

## Comment on acp-2022-389

Anonymous Referee #3

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Referee comment on "Intermittency of gravity wave potential energies and absolute momentum fluxes derived from infrared limb sounding satellite observations" by Manfred Ern et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-389-RC3>, 2022

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The manuscript presents an extensive study of gravity-wave momentum fluxes and potential energy intermittencies as observed by HIRDLS and SABER spaceborne instruments. Using these limb sounding instruments enable the authors to provide a broad geographical and vertical coverage: only polar regions are excluded, and intermittencies are reported from 30 km to 90 km of altitudes. This observational study gathers a lot of information on gravity-wave intermittency, and may thus provide very helpful guidance for parameterizations in GCMs. The article is well-written, easy to follow, references to previous literature is abundant, and the figures are of excellent quality. I would therefore recommend publication with only a few minor comments that may be addressed before.

### Minor comments

- Convective waves: The paper mentions quite thoroughly the limitations of the satellite dataset, notably in terms of spectral characteristics of the waves that can be observed. I would appreciate though a further discussion regarding gravity waves generated by convective systems in the tropics. Like convection, the activity of those waves likely presents a strong diurnal cycle (cf. e.g., Corcos et al., 2021, reference already cited). I wonder how the HIRDLS/SABER observation characteristics (e.g., local time of passage) might alter the retrieval of the intermittency. My impression is that undersampling the diurnal cycle would probably lower the observed intermittency... I also wonder whether this might be one possible reason for the higher

intermittencies reported in SABER observations around lines 515 onward.

- PDF Normalization process: I agree with the justification of PDF normalization... but I am still unsure how the normalization is actually applied. Actually, this is explained in only one sentence (l 239-240), which is repeated in line 247-248. I would appreciate some further details. In particular, my current understanding is that, in every geographical box used to obtain gravity-wave momentum flux PDFs (and for every calendar month), one normalization factor is computed: this would explain that the authors refers to the "global distribution median values", which are used as normalization factors. What I feel confusing is the application of this process that is made in Figure 6 (namely Figure 6a => 6b). A natural choice (at least for me!) would have to use a single normalization factor per year for the whole 65S-50S region. But this seems at odds with several of your results/remarks, so I have inferred that this is not what was applied.

#### **Technical remarks**

- l 122: remove "for about 60 days"
- l 153: flying northward rather than "southward", right?
- l 184: discarded rather than "neglected"?
- Figures 17 and 18: I would recommend putting the highest altitudes at the top of the figures and the lowest altitudes at the bottom.