

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2  
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## **Comment on hess-2021-424**

Anonymous Referee #2

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Referee comment on "A method for predicting hydrogen and oxygen isotope distributions across a region's river network using reach-scale environmental attributes" by Bruce D. Dudley et al., Hydrol. Earth Syst. Sci. Discuss.,  
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Referee comment on:

A method for predicting hydrogen and oxygen isotope distributions across a region's river network using reach-scale environmental attributes

By Bruce D. Dudley, Jing Yang, Ude Shankar and Scott Graham

The paper introduces a new method for predicting isotope distribution using information on the river network and environmental variables. The method is applied to NZ using a number of existing databases and some extra data collected by the research team.

The approach is novel and has potential for the improvement of the predictions, although the actual application to the NZ situation does not show a striking improvement over a more traditional method. I believe this fact should be reflected in the abstract and the conclusions more clearly, so the reader does not have excessive expectations.

I believe a part of the methodology that is somehow understated by the authors is the use of the regression Kriging technique. I would highlight this more throughout the paper and give a bit more background in the introduction and discussion about its rationale, implementation and potential. If this is a common tool used elsewhere discuss its novelty in the application of this particular problem.

The period of analysis of the paper is rather short, 2017-2020. An acknowledgement of this fact and the justification for why it has not been possible to use an extended period would be great. Also, what are the expectations into the future when more data becomes available?

Minor comment: Line 111: "Hence, we checked the results of our procedure by performing regressions between our modelled, amount-weighted monthly precipitation isotope values and measured values from the dataset of Baisden et al. (2016), comprising monthly collections from 51 sites across New Zealand between 2007 and 2009."

Why is this check carried on over only two years? Again, a justification here would help the reader understand a bit better the limitations of the study.