

Author's Response to Editor's Decision

We thank the editor for handling our manuscript and thank the referees for going through it carefully and providing their feedback. We have revised the manuscript based on the comments provided by referee #2 in his/her report #1. Point-by-point replies to the referee's comments are provided below. Comments are in black text while their replies are in blue text. We hope the revised version of the manuscript is suitable to be accepted for publication in Atmospheric Chemistry and Physics journal.

Point-by-point reply to the referees' comments

Report#1 comments

I thank the authors for their corrections and answers after the first round of review. I do think this paper has improved a lot and provides a nice observational study, unique in the wide set of techniques used.

Reply: We thank the referee for carefully going through our manuscript and providing his/her comments and suggestions for further improvement. We are glad that the referee has found many improvements in the manuscript and feels that it provides a nice and unique observational study.

I would still recommend a minor revision as I am still puzzled by the term 'gravity waves' used in their study. In my understanding, the authors are removing a background defined as a monthly mean to retrieve the 'gravity waves' perturbations (example figure 14). These waves are first described by the 'wave-like patterns' they produce, until the hodograph analysis, described at the end of the paper, that gives some of their characteristics. The authors are using the study of Kim and Alexander 2016 to justify their method and compare their results. In my understanding, Kim and Alexander removed a monthly mean to obtain the perturbations yes, but they are very specific about this technique only filtering the signals with a period less than 30 days, so gravity waves but also Kelvin waves and mixed Rossby-gravity waves as well. They do not link cold phases of gravity waves with cirrus clouds (unlike wrote p44 l8), but between cold phase of tropical waves and cirrus clouds, without distinguishing the type of waves. I would not expect gravity waves to have a period longer than a few days at these latitudes, and still do not understand completely why the authors used a monthly background if the goal was to highlight the gravity waves specifically. Although, the horizontal wavelength derived by the hodograph is in the upper end of the distributions of the observed gravity waves (Vincent and Alexander, 2000, <https://doi.org/10.1029/2000JD900196>). So I wonder if I missed something and the authors have enough elements to call these perturbations 'gravity waves' or if using a more generic term of waves would be better? Maybe deriving the characteristics of the waves earlier would be better to name these waves for specifically 'gravity waves' in the paper.

Reply: We thank the referee for bringing this point to our notice. We have replaced the word "gravity waves" with "waves" in the revised manuscript.