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Hydrology and Earth System Sciences Discussions

Interactive comment on "Calibration of a transient transport model to tritium measurements in rivers and streams in the Western Lake Taupo catchment, New Zealand" *by* M. A. Gusyev et al.

Anonymous Referee #2

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This study presents a hydrologic transport modeling simulation for the Western Lake Taupo catchment in New Zealand. The work incorporates tritium tracer data into the modeling calibration. While the manuscript is well written and quality of the modeling effort appears high, it is unclear how the tracer data is utilized in model calibration in the current presentation of the work.

This is a major concern as incorporation of tracer (specifically tritium) data in model calibration seems to be the central focus of the study and the central novel aspect. Specifically, at P9751 L1 the authors state that measured tritium values were 'essen-

tial' to fine-tune the model. Yet, no information on how calibration was carried out is given. Was some off-the-shelf package used? Was calibration approached in a multi-parameter sense or were parameters handled one at a time? How was the potential information from the tritium tracer balance to the direct information available from groundwater observations and outflows? Incorporation of tracer data into model calibration is an extremely active field of research, so the authors must give more insight to the methodology they are proposing with this study.

In the current presentation, the approach appears ad hoc and more-or-less as a trial-and-error method. The title and general presentation of this work leads the reader to expect a detailed explanation outlining a new or novel methodology of how to use tritium tracer data (or perhaps other tracer data) in model calibration. No information is given in this regard. This makes it impossible to judge the calibration procedure or the value added by even considering the tritium data. Beyond being 'essential', could there be some quantified metric of the improvement obtained by considering the tracer data? Also, how could one attempt to reproduce the work or apply the procedure to their own datasets without some more information?

In addition to the above, there is apparent disconnect between the measured data and that used in the model calibration. At P9748 L22, it appears that several rivers were monitored for tritium concentrations; however, in Figure 3 only one river appears to be considered. Have I missed something here?

Finally, the discussion alludes to the ability to simulate nitrate within the same model framework. It is not explicitly clear how the improvements brought about by considering tritium data translate directly to improvements for nitrate predictions. What is the connection here? Are the parameterizations made to represent tritium movement and decay parallel to those for nitrate? The connection here is rather loose and could be made much stronger and more explicit in the discussion

Minor/editorial comments

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P9748L1: can the authors motivate the reasoning and validity of multiplying recharge values by 0.88? Is this more than a ‘fudge factor’ to correct a bad model?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 9743, 2012.

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Interactive Comment