does that come from? Do you have an internal a geopotential height product?

L210

Could you give some indication of the error incurred in assuming no horizontal gradient across the line-of-sight in the refractive index? Also this is the only mention of the Curtis-Godson approximation (CGA) and should have a reference to the original work at least

and possibly to other documented retrieval codes for ir limb sounders. What led to the choice of CGA and were any other alternatives considered e.g. Emissivity Growth Approximation (EGA) or Correlated-k (presumably not needed as the micro windows are quite narrow)?

L211

Regarding the ray tracing... What is the spacing of the angular grid used to represent the climatology along the line of sight?

"With an adaptive step that depends on the curvature of the ray paths"... probably worth to point out that this describes the treatment near the tangent point where finer vertical levels are required for accuracy.

L228

Do you really have the horizontal resolution to achieve a 2nd order correction?

L342

What is the effect on temperature on the discontinuous CO₂ concentration change on crossing a year boundary?

L455

How about a joint retrieval of H₂O and the HDO/H₂O ratio?

L454

Where does the magic number 31.6 come from? Need some context here e.g. over what values does the continuum range?

L470

What is the size of the matrices that need to be furnished to accomplish this feat. Would representative matrices suffice i.e. if they be aggregated over seasons and latitude bands?

L593 and L683

not-good -> bad I suppose

L594

So are the VMR retrievals also marked as "bad" or some other specific flag that indicates missing data because the temperature retrieval failed?

L603 and Page 33 Fig 22

Representative retrieval [product]? What product and OR or FR? If this distribution appears (or not) in Fig 1 or 2 then please indicate which one.

L608

the values of the thresholds [for each product]

L601

derive [atmospheric] trends

L636 and Fig 23

Fig 23 is not very good for showing the temporal variation. The sequence of colors/symbols bears no relation to the time domain. I suggest taking only three pressure levels for UTLS, LS and MS and plotting the Tdiffs vs time.

Also then you could indicate where the decontaminations (L653) occur on this figure.

L686

Some indication of file sizes would be useful

L698

If 2nd order effects are a big deal (I doubt that the auxiliary model data can be used to correct to this order anyway) then you should indicate that these gradients are limited to a linear assumption along the line of sight.