

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

### **Anonymous Referee #2**

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1. General comment This paper employed the elasticity method based on a Budyko-type equation and the method based two hydrological models to separate the impacts of climate variability and human activities on the streamflow of the Jinghe River in Northwest China. These two kinds of methods have been widely used in assessing the impacts of climate change and human activities on streamflow. There is a lack of methodological or theoretical contribution in this paper. On the other hand, the authors failed to give a clear presentations of both the methods used in this paper and the results of case study. There are also many issues in their paper writing, such as wording and typographical errors.

2. Specific comments: (1) In the title of this paper, the authors used the phrase “human activity”, but the phrase “human activities” appears many times in the body of this  
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paper. (2) Abstract, Line 7: Jinhe basin or Jinghe basin? (3) Line 10: What does “climatic differences” mean? (4) Line 14: “contribution” may be a better phrase than “change impacts”. (5) Lines 13-23: The description of the study results is very messy. It is difficult for the readers to understand what the authors have found in their study. (6) The last sentence in Abstract: The readers will be confused when reading about “We emphasized various source of errors and uncertainties. . .”. Did the author analyze the errors and uncertainties of these methods? What are the specific findings about the errors and uncertainties of these methods? (7) Introduction: Line 1: is or are? (8) Line 8: “separate and quantify the effects of climate variability/climate change” In this paper, the authors used the concept of climate variability, and I wonder water is the difference between climate variability and climate change? Since the aim of this paper is assessing the impact of climate variability and human activity to streamflow variation, it is better to change this sentence into “separate and quantify the effects of climate variability and human activities”. (9) Lines 23-25: Since the hydrological models have been regarded to have such many disadvantages, why did the authors applied these methods in this study? (10) Page 4, Last sentence: Please put some proper references for this statement. (11) Page 5, Lines 6: Since the abbreviation of JRB has appeared before, it is unnecessary to put this information again. (12) Lines 23-24: The author should put the proper references to support the statement of “climate variability combined with human activities has contributed to the decrease of the streamflow in the JRB.” (13) Lines 25-26: Please reword this sentence. (14) Page 5, Line 1: Please check “196-2010”. (15) Lines 5-6: Please reword this sentence. It is difficult to understand. (16) Line 13: It is better to merge Figure 1 and Figure 2, since they give the similar information. (17) Page 7 Eq.(4-5): Eq.(5) should has the same form with Eq.(4). (18) Page8 Line 1: were or are? (19) Line 7: What’s the meaning of “Eq.(.)”? (20) Lines 9-11: All Budyko-type equations do not include the term of streamflow (as displayed by the Eq. (8) in this manuscript). Please correct this statement. (21) Eq.(7): The symbol “F( )” has not been defined. The authors just present the expression of the elasticity of precipitation, but I wonder how is the elasticity

of potential evaporation estimated? Using the Eq.(5) or subtracting the elasticity of precipitation from 1? What is the difference between these two methods? (22) Lines 26-27: “w was set to 2.0 according to the land use and land cover status in the study area”. Is there a certain relationship between the parameter and land use/cover status? If any, please present this relationship. The value of this parameter can be estimated by using the observed data, and I wonder what is the difference between the estimated value from the observed hydrological data and the value set in this manuscript? (23) Page 9 Lines 2-3: hydrological or hydrologic? (24) Lines 7-11: Please show how to estimate the simulated streamflow during changed period. Since TOPMODEL is usually applied at the daily or shorter time scale, how did the authors simulate the mean annual streamflow by using this model? (25) Page 10 Line 9: Please put some proper references for the Xinanjiang model. (26) Line 20: What’s the specific meaning of “corresponding data”? (27) Lines 21-24: The author concluded that the streamflow had a larger decrease than precipitation, but why the regression slope of precipitation was larger than that of streamflow? (28) Lines 24-26: It is ambiguous for this sentence. What’s the meaning of “reduced by 17.39 % compared with the multi-year average streamflow”? How the value of 17.39% was calculated? The same issue for the value of -26.96% in next sentence. I suggest the authors to reword this paragraph, because it is hard to understand. (29) Page 11 Lines 22-23: Please distinguish evaporation and potential evaporation. The terms of 60s, 80s should be written as 1960s, 1980s. Please check this kind of issues. (30) Page 12 The first paragraph should be put into the section of methods. (31) Page 13 Lines 14-15: Why did the authors select the period of 1960-1970 as the baseline period? (32) Page 15 Section 4.5: This section should be put before the results of the hydrological models to agree with the presentation of the methods. In section 3, the elasticity method was firstly presented. (33) Line 9: Eqs. (3)-(?) (34) Lines 25: It is better to put the reference (Willmott and Feddema, 1991) into the section of methods. (35) Page 16, title of 5.1: Please reword the title of this section. (36) Lines 12-13: It is only here that readers find the time scales of the two hydrological models. Please put this information into the section of methods.

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TOPMODEL was usually applied at daily or shorter time scale, why was it applied at monthly scale in this paper? Since the authors just need to analyze the change of mean annual streamflow, what’s the advantage of the hydrological simulation based on daily or monthly scale? (37) Line 13: Vic or VIC? (38) Page 19: In the section of conclusion, the authors present their findings by using a lot of numbers. It is difficult for the readers to understand the results of this study from a macroscopic perspective. (39) Table 6: The font size is too small. (40) Figures: Please adjust the font sizes in all figures. The font sizes in Figures. 5-9 are too small. It harms the quality of presentation.

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