

Interactive comment on “Do changes in climate or vegetation regulate evapotranspiration and streamflow trends in water-limited basins?” by Q. Liu et al.

Anonymous Referee #2

Received and published: 17 November 2014

The paper by Liu et al. addresses the important question on the cause of trends in streamflow within water-limited basins. The authors use Budyko's conceptual model (incorporating ecohydrological influences following Donohue et al. 2011), to attribute hydrological change to changes in climate or changes in rooting depth (Z_e). The authors state that changes in Z_e had a greater overall response to changes in hydrological processes than climate change only.

In general, the study could provide an interesting contribution to the heavily debated question on the importance of vegetation changes related to hydrological change. However, some technical and methodological issues give rise to concern if the study

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is suited to be published in HESS in its present form. Furthermore, the title is very promising, but from my point of view slightly overstated.

General Comments

1. As far as I understand, the rooting depth Z_e is parametrized as a function of precipitation only. The authors further found a general decrease in P for the YRB, resulting in a corresponding decrease in Z_e . Decreasing Z_e results in a smaller n -parameter in the BCP, causing the alteration of the hydrological conditions. However, two aspects, which are essential to understand and reproduce their results are not given and discussed in the manuscript: (i) The function of how Z_e is calculated from P and (ii) a map (or at least the basin wide average) of the particular aridity values (E_p/P), since the sensitivity of the n -parameter on E is a function of E_p/P (see Zhang et al. 2004) and is much larger in transitional climates compared to dry or wet climates.

2. Is using 1961 to set the base condition for Z_e really appropriate? Would you consider 1961 to be a rather 'normal' year? Why not using the first 10 years to set the base conditions?

3. How realistic is the assumption of fixed vegetation type and fraction under climate change? A discussion on this is definitely needed.

4. From my point of view, the model description and dataset section is far too short. How do you calculate Z_e (see first comment)? How do you calculate κ and α ? Which data are you using for their calculation? How do you calculate the trends? Which data are you using to calculate E_p ?

5. You should discuss the influence of human activities (river damming, land use change, diking) somewhere in the manuscript.

6. Please state throughout the manuscript, if (i) computed trends in and (ii) differences between the dynamic and static experiments are significant.

7. From my point of view, the conclusions in its present form are not really conclusions,

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but more a summary of the main findings. The whole section could be incorporated in the discussion section.

8. It would be beneficial to provide a map indicating the location of YRB within China or East Asia.

8. In general, the paper is well written. Nevertheless, there are some phrasing issues. Maybe, it would be beneficial to get some input from an English native speaker.

Specific Comments

P.11184, l.2: Please provide some basic information on YRB already in the abstract.

P.11185 l. 2: Please provide some basic information on the 'Grain for Green' program, since many people outside China are probably not aware of it.

P.11185, l. 22: Please reference some of these numerous studies.

P.11187, l. 25: Why is it ' -0.96 mm a^{-2} ' and not just ' -0.96 mm a^{-1} '?

P.11188, l. 18-19: Please state if these trends are significant.

P.11189, l. 6-12: It would be nice if you could maybe illustrate these results with e.g. histograms.

P.11190 l. 18-19: You probably meant: '(with an average decrease of -0.96 mm/a)'

P.11198 Fig. 2: Any idea on what causes the great difference between the static and dynamic Ze in the Northeast of the YRB?

P.11199 Fig. 3: The blue and the black line are rather hard to distinguish.

P.11201 Fig. 5: Please provide the information on the method used to quantify the significance in the text as well.

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