

## ***Interactive comment on “A multi-site techniques intercomparison of integrated water vapour observations for climate change analysis” by R. Van Malderen et al.***

### **Anonymous Referee #1**

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#### General comments

This manuscript is well written and of high quality. Presented is an extensive inter-technique comparison of vertically Integrated Water Vapour (IWV). The study aim to intercompare IWV derived from AIRS, GOME, SCIAMACHY and GOME-2 satellites, in-situ radiosonde and ground-based GPS and sunphotometer technique for 28 global sites. A detailed analysis of technique/instrument specific biases is presented. The work is purely observation based and is a first step towards use of the derived IWV time series for climate trend analysis. The GPS is used as reference dataset.

C169

#### Specific comments

The main concern regarding the study is the data quality of the reference GPS tropospheric products. The IGS repro1 tropospheric products are used and assumed to be a homogeneous dataset (line 2-3, page 1100). This however is only partly true. It is to be noted that dataset is processed with the same processing strategy for the period of the study but this does not necessary mean that the equipment changes are investigated. This needs to be addressed in the paper.

The second comment is regarding the GPS-radiosonde comparison for Brussels. On page 1103, line 24-25 a wet bias is reported in the nighttime observations 0000 UTC. Further on page 1104 line 12 the GPS data is assumed to be insensitive to the diurnal cycle. However, the IGS repro1 processing is done with a processing time window of 24 hours changing at 0000 UTC. I will advice the authors to investigate this processing artifact. The high temporal resolution of GPS repro1 can be used to compare the 2355 UTC observations from the end of the processing with the start of the next day processing at 0000 UTC. I assume that taking into account this effect will improve the the reported nighttime bias to the radiosonde. I insist that this additional test is carried out.

The conclusions section can be improved. It is not appropriate to point to where the results are summarized (line 4, page 1123, and line 8) but the main findings are to be reported briefly. The purpose of the "conclusions" is to facilitate the reader, which is not willing to follow the details of the study, but is interested only in the main finding. This conclusion section is not written with this in mind and it is recommendable to rewrite it.

#### Technical corrections

On page 1089 line 24, it is not clear, which parameter has "4 mm jumps". I assume it is IWV but will recommend to be clarified.

Line 20-23, page 1091: the sentences "Because ..." is long and not clear.

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Line 9-11, page 1096: the sentence "This number ... " is long and not clear.

Parasite language constructions like:

"we now want to", on page 1107 line 22, "we already" want" on page 1112, line 27, "when we now consider" on page 1114, line 19, "The finding strengthens us in" on page 1114, line 22, "When going through the literature reports on similar techniques intercomparison it turns out that" on page 1123, line 18-19

are often spotted in the manuscript and more appropriate for a casual conversation than a manuscript. Please correct.

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Interactive comment on Atmos. Meas. Tech. Discuss., 7, 1075, 2014.