

(1) I strongly disagree with your statement that what you refer to as "time series approach" to estimate transit time distributions and mean transit times requires the assumption of time invariance. It is true that most lumped, convolution integral models work that way. Yet, this is not true for all; see for example Weiler et al., 2003, who introduce weighing factors to account for variable flows, or of course the original work by Niemi (1977) and his concept of flow time. In addition, there was considerable progress over the past years, explicitly allowing for variable flow conditions also in lumped models (e.g. Botter et al., 2010,2011; Benettin et al., 2013; Rinaldo et al., 2015).

We have clarified this point to:

"However, constraining lumped parameter models using sequential ^3H data collected over several years has commonly made the assumption that the data can be described by a single lumped parameter model and that the flow system is time invariant, which may not be the case in reality (e.g., Kirchner,2016b)" (Page 5, lines 11-14).

(2) I agree that testing several models is a good idea when insufficient information about the actual system is available. This, however, does not answer the question raised by Reviewer #2: How did you choose for the different functional shapes of transit time distributions (e.g. epm, em, dm) the associated transit times (tau or taum) which you need in your eqs.1-3. This is not clear from the text and needs to be explained to allow the reader to completely follow what you are doing, because surely different values of tau can produce the observed signal with different recharge activity and different values for the other parameters. In other words, as far as I understand, you vary the recharge H_3 activity and the other parameters but not tau. This needs to be clarified and justified.

We have clarified this point, we now specify:

"In this study mean transit times were calculated by matching the predicted ^3H from the lumped parameter model to the measured value at the time of collection using TracerLPM. For these calculations, the form of the lumped parameter model and its parameters (i.e. the EPM ratio or D_p) and the ^3H input function were specified" (Page 12, lines 17-20).