

RC2:

In this study, the authors use observational data of precipitation, temperature, and discharge of more than 50 karst springs spatially distributed over Europe to give a continental overview of changes in groundwater resources in karst areas. They perform a trend analysis using Mann-Kendall and Sen's slope on two different periods of 20 and 40 years, stating that long-term trends in spring discharge follow the general pattern of river discharge found in literature, while the last 20 years deviate from this behavior, mainly influenced by the temperature increase. Possible process changes were assessed by analyzing also trends in high and low flow values, and structural differences of the systems were considered by using two indices related to the storage and inertia of the system. The results of the analysis of the observed trend of hydroclimatic and hydrological variables are discussed with respect to the indirect influence of other drivers such as changes in land use or land cover, specific regional conditions but also changes in processes related to groundwater recharge and storage, providing insights for assessing groundwater recharge in the past and in the future.

The scientific contribution of this paper falls within the scope of Hydrology and Earth System Sciences. The results are discussed in an appropriate and balanced way; the paper is well-written with a clear and well-organized structure.

RESPONSE: We thank the reviewer for contributing his comments and highly appreciate the overall positive assessment of our work.

A more mathematical and detailed explanation of how the Mann-Kendall test and Sen's slope are performed could be included in paragraph 2.3 to help the reader better interpret the results of the study.

RESPONSE: We will add a more detailed explanation on the Mann-Kendall test and Sen's slope.

The final connection to modeling approaches provided in the conclusions is not clear: can you explain better how these results impact the discharge modeling?

RESPONSE: While it does not have a direct impact on discharge modeling, it is something that should be considered when predicting future spring discharge. As stated in the conclusions, most time series of karst discharge are relatively short, and therefore there is a high risk that these time series are influenced by trends. If we use these time series without accounting for the trends and their underlying drivers in future predictions, there is a high risk of misrepresenting future conditions, assuming these trends will continue linearly and are representative of future system behaviors.

The visualization of the results is crucial and I found all the figures suitable to convey the different messages about trends, changes, and relationships in the observed variables. However, I suggest improving the selection of the markers to make the plots more effective, clear, and straightforward to interpret. In particular, I have difficulties identifying bold symbols.

RESPONSE: We already tried different ways of visualizing the results in a comprehensive manner but understand the difficulties mentioned by the reviewer. We will find a better way to distinguish between the two different periods.

Line 162: clarify the procedure reformulating the sentence “Daily values of precipitation and temperature were accumulated respective averaged to obtain monthly and seasonal values.”

RESPONSE: We agree that the description lacks some basic information, which will be added to the text.

Fig. 4: the caption refers to panels a) and b) but in the figure no label is provided to identify the panels.

RESPONSE: We will include the labels.