

Interactive comment on “Robust, spatially scanning, open-path TDLAS hygrometer using retro-reflective foils for fast tomographic 2-D water vapour concentration field measurements” by A. Seidel et al.

Anonymous Referee #2

Received and published: 29 January 2015

1 General comment:

In this study the development of a novel 2D scanning TDLAS instrument for measuring water vapour fields is described. The functionality of this instrument is described in good way. Accuracy and precision is determined with a homogeneous water vapour field and a reference instrument. In general, this is an appropriate contribution to AMT. I recommend minor revisions, i.e. some issues should be clarified before the manuscript

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can be accepted for publication.

2 Major comments:

1) Several remarks concerning the 2D water vapour field, which have to explained in the manuscript.

a) The TDLAS technique allows you to get an average water vapour concentration along the light path. How will you be able to reconstruct the 2D water vapour field? There is nothing stated how the reconstruction of the field is working. Can you please provide information about the general approach.

b) The instrument is build for measuring inhomogeneities in the water vapour field. How large can these inhomogeneities be to resolve the right values ? And to which spatially resolution do can measure small-scale structures in the water vapour field?

c) The derived concentration depends on temperature along the line of sight. You assume a constant temperature in the complete field. If there is any inhomogeneity in the temperature field, how large can the temperature inhomogeneity be so that the error of the water vapour measurement are within their stated uncertainties ?

3 Minor comments:

- l. 12 - 25: It is not clear, why the standard deviation for step-wise measurement is the same as for continuously moved laser beam. It seems that standard deviation isn't depending on the movement? Why is standard deviation so large compared to the reference? Is it because of the inaccurate knowledge of the path lengths. Can you please state on this.

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- Please provide information about the height of the instrument walls and the height of the laser beams above ground.

- As the derived water vapour concentration depends on the current temperature and pressure, the location of the temperature/pressure sensor has to be described. It would also be helpful to include the two sensors in Figure 1.

4 Technical comments:

p. 12828 l 17: missing word: can be considered "as" a good basis

p. 12830 l 18: missing bracket: Ma et al., 2013)

p. 12830 l 24: rewording: "100 ms per field scan" instead of "field scan⁻¹"

p. 12833 l 7: typo: center → centre

l 19: typo: tomografic → tomographic

p. 12834 l 9: rewording: revolution speed → rotating speed

p. 12835 l 3: typo: TLDAS → TDLAS

l 5: Please specify the acronym: PXI rack.

l 14: Please specify Channel 0. Which of the polygons is Channel 0? Maybe denote this also in the Figure 1.

Figure 1:

Caption: I suggest to replace broken lines → dashed lines

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 12827, 2014.