



EGUsphere, referee comment RC2
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Comment on egusphere-2022-381

Peter Haynes (Referee)

Referee comment on "Equatorial waves resolved by balloon-borne Global Navigation Satellite System radio occultation in the Strateole-2 campaign" by Bing Cao et al., EGU Sphere, <https://doi.org/10.5194/egusphere-2022-381-RC2>, 2022

[I am Editor for this paper. One of the referees who originally agreed to provide a report on this paper has failed to respond. Therefore I am acting as a referee myself.]

This is an interesting paper setting out algorithmic details of extracting temperature information from balloon-based radio occultation during one of the preliminary STRATEOLE balloon flights. It is clear that when the main STRATEOLE campaigns are under way, with radio occultation available from many balloons on long-duration flights, this technique will provide much useful new information on temperature profiles in the TTL. This paper provides much useful preliminary information.

My only reservation about the paper is that it has been submitted as a Research Article, and indeed I as Editor accepted in on that basis, but having looked at the paper in more detail it does seem to me to be more a "Measurement Report" than a "Research Article" -- see the description of different paper types at:

https://www.atmospheric-chemistry-and-physics.net/about/manuscript_types.html

In raising this I am not trying to obstruct publication of the paper. But I do ask the authors to consider whether the paper would be more appropriately published as a measurement report. (As far as I am aware, all the standard bibliographic databases make no distinction between the different manuscript types and I believe that the category of 'Measurement Report' was introduced to acknowledge the value of this kind of contribution and to avoid publication delays where, e.g., referees or Editors were reluctant to recommend publication of a potentially very valuable paper because of confusion about whether it contained sufficient new scientific results to the publishable.)

l12: 'A short dataset from the extra Galileo and GLONASS ... planned follow-on' -- the only mention of this in the text is almost a repeat of this sentence -- l588-589 -- saying that no details are given in this paper. It doesn't really seem appropriate to mention this point in the abstract.

l11-16: There is really no concrete information on results here in the abstract. That makes the status of 'Research Article' difficult to justify.

l35-52: This is quite a long introduction that could be shorted significantly simply to say, with appropriate references, that the QBO is important and but aspects of it are poorly understood, one being the quantitative role of different waves in driving the QBO winds changes in the lower stratosphere.

l41: 'uncertainty in period and amplitude'?

l43: 'somewhat muted in forecast models compared to observations' -- I think that you are really talking about free-running global climate models here -- not models that start from an observed state. I think that most readers will interpret forecast models as the latter.

l76-78: 'For example, the difference ... 40 per cent difference in the force in the QBO' -- this seems to be very specific quantitative statement and I wondered what calculation exactly had been done to arrive at it.

l83: 'tangent point ... drifts' -- I suppose that this is standard terminology but it is potentially a little confusing since you have also referred to the 'drift' of the balloon itself. Perhaps consider later in the paper whenever 'drift' is used whether it is always absolutely clear -- to a non-expert reader -- whether it refers to the position of the balloon or the position of the tangent point.

l87-88: I assume, on the basis of the previous statement re 500km, that short here implies say 1000 km or less and larger-scale implies say a few 1000 km. It would be useful to have some indication.

l120: Just to be clear -- the implication here is that this technique works ONLY for quasi-hydrostatic waves. (Any comment about that re implications for estimating QBO momentum fluxes.)

l182-186: You refer to various intervals when different radio occultation signals were recovered and note that these are indicated by dashed boxes on Figure 1, but there doesn't seem to be any information on which box corresponds to which interval.

l185: 'data' is needed only once.

l200-201: I suppose that 'epoch' is being used here in a technical sense. What does it mean.

l236: 'loess' -- I suggest capitalising this -- even if it is not capitalised in program scripts.

l307: 'consecutive' -- should this be 'regular' (in contrast to 'random')

Figure 4: 'lowest tangent point further from the balloon path' -- I think that this means that for each derived profile the lowest point on the profile corresponds to the horizontal location furthest from the balloon path? Is that correct? Perhaps make slightly more explicit.

l364: 'BRO profile matches the ERA5 profile well for this case, which we attribute to the fact that they both consider the same tangent point drift' -- on first reading I was slightly confused by 'for this case' because I interpreted the sentence as implying that 'same tangent point drift' applied to this case, but perhaps not to other cases. But in fact my understanding is that construction of ERA5 profiles with the same tangent point drift as BRO is a standard feature of your calculation.

l372: add 'temperature' -- i.e. 'depress the cold point tropopause temperature by $\sim 1\text{K}$ '?

l423: You give 'quadrature in zonal wind and temperature' as permitting identification as a Kelvin wave here -- then at l478-479 you essentially repeat the same point and cite Andrews et al. Remove repetition?

l494: 'was used in the calculation' -- do you mean in the Sato and Dunkerton calculation?

l499-594: This statement seems to be more appropriate for the concluding Section.

I594-604: As my comment above re I35-52, there is a certain amount of general motivation here that is pretty much the same at the end of the paper as it was at the beginning -- i.e. the results in the paper, apart from showing temperature retrieval from BRO is possible, have not really focused this motivation.