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Hydrology and Earth System Sciences Discussions

Interactive comment on "The causes of flow regime shifts in the semi-arid Hailiutu River, Northwest China" *by* Z. Yang et al.

Anonymous Referee #2

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General comments: Using commonly used statistical approaches, observed climate data, streamflow data and crop area, this study tried to disentangle the influences of climate change and human activities on streamflow in the middle reach of Yellow River basin. The paper is in general written well. Objectives and approaches were described clearly. However, the study has two major issues that need to be clarified. The paper can be published after major revision.

1. The study has problem in temperature impact interpretation. Three changing point detection approaches failed to account for the temperature impact. Yet, in the regression analysis, temperature impact reflected from the correlation coefficient is larger than both precipitation and crop area. The analysis in this respect is not consistent. It

might be necessary to look into seasonal series instead of annul time series only. 2. In the attempt of deconvolve the climate change and human activity impacts, the authors did weak analysis. Author claimed that air temperature increased during growing season, but pan evaporation had no significant change. Based on the above evidence, the authors stated that there was no correlation between climate change and discharge. In fact, not pan evaporation, but actual evaporation affects the stream discharge. Given that the area is cultivated, there must be effects from crop actual evaporation. What will actual evaporation change under the condition that air temperature is increasing? On the other hand, the actual evaporation change is essentially the result of the human activity caused land cover change effect. It would be interesting to separate air temperature change and land cover change impacts on actual evaporation. If authors provide more background information on crop area such as starting time, increasing rate, it would be help to understand the issue. Authors need to do more analysis in this respest.

Minor comments: Page 6001, lines 7-8, lines 10-11: there are many studies about climate change impacts on streamflow. Only 1 or 2 were cited in the paper. The authors should have wide references on this.

Page 6002, line 26, typo: coved should read covered.

Pages 6002-6003, Section 2.1, How much of the watershed is covered by desert? Is longer term air temperature 8.1C for daily or annual, what period was it averaged for? "monsoon from southeast", usually it is phrased as "southeast monsoon".

Page 6003, lines 27-28, how was this calculated? and why was it selected for detecting the changing point? It's better to list climate and hydro stations characteristics including elevation, data measured and data period in a table.

Page 6004, lines 4-6, This sentence is hard to understand. Please provide a map showing the crop area distribution.

Page 6006, lines 9-15, This part is not clear to me. What are you comparing? You have 3 time series of data. In Figure 3, there are no multiple changing points as detected by different methods showed in Table 2. Do you mean that those changing points detected by different methods are statistically the same?

Page 6007, line 17, whiles should read while. Remove “and”.

Page 6009, lines 9-10, what are those stations mentioned in “some”?

Page 6009, line 18, Why are you only interested in April to October air temperature? Is there snow in this region? Snow melt also contributes to flow in the summer. This also explains that your temperature interpretation is not sound.

Page 6012, line3-4, Weird sentence.

Page 6012, lines 22-23, Forest and grassland will evaporate more than cropland. It would be expected that streamflow will decrease due to evaporation increase. However, the combined effects of reduced reservoir and diversions, and more vegetation make the prediction of streamflow change hard.

Page 6013, lines 3-4, Needs proof.

Figure 1, Please provide terrain map of the watershed.

Figure 5 y-axis scale is too coarse.

Figure 6, caption and figure labels don’t match.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 5999, 2011.