

Interactive comment on “Assessment of COSMIC radio occultation retrieval product using global radiosonde data” by B.-R. Wang et al.

B.-R. Wang et al.

markwangpk@gmail.com

Received and published: 9 March 2013

Reply to Anonymous Referee #2

Comment: My main objection to the paper is the comparisons of humidity data at high altitudes. In my opinion neither the COSMIC data nor the radiosonde data can be expected to hold enough information about humidity above 200 hPa to justify any conclusions based on this part of the dataset. I agree with referee # 1 that the radiosonde data are unreliable above 200 hPa. Also, as far as I am concerned, stratospheric radiosonde humidity data are flagged out in the ECMWF data assimilation. But more important: The GPS RO humidity retrieval holds no information above 200 hPa: In equation 2 the second term is probably 3-5 orders of magnitude lower than the first

C4059

term above 200 hPa. Consequently N is quite insensitive to variations of V_p , as the authors also note. 1DVAR responds to that by falling back on the background humidity with added noise. This is why the authors conclude (p 8412 l8) that: "The wetPrf specific humidity bias and background bias were almost the same in the layers above 200 hPa". I think that the authors are confusing the subject because the comparisons of stratospheric humidities are applied in an unreflected way. Figures and discussion relating to water vapor above 200 hPa are quite irrelevant and should be removed from the paper.

Answer: We have removed all the discussions and figures relating to water vapor above 200 hPa. The comparison of humidity above the 200 hPa level is not suitable.

Comment: The method for dealing with the outliers, i.e. removing profiles outside a certain relative error (900 %, 9900 % etc.) of water vapor pressure may be seen either as an additional quality check or as a way to characterize the relative error distribution. I am not sure which. It looks as if data points are removed one by one rather than whole profiles. Is that justified? If a single data point is flagged as invalid I would suspect that at least a larger part of the profile, if not the whole profile, would have to be flagged out because the atmospheric variables at a single level depends on bending angle retrievals from several layers. I prefer to look at the reduced data sets as a tool to describe the relative error distribution. And that is probably better achieved by making histograms or scatter plots as in figures 4 and 5.

Answer: Yes, if one data point has large bias, the other data points in the profile would also be affected. Take the extremely low water vapor pressure for example. If the profile contains the extremely low water vapor pressure data points, usually, in the comparison with radiosonde, the bias of some part of the profile is also large. We have changed the data filtration method. If one data point exceeds the limit, we removed the whole profile instead of the single one data point.

Comment: p 8415 l 15-21 I became a little uncertain about whether the 1DVAR algo-

C4060

rithm referred to here is the same as the analysis as a whole is based on? I suppose that it is an alternative experimental 1DVAR. Maybe state that a little more clearly.

Answer: Yes, it's an experimental 1DVAR. It isn't the same algorithm CDDAC used. We were a bit confused about the extreme small humidity data from wetPrf. So, we developed this 1DVAR algorithm. More description was added.

Comment: p 8417 l 5 (sec 3.4) This is an interesting discussion and the conclusion (that refractivity is a better benchmark than the 1D-Var products) sounds right whatever the reason for the discrepancy between the ECMWF model and the Chinese radiosondes is. The comparisons in refractivity space between observed and direct calculated refractivity from radiosonde measurement (fig 8 and 13) seems like a good tool because such comparisons would (as far as I understand) be completely independent of NWP models.

Answer: Yes, in our opinion, the observed refractivity profile is more suitable to be used as benchmark. The 1DVAR product is significantly affected by background.

Comment: p 8409 l 20 : There seems to be a small misunderstanding here. The Goff-Gratch equation is not exactly reported in Murphy et al., 2005. Rather they (Murphy et al.) suggest a more accurate parameterization.

Answer: We have changed the reference to "Goff, J. A.: Saturation pressure of water on the new Kelvin scale, Trans. Am. Soc., Heating Air-Cond. Eng., 63, 347-354, 1957."

Comments: p 8406 l 4 : global radiosonde -> global radiosonde data p 8404 l 13 could not detect some abnormal -> failed to detect some of the abnormal p 8409 l 5 : "whicha" ? p 8412 l 10 : smaller than radiosonde -> smaller than the radiosonde specific humidity p 8412 l 17 : mean relative error had -> mean relative error has p 8412 l 18 : function which calculates the relative error. -> function used to calculate the relative error. The negative relative error could -> The negative relative error can p 8414 l 20 : not consistent -> inconsistent p 8415 l 15 : had developed -> have developed

C4061

p 8426 show the data number -> show the number of data points (Possibly elsewhere also - consider writing "data points" rather than just "data" through out the paper)

Answer: We have corrected all the wrong phrases.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 8405, 2012.

C4062