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Hydrology and Earth System Sciences
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Discussions

Interactive comment on "Impacts of land use change and climate variations on annual inflow into Miyun Reservoir, Beijing, China" *by* J. K. Zheng et al.

Anonymous Referee #2

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General comment:

The work presented here certainly lies within the scope of HESS and contributes to the body of hydrological literature. However, I still would like to present my critics on the paper, serving as further improvement to bring the paper into publishing level or lastly helps to appear in HESS. The paper presents the impacts of land use change and climate variation on annual inflow into Miyun reservoir, China. The paper tried to disentangle the contribution of the changes on streamflow due to land use and climate variation. Three models, the annual water balance model, the Climate Elasticity Model, and simple empirical rainfall runoff model were used. Furthermore, break points in time

series were detected using sequential Mann-Kendall and double mass analysis. The main concern in this research is that the methodology employed is not add new ideas or techniques to investigate the impacts of land use/ land cover and climate variation on streamflow. Past researches also used the same methodology in different part of the world (e.g. Yang and Yang, 2011; Zhang et al., 2008; Li et al., 2009). Though the CEM and empirical rainfall-runoff models gave comparable results, both methods lacks physical basis. The coefficients in both models are not explicitly accounted the vegetation or other physiographic characteristics of the catchment. Besides, the results need further interpretations or discussions with respect to past work on the same catchment or in different parts of the Globe. The discussion part is only emphasis on the qualitative aspects of uncertainty analysis. The quantitative values of the uncertainty analysis would support your results or increases the degree of belief of the model results. In general, most of the statistical test like the Mann-Kendall test is prone to give biased results unless the data set is of good quality. Consequently, revising the data analysis part is vital to see the quality of the hydro-meteorological data, which was not presented clearly in the manuscript.

Specific comment:

Abstract:

The abstract is well written except that on Line 20 on wards, i.e. the last paragraph should be modified as uncertainty analysis has not done.

Introduction

Overall, the introduction provide information about different past researches on the area but lacks to provide the current state of arts how different researches in different parts of the world are conducted with regard to impacts of land use and climate variation on streamflow. Please enrich the literature review in the introduction part a bit. On page 7788, Line 15 mentioned literature is worked out in MYRC. Please discuss at least the unique part of your study next to this paragraph. On page 7789, the results

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provided to meet the third objective is speculative.

Material and Methods

On page 7790 under 2.2 the hydro-meteorological data, nothing is mentioned about the data quality. Assessing the quality of hydro-meteorological data is a key task before making any analysis about hydrological variability/changes. Please re-do the data quality under this section. Page 7791, before applying directly the Mann-Kendall test, the assumption inherent for the null hypothesis is that a data series is serially independent and identically distributed with no trend. Hence, The MK test should be applied to serially independent or uncorrelated data (Helsel and Hirsch, 1992). To correct the data for serial correlation, the procedure of trend free pre-whitening (TFPW), should be applied (e.g. Yue et al., 2002 and 2003; Tekleab et al., 2013). Re-evaluating the data for serial correlation could potentially change your trend results OR YOUR REFERENCE AND EVALUATION PERIODS.

Results

Page 7795, the descriptions given under sub-title "Land use change and its major driving factors" are not results rather you provided information about the land use changes over time. In order to accept this section as a result, clear methodology about land use change classification should be provided under methodology section. I think this section has to be removed and the information can be described in the discussion section. Page 7796, Line 1-10, the description is about the method. I see structural problem (mixing results with methodology). Page 7797 what does it tells the elasticity coefficients áţŃ1 and áţŃ2 provided 2.12 and -2.25? The error of data, combined with uncertainty of model structure, increased uncertain to attribution of land use change. This statement is not clear and needs paraphrasing.

Technical correction:

Page 7793, Line 7, what is this correction factor K how the value is set? Line 8, the

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average daily temperature expressed (°)? °C, or °F ??

Page 7793 correct equation 13.

Page 7794, Line 17 the word ”hydrometeological” should be corrected as hydro-meteorological.

Page 7796, Line 15, 17 and 18, and throughout the manuscript, watershed and catchment are interchangeably used. Choose either catchment or watershed consistently throughout the manuscript.

Page 7797, Line19, the coefficients should be computed from Eqn. 16 NOT Eqn. 14??

Page 7799, line 27, calibration and validation phases.... Phases shall be replaced by periods.

Page 7811, the catchment areas provided under in figure 1 caption is inconsistent with the area mentioned on page 7789 Line 15.

Pages 7816, the dashed lines described in figure 6 are confusing. Replaced the dotted horizontal lines with dashed bold horizontal lines represent critical values at the 95% confidence.

References

Helsel, D.R., Hirsch, R.M.: Statistical Methods in Water Resources. Studies in Environmental Science 49. Elsevier, Amsterdam, The Netherlands, 1992.

Li, Z., Liu,W., Zhang, X., and Zheng, F.: Impacts of land use change and climate variability on hydrology in an agricultural catchment on Loess Plateau of China. Journal of Hydrology 377 35-42, 2009.

Tekleab S, Mohamed Y, Uhlenbrook S.: Hydro-climatic trends in the Abay/Upper Blue Nile basin, Ethiopia. Journal of Physics and Chemistry of the Earth 61-62: 32–42. DOI: 10.1016/j.pce.2013.04.017, 2013.

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Yang, H., and Yang, D.: Derivation of climate elasticity of runoff to assess the effects of climate change on annual runoff Water Resources Research, VOL. 47, W07526, doi: 10.1029/2010WR009287,2011.

Yue S, Pilon P, Phinney B, and Cavadias G.: The influence of autocorrelation on the ability to detect trend in hydrological series. Hydrological Processes 16: 1807–1829, 2002.

Yue, S., Pilon, P., and Phinney, B.: Canadian stream flow trend detection: impacts of serial and cross-correlation, Hydrolog. Sci.J., 48(1), 51–63, 2003.

Zhang, X., Zhang, L., Zhao, J., Rustomji, P., and Hairsine, P.: Responses of streamflow to changes in climate and land use/cover in the Loess Plateau, China. Water Resources Research, Vol.44, W00A07, doi:10.1029/2007WR006711, 2008.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 7785, 2015.