

Review of **Observations of stratospheric gravity waves in the tropics: can GNSS-RO extend the SABER climatological record?** by Almowafy et al.

This paper provides an interesting and in-depth analysis of observational methods for gravity wave research via the SABER instrument and the GNSS-RO technique. The authors provide a well-written and thorough manuscript describing their methods and the important takeaways from their work. The focus on directly comparing SABER with GNSS-RO observations and on the implications of observational filters with the purposes of continuing the climatological record of gravity waves after SABER is decommissioned is novel and unique and will be of interest to the AMT audience. However, there are a few key details that should be considered before the manuscript is published. My in-depth comments, primarily minor in nature, are below.

General Comments:

1. Section 2.2: With different instruments and centers using different processing techniques of the 13 different GNSS satellites/missions, could this have an impact on your results? For example, is there any sensitivity or difference between your results if only COSMIC were used vs. only Spire? Also, what is the breakdown of profiles from each of the different missions? This would also help to demonstrate how different this study is from the COSMIC/SABER work in Wright et al. 2011 & 2016.
2. This is a bit more of a technical correction but there are some issues with citations throughout, my guess is just from a mix-up of `\cite`, `\citet`, and `\citep` in LaTeX. I've caught a few of them and written their line numbers here, but suggest double checking this throughout the manuscript:
 - a. Line 181, 183, 203, 204, 382, 413, 564, 565, 566/567, 577/578, 597, 600, 601
3. Section 4.1 and Figure 4: This section would greatly benefit with some statistical significance testing of the power spectra peaks. I especially struggle with Line 315-316 and the statement that there is a persistent peak at 1.25 years evident in all three datasets, where the zonal wind peak is very small (and smaller than other, seemingly random, peaks). Significance testing against a red noise hypothesis and a 95% significance curve would do a lot to strengthen your argument; or if the results end up being not statistically significant, could help inform your analysis and discussion.
4. In the current discussion and conclusions section, it feels that the use of GNSS-RO to extend SABER is more of an afterthought rather than the purpose of this paper based on the title. I strongly recommend adding more detail here to make the story more compelling. One potential suggestion would be to add a figure showing a comparison of the time series of E_p across the period of SABER and the smoothed GNSS-RO data at some height or for some layer. If the time series line up well, this would be a good demonstration of the ability for RO to continue the GW climatology of SABER.

Specific Comments:

1. Line 32: Please define SABER and GNSS-RO at first use
2. Lines 61-62: The results of the previous study mentioned here seem particularly relevant to this work and should be mentioned/discussed further here. Additionally, please define COSMIC at first use.
3. Line 68: I would be careful at calling GNSS-RO an “instrument”, perhaps calling it a “technique” here is more fitting?
4. Line 77-79: use the main ERA5 citation at the end of this first sentence
5. Line 85: What is the vertical resolution in the stratosphere?
6. Section 2.2: Mention the GNSS vertical resolution here, like how the SABER resolution is mentioned in 2.3
7. Section 3.1: I’m a bit confused as to why the GNSS-RO data is oversampled and interpolated to 0.1 km levels (more than 10x the original resolution) while the SABER data is interpolated to 0.5 km (4x the original resolution) to avoid oversampling. Then the RO data is downsampled to 0.5 km anyway, so what is the purpose of the intermediate step? Please explain.
8. Line 130/575 and throughout: Please ensure proper use of “grid spacing” rather than “grid resolution” where appropriate
9. Lines 176-178: The ending of this paragraph feels a little jumbled and a bit unfinished, specifically in the last sentence. I suggest reworking to make clear that the RO dataset coverage is not sufficient for the method being described.
10. Line 180: “...significant advantages in terms of more robust derived values over a binning approach” → what does this mean exactly?
11. Figure 2: I suggest either reorganizing this figure or adding in additional titles/labels to make the differences in the panels clearer. Specifically, since there is no x-label for panel b, it looks as if the panel has a shared x-axis range of 28 months as panel c. Additionally, add a label to the colorbar for panel c
12. Line 217-218: This is a pretty subjective statement (though I don’t disagree), maybe add a little more detail about their main differences?
13. Line 230-231: I had to read this a couple of times to understand, I suggest reordering the sentence for clarity so that it reads “these two metrics are chosen as they can be measured easily using both instruments, unlike more heavily-derived...”
14. Line 284: where does this “90% larger” number come from? Should this say 900%? Or 9 times larger?
15. Line 485-486/Figure 4: I think it is important to mention that the SABER distributions do have a more pronounced tail to smaller wavelengths.
16. Figure 10 caption: I think this caption needs to be a little more descriptive (particularly in the last line) so that it explains what the 2 km smoothing is applied to even though it is described well in the text
17. Line 571-573: Please add a citation here. Additionally, it could be helpful to provide approximate wavelengths for convection
18. Line 579/580: “The sampled Ep revealed noteworthy results” is a bit of an abrupt transition, I suggest reworking

Technical Corrections:

1. Line 47: “that SABER instrument” → “that the SABER instrument”
2. Line 182: PWs → GWs
3. Line 215: include → includes
4. Line 374: “the observational filters of these” → “the observational filters are of these” or something similar
5. Line 589: such → Such