Atmos. Meas. Tech. Discuss., 5, C3604–C3606, 2013
www.atmos-meas-tech-discuss.net/5/C3604/2013/

Atmospheric Measurement Techniques Discussions

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

Anonymous Referee #1

Received and published: 20 January 2013

This paper discusses the comparisons of COSMIC GPS "wetPrf" data product (which is the COSMIC 1DVAR retrieval product using the ECMWF analysis as the background) with world-wide radiosonde data set during the period of 2007 to 2010. The manuscript title states that the assessment of COSMIC data is made using radiosonde data; however, it is well known that radiosonde temperature and relative humidity data have various bias problems particularly when they are to be used for climate studies (see for, example, WMO CIMO intercomparison campaigns - the latest one is Nash et al., IOM 107 (TD 1580), WMO, 2011 http://www.wmo.int/pages/prog/www/IMOP/publications/IOM-107_Yangjiang.pdf), and therefore assessment of different radiosonde types using COMSIC GPS data is also of great interest.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

I have two major comments.

1) Please add more, thorough explanation of the "COSMIC data." In section 2, the authors explains that they use COSMIC 1DVAR retrieval product wetPrf profiles, without further explanation about, e.g., the use of ECMWF analysis data as the 1DVAR retrieval background. In later sections, they also discusses "ecmPrf data" and "Observed N and Retrieved N." These were quite confusing. In section 2, please write about the whole picture for various "COSMIC data," and then add more specific information on the data that are actually used in this manuscript. Also, in Introduction, the authors cite several previous works. Please specify which type of COSMIC data each of them used (if this information is critical). I do not have detailed knowledge about various types of COSMIC data.

2) Please remove all the discussions/figures for relative humidity/water vapour above the 200 hPa level. Radiosonde humidity data (not corrected for the time-lag error) above the 200 hPa level cannot be trusted. ECMWF humidity data above this level are of no use for this kind of purpose, because no observations are assimilated there. I also think that GPS radio occultation has virtually no sensitivity to stratospheric water vapour. Stratospheric water vapour can be measured with very special balloon-borne, aircraft-borne, and satellite-borne instruments. See, for example, Kley et al., SPARC Report, 2, 2000 (http://www.sparc-climate.org/publications/sparc-reports/sparc-report-no2/) and the SPARC water vapour II activity website, http://www.sparc-climate.org/activities/water-vapour-ii/ Later in the manuscript, the authors restricted their discussion below the 200 hPa level for humidity, but I think that they had better omit the profiles above the 200 hPa level from the beginning to avoid any confusion/misunderstanding.

Other comments.

Page 8410. Does the wetPrf data set also contain pressure data as well as the altitude data? How is the pressure calculated for each data point? What is the influence

AMTD

5, C3604–C3606, 2013

Interactive Comment

of the potential errors in the pressure calculation for the temperature and humidity comparisons?

Section 3.1 and elsewhere. Is it possible that GPS radio occultation retrievals of temperature and humidity near the surface have much larger uncertainty for technical reason compared to the upper layers?

Section 3.2. Is the point that a small number of extreme values significantly affect the statistics?

Section 3.4 and elsewhere. Please add more explanation about the background data issues. My understanding might not be correct, but, the problems may be in the biases in the original ECMWF analysis data (i.e., the "background" data in this manuscript) or in the local radiosonde data or in the way the assimilation was made in the ECMWF analysis. If the forecast model output for the analysis (this is the "background" for the ECMWF analysis) and local radiosonde data differ much, the radiosonde data may be rejected in the analysis data. In this case, the difference between the wetPrf data and radiosonde data can also be large.

Page 8419, line 9. I suspect that Chinese radiosondes could have large biases in the relative humidity measurements.

Typos. p.8409, l.5. which p.8412, l.18. which p.8413, l.6. Figure 6 p.8413, l.15. Figure 7 p.8413, l.19. first p.8414, l.10. systematically p.8415, l.17. significantly influenced

---

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