

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC4
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Comment on nhess-2021-218

Anonymous Referee #4

Referee comment on "Spatiotemporal evolution and meteorological triggering conditions of hydrological drought in the Hun River basin, NE China" by Shupeng Yue et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-218-RC4>, 2021

The paper focuses on the study of drought duration and severity using precipitation and runoff data. The main objective is to estimate drought propagation from precipitation to runoff deficit. Moreover, the propagation is studied using runoff data with a system including a large reservoir. Methodology includes copula estimation of the bivariate process of drought duration and severity. I m not convinced by two points which are the test of adequacy for the copula. There is no test of the copula model. Moreover, the discussion of propagation is lacking coherency due to the fact that authors do not properly takes into account the physical system, The latter is composed by 4 hydrological stations one upstream; the reservoir two downstream the reservoir and one at the outlet of the reservoir.

Page 2 Line 3 Hydrological drought refers to the condition when 3 the water level of a river or aquifer is lower than normal. This is not true

Page 2 line 7 the concept of drought resistance is not explained, it is not clear for me. No references are given. Any way I would think that it is not appropriate to compare the SRI severity for basins with different sizes. Severity should be scaled according to basin size.

Page 2 Line 8 Run 8 Run theory, a time series analysis method. Here Yevjevitch 1980 should be cited as first reference

Page 3 line 9 Authors need to mention the climate of the 3 studied sub regions DHF, SY, XJWP.

Page 3 line 27 what is tison polygon method?

Page 5 line 6 the combination of droughts is important to mention in the abstract

Page 5 line 11 why did authors selected these pdf?

Page 5 line 19 it is not clear whether the dependency between drought duration and severity is for the same variable rainfall or runoff

Page 5 Line 21 RMSE and AIC do not seem adequate to measure the adequacy of Copula. Authors should use Kolmogorov Smirnov test or other tests based on Monte Carlo simulations and Cramer Von Mises statistics to check the copula model adequacy (See for example the paper of Genest et al 2011 <https://arxiv.org/pdf/1102.2078.pdf>)

Page 5 line 24 how did authors computed $F(d,s)$?

Page 6 line 10 Did authors compute the Pearson correlation coef between SRI 1 month and SPI k months from k equal 1 to k equal 24?

Page 6 Line 13 it is not clear how authors used Bayesian network BN. There is no graphical model. The causal influences among variables are not described. May authors add a graphical model? I understood that authors contribute to identify or fit the conditional probability which is known as parameter learning component in learning BN but the structure learning is missing. A reference to Pearl papers should be included for example https://ftp.cs.ucla.edu/pub/stat_ser/R246.pdf

Page 6 Line 21 Authors do not use the conventional words within BN which are nodes and parents, response variable y here hydrological drought with two components duration and severity and the feature variable x that characterizes y and which is here is rainfall deficit

Page 7 line 21 what do authors mean by seasonal scale SRI? Is it SRI 3 months beginning in January; April etc...or is it SRI3 of 3 ;onth period beginning in January, then in February m then in March etc... ?

Page 9 line 1 figure 4 what does mean heat map?

Page 7 to 9 trend analysis should be first presented in methodology section and then in results section

Page 9 line 3 it is not clear whether the trend analysis is about SRI. It is not clear how are obtained the results of Table 2 . What are the series that are analyzed using M K test?

Page 9 line 18 why do authors analyze 1 month SRI?

Page 10 line 9 alpha equal 0.01 is problematic. Usually, we use 0.05. Other tests should be used. Also authors need to test the normality of the SPIs and SRIs series

Page 10 line 11 it is not clear whether Table 3 is about precipitation data, this should be indicated in the title

Page 10 discussion of the number of droughts. How did authors took into account the reservoir impacts on the runoff downstream ? Downstream stations SY and XJWP are affected by the reservoir operation . The comparison of the three hydrological stations does not hold because drought conditions in Downstream stations SY and XJWP are not due to natural variability but to both natural variability and storage decisions. This explains the seasonal characteristics discussed in Page 12 Line 8 and the results in Page 13 Line 7 and 8. However the comparison between DHF and BKQ holds. So in Fig. 7 c and d are not worth for comparison

Page 11 Line 14 authors choose 0.5 as reflecting moderate drought, They should explain why 0,5 corresponds to moderate drought. (the mean is greater than the median corresponding to 0.5).

Page 11 in Figure 6 and Table 5 why not representing results of station BKQ station?

Page 12 line 6 What is Poisson correlation coef?

Page 14 Line 1 to 3. I would not agree with authors conclusions, the result of 4 months as propagation time in relation with an interdistance of 40 km is due to the fact that the reservoir exists. Otherwise I guess that the propagation time would be one month or less

for such a distance

Page 14 the complexity of the situation (lines 7 to 17) argues in favor of drawing a Bayesian network BN scheme.