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Interactive comment on "Isoscape of precipitation amount-weighted annual mean tritium (^{3}H) activity from 1976 to 2017 for the Adriatic-Pannonian region" *by* Zoltán Kern et al.

Zoltán Kern et al.

hatvaniig@gmail.com

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Dear Reviewer,

Please find your answers to your questions below.

Yours sincerely,

The authors

https://www.earth-syst-sci-data-discuss.net/essd-2019-244/#discussion

Anonymous Referee #1 Received and published: 15 March 2020

——————— The manuscript describes a high-resolution gridded dataset for tritium in precipitation across the Adriatic-Pannonia region in Europe. I am not familiar with the applications of tritium for hydrology, my expertise is on geostatistical methods for hydrological sciences. The objective of the work is clearly stated in the abstract and in the introduction. Material and methods are described in detail in section 2. The data sources used are properly reported. Standard statistical techniques, such as ordinary kriging, have been used for spatial analysis. Pros and cons of the applied statistical methods are discussed in detail, especially in connection with the scarcity of data available. Section 3 described the gridded dataset. Section 4 contains the evaluation: the regional dataset has been compared with global ones, the benefits are clearly highlighted; a validation against independent measurements is also included (see Fig.5). All the presented results support the conclusions of the authors presented in section 5. The contribution of this study for regional hydrological applications is valuable, since the uniqueness of such a reference and up-to-date dataset. Given the limited amount of stations available, the creation of a gridded dataset is totally justified and can provide useful data where no direct measurements are available. The statistical analysis is, as far as I can judge, without major flaws. The presentation of the manuscript is clear and concise. In conclusion, the study is valuable. My advice to the editor is to publish the manuscript after minor adjustments to the text. We would like to thank Reviewer#1 for her/his positive opinion on our work and for the constructive comments.

Specific comments follow.

——————— Comment-1: Why use such a high-resolution 1x1 km grid when the planar distances (Fig.3) are hundreds of kilometers? By using this grid, the authors implicitly persuade the users that the information is available on a very local scale. This is not the case. The authors need to (1) justify their choice of a 1x1 km grid; (2) explicitly state that their gridded dataset is suitable for the representation of variations in the field over much larger spatial scales than the grid spacing.

Response-1: Thank you for the suggestion. The 1×1 km grid resolution was chosen based on practical considerations, it does not aim to imply that there are such fine km-scale differences, yet help the users to delineate smaller outcrops (e.g. watersheds) more accurately. This explanation will be added to the revised manuscript.

—————— C-2: The authors apply kriging without showing that the input data satisfies the prerequisites for a direct application of ordinary kriging. However, the validation shows that the output is useful and -in a sense- this justifies the application of kriging. My question for you is: have you considered other statistical interpolation methods? What is the reason that made you choose kriging?

R-2: To further reinforce the Reviewer's opinion on that the verification employed in the study is convincing two additional stations have been included as out-of-sample verification (please see Fig. 5). In addition, the discussion has been thoroughly extended and the MS reorganized. An additional checking was performed on the amount weighted annual means using h-scattergrams {Bohling, 2005 #1305} which did not find any outliers that have been introduced by the weighting procedure confirming that the dataset satisfies certain prerequisites of kriging. This explanation will be added to the revised manuscript. The deviance from normal distribution in the case of the 3H values was found negligible; thus kriging can be applied confidently to the data. Moreover, although Kriging smooths the data, thus decreases the range of the actual values, in the present case the extremities (positive or negative) are not the main subject of the analysis, rather the mid 60% of the data. This was one of the main reasons for choosing kriging to investigate the large scale patterns, which kriging is highly applicable for (REF. e.g. Herzfeld, Chilés etc.)

—————— C-3: Figure 3. This is perhaps the core result of the paper and I like very much the way the authors present it. However, the blue shades in the colour scale are by far not optimal in representing the fields. Please present your main results in a way that the readers can fully appreciate them.

R-3: Fig. 3 has been substantially changed in the revised version. We hope that the more complex color scale (white-blue-red-yellow) sufficiently improves the contrast in the map series.

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