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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Climate regime and soil storage capacity interact to effect evapotranspiration in western United States mountain catchments" *by* E. S. Garcia and C. L. Tague

Anonymous Referee #1

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In this paper a physically based model is adopted to evaluate the effects of climate and soil properties on Evapotranspiration (ET) in three snow-dominated mountainous catchments in US. The authors carry out a sort of sensitivity analysis to quantify the influence of soil properties (including soil water holding capacity and drainage rates) on the relationships between ET and magnitude of precipitation, spring temperature and its partitioning into rain or snow and snowmelt timing.

Authors use the RHESSys (Tague and Band, 2004) model to calculate total annual ET

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in each basin using a record of about 25–45yr. They investigate on the dependence of inter-annual variability of ET and indicators such as annual precipitation (P), average spring temperatures (T_{amj}) and timing of soil water recharge (R_{75}), against total annual ET.

As results of the analysis, they observe that in all watersheds higher P results in greater total annual ET; moreover for all three catchments investigated, they find that later R_{75} has a significant positive correlation with ET, and warmer spring temperature (T_{amj}) generally reduces annual ET. Finally increased soil available water capacity (AWC) increases the long-term average ET in all basins.

General Comments The paper is well structured, its abstract is accurate and informative and the contents are consistent with the title and the figures are sufficient. The problem is certainly not in the writing and presentation, but in the main objective of the paper. It is hard to understand what is the scientific motivation for a study like this one. The work may represent a sensitivity analysis of a physical model focused on ET, but it is not presented as such. As it is, the work does not add any significant contribution to our current knowledge and if it does the authors were not able to transfer and properly describe the relevance of the research. Moreover, the paper in some parts is too detailed in the descriptions of climatic behavior missing the task to identify properly a challenging research question. As the present stage, I regret to say that the paper is not ready for publication on HESS.

Minor comments

page 2293, lines 4 and 5 the authors remark that: “the parameter sets may give the same AWC but result in different drainage rates, affecting downslope lateral redistribution of moisture” this reveals an equifinality problem in model application that has not been considered in the paper. Model reality may not necessarily correspond with real dynamics.

The use of experimental data may certainly help to increase reliability of the analysis.

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Tague, C. and Band, L.: RHESSys: regional hydro-ecologic simulation system-an object oriented approach to spatially distributed modeling of carbon, water, and nutrient cycling, Earth Interact., 8, 1–42, 2, 2004.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 2277, 2014.