

## ***Interactive comment on “Have precipitation extremes and annual totals been increasing in the world’s dry regions over the last 60 years?” by Sebastian Sippel et al.***

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The authors examine the robustness to choices made in the analysis of a recent analysis of observed trends in precipitation in dry regions around the world. In general I quite like this, as results of studies are usually interpreted beyond the specific experiment design of the analysis, and so this paper performs the important task of determining the extent to which it is possible in the case of observed precipitation trends in dry regions. However, I think there are a couple of additional aspects to this that the authors have not considered, as well as one important syntactic issue, that I believe need to be addressed before publication.

First, the motivation you frequently mention is for informing adaption decisions. For

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that motivation, though, it is not clear to me that what you do in terms of normalising to the full period is necessarily any more appropriate than what Donat et alii (2016) did. Many decisions are based on climatic or hydrologic data from a specific time period, for instance in the case of international treaties allocating water on an international river. Thus adaptation decisions need to be made with respect to divergence from that reference baseline (ignoring non-climate stuff). So while e.g. you may be correct that there has been no actual trend in precipitation totals, say, that does not necessarily mean there has not been a trend as measured by stipulated monitoring procedures used in many decision-making settings. Cast another way, we have the same problem in dealing with future climate change: projections are based on, say, the full historical period you use, but that does not include the future itself. I expect you are not arguing that we cannot make useful projections of future climate change simply because we have not monitored the future yet. In this context, I laud your effort because you highlight the sensitivity to this point, but I think it is important – and entirely consistent with your consideration of robustness – to emphasise that there is not necessarily a single "correct" answer.

Second, in terms of all of the discussion about what constitutes a "dry" region, the most striking thing to me is that none of the definitions of dry regions you consider include what I think of as prototypical dry regions: the Sahara, the Saudi Peninsula, Central Asia (particulaly for Rx1D), southwestern Africa (other than South Africa), western Australia, northern Mexico (for Rx1D), nor the driest areas of South America (for Rx1D). The reason for this of course is monitoring coverage, but given the absence of all of these regions (the Sahara!) I do not think these results can plausibly be considered as being indicative of how precipitation is actually changing over the world's dry regions. Again, I consider this a point about robustness that is entirely consistent with your paper, but it most certainly needs to be acknowledged/noted/highlighted.

Third, on the syntactic side, while the title refers to precipitation and it appears to be precipitation you are actually analysing, within the text this is generally referred to as

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"rainfall". Please clarify which you are examining, as these are certainly not identical for annual totals (and, if defined in certain ways, for heavy extremes) in many of the regions you examine.

Specific comments:

page 1, line 1 The title says you are examining precipitation extremes and annual totals, but here you indicate it is rainfall. Which is it? It seems to be a precipitation dataset you are using, so it looks like the usage of "rainfall" is wrong?

page 2, lines 24-25 If they are being underestimated, then it sounds like the errors are not completely cancelling, right?

page 2, line 25 "These results": Which, Donat's or yours?

page 2, lines 25-26 I think such an assertive statement concerning the decision-making processes utilised in dry regions requires some supporting evidence, e.g. to other research on decision-making in those regions.

page 3, line 9 "in both time periods" -> "over the combined periods"

page 4, lines 21-22 This is a case where if you are considering rainfall, and not precipitation, then indeed North-East Siberia is rather dry.

page 4, lines 25-26 I do not believe that Fischer and Knutti (2015) studied the decision-making processes used by those involved in responding to climate change, and in particular what they considered "relevant" information for informing those processes.

page 6 "Figure 0" should have a different identifier.

page 6, caption Can you confirm that for only different between columns for the lowest two rows is the mask? I found this caption confusing, for instance with the distinction between the columns being introduced only halfway through. Subtitles on each panel could help.

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Figure 2, caption line 3 By "red lines" do you mean yellow?

Tables 1 and 2 What does "Period Inc. (%)" mean?

Tables 1 and 2 Why do the "Sample size" values differ? Aren't all the trends calculated over the same number of years?

Table 2 There is one trend values listed as "<0.000". Why do you not give the numerical value for a negative trend? This one is interesting, because it is the only significant negative trend.

Sincerely, Dáithí Stone

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