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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Should seasonal rainfall forecasts be used for flood preparedness?" *by* Erin Coughlan de Perez et al.

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COMMENT: General comments: The paper questions whether seasonal rainfall information can be used to indicate the likelihood of flooding within a season, focusing on sub-Saharan Africa. In particular the paper focuses on correlations between different seasonal rainfall variables (e.g. total seasonal rainfall, mean rainfall intensity and cumulative wet days) and "floodiness" determined through using a reanalysis dataset to drive a global hydrological model. The authors conclude that forecasts of seasonal total rainfall may be less informative than other more granular metrics, providing further motivation for studies to understand what seasonal forecast variables can best inform disaster management and humanitarian decisions.

This paper provides a concise and interesting research contribution on an important

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topic with implications for disaster risk management and the design of seasonal climate services. It is well written, focused, and provides a balanced interpretation of the evidence provided through analysing reanalysis and hydrological model datasets. The paper will be of interest to those who are involved developing climate services, particularly using seasonal forecasts, humanitarian agencies, government decision makers addressing flood risks, and the climate scientists advancing methods for relating longterm rainfall patterns to the risk of flooding events. This paper will provide a valuable contribution to the literature.

Below are some relatively minor recommended changes that should help further improve the paper, focusing on refining some of the key arguments and explanation of the results.

RESPONSE: Thank you very much for this summary and your insightful comments. We indeed hope that this research contribution will be used by those who are developing climate services. We have addressed each of your comments below, and appreciate these improvements to the manuscript.

COMMENT: Specific comments: 1) Abstract, line beginning “Results demonstrate...”: the evidence of “little to no indication...” is not necessarily true of all wet climate regions in the study area and is perhaps an over-generalisation. Suggest rephrasing – i.e. some regions of west, central and east Africa with typically wet climates.

RESPONSE: Thank you for the suggestion; we have implemented this change in the text.

COMMENT: 2) The term “flood-generating process” is used throughout the paper (e.g. in section 4) when referring to measures of seasonal rainfall and their correlations to “floodiness”. I am not sure the terminology is entirely appropriate since the measures evaluated in this paper are statistical indicators/quantities as opposed to physical processes (e.g. convective or frontal rainfall). Consider revising this terminology to something less associated with processes – e.g. “Total seasonal rainfall is not a reliable

indicator of the intensity of flood events within a season in most river basins...".

RESPONSE: Indeed, you make a good distinction, which was also noted by reviewer 2. We have retained the phrase "flood-generating mechanisms" in the introduction when discussing the work of Berghuijs et al., as this is the terminology used by them for their work. In all other instances when referring to our own analysis, we have adjusted the terms used to clarify that we are examining statistical indicators. This includes in the methods section (line 18) and the conclusions section 4.

COMMENT: 3) Last sentence of section 2.1: The horizontal resolutions of seasonal forecasting systems from global producing centres have increased substantially in recent years, and many operational systems now run at 0.5 degrees and sometimes as high as 0.25 degrees. The justification of using a 2.5 degree resolution therefore needs to be revised, with reference to more recent literature (a paper from 2003 is currently cited).

RESPONSE: Indeed, while many seasonal forecasts are available at higher resolutions, there is a tradeoff between spatial structure and statistical significance. We do not believe that repeating the calculations at a higher resolution would provide more information, but rather introduce noise. In fact, the larger scale of FPUs showed a greater relationship between rainfall and floodiness. We do note that 2.5 degree resolution is the WMO standard for Global Producing Centres (GPCs) of Long-Range Forecasts.

COMMENT: 4) Section 3, second sentence: In addition to West and Central Africa, from viewing the figures I would add the Greater Horn of Africa region in East Africa as a region where the relationship appears weak. The reference to West and Central Africa is mentioned in other places in the paper so check the consistency in the rest of the paper after making any revisions.

RESPONSE: While it might appear that the Greater Horn has a weaker relationship, we would note that there are a few pixels that contain only water in the top right, which are grey. This might cause a perception that the region has a weaker relationship than

it actually does. We will clarify in the text.

COMMENT: 5) Section 4, second sentence: Insert “understanding of” before the word “predictability”. The point being that predictability comes from the accuracy of the forecast models used to predict seasonal rainfall and not the quality of the reanalysis data per se.

RESPONSE: Excellent point; we have implemented this suggestion.

COMMENT: 6) Section 4, paragraph 2: The reference to Koppen climate classifications is first made here. Whilst I can see the value in linking the relationships between seasonal rainfall metrics and floodiness to different climate types, there is a risk of over-generalising the results. The climate types within East Africa and southern Africa (and elsewhere) vary greatly so to generalise by saying these regions are classified as “arid” is misleading – some areas are far from arid – and further using this as a basis to generalise the results of the study risks over-simplifying the findings. Understanding the robustness of these findings for different climate types would require further investigation.

RESPONSE: Noted; we agree that there is considerable variation in climate in each of these regions. We have adjusted the language accordingly.

COMMENT: Technical corrections:

RESPONSE: Thank you for these thoughtful corrections; we have noted below as they have been incorporated.

COMMENT: 1) Section 1, second paragraph, final sentence needs rephrasing to improve clarity.

RESPONSE: OK

COMMENT: 2) Suggest inserting “many parts of” between “for” and “Africa” in first sentence of section 2.

RESPONSE: OK

COMMENT: 3) Is the third predictor variable definitely at the 75th percentile? The results do seem consistent with this but just checking as the 1 day variable is 95th and 99th percentile whilst 3 day is 75th and 99th.

RESPONSE: Yes, that is correct.

COMMENT: 4) “Floodiness” is first defined in section 2.2 but used earlier in the paper. Either define this term earlier or state that it will be defined in section 2.2 when first introduced.

RESPONSE: OK

COMMENT: 5) Section 2.2: I think it would be helpful to know approximately how many river pixels typically can be found within 2.5 degree gridbox. This would help in interpreting the “floodiness” metric when used throughout the paper.

RESPONSE: Excellent idea. We will include a map of number of river pixels per gridbox.

COMMENT: 6) Section 2.4, third paragraph – acronym GLM needs introducing earlier (not in section 3).

RESPONSE: OK – we have added it at the beginning of that section.

COMMENT: 7) Section 3, fifth paragraph, consider rephrasing second sentence beginning “Figure 4a” to replace “not more strongly” – this is a little confusing.

RESPONSE: OK

COMMENT: 8) The figures would benefit from latitude and longitude values on the axes.

RESPONSE: OK

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