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Atmospheric Measurement Techniques Discussions

# *Interactive comment on* "Analysis of internal gravity waves with GPS RO density profiles" *by* P. Šácha et al.

**P. Šácha et al.**

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We would like to thank D. Luna for a positive review of our manuscript. We have answered all the comments below.

Specific comment: Referee: The topic is potentially interesting, but I think more evidence should be shown if this analysis pretends to replace the usual ones, based on temperature fluctuations. Maybe a larger statistic (more than 60 cases) could help.

Larger statistic would be more convincing at the first sight. Nevertheless, a sample of sixty independent occultation events is large enough to remove individual qualities of each profile's power spectrum by averaging. Also, we would like to point out the robustness of our results. They are by nature independent of the sample size because



they root in differentials between the dry temperature and density data caused by the hydrostatic balance assumption. The key is that for a temperature background we were able to find correspondent density backgrounds with both smaller and higher complexity (that is illustrated in Fig. 4 by different powers in low wavenumber spectra). Then, regardless of the separated background complexity, the temperature fluctuations have increasingly less power with increasing wavenumber compared to density fluctuations. This feature is a fundamental attribute of the finer, nonfiltered (compared to the dry temperature) structure of density data and is therefore independent of the sample size.

Technical corrections:

Referee: Page 8312, Line 23: Internal gravity waves should be replaced by "IGW", as previously defined.. Thank you very much, the text was changed. Page 8312, Line 23: IGWs exist in continuously stratified fluids.

Referee: Page 8313, Line 23: In that discussion.. Thank you very much, we changed the text according to your remarks. Page 8313, Line 23: In that discussion, they have also stated the future scientific goals of IGW research.

Referee: Page 8315, Lines 8-11: The enhancement due to the tropopause kink should be clarified.. The statement was added: Page 8315, Line 11: (see Alexander et al. 2011) With the following reference: Page 8329, Line 4: Alexander, P., de la Torre, A., Llamedo, P., Hierro, R., Schmidt, T., Haser, A., and Wickert, J.: A method to improve the determination of wave perturbations close to the tropopause by using a digital filter, Atmos. Meas. Tech., 4, 1777-1784, doi:10.5194/amt-4-1777-2011, 2011.

Referee: Page 8319, Line 2: Please detail the space-time criteria you adopted for consider two events to be close.. We have chosen occultation events belonging to the time interval (one hour prior, nine hours after the earthquake) within a distance of 3500 km from the epicenter.

Referee: Page 8319, Line 3: Please explain the relevance of the Tohoku earthquake

with respect to this work.. We have chosen to demonstrate our method on the sample connected to the Tohoku earthquake because we presumed that the profiles will be strongly perturbed, making the background separation issue even more peculiar and that it would be possible to detect significant IGW modes and their interactions using the CWT. Nevertheless, the results presented in this paper are strictly general with no additional focus on the IGWs created by the earthquake. These particular results were presented at the EGU meeting 2014.

Referee: Page 8320, Line 3: Explain which definition of tropopause was used (cold point or WMO).. We have computed the altitude of both, cold point and lapse rate tropopause, taking the higher one as a lower bound of the region.

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Interactive comment on Atmos. Meas. Tech. Discuss., 7, 8311, 2014.