

Review of *'The role of cyclones and PV cutoffs for the occurrence of unusually long wet spells in Europe'* by Röthlisberger et al.

Overview

This paper presents an assessment of long wet spells across Europe and their association with PV cutoffs and extratropical cyclones. I find this an interesting study that contributes to the breadth of knowledge of extreme event drivers, although provides only small amounts of new scientific insight that has not been documented in the already published literature.

Overall, I have very few comments as this study presents four case studies and the dynamics surrounding them. My main query is regarding to the anomalies presented in Figs 8 and 9. I find the method of calculating the climatology unusual and expand more upon this below. Furthermore, I question the use of ERA-Interim reanalysis when the newer and higher resolution ERA5 has been readily available for some time now.

Once the authors address my comments I recommend this manuscript for publication as I believe it will suit the journal well. My main points to be addressed can be found below.

Comments

L50 – the reference needs re-formatting. The comma should not be there.

L55-65 – I would re-phrase this paragraph. The way it is introduced suggests that features such as WCB, fronts, cyclones are individual features, when this is rarely the case and they are often all part of one synoptic system. I appreciate the authors do mention this toward the end of the paragraph, however I think this could be phrased better.

L135-143 – The choice of ERA-Interim as an analysis dataset is a confusing one. Newer reanalysis products such as ERA5 have been readily available for several years now and using a more up-to-date product, with higher resolution would surely be beneficial for a study such as this. The specific dynamics and features that would be resolved would increase and also the issues with precipitation mentioned by the authors may be reduced.

Have the authors tested their selection of the wet spells to the different precipitation products? Would there be different climatologies in Figs. 1, 7, 8, 9 as a result?

L175 – How sensitive are the results to the choice of mask radius/distance from gridpoint? Why did the authors choose 400km?

L194-201 – I find the choice of how the climatologies created confusing. From my interpretation you take all the days of the year that the wet spells occur (from start to end) and create the climatology based on those days of the year? Firstly, how many days of the year are in the climatology of each grid point – surely this varies depending on the average length of the spell and how likely the spells are to overlap/be in the same season. Secondly, would it make sense to have the climatology for all wet days and then the anomalies would be for how the unusually wet days differ from just wet days? On this, the wet spells in summer are also likely averaging some significantly warm (and cyclone-less) days as well, do these skew the anomalies significantly? Is the question of the paper how do unusually long wet spells differ from wet periods, or from all other days in general? This needs to be made clearer in the introduction.

Fig. 1 – it would be good to also show the variation in the length of the extreme wet spells. How much does this variation skew the averages shown in this figure? Would the median be a better choice for some of the panels?

L294-295 (and throughout) – are the numbers quotes for $N_{cyclone}$ and $F_{cyclone}$ statistically significant? If not then this does not suggest that these wet spells feature unusual synoptic conditions.

Fig. 5 – please define the Streamers in the figure caption and the text. These are not introduced prior to this in the text and therefore should be explained.

L463-464 – I would argue that the residence times are somewhat similar for the UK and the Italian seas. I'd rephrase this paragraph to reflect the lack of differences in this field.