Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2019-426-RC2, 2020
© Author(s) 2020. This work is distributed under
the Creative Commons Attribution 4.0 License.

Atmospheric Measurement Techniques 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 #2

Received and published: 7 January 2020

The study performed by Momoi et al., is a very important evolution in PWV retrieved from radiometers. It exploits findings of established methods and proposes an approach that can be used without prior calibration and could provide reliable PWV from sky-sun measurements. The methodology is described in detail and justified in an appropriate manner. Results are promising and the method could be adopted operationally from Skynet and other networks. I suggest accepting the manuscript for publishing in AMT, after some minor technical corrections and clarifications.

Since it is a novel method, it is crucial to add some preliminary discussion on the uncertainties of the method. It is important for scientists to have an estimation of the

Printer-friendly version

Discussion paper

expected uncertainties, before applying the method. Is it more accurate than the well -established methods or the main advantage is the field calibration? Also, when transferring the calibration from the one method to the other, to retrieve PWV from the direct sun data, the error propagation is expected to be very high. I suggest discussing this issue in detail.

It should be clarified in abstract and introduction section, that the calibration constant is referring to the extraterrestrial / Top of the atmosphere value of F. It might be reasonable for people into sunphotometry, but when referring to various equations and approaches, it should be crystal clear the referred quantity.

Method for cloud screening described in 2.2.4, is first time described? If it is not, or if it is based on an existing method, some references should be provided. If it totally new, it should be discussed more. Not just one day as an example for the validity. What are the improvements compared to other approaches? If 17% of cloud cases are contaminating the clear sky data, why don't change to different threshold values? 17% seem a big number which will end in high errors to the data set. At least for the validation of PWV method, stricter criterion is preferable, though it might result in smaller database, because the goal is to estimate the results of algorithm in clear sky conditions.

In step 2 of SKYMAP. Does it retrieves PWV or just the corresponding transmittance (as stated in the abstract?) If it is just the transmittance is should be clarified in the description and change the title of 2.2.2. If it is PWV it is important to plot separately the PWV retrieved with SKYMAP in the comparisons sections. Are these retrievals useful or are just a step in the calculations to obtain the Fo?

Technical comments

Abreviations should be defined also in the abstract.

L56-60 . The two sentences should be separated. It seems that PWV is defined only

CC BY

at 940nm. 940 is a bandwidth that is selected because of the highest absorption in the shortwave spectral range.

L66 Bruegge approach was also dependable on the altitude of the station, which made it difficult when transporting an instrument.

Figure 10-11. It is not clear what is referred as true values. Please explain in the manuscript.

L124 It seems that something is missing. Which quantity is integrated from BOA to TOA?

L152-153 How R was simulated? An RTM was used? Please describe in detail.

Figure 3. Please use same range in y-axis because it is confusing when it changes all the time.

L167 Some explanation should be provided regarding the selection of dust for the simulation.

L240 There are not 18 boundary layers. As it stated by the term boundary, it is located on the boundaries. Stratosphere is not a boundary layer. I suggest to change to just " 18 layers"/

L440. 0.5cm is too big and not visible in figure 10. Since it is for values <2cm, this is more tha 50% error. Is it a typo or it is estimated from somewhere not shown on the figure?

L476-85. Write in a clear manner that annual values refer to Fo and not PWV.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-426, 2019.

CC BY