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Discussions

Interactive comment on "Development of on-site self-calibration and retrieval methods for sky-radiometer observations of precipitable water vapor" *by* M. Momoi et al.

Anonymous Referee #3

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This manuscript written by Momoi et al. presents a new in-situ method to calibrate the so-called water channel in a sky-radiometer Prede POM02, and to derive the precipitable water vapor content in the atmospheric column, by using measurements from the sky-radiometer in the almucantar and principal planes. The method means a further step in the development of methods for the retrieval of aerosols and gases, with very good applicability for the SKYNET international network.

The method description is also complemented with sensitivity analysis, ending with a couple of experimental cases along 1-2 years in two different sites.

The paper is clear, with a good detail about the theoretical considerations. The English

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Discussion paper

grammar is good, with very few typo errors if any.

I consider the manuscript must be accepted in AMT, after some comments are addressed.

General comments:

- It is very important to include an estimation of the uncertainty of the method, performed by expanding the forward sensitivity analysis or by comparison with other methods, even if preliminary. This information is critical and I miss it in the abstract and more in depth in the text body, if it is currently available.

- The POM02 has been used in this study; however, version POM01 also has a channel in 940nm. Then I understand the method can also be applied to this version. This should be made clear.

- What is the model used for the sensitivity analysis performed in section 2.1.2? RSTAR? State it clearly and give some detail.

- A comparison to other techniques for PWV retrieval developed in SKYNET framework is envisaged (i.e. Campanelli et al), and discussion of pro/cons advised. If this is planned for a future work, please state.

- Errors in aerosol properties interpolated at 940 nm could have an impact on the comparison of PWV between AERONET and this method? Have the authors checked the comparison of aerosol properties from Cimel and this method, during the period studied? If yes, it is not need to include a detailed description, but comment (related to Figure 14).

- Is the cloudscreening also a new method developed for this study? Two different thresholds are used for the two near and far indices. How these thresholds have been selected? Did you performed an statistically study, or it is simply a preliminary proposal?

Specific comments:

- Abstract, line 22: "remains challenging" ?

- Abstract, line 28-30: in the second step, the transmittance of PWV is retrieved; however, both in the text and the plots look like it is the PWV content, not the transmittance, retrieved. Please write consistently.

- page 3, line 73: the calibration method described for AERONET is solely for field instruments, please state.

- page 6, line 150: I'm not sure to understand the need for this sentence here, or it looks like incomplete discussion here.

- Page 11, line 326: In equation 21, the band average transmittance is used, converted from PWV in step 2. Do you mean the conversion is performed in the step 3, from the PWV obtained in step 1?

- Page 12, line 355. Is the Huber's M-estimation method iterative? (the weight to calculate ln<F0> depends on ln<F0>, so any condition applied?)

- Page 14, line 415: what is the time stamp used for any triplet? The central element time stamp or the first element time stamp?

- Page 14, line 440: this error estimation about 0.5cm looks somewhat high to me, in comparison to other techniques. It would be useful to provide literature estimations of the uncertainty for the methods used as referents (AERONET, MWR, GPS...) in the comparison discussion.

- Page 17, summary (conclusions): is there any error estimation for PWV>2cm? Some discussion on the pros and cons of this method and other methods developed for Prede POM instruments would be useful.

- Is figure 1 used in the text?

- Caption figure 3: please explain what S-S refers to (I think it is single scattering) .

- Figures: I think saying "top row" and "bottom row" is more appropiate than "top and bottom line".