Hydrology and Earth System Sciences Discussions

Interactive comment on "Temporal dynamics of hydrological threshold events" *by* G. S. McGrath et al.

Anonymous Referee #3

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This interesting paper studies the temporal dynamics of infiltration and saturation excess by considering a Poissonian model for rainfall coupled with the soil water balance. The work presents the existing work in a clear manner and introduces new expressions pertaining to first passage time statistics for the saturation excess case. The analysis includes a host of pertinent scenarios based on the aridity index that shed light on the threshold dynamics.

This article is certainly relevant for the readership of HESS and pertinent to the special issue. The following minor suggestions would enhance this contribution.

- The abstract may perhaps contain the acronyms IET and FPT as such are later on

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used at few places in the manuscript.

- On page 2863, just before eq (6), say "and the expected arrival time of the next storm was **an exponential distribution emanating from** a memoryless Poisson process **for the rainfall arrivals**."

- On page 2865, just before section 5.2, say that such an expression, eq. (14), shall be further explored later on.

- On page 2865, line 10, add the acronym FTP after first passage time.

- On page 2670, second paragraph. In the first phrase, isn't it lower rather than higher?

- On page 2671, first few lines. Although the authors are certainly making a valid point, it ought to be emphasized that what they are dealing with is a model of climate and not the climate itself...

- On page 2872, line 16. Instead of Sect 6.2.1 it should be "at the beginning of Sect 6.2."

- On page 2872, line 19. Delete "in arid ecosystems" as it is repeated in the phrase later on.

- On Conclusions, could the authors comment on the possibility of deriving similar expressions based on a rainfall model that accounts for clustering? What if storm depths are not modeled as exponentials as in the Appendix?

- On page 2878, just after eq (A1) define the term $L(s_0)$.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 2853, 2006.

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