

Interactive comment on “Role of vegetation and landcover dynamics on the recycling of water in two endorheic watersheds of NW China (Gansu Province)” by M. A. Matin and C. P.-A. Bourque

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The title looks novel and interesting. Moisture recycling in inland river basins may be important for understanding the local water cycle. However, while reading the text, I got disappointed. The paper is weak in its conclusion that evaporation in the oases triggers precipitation in the higher source areas. For the substantiation of this conclusion, the authors use correlation (which is not necessarily based on a causal relationship) and the timing of the vegetation growth, which in the oases predates precipitation in the mountains. But this time lag is quite normal in many places in the world. Vegetation development often predates the onset of rain. Moreover temperature depends on ele-

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vation. Vegetation will only start to develop when the temperature is above a minimum value. The temperature in the lowland is several degrees higher than in the mountains where vegetation starts later in the season. Moreover, if the authors had studied the literature on moisture recycling (e.g. Van der Ent et al., 2010 and several follow-up papers by this author) then they would have known that the atmospheric moisture source is from the West and that the length scale of recycling is in the order of several 1000 kms.

This paper could potentially be interesting to demonstrate the effect of EVI on evaporation and water yield, but then the paper should be completely re-written. An alternative title or story line might be: ‘The vegetation phenology and its relationship with precipitation and evaporation in two endorheic watersheds in northwest China’, or any others representing the content more properly. To support the authors’ original argument, the authors would have to collect isotopic and meteorological data, such as wind directions etc. A regional moisture cycling model might also be required to draw the original conclusion. I suggest you study and refer to Van der Ent et al. (2010).

Finally, the authors violate the important rule of using correct units. The web site of HESS on textual conventions and the correct use of physical dimensions should be followed. This same directive is used by all hydrological journals. All hydrological fluxes (precipitation, evaporation, discharge, etc.) need to be expressed in terms of fluxes: M/T , L^3/T or L/T . It is absolutely wrong to present a flux as a length ! Although at some places in the text you do so correctly, you do it wrongly in lines 15-17 on p1165 (I guess the unit should be $m^3/year$) and in the vertical axes of Fig 6, 7, 8, 9 and 10. This must be corrected.

Another issue, but this is a matter of taste, is the use of the term ‘evapotranspiration’, which although widely used, is considered bad jargon. Evaporation is the correct term, which is the physical term for the transition of liquid into vapour. For the combination of different evaporative fluxes (transpiration, interception, soils evaporation, open water evaporation) one could use the term ‘total evaporation’. The addition of the term ‘actual’

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is also redundant since evaporation from a catchment is always actual.

Finally, please don't use the abbreviation AET, which in your text can be simply replaced by the term evaporation. There is no need for this jargon abbreviation. There is also no need for the abbreviation PET. This is the potential evaporation, which can be very well symbolized by E_p . Moreover, in equations it is not allowed to use multi-letter variables, as is explained in the 'symbols' convention of HESS. So in Eq.(2) for snowmelt, I suggest to use the symbol S , and for evaporation the symbol E . In the caption of Table 3: "Evaporation (E) as a percentage of the sum of precipitation (P) and snowmelt (S)", Likewise change Figure 2 and captions of Fig.7 and 9.

Further specific comments: 1. The authors obviously neglected some important publications on tracing moisture origin by isotope in the Heihe River [Zhang et al., 2009; Wu et al., 2010; Zhao et al., 2011], and on topography-based landscape classification and hydrological modelling in the Heihe River [Gao et al., 2014]. I suggest the authors do refer to these relevant publications.

2. The authors shall use the proper and correct scientific terms. For example, in P1154, L7, it is better to change 'DEM-height values' into 'elevation'. In P1163, L1, the 'cumulative

3. The study area section should be separated into two sections. One is the study site section, and another is the data section.

4. Equation 1 and 2 use multi-letter variables. According to HESS's conventions, please use single-letter variables with subscript.

5. P1164, Equation (2): It is strange to put the variable k as an exponent. The k can easily be added to the subscripts: i,j,k .

6. Section 4.3: The authors mentioned that 'Vegetation influences on precipitation'. However, it could as well be the other way around 'precipitation influences vegetation'. There may be interactions between vegetation and precipitation. But from the content

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of this section, I do not think the results support the authors' argument. Furthermore, in P1166, L10, the authors mentioned that '...water vapour production by the oases is responsible for the generation of precipitation in the Qilian Mountains'. This conclusion requires more supportive information, both observations and model simulation.

7. In P1167, L15-17: '...vegetation growth in the oases provides a biotic trigger for the initiation of the precipitation season...'. Do your results really support this conclusion? I am not convinced.

Gao, H., M. Hrachowitz, F. Fenicia, S. Gharari, and H. H. G. Savenije (2014), Testing the realism of a topography-driven model (FLEX-Topo) in the nested catchments of the Upper Heihe, China, *Hydrol. Earth Syst. Sci.*, 18(5), 1895-1915.

Van der Ent, R.J., Savenije, H.H.G., Schaefli, B., Steele-Dunne, S. C., 2010. Origin and fate of atmospheric moisture over continents, *Water Resour. Res.* 46, W09525, 12pp. doi:10.1029/2010WR009127.

Wu, J., Y. Ding, B. Ye, Q. Yang, X. Zhang, and J. Wang (2010), Spatio-temporal variation of stable isotopes in precipitation in the Heihe River Basin, Northwestern China, *Environ Earth Sci*, 61(6), 1123-1134.

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