

Interactive comment on “Aircraft measurements of gravity waves in the upper troposphere and lower stratosphere during the START08 Field Experiment” by F. Zhang et al.

Anonymous Referee #3

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This is a study of mesoscale gravity waves observed during the START08 field experiment. The authors carefully identified gravity waves (GWs) from aircraft measures, and estimated gravity wave characteristics using spectral and wavelet analyses. The manuscript shows that spectra of horizontal winds and temperature follow the $-5/3$ power law. Overall, this is a well-constructed manuscript. I have a few minor comments. I recommend accept this manuscript after minor revision.

Comments:

1. Line 15, Page 4727: Signals with periods of $\sim 20\sim 60$ s. This is mentioned in the

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abstract and conclusion, but I cannot really see how this is estimated in the main text.

2. Line 1-2, Page 4734: u and θ change drastically near the high terrain (100-200 km west) associated with enhanced variance of w . This appears to suggest that this disturbance is associated with topography.

3. 2nd paragraph of Page 4736: It is remarkable to see a power law can emerge from a very limited number of aircraft measurements. It appears to me that the composite spectra horizontal velocities (panels a, b, c of Fig. 5) and potential temperature (panel e of Fig. 5) show a slope somewhere between $-5/3$ and -3 for the considered wavenumber range by eye.

4. Line 7 of page 4735: The logic of this sentence is confusing. Continuity equation is always satisfied regardless of the scale of the motion, so it is difficult to use it to explain why power of w is much smaller at subsynoptic scale.

5. Line 6 of Page 4742: rotation could also alter the dispersion relation, hence the phase relation between different variables. It is helpful to state clearly what types of GW dispersion relationship is used in this study. Is it non-hydrostatic GWs, or inertia-gravity waves?

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