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Atmospheric Measurement Techniques Discussions

Interactive comment on "Intercomparisons of HIRDLS, COSMIC and SABER for the detection of stratospheric gravity waves" *by* C. J. Wright et al.

Anonymous Referee #2

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General comments

This paper presents a novel study for the ability to detect stratospheric gravity waves (GWs) from three different satellite missions. Each mission provides temperature information in the lower stratosphere with comparable precision and more or less vertical resolution. The authors use colocated vertical detrended temperature profiles and analyse them with a correlation/standard deviation method and the S transform. The analysis methods arise some additional questions that should be considered. Overall, the paper is well structured and written. My recommendation is that the paper should be published with minor revisions described below.

In the order of occurrence:

In section 2 (Instruments) I would recommend to include some basic information about the observational window (filter) with respect to the detection of GWs that each of the satellite system is able to see. E. g., for the radio occultation technique (COSMIC) Marquardt and Healy (2005) have shown that for realistic noise levels temperature fluctuations can be interpreted as generated by GWs with vertical wavelenghts larger than 2 km in the altitude region up to 30 km. Similar information should also be given for HIRDLES and SABER.

Section 3.1, page 743, line 3: It is not quite clear which colocation criteria is choosen: "... ten times this, ...". I suppose the spatial distance is not more than 180 km. 1800 km should be too much for a realisitic comparision with respect to GWs.

Section 3.2, page 743, line 9: The hight range used in this study includes the tropopause in the tropics. Using vertical detrending of the temperature profiles for the determination of the temperature background leads in most of the cases to unrealistic high temperature variances near the tropopause level depending on the ability of the filter to follow the temperature kink at the tropopause. Of course, the application of the vertical detrending should give similar (but mostly unrealistic) T' values for the different instruments near the tropopause (your figure 2, 3rd plot) for further analyses. But due to the different vertical resolution of the different instruments and therefore possible differences in the tropopause height, I recommend to use a height range starting at 20 km, or individually 2 km above the tropopause.

Section 4.1, page 746, line 5-7: For the identification of GW type features or other in a temperature profile I refer to the study from Gubenko et al. (2008). For (internal) GWs they use the relative amplitude threshold "a" and conclude that observed temperature fluctuations in the lower stratosphere may generally be related to GWs when 0<a<1 is fulfilled. Could this criteria also applicable for this study?

Specific comments

Table 1: In an ideal case (which occurs often for dry conditions) the GPS radio occul-

tation technique provides atmospheric information down to the surface and not only to 800 hPa. Realistic temperatures from COSMIC are available up to about 40 km, i.e., approximately 3 hPa.

Figures:

For all figures the caption should be significant larger, especially for Fig. 3 and Fig. 5.

References

Gubenko, V. N. et al., Determination of the intrinsic frequency and other wave parameters from a single vertical temperature or density profile measurement, J. Geophys. Res., 113, D08109, doi:10.1029/2007JD008920, 2008.

Marquardt, C. and Healy, S. B., Measurement noise and stratospheric gravity wave characteristics obtained from GPS occultation data, J. Meteorol. Soc. Japan, 83, 3, 417-428, 2005.

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 737, 2011.