**Atmospheric
Measurement
Techniques**
Discussions

Interactive comment on "Implementation of a GPS-RO data processing system for the KIAPS-LETKF data assimilation system" *by* H. Kwon et al.

Anonymous Referee #1

Received and published: 11 December 2014

This discussion paper summarises the use of GPS-RO data in an LETKF system. Details of forward-modelling are provided along with quality control procedures. The LETKF methodology is described and the effect of RO on the ensemble is demonstrated, both compared to a 'control' run, assimilating conventional observations only, and also ERA-interim reanalysis fields, both showing improvements.

1   General comments

The quality control step is described clearly, and the statistics following this step are improved, but the number of observations that pass/fail the QC at different heights should be plotted, with an approximate percentage noted in the body text.

In the LETKF experiment, the top of the model is at 40km. This is very low for the assimilation of bending angles (though the text clarifies that the model will be extended). A description of the (presumably extrapolated) background data used to integrate Equation 1 above the model top is required, which should explain the large bias above 30km in Figure 5a.

Although the model is already constrained by radiosondes in the NH, it is surprising that the RO has almost no effect in the NH (Figures 7 and 8), given that RO observations exist over oceans, where sondes do not. A brief discussion of this should be included.

Figures 8, 9 and 10 are plotted for a single height (100hPa), where RO is known to improve analyses in other systems, but this paper would greatly benefit from vertical profiles of the reduction in ensemble spread, and fit to ERA-interim (perhaps separated by NH,TR,SH). Though it is appreciated that this is a system in development, such details are worth including.

2   Specific details

p11929 l4: mention rising occultations as well.

p11932 l7: ECMWF have plans to implement a 2D operator in the next model cycle.

p11932 l16: the GRAS SAF is now called the ROM SAF.

p11932 l21: state 'horizontal location' for clarity.

p11932 l23: "refractive index" not "refractivity index"

p11932 l24: 'r' only takes this definition for spherical symmetry. In a 1D operator it is strictly the distance from the local centre of curvature.

p11933 l10: Which constants?

p11933 l11: "impact parameter" should be "x=nr"

p11933 l26: Define "impact height"

p11935 l17: Use "larger" rather than "inflated"

p11935 l20: Repeated word: "bending".

p11936 l4: Why does tangent point drift reduce the number of observations passing QC? This is counter-intuitive.

p11937 l2: "an every 6 h" -> "a 6-hourly"

p11939 l21: "increment"->"increments"

Figure 1: Should be "TerraSAR-X", "SAC-C" and "C/NOFS" (CORISS is the instrument not the satellite).

Figure 3: Requires counts (see above). Are the zonal plots for all satellites?

Figure 4: What is subtracted from what? TPD-noTPD?

Figure 5: Add season to caption.

Figure 6: "Ensenble"->"Ensemble" in title. Specify units of colour scale (radians?).

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 11927, 2014.

C4182