Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2017-497-RC1, 2017

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Technical note: Transit time distributions are not L-shaped" *by* Earl Bardsley

Anonymous Referee #1

Received and published: 2 September 2017

This technical note discusses the general form of pdf employed in transit time distribution analyses. The entire argument is based on the argument that because, on physical grounds, f(t=0) = 0, the frequently-used forms are inherently "wrong" because they have the property that f(t=0) > 0. The author therefore suggests that alternative pdf's should be used, although the author does not offer concrete suggestions.

On a philosophical level, the author is correct – but as the statistician George Box wrote: "Essentially, all models are wrong, but some are useful." So while we are all well aware that the property at t=0 is incorrect, I consider this a minor, irrelevant point. Many existing models "work" well, notwithstanding this point.

In principle, this Technical Note could be published, but quite honestly, I doubt that it will generate much interest. I leave this decision to the Editor. Two points below should

be addressed, however, prior to potential publication.

First, the author uses the term "L-shaped probability density functions", which I find somewhat misleading. Not all pdf's that have f(t=0) > 0 – a single point property – look like an "L".

Second, the author might note that not all currently-used pdf's are "L-shaped" – for example, transit time distributions based on the continuous time random walk (CTRW) include the case for f(t=0) = 0 — see, e.g., Dentz et al., Transport behavior of coupled continuous-time random walks, Phys. Rev. E, 78, 041110, 2008 (see the coupled case). The CTRW has been applied frequently and successfully in analyses of a range of groundwater applications (e.g., the citations in the Phys. Rev. E paper). Thus, the author's "call" for consideration of "correct" pdf's has in some sense already been heeded.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2017-497, 2017.