Review report of the manuscript:
Spatial and temporal Trend Analysis of Long Term rainfall records in data-poor catchments with missing data, a case study of Lower Shire floodplain in Malawi for the Period 1953-2010
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The paper investigates the long-term trends in precipitation from 16 stations located in the lower Shire catchment in Malawi over the period 1953-2010. Both annual and monthly trend analyses are considered. Trend presence of trend is checked using the nonparametric Mann-Kendall (MK) test statistic. The trend magnitude is estimated using the Sen's slope method. Finally, the homogeneity of trends is examined using the Van Belle and Hughes method. According to the authors the results indicate that 20 annual precipitation has increased, whereas, monthly precipitation revealed an upward trend in wet seasons (November to April) and a downward trend in dry seasons (May to October). The monthly peak trend analysis has shown upward trend in rainy months at all stations.

General comment
The authors perform very simple analyses using standard tests. In general, this is not to be viewed as a serious drawback. Nonetheless, in cases like this, more than in cases of papers that propose original methodologies, it is indispensable, for the paper to be considered for publication, that adopted methods are applied with scientific rigour and that results are properly interpreted. Unfortunately, in the present case the considered statistical tools are applied in a non-convincing way and interpretation of results is not convincing as well. Valid interpretations can be obtained only if the working assumptions the adopted statistical techniques rely on are met. In the paper, the majority of these working assumptions are not formally checked. In addition some of the considered statistical techniques are not correctly implemented.

Specific comments

At page 3 lines 4-7 The authors write: <<The daily records from which the monthly and annual records were generated contain numerous gaps and missing values which require a scientific infilling before performing any trend analysis. 5 This infilling exercise has been performed and reported elsewhere (Mwale, Adeloye, and Rustum 2012)>>	The authors should explain whether (depending on the amount of missing values and/or on the adopted infilling procedure) the infilling exercise can affect or not the result of the trend test.
At page 3 lines 23-25 The authors write: <<It is worth to mention that some researchers (e.g. Sang et al., 2014) highlighted the need for pre-whitening of the time series data before conducting any trend analysis test, however, if the sample size is more than 70 then serial correlation does not affect the MK test (Basistha, 25 Arya, and Goel 2009)>>	It is not clear what the authors mean for sample size. It seems to me that the mentioned condition is not satisfied. For example, the trend analysis of annual precipitation time series is performed on the basis of 58 data.
At page 4 line 4 The authors write: <<…the null hypothesis that a sample data is independent and identically distributed…>>	a) Data is a plural noun. b) Data are numbers. It is not correct say that numbers are stochastically independent and/or identically distributed. I suggest to write: ….the hypothesis that observed variables are independent and identically distributed….
At page 4 sentence 5-6 The authors write: <<Thus, if the null hypothesis H_0 is accepted at the significant level α, then the mean and variance of the S statistics are given by Kendall as it is approximately normally distributed, mean (S) is zero.>>	a) It is not correct to write significant level. It should be significance level (this error is repeated several times in the manuscript). b) It is not correct to write: <<if the null hypothesis H_0. is accepted at the significant level α then the mean and variance of the S statistics are given by Kendall >>. The level of significance only impact on the decision rule. At this stage the authors are not discussing about the test result. It is correct to say: Under the null hypothesis H_0, the mean and the variance are those given in equations (3) and (4), respectively.

	c) The fact that the mean of S is zero does not depend on the fact that it is approximately normally distributed. It is due to the fact that, under the null hypothesis, the observed variables are assumed independent and identically distributed. In addition, a normally distributed random variable can have a mean that is not zero.
At page 4 Equation (5) The authors write: $Var(S)=\left\{\frac{n(n-1)(2n+5)}{18}-\sum t_t(t_i-1)(2t_i+5)+\right.$ $\left.-\sum u_t(u_i-1)(2u_i+5)\right\}+$ $+\frac{1}{9n(n-1)(n-2)}\left\{\sum t_i(t_i-1)(t_i-2)\right\}\left\{\sum u_i(u_i-1)(u_i-2)\right\}+$ $+\frac{1}{2n(n-1)}\left\{\sum t_i(t_i-1)\right\}\left\{\sum u_i(u_i-1)\right\}$	a) The symbol u_i is not defined in the text. b) It is not specified which values can assume the index i. c) This is not the formula usually adopted in the considered case. The authors don't provide a reference for it. I suggest to write: $Var(S)=\frac{1}{18}\left\{n(n-1)(2n+5)-\sum_{i=1}^{m}n_i(n_i-1)(2n_i+5)\right\}$ where m ($m\geq 2$) indicates the number of tied groups and n_i is the number of elements (i.e., ties) in the $i-th$ group.
At page 5 line 1-2 The authors write: <<However, the absolute value of Z is compared with the standard normal cumulative distribution to detect if there is any trend The trend is said to be decreasing if Z is negative and increasing if *Z* is positive. H0, the null hypothesis of no trend, is rejected if the absolute value of z is greater than $z_{1-\alpha/2}$, where $z_{1-\alpha/2}$ is obtained from the standard normal cumulative distribution tables.>>	The sentence is misleading. In particular, it is not clear what the authors mean when they write: <<the absolute value of Z is compared with the standard normal cumulative distribution>>. I suggest to write: The null hypothesis of no trend, H_0 is rejected, at the selected level of significance (α), if the absolute value of Z is greater than $z_{1-\alpha/2}$, where $z_{1-\alpha/2}$ is obtained from the standard normal cumulative distribution table. In particular, the trend is said to be decreasing if Z is negative and increasing if Z is positive.
Page 5 section 2.2. Sen's slope estimator	As remarked by the authors themselves: <<the method uses a linear model to calculate the change of slope and the variance of the residuals should be constant in time.>> Although the plots in figure 3 seems to corroborate the validity of these assumptions, the authors should check them via formal tests (and/or at least discuss them explicitly) when they apply the Sen's slope estimator to the considered time series.
At page 7 lines 26-28 The authors write: <<The results of the trend analysis of annual precipitation using Mann-Kendall and Sen's slope estimate are shown in Table 4. Trend analysis revealed a significant increasing trend of at least 0.001 confidence. The slope of the increase Q ranges from 3.30mm/year at Mwanza to 10.27 mm/year at Mimoza.>> At page 8 lines lines 4-6 The authors write: <<..Additionally, Table 4 highlights the smallest significant level α with which the test demonstrates that the null hypothesis of no trend should be rejected. For example, in case of Nsanje, the results of the test is returned as H=1, hence the null hypothesis at the significant level of 5% is rejected, whereas in 5 case of Makhanga, the H is zero, thus, the null hypothesis cannot be rejected at the significant level of 5%>>.	a) At page 7 it is not clear what the authors mean for 0.001 confidence. I guess they mean "at the significance level of 0.001". Assumed I am right, this value differ from the significance level of 5% which the authors make reference at page 8. b) Results in table 4 are not correct. Based on the p-values reported in the table (I checked the p-values, they are correct) only in the case of Mwanza the test is not significant at the significance level of 0.05. It is clear that something doesn't work. For example, note that, despite of the fact that the values reported in the second row are identical to those reported in third row, according to the authors the null hypothesis is rejected in the case of Makhanga while it is not rejected in the case of Ngabu.

At page 8 lines 9 The authors write: <<The MK test was applied to different months and hence every time series for 58 years is considered as uncorrelated and thus meet the test assumptions.>>	The meaning of this sentence is not clear. I suspect that the author are trying to say that different time series are not cross-correlated. In the case I am right, I think that they should check this assumption (it is not obvious). The authors should also explain why this assumption is important for the MK test reported in table 6. I expect it is important for testing the homogeneity of trends (where, for example, it is needed that Z_j computed over different seasons are nearly independent, an assumption that is usually assumed to be reasonable if the seasonal observations are far enough apart).
At page 8 lines 14-15 The authors write: The test is calculated based on the smallest significant level α in which the trend is considered statistically significant at the α confidence level.	a) This sentence is not clear. I suspect the authors are trying to make reference to the p-value. b) The term confidence level should not be used in the case of tests of hypotheses. It is correct to use the term level of significance.
Page 8 lines 24-30 The authors write: <<The results of homogeneity of trends between stations based on van Belle and Hughes (1984) at different months are presented in Table 8 and the results of homogeneity of trends between months at different stations are presented in Table 9. The results of the homogeneity of month-station interactions are presented in Table 10. The values of homogeneity Chi-squares for stations, months and station-month interactions were compared with the significant level α=5%. By comparing the results, it is clear that Chi-squares exceeds the critical value of α for all cases, thus, the trend results are homogenous between months, stations and between month stations interaction. The homogeneity is also clear from Figure 5, where all stations follow the 30 same trend when Z values move from one month to the other.>>	The null hypotheses of the performed test is that there is homogeneity of trends. In table 9 only the test statistics computed in the case of Mimosa doesn't exceed the critical value (the test statistics has 11 degrees of freedom the critical value is 19.67). In all the remaining cases the right decision, at the significance level of 0.05, is that there is not homogeneity of trends.
Page 8 lines 24-30 The authors write: <<The results of homogeneity of trends between stations based on van Belle and Hughes (1984) at different months are presented in Table 8 and the results of homogeneity of trends between months at different stations are presented in Table 9. The results of the homogeneity of month-station interactions are presented in Table 10. The values of homogeneity Chi-squares for stations, months and station-month interactions were compared with the significant level α=5%. By comparing the results, it is clear that Chi-squares exceeds the critical value of α for all cases, thus, the trend results are homogenous between months, stations and between month stations interaction. The homogeneity is also clear from Figure 5, where all stations follow the 30 same trend when Z values move from one month to the other.>>	Technical language should be revised: it is not correct to say: • The values of homogeneity Chi-squares for stations, months and station-month interactions were compared with the significant level α =5%. It is correct to say significance level. In addition, it is correct to say that the test statistic is compared to the critical value corresponding to the significance level α =5%. Similarly it is not correct to say: • The Chi-squares exceeds the critical value of α It is eventually correct to compare the p-value to the significance level.
Page 8 lines 24-30 The authors write: <<The results of homogeneity of trends between stations based on van Belle and Hughes (1984) at different months are presented in Table 8 and the results of homogeneity of trends between months at different stations are presented in Table 9. The results of the homogeneity of month-station interactions are presented in Table 10. The values of homogeneity Chi-squares for stations, months and station-month interactions were compared with the significant level α=5%. By comparing the results, it is clear that Chi-squares exceeds the critical value of α for all cases, thus, the trend results are	It is necessary to specify the number of degrees of freedom of the test statistics considered in tables. For example in table 9 the number of degrees of freedom is 11.

homogenous between months, stations and between month stations interaction. The homogeneity is also clear from Figure 5, where all stations follow the 30 same trend when Z values move from one month to the other.>>	
Table 6	It is not clear the meaning of the asterisks. I guess the number of asterisks increases if the p-value decreases. The authors should clarify this point.