

Review of HESS Manuscript MS#hess-2020-535: Second review

Title: Attribution of growing season evapotranspiration variability considering snowmelt and vegetation changes in the arid alpine basins
Authors: Ning et al

The revised manuscript has greatly improved with some of my concerns addressed especially about the data reliability. However, one very important issue still need be resolved before the manuscript can be published.

As the authors explained in the response, the term “temporal variance” in this study was defined as the ET variance in the growing season (April to September), i.e., the unbiased sample variance of ET in Eqn 13. The sample size was 6 months/year×14 years=84 months, and ET mean in Eqn 13 was calculated as the long-term average for 84 months.

Then what is the physical meaning of that defined “unbiased sample variance of ET”? It is obviously different from the definition of “temporal variance” from previous work (e.g., Zeng and Cai, 2015), and should not be seen as a simple extension of those work. The authors should carefully think about the “temporal variance” definition in this study and provide its physical explanation.

In addition, the ET mean in the “temporal variance” definition in previous studies was the long-term average of all months and kind of fixed (in certain years). In this study, six months (April to September) was selected to define the “temporal variance” and calculate the ET mean. Is it possible that the results could change a lot with different months (e.g., April to July) since the ET mean varies in different months? How the potential divergence of results using different months could be explained?

Another minor comment about the new Fig. S4. We can see that the estimated ET was generally underestimated compared with ETmap. Is it possible to discuss the reason of underestimation and how it could influence the results? Further, why 15 dots in Fig. S4? It should be 18 dots if I understand it correctly?