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Hydrology and Earth System Sciences Discussions

Interactive comment on "Landuse effects on runoff generating processes in tussock grassland indicated by mean transit time estimation using tritium" *by* M. K. Stewart and B. D. Fahey

Anonymous Referee #1

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The purpose of this paper is to identify streamwater sources and estimate residence time of three headwater catchments in New Zeeland. The dating of water is based on tritium measurements and is estimated with 'double dispersion' model.

Overall, this is a very good paper. It is well written, referenced, and logically structured. Results are well presented and related to previous work. I have a few comments that the Authors may want to address.

(i) Despite the work is valuable for a better understanding of the behaviour of these three catchments, I would invite the Authors to better emphasize both in the Abstract and in the Discussion whether there are some general findings that can go beyond this

particular application.

(ii) The Authors present a master recession curve (MRC) of the catchments GH1 and GH2. Can a MRC be calculated both for the period before and after the afforestation? Eventual differences may substantiate the conclusions in 5.2.

(iii) The 'double dispersion' model, which is characterized by two dispersion models in parallel, may be affected by some equifinality of parameter sets. Can the authors discuss this aspect?

Minor comments:

I suggest to use mm/a instead of mm when fluxes are used (85 mm/a in the abstract, 1350mm/a and 743mm/a Precipitation (1350 mm/a)−ET (600 mm/a)=Runoff (743 mm/a in Section 2.4, etc.). I understand that this are annual amounts, but a flux should have L/T units.

Page 1086 Line 22: Change 'each of which will have their own particular flowpaths and transit times depending on their nature' into 'each of which will have its own particular flowpaths and transit times depending on its nature'

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 1073, 2010.