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Atmospheric Chemistry and Physics Discussions

Interactive comment on "New insights into Rossby wave packet properties in the extratropical UTLS using GNSS radio occultations" *by* Robin Pilch Kedzierski et al.

Anonymous Referee #1

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The present study gives brought insights into the climatological structure and evolution of Rossby wave packets in the middle atmosphere, and potential anomalous behaviour during and before specific Eurasian heat wave and stratospheric sudden warming events. Overall the paper is well written and the scientific content is interesting. In the following are various comments on general and specific aspects of the study:

The paper is generally quite long, which is OK considering that is covers a wide range of topics. However, although I do not have specific examples in mind, I suppose there would also be some scope for shortening.

You mention several times that the RWPs 'defy the Charney-Drazin criterion' as they

reach heights above 20km. This would require the corresponding waves to be vertically propagating, but in most of your plots (e.g. Fig. 1 or Fig 2, keeping in mind the normalisation) it appears to me that the signal is decaying quickly with height and signs of vertical propagation are hard to see.

In your analysis of the 2010 Moscow heat wave you state that 'RWP in the UTLS need not be very strong to cause extreme events on the surface'. How established is the causality that UTLS processes have determined the Eurasian surface fields during that year?

At various places you discuss the 'co-amplification' of the UT and LS signals of RWPs. Considering the almost perfect (anti-)correlation you found, is it sensible to think of it as two separate structures that interact compared to UT and LS signatures of one UTLS structure?

I felt some of the conclusions in section 6 could be slightly more specific. Point 3, based on section 5, claims a potential importance of tropopause-relative frameworks when analysing RWPs. It would be nice to have and idea how significant the use of a non-relative framework can influence certain results. Correspondingly it would be nice to have one or two examples listed for point 4 emphasising the advantages for analysing GNSS-RO data.

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