

Reviewer#2 - Finlayson

Reviewer comment

The overall academic content of this paper is sound, exploring the possible future runoff across the coterminous United States under conditions that may develop as predicted global climate changes unfold. However, my concerns with this paper relate to the way this material is presented. The authors appear to be unaware that they are writing to a global audience, and not to a group who, like themselves, are very familiar with the geography of the coterminous USA and with the systems used for identifying watersheds and location in the USA. I list below a series of points to illustrate my concerns.

Author reply

We thank Dr. Finlayson for pointing out this important issue. We will add a section of “Study area” at the beginning of “2 Methods” to introduce the American hydrologic unit system and clarify the object of this study. The descriptions involving the geography of the conterminous US will be revised through the manuscript. Point-by-point responses are listed below.

Reviewer comment

P 1 Lines 5-6: The use of the phrase “hydrologic paradigms” seems inappropriate here. What is at issue here is the strength or intensity of different hydrological processes. Paradigms are something rather different.

Author reply

We will change it to ‘water balance’, which is a more general term and may be more appropriate here.

Reviewer comment

P 1 Line 7: “intensification of hydrologic cycle“. What does this phrase mean?

Author reply

We referred to the phenomenon that climate warming causes general increases in evaporation and precipitation, and higher frequency of extreme hydrologic events, which indicates an intensification (or acceleration) of the water cycle (Huntington, 2006).

Huntington, Thomas G. "Evidence for intensification of the global water cycle: review and synthesis." Journal of Hydrology 319.1 (2006): 83-95.

Reviewer comment

P 1 Line 12: The use of “sustainably” in this context seems rather out of place. There are a lot of surface water sources and shallow aquifers that are being used very unsustainably.

Author reply

This sentence will be revised to “runoff is a critical source of fresh water for humans”.

Reviewer comment

P 4 Lines 16-17 “the rate of decadal change of temperature over the CONUS has reached - 0.03~+0.28 °C since 1960s”. I’m not sure what this means, it needs to be more clearly stated.

Author reply

This sentence will be revised to “the rate of decadal change in temperature over the CONUS fluctuated between -0.03 °C and +0.28 °C from 1960s to 2000s”.

Reviewer comment

The authors assume that the readers have an intimate knowledge of some of the materials they are working with. So, for example, they use the term “8-digit Hydrologic Unit Code (HUC-8) watersheds” and “2-digit HUC Watershed”. I have no idea what these are and I suspect I’m not the only one. The paper needs to be written for an international audience and not a just a group of those specialising in North American hydrology.

Author reply

We will add a section “2.2.1 Study area” to clarify the object of this study and introduce the American hydrologic unit system.

Reviewer comment

P 8 I do not follow the discussion from Line 3 to Line 17. Especially this term (Line 12) - $R(C1t1, \dots, Ci t2, \dots, CNT1) - R(C1t1, \dots, Ci t1, \dots, CNT1)$. What is going on here needs to be explained more clearly, or is there a misprint?

Author reply

$R(C1_{t1}, \dots, Ci_{t1}, \dots, CN_{t1})$ denotes runoff under the climate condition in the time period of $t1$. $R(C1_{t1}, \dots, Ci_{t2}, \dots, CN_{t1}) - R(C1_{t1}, \dots, Ci_{t1}, \dots, CN_{t1})$ denote runoff change driven by the change in variable Ci from $t1$ to $t2$, while other variables remain constant.

We will rephrase this section according to reviewers’ comments.

Reviewer comment

P 8 Line 20 “statistically downscaled” What does this mean? Is this a way of saying that the means or the medians were used?

Author reply

We were trying to say that the data was corrected and downscaled from raw climate model outputs using statistical downscaling methods. This sentence will be broken into shorter sentences to avoid confusion.

Reviewer comment

P 9 lines 1-2 “RCP4.5 and RCP8.5 were adopted as representatives of the intermediate and high emission scenarios respectively”. At this point in the paper the readers have no idea what RCP4.5 and RCP8.5 are. There is some explanation later in the paragraph but it is not particularly clear. These terms need to be defined before they are used.

Author reply

We will rewrite this paragraph to clarify the datasets and scenarios used in this study.

Reviewer comment

Similarly, in Section 3, where the results are presented, Water Resource Regions (WRR) are referred to by their numbers and sometimes also the name of a general region, such as Midwest, Mountain West or coastal regions, in this case with no indication which bits of the coastal US are being referred to.

Author reply

In the revised version, we will avoid terms that are not familiar to international audience, such as ‘Midwest’ and ‘Mountain West’. We will use more general descriptions such as ‘central U.S.’ and ‘northwest of U.S.’.

In P14 L9, “coastal regions (WRR1,2,18)” will be revised to “Atlantic coast (WRR1,2) and Pacific coast (WRR18)”.

Reviewer comment

The writing style is rather unsatisfactory with frequent lack of the definite article and missing and incorrect words. Here is an example: “For example, slight decreases in P but somewhat increases in R are projected in south Texas due to the alteration of innerannual climate variability.” I suspect that this, and the many similar cases in the text, come about from reviewing the text using the word processor’s spelling check rather than careful reading by the authors.

Author reply

We will recheck the writing more carefully based on the reviewers’ comments.

Reviewer comment

In Section 4.3 the authors argue that the results presented here indicate that “Additional water storage such as reservoirs and flood prevention measures may be needed in regions expecting more R”. That may be the case but there is no evidence in this study that relates to flood behaviour and simply an increase in runoff does not say anything one way or the other about how floods will behave.

Author reply

We will delete the statement about flood.