

Interactive comment on “Assessing the impact of climate variability and human activities on streamflow variation” by J. Chang et al.

Anonymous Referee #2

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General Comments This paper quantitatively isolated the relative contributions that human activities and climate variability made to decadal streamflow changes in Jinghe Basin of China using an elasticity-based method and two hydrological models (TOPMODLE and VIC models). There are three major concerns with this manuscript.

1. I think the results could be made more concise and understandable, and the discussion should be deeper, especially for the uncertainties of the three methods.
2. The logic and statement should be consistent throughout the whole paper.
3. The paper is understandable but the English would need considerable improvement from a native speaker before it should be published.

Specific Comments Abstract 1. P12748 L10 Relative to what, the decreased speed of streamflow was higher? 2. P12748 L13 Please specify “the multi-year average value” represents the average

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value from which year to which year. 3. P12748 L18 Please point out what does the 99 and 40.44. P12748 L19 What is the significance to emphasize the errors and uncertainties that may occur in the methods used in the study. Instruction 5. P12750 L10 The “Yellow River basin” only appear once in the paper, I think that’s no necessary to use the abbreviation of YRB. Similarly, the MWR for the Ministry of Water Resources and the CMR for the China Meteorological Administration. 6. P12750 L10-12 The references should be noted for the numbers of 1.28°C/50 years and 8.87. P12750 L12-13 “A combination of these effects reduced the streamflow.” Does the streamflow reduced significantly? 8. P12750 L13-16 The streamflow variation of the Jinghe River was mainly caused by the combination effect of climate change and human activities. As one important drinking water source for a population of over 6 million people, I think the streamflow variation of the Jinghe River should have been investigated by several previous researchers. The study about the relative contribution of climate change and human activities on the streamflow variation of the Jinghe River is probably few. Please elaborate clearly. 9. P12750 L17 The objective of the study should be stated more clearly, especially, the innovation of the study. Study area and data Methodology 10. P12752 L13-14 What’s does the meaning of the sentence that “the historic streamflow series can be split into subseries from a year before when human activities were negligible”? 11. P12755 L8-9 “Hydrological models can also be used to assess the impact of climate change on streamflow.” Does the impact of human activities on streamflow also can be assessed by the hydrological models? 12. P12757 L3 Why the break points appeared in the 1970s? Was it caused by human activities? Or climate change? 13. P12757 L8 The mathematic expression of the NSE and WEB percentage should be given in the paper. Meanwhile, what’s the evaluation standard for the calibration and validation results? Results and discussion 14. P12757 L10 The sub-title of “Results and discussion” repeats with the sub-title of the “Discussion”. 15. P12758 L1-4 “. . .however, the minimum occurred in different years, which resulted from water withdrawal and other reasons, such as changes in groundwater.” This sentence is ambiguous. What does it mean the minimum occurred

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in different years? 16. P12758 L8 As we know, the runoff ratio decreased during dry years, while increased during wet years. Please elaborate why the increased runoff ratio during the wet years was emphasized, and the value of runoff ratio during the wet season should also be provided. 17. P12760 L15-16 “The correlation of the simulated streamflow and measured streamflow was higher during the calibration period and the R value exceeded 0.8.” What does the “higher” mean? Does the correlation coefficient of the simulated and measured streamflow was higher during the calibration period than that during the validation period? Maybe it's better to note the correlation coefficient in each sub-figure of the Fig. 7. 18. P12760 L18-21 “The NSE and WBE values during the validation period suggested that both the rainfall-runoff models and the calibration method used in the study were robust for the calibrated model to be used over an independent simulation period adequately.” 1) How to quantitatively evaluate the models used in the study is robust? 2) The different NSE and WEB values during the calibration period and the validation period was caused by the time-varied parameters inputted into the models. I think it is not sufficient to use the NSE and WEB values to indicate the models and calibration method used in the study were robust. 19. P12761 L7-8 “The time series plots in Fig. 9 show that the simulated annual streamflow values were always higher than the observed streamflow.” What I got from the Fig. 9 is that the simulated annual streamflow was always higher than the observed streamflow before 1990, while the simulated streamflow was lower or similar to the observed values after 1990. Discussion 20. P12763 L5-14 Please elaborate why the significant climate variability impacts appeared in the 1990s, while the most significant human activities impacts appeared in the 1980s. Does the impact decrease/increase the streamflow? What does the percentage mean in the bracket? Why the most significant human activities impact was 112.521. P12763 L19 What does the “two methods” represent? 22. P12763 L21-26 What's the relationship of Zhan et al. (2014) with this study? 23. P12764 L19-22 “For the hydrological model the predictions of physically based distributed models commonly contained a certain degree of uncertainty.” I think the information from this paragraph is common.

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That's no sense to emphasize the paragraph. However, a further discussion on the uncertainties of the TOPMODEL and VIC models is necessary. 24. P12765 L2-3 As mentioned above, the study area is a highly urbanized region and water withdrawal were extensive during the last several decades (P12749). Please elaborate how to get the result that "the human-induced reduction in streamflow in the JRB was primarily caused by soil and water conservation measures". If it is possible, please provide a multi-temporal land use map and briefly introduce it. 25. P12765 L14-17 If only the total comprehensive effect of the soil and water conservation measure and irrigation water withdrawal was assessed in the study, how to get the result mentioned in P12765L2-3 that the soil and water conservation measures is the primarily reason for the human-induced streamflow reduction? Conclusions 26. P12766 L3-7 I think this paragraph is a method introduction but not a conclusion. 27. P12766 L17-19 As mentioned in P12751 L15-16, water withdrawal has increased rapidly due to the increase of the population, industry and agricultural water demand. However, the conclusion is the maximum contribution value of human activities appeared in 1981-1990 due to the effects of soil and water conservation measures and irrigation water withdrawal. Does the irrigation is the primary cause for the water withdrawal? If so, please elaborate it in the result and discussion section but not only in the conclusion section. 28. P12766 L20 What does the "which" represent? Tables and Figures 29. Table 2 It should be noted that the potential evaporation is an estimated value. The observation period for the temperature should also be noted. 30. Table 3 What do the parameters of C_v , C_s , E_0 and T mean? The presentation of parameters should be consistent in Table 2 and Table 3. The time scale of the mean value of the potential evaporation and temperature should also be noted. 31. Table 5, Table 6 What does the parameter of $\dot{E}_{\zeta c}$ represent? Please also elaborate the parameter of $\dot{E}_{\zeta c}$ in the text. 32. Fig. 1. The legend for the Jinghe River and the Weihe River is same. As mentioned in the text, Jinghe River is the secondary tributary of the Yellow River, the largest tributary of the Weihe River in China. I suggest to label the Yellow River and Weihe River in the Fig. 1. 33. Fig. 2 No scale mark. 34. Fig. 4 It seems that the temperature values during

the period from 2000 to 2010 are missed. 35. Fig. 5 The such-titles are mismatch with the sub-figures of (b) and (c). Please check it.

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/12/C6832/2016/hessd-12-C6832-2016-supplement.pdf>

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