Atmos. Meas. Tech. Discuss., 6, C3028–C3030, 2013
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Atmospheric Measurement Techniques Discussions

Interactive comment on "Retrieval of characteristic parameters for water vapour transmittance in the development of ground based sun-sky radiometric measurements of columnar water vapour" *by* M. Campanelli et al.

Anonymous Referee #2

Received and published: 22 October 2013

The paper describes a new method based on surface pressure and relative humidity to initiate the estimation of the water vapour column from sun-sky radiometer measurements at 940 nm. Water vapour column estimates with the new method are compared with near-simultaneous microwave radiometer and radiosonde measurements. The methods and results presented are incremental improvements of earlier works by the same authors and provide documentation and validation of the water vapour procedure to be released as part of the ESR.pack software. While the paper validates the method for one site over a year, validation for other sites and climatologies are still needed.

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Interactive Discussion
Discussion Paper

Especially since the accuracy of the method is highly dependent on the shape of the water vapour profile.

Before publication the points below should be addressed.

Page 8075, line 24: Please specify at which wavelengths the instrument measures.

Page 8080, line 13: May you please justify why the "standard deviation appears to be the best estimate"?

Page 8081, line 11: It is stated that "... e_0 is calculated ... according to Lowtran code formula". Neither the Kneizys et al. reference nor the LOWTRAN code is easily available. And in the case LOWTRAN is available it is a waste of time to search for that single line with the wanted code snippet. Hence, please provide the equation(s) or a more detailed reference.

Page 8085, line 22: A radiative transfer code is mentioned to be written by one of the authors. This information is of little relevance and may be omitted. However, information should be included about:

- What does the radiative transfer code calculate?
- How does it include/treat absorption by water vapour? Line-by-line? If parameterizations then please justify the parameterization.
- Is the geometry plane-parallel or spherical? If plane-parallel, how accurate is it for $m = 8$ compared to spherical geometry?
- Does the radiative transfer code include aerosols and cirrus clouds?
- How does this code compare with other radiative transfer codes? If it is not a line-by-line code: has it been validated against line-by-line codes?
- Was there a problem with existing codes that necessitated the need to develop yet another radiative transfer code?

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Pages 8090-8091. On lines 20-22, page 8090, the water vapour from the Microwave Radiometer (MWR) is indicated to be poor for law water vapour content. Then, on lines 28 (page 8090), 1-2 (page 8090) it is emphasized that water vapour dependent a and b parameters improved the agreement with MWR measurements especially for low water vapour content. Thus such an improvement in agreement mean anything as long as the MWR measurements may not be fully reliable at low water vapour content?

Page 8092, lines 9-12. Please check the title of the Campanelli 2010 reference. Should it start with “Summertime”?

Page 8098: Caption Fig. 2. Why is a fixed value for b used and not one you have derived? Please justify the use of b from Halthore et al. Same comment applies to caption of Fig. 4, page 8100.

Page 8102, Caption Figs. 5 and 6. Please add reference to table 2 so it is clear where the values of a, b and V_0 come from. For example, for Fig. 5, change “each class.” to “each class, see table 2.”

Generally the language throughout the manuscript would benefit from a careful read by a native English speaker. That would potentially clarify expressions such as “with the intent of the reprocessing data once the calibration table is available” (Page 8089, line 13).

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 8071, 2013.