

Interactive comment on “Aggregation effects on tritium-based mean transit times and young water fractions in spatially heterogeneous catchments and groundwater systems, and implications for past and future applications of tritium” by M. K. Stewart et al.

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Julien Farlin's latest comment further misrepresents the work of Luther and Haitjema (1998).

I had commented that Luther and Haitjema's model of confined aquifers relies on the physically impossible assumption that the confining layer somehow "confines" the aquifer by preventing vertical flow, while simultaneously allowing the aquifer to receive

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vertical recharge. Farlin's response was to attempt to school me in the difference between confined and semi-confined aquifers, and to claim that Luther and Haitjema modeled a semi-confined aquifer rather than a confined one.

This claim is false. Although Luther and Haitjema do present a model of what they describe as a semi-confined aquifer in their Appendix B, their main paper clearly refers to "confined" and "unconfined" aquifers, but never semi-confined aquifers. And regardless of the terminology that is used, the mathematics of their model makes it clear that confined means confined. In their confined aquifer model, the thickness of the confined aquifer is fixed and the flow field does not feel the effects of a variable free surface. This can only happen if the confining layer is really confining.

If the confining layer is actually confining, then it prevents upward flow through the confining layer wherever the head gradient points upward (this is the only way to keep the aquifer thickness fixed, as their model requires). But their model also requires spatially distributed recharge, including recharge that would have to flow against this upward head gradient. This is obviously nonphysical.

Farlin's latest comment also cites Haitjema (1995) as if it were further independent confirmation for his views, but Haitjema (1995) makes the same nonphysical assumptions as Luther and Haitjema (1998).

Haitjema HM, On the residence time distribution in idealized groundwatersheds, *Journal of Hydrology* 172, 127-146, 1995.

Luther KH and Haitjema HM, Numerical experiments on the residence time distributions of heterogeneous groundwatersheds, *Journal of Hydrology* 207, 1-17, 1998).

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