

My thanks Markus, for your detailed and helpful comments.

As noted in my previous response, my intention is to withdraw the manuscript and (if the Editor permits) submit a new paper at a later date explicitly incorporating the effect of varying  $p$ , while also taking into account all current reviewer comments. My feeling was that the paper would then have such a different look to it that it would be better considered as a new submission. I hope the present reviewers will remain, if they are kind enough to do that.

As you note, there is a need for making a better case. Nonparametric methods are very flexible and there is a need to demonstrate that matching closely to data can in fact lead to helpful upper bounds located sufficiently below 1.0. However, I would prefer not to extend beyond a Technical Note in scope. If permitted, the way to do it might be to have an electronic supplement going into more examples. My preference is toward the toy model approach in the first instance, because application to real data, doing it properly, could require adding some constraints from local knowledge. Also with toy models we know what the truth is. It might also be helpful in the supplement to include some example LP setups so others can quickly run their own data.

In your comments, I think there are only a few minor points that need a brief response or comment at this stage (below).

With respect to (2)

It is true that if a cumulative distribution is known then so too is the density function. However, I am only obtaining an upper bound to the cumulative distribution and the derivative of an upper bound expression cannot be interpreted as providing information about the density function.

With respect to (4)

Cumulative distribution functions are upper-bounded at 1.0 by definition. So if, for given  $t$ , an upper bound of, say, 0.99 was obtained, then this would not be regarded as useful.

With respect to (15&16)

Gamma distributions only have defined modes for  $\alpha \geq 1$ . See, for example, the chapter on the gamma distribution in Johnson et al (1994). But yes – I should have mentioned explicitly that I am concerned with modes  $> 0$  because for the special case of the exponential distribution there is a mode at zero.

Simulations should be based on the correct form of transit time distributions  $f(t)$  such that  $f(0)=0$ , independent of considerations of instrumental resolution. So there is no necessity to use L-shaped distribution forms – just the opposite in fact. See also [doi.org/10.5194/hess-2017-497](https://doi.org/10.5194/hess-2017-497) and discussion.

My thanks again for your detailed input.

Johnson, N.L., Kotz, S., Balakrishnan, N. (1994) Continuous Univariate Distributions V1 (2<sup>nd</sup> Ed)