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Comment

Interactive comment on “Characterization of model errors in the calculation of tangent heights for atmospheric infrared limb measurements” by M. Ridolfi and L. Sgheri

Anonymous Referee #2

Received and published: 25 August 2014

This paper discusses causes of error in calculated tangent heights for IR limb sounders, with the work focussing on the MIPAS instrument on ENVISAT. Three causes of inaccuracy are investigated: 1) the refractive index of the atmosphere; 2) the ray tracing method; 3) the modelled atmosphere. The authors conclude that only the atmosphere used in the model has any significant effect on calculated tangent heights, and then, only in the troposphere.

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1 General comments

1) Limb sounding retrievals generally work in pressure coordinates so as to negate issues with the absolute tangent height. As such, a more accurate tangent height doesn't seem that important. This can clearly be seen in the final section, where in order to obtain significant errors in MIPAS L2 retrievals, the pressure had to be forced to the calculated tangent height pressure.

2) The study seems completely focussed on MIPAS and may not be of much use to other instruments.

3) Since relative tangent height of sweeps within the same scan are more accurately known than the absolute tangent heights, why not calculate a best guess tangent height which relies on the levels above in the troposphere where the modelled atmospheric assumptions are more unreliable?

4) Explanations of the methods are very brief and sometimes confusing, although ultimately understandable. The methods appear to be correctly applied and the results are convincing.

2 Specific comments

P7702 L6–9 Errors of 200m are only in very small set of measurements in the troposphere. The errors in would only have a significant impact if pressure were not retrieved, which seems very unlikely in a decent retrieval scheme.

P7707 L1–3 Not a sentence.

P7707 L20–26 Why did you not just take the position of the satellite instead of back tracing from the calculated tangent point?

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P7708 L1–9 This paragraph is very poorly explained.

P7708 L10 L13 “step-lenghts” should be “step-lengths”.

P7708 L16–24 Why do you consider the Ciddor formula more accurate than the Edlen formula if the differences between the two are so small? Also, why do you need to bother with water vapour and CO₂ in the refractive index model if the Edlen formula (which does not require these) has the same accuracy.

P7709 L6–8 Since this is the only mention in the paper of looking at the RO data, why do you bother mentioning it at all?

P7710 L10–11 I can't think of any retrievals that would use a fixed tangent pressure.

P7714 Fig. 2 The squares / triangles are redundant given that the colour indicates whether a value is positive or negative.

P7715 Fig. 3 The magenta line is completely obscured in both plots.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 7701, 2014.

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