Weather Clim. Dynam. Discuss.,
https://doi.org/10.5194/wcd-2020-61-RC1, 2021

Interactive comment on "The signature of the tropospheric gravity wave background in observed mesoscale motion" *by* Claudia Christine Stephan and Alexis Mariaccia

Anonymous Referee #1

Received and published: 2 February 2021

This paper studies the gravity wave characters through an extensive sounding network of a recent campaign and high-resolution simulation of the same period. A novel analysis is performed to connect the energy spectra of the inertial gravity waves and the observed scaling of divergence amplitudes with area. This manuscript is well written and easy to follow. The presentation is very clear, and the scientific approach is also valid. Yet, a few interesting points were raised while reviewing this manuscript. Therefore, a minor revision is suggested here before final publication of the paper.

Specific Comments:

1. decomposition of numerical data:

While analyzing the observation data, a Lanczos filter is used to filter out the waves with vertical wavelength between 500m and 10 km. Is similar vertical selection applied for the numerical data? How it might affect the results?

2. global spectrum

a. given that there is a lack of energy at small scales in the reanalysis data, it is not clear to what extent the steepening at k>100 in the model is realistic. Some models show a -5/3 slope till the diffusion zone. The reviewer is wondering how will it affect the calculation if the -5/3 slope holds for all the k that is greater than 8.

b. A significant amount of variation could be found in the wave amplitudes in the observation (Fig. 2cd). Is this temporal variation also holds for the global spectrum? If not, how should we reconcile this result with the direct attribution of global spectrum to the IGs?

3. Line 295: the reviewer is not fully convinced that there is a causal link between the gravity waves and the convection for the Jan 31st event. Is it possible that the good match between the wave characters and the cloud field is due to that the convection there modulates the wave signal? Also, just out of curiosity, is there a way to detect similar wave effects on the convection as this Jan 31 event in the model, especially for the 2.5km ICON run?

5. Table 1 shows a nice gravity waves analysis for the sounding data. It is interesting to know whether similar analysis could be also done for the numerical data. Moreover, the results in the models might also have implication for the sensitivity on the model resolution.

Technical Corrections:

Line 80: Missing words after "data"

Line 114: should be > 2

Line 235: Fig.6 -> fig.7

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