Atmospheric
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Interactive comment on "Validation of GOME-2/MetOp-A total water vapour column using reference radiosonde data from GRUAN network" *by* M. Antón et al.

Anonymous Referee #1

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General comments

The manuscript presents a comparison study between the total water vapour column retrieved from the Global Ozone Monitoring Experiment-2 (GOME-2) satellite measurements and the same quantity obtained from the GCOS Reference Upper-Air Network (GRUAN), which is considered here as the reference. The validation of satellite retrievals is extremely important because it allows determining its general accuracy. Additionally, the authors addressed the effects of solar and satellite geometry, cloud fraction, cloud top albedo and pressure in the satellite retrievals of TWVC, which will constitute valuable information for the potential users of this GOME-2 product. The

study is therefore relevant and appropriate for AMT. Below I listed the specific comments that the authors should address.

Specific comments

- The authors state (pag. 9576) that both data from GDP4.6 and GDP4.7 are used, I think this corresponds to the 1400 cases mentioned in the abstract and in section 3. But then, in the analysis of the geometrical parameters (pag. 9583) it is stated that only GDP4.6 is used, however it seemed to be the same dataset. What is the dataset in this case, how many data points? Please clarify.

- In the beginning of Section 4.2 the authors mention the use of three data sets (all data, CF<5% and CF>50%). But then I could not understand the meaning of the next sentence when it is referred that "The percentage of cases selected is about 39% for cloud-free conditions and 31% for cloudy conditions". Could this be connected with my previous comment on GDP4.6 dataset? Were all 1400 cases considered?

- Although the authors state that the relative differences between GOME-2 and GRUAN data do not present a significant dependence on CTP for SZA>50° (Fig. 6), it is curious to note that, in this case, the relative differences are nearly zero for low CTP (higher clouds). Apparently the shielding effect of clouds is not important for higher SZA or what could be the reason? Do the authors have an explanation for this? In fact, this apparently contrary behavior for higher and lower SZA, respectively, result in an overall decrease of the relative differences (in absolute terms) with decreasing CTP (increasing cloud top height), which would seem to be in disagreement with the explanation given by the authors regarding the shielding effect of clouds.

- GDP 4.6 is affected by a scan angle dependency that introduces a bias between East and West ground pixels, which was corrected in GDP 4.7. In this work, 86% of the data used is from GDP 4.6 (Section 2.1). Is it possible that the results presented regarding the dependence of the relative differences between GOME-2 and GRUAN data on the different cloud quantities are somehow altered due to this East-West bias? Please

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include a comment on this.

Technical corrections

Page 9575, line 28: "trough" to "through"

Page 9577, line 12-13: "daily near global " consider change the order of words

Page 9579, line 16: "with" to "to"

Page 9581, line 8: "The negative values of the almost. . .": remove "the"

Page 9585, line 4-5: ". . . which consist of that part of the trace gas column below clouds is hidden by them. . .". This sentence should be rephrased.

Page 9587, line 9: "provide" to "provided"

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 9573, 2014.