

Interactive comment on “Using isotopes to constrain water flux and age estimates in snow-influenced catchments using the STARR (Spatially distributed Tracer-Aided Rainfall-Runoff) model” by Pertti Ala-aho et al.

Anonymous Referee #1

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The paper presented a new study on specifically the stream water oxygen isotope by spatially distributed STARR model coupling with the snow evaporation fractionation and snow melting fractionation at three northern northern catchments with different annual precipitation and winter snow accumulation. The improved simulation work captured pretty well the observed seasonal stream water oxygen isotope variations at two of the catchments. The study also demonstrated the importance of snow evaporation and melting in the adjusting the temporal variations of steam water isotope. This work has the potential of wide applications in isotope hydrology in other catchments with significant snowpack in winter season. 1. A comparison between local precipitation and river

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water $\delta^{18}\text{O}$ may help to see the the impact of precipitaion on river water $\delta^{18}\text{O}$. And I wonder if we can see the lag between precipitaion $\delta^{18}\text{O}$ and river water $\delta^{18}\text{O}$, and this lage is related to the age of water? 2. Isotope fractionation in the surface evap-
otranspiration should be introduced in the paper, even it is included in the previous
publications, since it is another process significantly affect the stream water isotope. 3.
The d-excess in water may more sensitive to evaporation, and therefore, provide more
unequivical proof in the water cycle in snow evaporation and melting. 4. The incon-
sistence between the simulated stream water $\delta^{18}\text{O}$ and observed stream water $\delta^{18}\text{O}$
probably hints the impac of underground water at Krycklan. With decreasing trend
in both river discharge and stream water $\delta^{18}\text{O}$, there is probably a increasing ratio of
deep underground water with lower water $\delta^{18}\text{O}$. This agree with the increasing water
age. However, the underground water $\delta^{18}\text{O}$ data is necessary for further discussion.
5. From Figure 11 it is difficult to to see how different parametering can affect the simu-
lated results. There are minor questions: 6. In all the text, please include the full name
for the term while they are first mentioned, e.g. SWE (snow water equivalen?), DCEW,
MET, SNOTEL, 7. There are dummy text in Line 25-27, Page 3“Suspendisse a
elit ut leo pharetra cursus sed quis diam. Nullam dapibus, ante vitae congue egestas,
sem ex semper orci, vel sodales sapien nibh sed lectus. Etiam vehicula lectus quis
orci ultricies dapibus. In sit amet lorem egestas, pretium sem sed, tempus lorem.” 8.
Page 11“Line 29, change from “different to” to “different from”. 9. What is passive
storagee?

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