

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1  
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## **Comment on hess-2022-166**

Anonymous Referee #1

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Referee comment on "Does non-stationarity induced by multiyear drought invalidate the paired-catchment method?" by Yunfan Zhang et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-166-RC1>, 2022

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hessd-2022-166 "Does non-stationarity induced by multiyear drought invalidate the paired catchment method?" Y.Zhang, L.Cheng, L.Zhang, S.Qin, L.Liu, P.Liu, Y.Liu

This article looks at methods for partitioning changes in the rainfall-runoff relationship between vegetation changes, climatic variation, and non-stationarity in runoff generation.

The three acronyms PCM, TTM and SBM are introduced and explained in parentheses by the second sentence of the Abstract, but not until the third paragraph of the Introduction and then after the acronyms are already used. Please use and explain them as soon as they are mentioned in the main text of the paper.

Is the Pettitt (1975) method used in this work? It is mentioned once (p4 l101) where the authors state that the Mann-Kendall test is used for ranking tests of non-stationarity then never again.

Question of equilibration between rainfall-runoff process within catchment and between paired catchments? The catchments must be small enough and the changes of a suitable scale that either both equilibrate quickly, or at the same rate so that cumulative fluxes still appear as a straight line.

Do the authors think that having a single effect occur with reasonable gaps is necessary to analyse the data? In the case of Red Hill/Kileys Run the catchments were paired (hydrologically) well then had the afforestation and years of data, then the drought with years of data, then the post-drought conditions and again with years of data. Is there a risk if changing climate conditions inducing a non-stationary response would interfere with the land-use response if they occurred closely chronologically? Could a method determine

the changes and separate them?