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

water δ18O may help to see the the impact of precipitaiton on river waterδ18O. And I wonder if we can see the lag between precipitaion δ18O and river water δ18O, and this lage is related to the age of water? 2. Isotope fractionation in the surface evapotranspiration 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 inconsistence between the simulated stream water δ18O and observed stream waterδ18O probablly hints the impac of underground water at Krycklan. With decreasing trend in both river discharge and stream water δ18O, there is probably a increasing ratio of deep underground water with lower waterδ18O. This agree with the increasing water age. However, the underground water δ18O data is necessary for further discussion. 5. From Figure 11 it is difficult to to see how different parametering can affect the simulated 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 3ïïjŽ "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 11ïïjŇ Line 29, change from "different to" to "different from". 9. What is passive storeage?