

The manuscript "Detection of Turbulence from Temperature, Pressure and Position Measurements Under Superpressure Balloons" introduces a new methodology to derive turbulence from super-pressure balloon observations. This has not been done before, which makes this paper very relevant and exciting. This new methodology will open exciting new possibilities of turbulence studies in an atmospheric region where otherwise sparse observation (if any) are available. The method seems sound to me and its description is understandable. However, I would recommend major revision due to three reasons:

1. There is no discussion on why spectral analysis methods cannot be used in this context and if it will be possible to make a statement about the intensity of the turbulence events.
2. I'm missing some at least high-level discussion about turbulence occurrence. I'm aware that the purpose of this paper is to introduce a new methodology and more in depth analysis will follow at a later point. But the authors already state that most of the turbulence is detected close to convection, however no proof is provided. Also, it would be rather straight forward to contrast the STR and TTL balloons e.g. was there more turbulence detected by TTL balloons?
3. The manuscript is full of typos, some examples are: line 20: than -> that; line 55: probability-> probability; line 60: appears -> appear, line 100: the the -> the; line 100: in -> of; line 145: high-> night; line 200: smaller smaller-> smaller.... This is just to name a few, there are many more typos in the manuscript. Therefore, I highly encourage the authors to check the spelling.

Minor remarks

- Line 10: I thought the amplitude of the vertical balloon displacement is more on the order of 30m than 15m. Why is 15m cited here?
- Line 30: what about vertical transport through gravity waves?
- Line 75: "... obtained under super pressure balloons": do you mean "obtained with super pressure balloons"?
- Line 115: why did you degrade the RACHuTS measurements to 30m?
- Line 125f: "However, a rough estimate of the noise level has been evaluated...". I don't understand the tables and the noise calculation. How was this evaluated? Also the table states that it shows the standard deviation, while in the text the average of the 10% smallest variances of the 6th order increments is mentioned. How does this fit together?
- Eq 1: what is π ?
- Line 195: the amplitudes range up to 100m, I'm wondering if some of the large amplitudes are due to depressurization events. How did you actually handle balloon depressurization events?
- Line 220: What are the corresponding spatial scales?
- Fig. 5: don't fully understand this figure: Shouldn't the red line indicating Θ_2 be at the same level for both times t_1 and t_1+30s ? Maybe leave it out at t_1 ?
- Fig. 6: how do these spectra compare to other flights?

- Line 270: Typos/grammar: this throughout the manuscript that singular and plurals are mixed up. Either one coefficient is smaller or coefficients are smaller... please also check the whole manuscript for these mixes.
- Fig. 7: my copy didn't contain green lines in the bottom panel.
- Line 332: "... the choice of the time series...": do you maybe mean "the choice of parameter.."?
- Line 335: Could you show that the two methods detect the same turbulent periods in one single figure to make it really obvious. Plot them above one another... The histograms look very different between these two methods. What does that imply for the turbulence statistics?
- Line 374: Could you highlight the percentages in the figure to provide more guidance?
- Line 387: What about these differences? Are they significant? What would these differences imply?
- Fig. 13: what does the thick black line show in the bottom panel? Is it $Ri=0.25$?
- Appendix A:
 - o A2: what is X_i ? Should it maybe read X_i ?
 - o A5/A6: what is c_2 (A5) or c_n (A6)?