

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

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We would like to thank anonymous referee #1 for his or her comments on our paper. We consider the comments very helpful. Our responses to the comments are given below.

(i) We will consider adding remarks on general findings that go beyond this particular application in our revision of the paper. These will have to do with the common occurrence of long transit time water in streams revealed by tritium measurements (c.f. Stewart et al., 2010) and how this might affect the response of catchments to land use change.

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(ii) Master recession curves have been calculated for catchments GH1 and GH2 before and after afforestation of GH2 (McLean, 2001; Fahey, unpublished, 2010). GH1 remained in tussock, and no changes would have been expected, although variation from year to year was substantial. However, no patterns of change were observed in the average GH2 recession that could be attributed to the afforestation of the catchment.

(iii) We will consider possible equifinality of parameter sets further in our revision in response to both reviewers. The rationale for using the double dispersion simulation model was explained in the paper. Tritium measurements during the immediate post-bomb peak years (e.g. in the 1970s and 1980s), in addition to the current measurements, would have been valuable in helping to constrain parameter sets, but these were not available. We believe however, that tritium measurements made now as part of a sequence of measurements (covering as long a period as possible) would be effective and will become increasingly so for detecting long transit time water in catchments (Stewart et al., 2010). Additional samples can be collected in the future to further refine transit time interpretations.

Minor comments: We agree that mm/a should be used instead of mm for the fluxes in the catchments. Other change noted.

References: McLean, S.: Baseflow response to vegetation change, Glendhu State Forest, Otago, New Zealand. MSc Thesis, University of Otago, Dunedin, New Zealand, 2001.

Stewart, M. K., Morgenstern, U., and McDonnell, J. J.: Truncation of stream residence time: How the use of stable isotopes has skewed our concept of streamwater age and origin, *Hydrol. Process.*, 24, DOI: 10.1002/hyp.7576, 2010.

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