Response to Referee #1

This manuscript investigated climate change effects on extreme temperatures in the Blue Nile Basin. After a description of dataset and case study, authors described applied methodologies, among which emerges the widely employed Mann-Kendall test. The investigation was carried out by applying these tools to extreme temperatures detected in Blue Nile Basin. The topic is of paramount importance for hydrological applications to be implemented in the areas covered by this study. However, to my opinion the paper needs substantially improvements, both in its structure and results analysis, that are of major importance.
response: thank you very much. Your substantial and very appreciated improvements will be done in the revised version of the paper

2 General comments: The paper deals with a relevant topic for modern hydrology, highlighting the need of such analyses for a wide field of real applications. However, to my opinion the paper needs to be improved substantially in the introduction and in the result analysis, and the abstract reformulated in a more readable way. In particular, the introductive section should be rebuilt in order to provide a more logical discussion about the general framework and local situation, clearly specifying motivations and goals of the paper. More detailed comments will be shown in specific comments section.
response: the abstract will be reformulated and the motivations and goals of the paper will be specifyed clearly in the revised version of the paper

The second – and, to me, more important – issue is related to the analysis on Mann-Kendall test results and arise from the citation of the paper of Yue et al. (2002) at line 168. This is one of the most famous papers (1048 citations on Scopus ad November 17, 2020) on the use of Mann-Kendall test for detecting trends in hydrological series, highlighting the role of power evaluation when applying this test. In this way, a complete analysis of applications to real data can be performed, investigating both type I and II errors. A lot of papers discussed on the practical implications that the assessment of power can generate. Among the most recent, I suggest to refer to the following for the specific reference to Mann-Kendall (published in 2020): - Totaro, V.; Gioia, A.; Iacobellis, V. Numerical investigation on the power of parametric and nonparametric tests for trend detection in annual maximum series. Hydrol. Earth Syst. Sci. 2020, 24, 473–488.
- Wang, F.; Shao, W.; Yu, H.; Kan, G.; He, X.; Zhang, D.; Ren, M.; Wang, G. Reevaluation of the Power of the Mann-Kendall Test for Detecting Monotonic Trends in Hydrometeorological Time Series. Front. Earth Sci. 2020, 8.
This about an application of power evaluation with parametric Likelihood Ratio test: - Németh, L., Hübnerová, Z., Zempléni, A. Comparison of trend detection methods in GEV models. Communications in Statistics-Simulation and Computation, 2020, 1-16.
And these latter to implications and concerns on the need of evaluating the power:
- Vogel, R. M., Rosner, A., and Kirshen, P. H.: Brief Communication: Likelihood of societal preparedness for global change: trend detection, Nat. Hazards Earth Syst. Sci., 2013 13, 1773–1778. - Serinaldi, F., Kilsby, C. G., and Lombardo, F.: Untenable

nonstationarity: An assessment of the fitness for purpose of trend tests in hydrology,. Clarified this issue, I know that lots of hydrological applications are carried out in the same way as you did. However, to my opinion you should base your findings reporting some notes supported by literature references about Mann-Kendall test power, to reinforce your statements, in order to provide a more complete and appropriate interpretation of results.
response: the suggested refernecs will be studied and the current paper will be enhanced using these papers in the revised version of the paper

Finally, in addition to these two remarks, I would like to see a more detailed discussion in Par. 3, that I found too short and an inversion between order of Par. 2.1 and 2.2..
response: more detailed discussion in Par. 3will be done and an inversion between order of Par. 2.1 and 2.2in will be presented in the revised version of the paper

Specific comments: - Line 13: specify which data; to me, monthly is too generic and is repeated at lines 13-14; - Lines 15-17: please, provide a clearer summary of your methodologies;
response: the repitition of monthly in the abstract will be revised and a clearer summary of the methodologies will be provided in the revised version of the paper

- Line 28: there has been: : :I think that it still is;
response: the sentence will be updated in the revised version of the paper

- Line 29: its direction. Please, use a more specific term;
response: the word direction will be replaced with (trend)

- Line 30: and the potential river basins in the Nile Basin: what do you mean?
response: the authors mean that this sub-basin has the potential for development and hydropower generation

- Line 35: please, remove comma;
response: will be removed

- Lines 39-40: this statement should be moved to the Conclusion section;
response: the statement will be moved to the Conclusion section

- Lines 42-44: please, support your statement with references;
response: the reference (Jun et al, 2010) will be used

- Line 46: what consequences are you referring to? –
response: the consequences as higher evaporation rates and deterioration of quality

Lines 48-51: please, support your statements with references;
response: the reference (Sohoulande et al, 2016) will be used

- Line 59: it is not clear what basins are you referring to;
response: the basin studied in the papers of (Anache et al., 2018, Bergström et al., 2001, Chen et al., 2012, Yan et al., 2020)

- Lines 63-64: is this statement referred to the work of Gleick (2000)?
response: yes the statement refered Gleick (2000) work

- Lines 71-72: to me, you can better specify the type of variable you are analyzing;
response: the variables are min, mean, and max monthly temperature

- Lines 79-86: this detailed discussion should be moved to case study description, leaving only some notes about climate of Ethiopia that are strictly essential for developing the introduction;
response: this discussion will be moved to the case study description section

- Line 103: please, remove &;
response: will be replaced by "and"

- Lines 104-107: to me, you have to provide a better declaration of hydrological variables you are investigating and to which you are applying tests;
response: hydrological variables will be declared

- Lines 108-110: please, report more details on the occurrence and treatment of missing data;
response: more details on the occurrence and treatment of missing data will be introduced in the the revised version of the paper

- Line 118: Figure 1, pleas improve readability of words and numbers (e.g., increase dimensions);
response: the figure will be updated in the revised version of the paper

- Lines 142-144: please, provide a reference for your statement;
response: the references (Onyutha, 2017 and Partal, 2006) will be used

- Lines 153-154: I think you can rephrase your statement in a clearer way. I can't understand what do you mean;
response: the statement will be rephrased to (Moreover, MK and Sen's slope estimator test were employed to reveal the temperature trend)

- Line 163: specify what do you mean with homogeneity and why you apply Pettitt test;
response: more explanation will be introduced

- Lines 163-167: why describe this test only with words and dedicate little less to a full page to Mann- Kendall test with all formulas?
response: Pettitt's test formula will be introduced

- Line 181: Zc?
response: will be corrected

- Line 196: I think you are referring to Zc (attention when using the term p-value), and must declare it as the title of MK column in tables 2, 4, 6, 7. Furthermore, when you use *, **, *** in those tables I think that you have to clearly give meanings to these symbols in each caption. However, I understood what they mean, but they need an explicit explanation;
response: explicit explanation of all symbols will be introduced

- Line 199-201:
why reporting global statistics before showing your results? They can have place in the Discussion section, and only if compared with local findings;
response: will be compared with local findings

- Lines 218-219: where?
response: in many parts worldwide

- Lines 223-224: I think you should address the use of the word significant in the whole document, also in the light of considerations about test power
response: will be addressed in the revised version of the paper

Finally, we would like to thank you for your valuable comments that boosted the paper totally