

Hydrol. Earth Syst. Sci. Discuss., author comment AC3  
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## Reply on RC2

Tuvia Turkeltaub and Golan Bel

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Author comment on "The effects of rain and evapotranspiration statistics on groundwater recharge estimations for semi-arid environments" by Tuvia Turkeltaub and Golan Bel, Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-257-AC3>, 2022

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**Dear Reviewer,**

**We thank you for the careful assessment of our manuscript and for the constructive criticism. Below we address the reviewers' comments one by one. For clarity, we use regular font for the quoted reviewer comments and italicized font for our responses.**

### General comments

**General comment 1:** The abstract is too popular and not scientific enough to reflect the conclusion of the manuscript. Some sentences should be rewritten and supported by data.

**Reply to general comment 1:** *We revised the abstract and added, in multiple places, specific results and data values in relevant sentences. Specifically, the revisions appear in lines 5-7,9-10 and 14-16.*

**General comment 2:** In the introduction, the necessity of this study must be stated more explicitly.

**Reply to general comment 2:** *We added text to better clarify and emphasize the goals of the current study. In lines 59-60, we added the following text: "Specifically, we test the sensitivity of estimated GR fluxes to the daily, monthly, and annual statistics of rain and ETref."*

**General comment 3:** In conclusion, it is necessary to reflect what is the scientific novelty of the results of your research. On the other hand, which synthesis method performed better for both rainfall and ETref?

**Reply to general comment 3:** *The text in the Introduction and Conclusion sections was revised to provide the missing information (lines 19-21 and 380-382).*

**General comment 4:** What is the importance of understanding rainfall and evapotranspiration characteristics on groundwater recharge?

**Reply to general comment 4:** *Understanding the effects of rainfall and evapotranspiration characteristics on groundwater recharge is important for both*

*fundamental understanding of the underlying physical processes and for groundwater management under future climate conditions. The text was revised to include this information (lines 19-21).*

### **Specific comments**

**Comment 1:** In line 1, you should eliminate the word climate in order to be clearer, since only the factor rainfall is boarded.

**Reply Comment 1:** *The word has been removed as suggested.*

**Comment 2:** In lines 37-38, this sentence should be added to the next paragraph. Since I understand that paragraph explains the Poison approach.

**Reply Comment 2:** *The suggestion was implemented in the revised MS (line 36).*

**Comment 3:** In lines 59-61, "To 60 overcome this issue, several new methods, preserving different characteristics of the measured rainfall and ETref records, are applied", you must be more specific, which methods did you employ for rainfall and ETref?

**Reply Comment 3:** *The full details of all the methods implemented are provided in the Methods section and throughout the MS. It would be impossible to provide the full details in the Introduction. The text has been revised in order to refer the reader to the section with the full details (lines 59-60, 63).*

**Comment 4:** In lines 156-158, "the two- sample Kolmogorov-Smirnov test indicated that the synthesized and the measured distributions are statistically similar for the DS, ETDS, and ETWD methods", which is the value of the KS test for this affirmation?

**Reply Comment 4:** *We now provide Table S1, in the Supplementary Information, that details the p-values of the KS tests for each method and location (line 162).*

**Comment 5:** In line 325, "We find that there are high correlations between the annual rain and the annual GR for sandy...". Please specify which correlation criteria is used, it means which values correspond to high correlations. Also add these values to the sentences. Please, review this in the manuscript.

**Reply Comment 5:** *The text has been revised to provide the correlation coefficient values (lines 329-330). In addition, we wish to mention that these details appear in Figures S15 and S16 of the Supplementary Information.*

**Comment 6:** In line 361, "Here, we considered five different methods for rain synthesis and seven methods for ETref synthesis". In total you applied 12 synthesis methods, however, in Table 1 only appear 11. Please correct this.

**Reply Comment 6:** *The UDDS method specifies the synthesis methods of both the rain and the ETref (both are uniformly distributed over the month). This information appears in Table 1, and we added text to emphasize this (lines 365-366).*

**Comment 7:** In subsection 2.2 Generation of rain and ETref time series. Consider separate rain and ETref in two subsections (e.g., 2.2. and 2.3) to facilitate the reading.

**Reply Comment 7:** *Since the rain and ETref time series are generated by similar synthesis methods, we would prefer to preserve the original structure of the Methods section.*

**Comment 8:** In line 50, you employed ETref for potential evapotranspiration. However, in line 71 you refer for reference evapotranspiration. Take this into account and make the corresponding corrections throughout the manuscript

**Reply Comment 8:** *Thanks for catching this. The text has been revised (lines 51-52), and the term ETref now denotes the potential evapotranspiration throughout the revised manuscript.*

**Comment 9:** In Figure 5, I suggest the use of letters (A,B,C,...) such as in Figure 8, to facilitate the reading and location of the graphic. For example, in lines 263-265 "Figure 5 top right panel" could be hard to follow.

**Reply Comment 9:** *Figure 5 has been revised to include panel labels, and the text was revised to refer to these labels.*