

Response to Editors Comments.

Dear Dr. Beven,

As you have seen, the reviewers are fairly positive on your paper. The main critical remarks came from reviewer 2. I think the discussion replies you provided may be a little too brief. Basically, you so "no, what rev 2 says is not the case", but your reasoning for that is limited. Would it be possible to include some further remarks about the debate you want to discuss in your paper versus two other debates relevant for history of hydrology, which are rainfall-runoff and the use of mathematical simplifications?

On the changes you already suggested before I made my decision (thanks for those), I have mixed feelings, to be honest. I have indicated before that a historical paper - that is a paper discussing why and how certain concepts were drafted and used - is not the place to solve an hydrological issue - that is an issue that needs a solution. Your new text does include quite some new judgements by yourself on the suitability of certain approaches. That suggests to me that the text keeps including two positions, a historical perspective on ideas and call for sound hydrology, that the historical discipline tries to keep separated. Would you be able to clarify your position on this problem of mixing?

Kind regards,

Maurits

I did previously reply to this issue in my first response to the Editor's comments (though I now see that this somehow ended up as a response to referee 2, though titled correctly.

I do not think my position has changed much. The mix of historical perspective and call for sound hydrology seem to fit rather neatly together in this particular case. In particular going back to the very first exposition of a time-area method for time of concentration, that due to Imbeaux at the end of the 19th Century, I have demonstrated that he used both velocities (for hillslope responses) and celerities (for routing in the channel network) in his methodology. Once this is pointed out, therefore, it immediately requires some consideration of which should be used, especially as I show (historically) that the confusion persists to recent review papers without really being debated. It is then only natural to make some recommendations about future practice in using the time of concentration concept. I am not aware of any other paper in the literature that has considered this confused history of time of concentration.

I remain somewhat surprised at the reaction of Referee 2 who suggests that the paper is more a history of mathematical simplification in rainfall-runoff modelling, and seems rather blasé about what simplification is used. The fact remains (as noted in the paper) that time of concentration is still frequently used in hydrological texts and papers which suggests that we should be clearer about how and why we use it (or, in the case of the WMO International Glossary Definition should not use it, despite its apparent common sense basis). This was the original motivation for producing a history of the time of concentration (which, of course, has to carry over into its use in unit hydrograph theory, and the way in which DEMs have been used to produce times of concentration in this century). I think this is also made clear in the abstract to the paper.

In producing this final revision, I have added some more material on early work on urban drainage systems and the issue of hydrograph skewness (after a communication from Walter Collischonn on the HESSD paper).

I would suggest that the paper is dominated by the historical development (Introduction section to Velocities, Celerities and Time of Concentration) and that this is suitably separated from the final relatively short sections on Mathematistry and Teaching). I will accept that the Appendix is not essential to the historical part of the paper (that is why I moved it to an Appendix from the original submitted paper). I would, however, like to keep it associated with this paper as potentially useful to anyone implementing the recommendations about teaching time of concentration / equilibrium concepts.