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Atmospheric Measurement Techniques Discussions

Interactive comment on "Atmospheric QBO and ENSO indices with high vertical resolution from GNSS radio occultation temperature measurements" *by* Hallgeir Wilhelmsen et al.

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AC4

We would like to thank the reviewer for the helpful comments and questions. Please see our responses below.

Comment 1: "The authors applied two different methods in order to demonstrate the advantage of the high resolution of GNSS RO profiles. This result, according to lines 6-10 of page 9, seems to be inferred from what the authors called reconstructed fields. I'm not sure if PCA methodology allows calling reconstructed patterns by multiplying

the PC loadings by PC scores (see below). Please add some reference about it or explain this concept."

Response 1: We added a citation to page 8, line 15:

"We do this by multiplying the EOF with its corresponding PC (Wilks, 2006)."

Comment 2: "PCA results change according to the input matrix and they can be different considering for example, a domain between 60 and 60. I think the authors should show some result or make some comparison."

Response 2: The sensitivity of the different methods is an interesting topic that we only briefly discuss in the manuscript.

In this work we focus on tropical atmospheric temperature variability. The method is equally valid for other latitudinal regimes. We plan to create indices also for the mid and high latitude regions in future work.

Comment 3: "Perhaps calling PC loading fields to what authors called "EOF" and PC scores to the time series that they call "PC" it would be better, since it would agree with the common terminology for S-Mode in PCA (EOF)."

Response 3: We acknowledge that the labels can be confusing. As also discussed in the review paper on EOF analysis / PCA, Hannachi et al. (2007, page 1122, https://doi.org/10.1002/joc.1499), there are many different and ambiguous labels of the components from the literature. We therefore chose to follow the naming from Hannachi et al., 2007, and specified which labels we are using in the introduction of Sect. 3 in the manuscript.

To specify this better in the manuscript, we added to page 4, line 17:

"Many names have been used to describe the output from the EOF analysis (see discussion in Wilks, 2006; Hannachi et al., 2007)."

Comment 4: "In my opinion there a too many figures. I'm not saying that they are

needless, but perhaps they can be re-organized or so. In most of them you can find panels with more figures inside. As a result, it's hard to read the axis, the legends, etc."

Action 4: We will improve the figures in the revised document by better merging the plots, and making the labels easier to read.

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