Comment on hess-2021-213 - Additional graphics to better visualize the discussion in section 4.3

Simon Hoeg

Author comment on "Benchmark tests for separating n time components of runoff with one stable isotope tracer" by Simon Hoeg, Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-213-AC1, 2021

Dear Editor, dear Reviewers and interested Readers,

actually I plan to improve section 4.3 with additional results that show how intrastorm variabilities regarding $c_e(e)$, $c_{e-1}(e+1)$, $c_{e-2}(e+2)$ and $c_{e-3}(e+3)$ can be calculated on the basis of the simulated event water response, which relates to the right hand side of Niemi’s theorem, $J(t_{in}) \Theta(t_{in}) h(t-t_{in},t)$. Then by piece wise equating Niemi’s left hand side

$h^\Theta(\varphi,t) Q_t = Q_{e}(\varphi)$, $\varphi \vartriangleleft e$

$h^\Theta(\varphi,t) Q_t = Q_{e-1}(\varphi)$, $\varphi \vartriangleleft e+1$

$h^\Theta(\varphi,t) Q_t = Q_{e-2}(\varphi)$, $\varphi \vartriangleleft e+2$

$h^\Theta(\varphi,t) Q_t = Q_{e-3}(\varphi)$, $\varphi \vartriangleleft e+3$

I can finally resolve and recalculate the tracer concentrations $c_e(e)$, $c_{e-1}(e+1)$, $c_{e-2}(e+2)$ and $c_{e-3}(e+3)$. The mean deviation between the simulated event water response and separated event water response is then in a range of 1e-13 % also for a large delayed fractions of event water $a_{\text{max}}$, for instance 0.3, given that criterion 1 and 4 is fulfilled, which I think is a quite good result. Of course, in real field experiments a simulated event water response is not available. Instead, the hydrologist has to work with calibration procedures and/or Monte Carlo simulations.

Best regards,

Simon Hoeg