Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC2
https://doi.org/10.5194/amt-2021-116-RC2, 2021

Comment on amt-2021-116

Anonymous Referee #2

Referee comment on "Differential absorption lidar for water vapor isotopologues in the 1.98□µm spectral region: sensitivity analysis with respect to regional atmospheric variability" by Jonas Hamperl et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-116-RC2, 2021

Hamperl et al. presents a theoretical analysis and performance evaluation of a DIAL system to measure vertical profiles of water vapor H2(16)O and its isotopologue HD(16)O. The paper is well written and detailed. I recommend it to be published after the following comments are addressed:

General comments

1) I understand the authors decided to exclude the laser linewidth from the analysis, nevertheless I think it would be good if they at least provide a first order estimate of its impact.

2) Is the ‘efficiency’ of the receiver optics (Tr in Eq. 2) assumed to be 1? If so, is that a reasonable assumption?

3) The authors include the effect of solar background in Eq. 10, but there is no further discussion regarding its impact on the instrument performance (and the optical filter bandwidth is not included in Table 1).

4) As the previous reviewer pointed out, it would be nice to have a more detailed analysis of temperature sensitivity of the line strengths and its impact of the overall retrieval uncertainty.

5) Have you considered exploiting an absorption line with strong temperature dependence to try to retrieve temperature simultaneously? I’m unsure if a reasonable uncertainty can be achieved, but it might be worth exploring it.