Editor comments to: "Hydrological impacts of climate change on small ungauged catchments – results from a GCM-RCM-hydrologic model chain"

June 5, 2020

1 Introduction

- p3 l58: Adverse effects ... this sentence is still strange as "effects" is plural and the related verb "calls" is singular. Furthermore, the "," doesn't seem to be right.

- p3 l61: "The projected increase ..." is still not a correct sentence. The subject "projected increase" uses the verb "increases". That sounds strange. Suggestion: "An increase in heavy localized precipitation events as projected suggests an increase in precipitation generated local flooding"

- p5 l110ff: I have the same question as the reviewer. Even if you add a reference, it seems odd that you quantify model performance for an ungauged catchment as by definition of "ungauged", there is no data to quantify the performance. I think this needs to be stated somewhat differently.

2 Data and Methods

The description of the bias correction method on page 12/13 is still strange. I give you an example for a way of writing this, starting at your l.213.

2.1 Example for anomaly based bias adjustment in your section 2.2.1

A reference period of 30-years (ref, from 1981 to 2010) was selected for which we calculate mean values for the month $m = 1, \ldots, 12$ of a variable $Y_{\mathrm{ref}}^{\mathrm{ERA}}$ (e.g. temperature) from ERA-Interim

$$\overline{Y_{\mathrm{ref},m}^{\mathrm{ERA}}} = \frac{1}{N_m} \sum_{i=1}^{N_m} Y_{\mathrm{ref},i}^{\mathrm{ERA}} . \tag{1}$$

Analogously, we calculate monthly means for variables $Y_{\mathrm{ref}}^{\mathrm{Nor}}$ from the NorESM-1-M simulations, denoted as $\overline{Y_{\mathrm{ref},m}^{\mathrm{Nor}}}$.

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For NorESM-I simulations $Y_{\text{ref},i}^{\text{Nor}}$ (six hourly time resolution) in the reference period, we define anomalies for a data point i as

$$Y_{\text{ref},i}^{\prime,\text{Nor}} = Y_{\text{ref},i}^{\text{Nor}} - \overline{Y_{\text{ref},m}^{\text{Nor}}} \tag{2}$$

for each month m as deviations from the monthly means of the reference period. For simulations $Y_{\text{fut},i}^{\text{Nor}}$ for the future period, anomalies are also taken as deviations from monthly means of the reference period

$$Y_{\text{fut},i}^{\prime,\text{Nor}} = Y_{\text{fut},i}^{\text{Nor}} - \overline{Y_{\text{ref},m}^{\text{Nor}}} \,. \tag{3}$$

An anomaly based bias adjustment for a data point i in month m is now defined as

$$\widehat{Y}_{\text{per},i}^{\text{Nor}} = Y_{\text{per},i}^{\text{Nor}} - \overline{Y_{\text{ref},m}^{\text{Nor}}} + \overline{Y_{\text{ref},m}^{\text{ERA}}} \,, \tag{4}$$

where the index per denotes the reference (ref) or future (fut) period.

3 Miscellaneous

- write $\sum_{i=1}^{N}$ instead of $\sum_{i=1}^{i=N}$

- Until the late 80ties, the "*" was used on typewriters as a symbol for multiplication as there was no dedicated symbol on the typerwriters. With modern computer typesetting systems, this is not needed anymore. For denoting a times b either use the convention that no sign means multiplication ($a\,b$) or, if needed, write $a \cdot b$. Your Eq. 6, using the above notation, should look like

$$\Delta Y = \frac{Y_{\text{fut}} - Y_{\text{ref}}}{Y_{\text{ref}}}\, 100 \,. \tag{5}$$