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.

(1) 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.

RESPONSE: Thanks for your carefully comments very much. Actually, "temporal variance" was also expressed as "unbiased sample variance" in previous work (Liu et al., 2019; Zeng and Cai, 2015), and the specific formula was shown in Eq.13 in Zeng and Cai (2015), and in Eq.6 in Liu et al. (2019). The difference between these two studies is the calculation process of Δ in this equation. The method of Zeng and Cai (2015) was adopted by the most of previous works (Wu et al., 2017; Ye et al., 2015; Zhang et al., 2016). But we made an extension to Liu et al. (2019) by considering the effects of snowmelt and vegetation changes, because of their calculation process of Δ is simpler. The "unbiased sample variance" is the concept in probability theory and statistics, and is the expectation of the squared deviation of a random variable from its mean. In other words, it measures dispersion of a set of numbers from their average. As you suggested, we further explain its physical meaning in Line 229-238:

In this study, the temporal variance of ET reflects the fluctuation of monthly ET in growing season for years, which can be quantified by the unbiased sample variance (σ_{ET}^2) :

$$\sigma_{ET}^2 = \frac{1}{N-1}\sum_{i=1}^{N}(ET_i - \overline{ET})^2 = \frac{1}{N-1}\sum_{i=1}^{N}(\Delta ET_i)^2. \quad (13)$$

where $\overline{ET}$ is the long term monthly mean of ET. N is the sample size, it equals 84 in this study (6 months/year×14 years=84 months). i is used to index time series of month from 1 to N. ***σ_{ET}^2 indicates how far a set of monthly ET in growing season is spread out from their average value. The larger σ_{ET}^2, the larger fluctuation of ET, and vice versa.***

(2) 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?

RESPONSE: Yes, the results could change a lot using different months. The potential divergence of results using different months could be explained by the different time series of ET, which not only determines ET mean, but also impacts sample size in Eq.13. But the choice of months should have scientific basis. We focused on the ET variance and its attribution in growing season in this study. It has been showed that the growing season is from April to September in previous studies (Jiao et al., 2016; Tian et al., 2013; Xing et al., 2017; Zeng et al., 2019), thus six months (April to September) were selected.

(3) 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?

RESPONSE: The reason for the underestimation of ET and possible influence were added in section "Uncertainties". Line 445:

To validate the reliability of our estimated ET, the comparison with ET_{map} from May to September during 2012-2014 was conducted (Figure S4). The results showed that our estimated ET fitted well with ET_{map} and basically fell around the 1:1 line, indicating ET estimated using water balance equation by considering the items of ΔS and Q_m is acceptable. ***However, it cannot be ignored that our estimated ET was generally lower than ET_{map}. The error of rainfall spatial interpolation may explain the underestimation of ET. Most meteorological stations are located at low elevations or in river valleys, but some stations are distributed in high elevations in Qilian Mountain (Figure 1). It has been found that rainfall in mountainous regions is generally larger than that in plain regions (Qiang et al., 2015). Even the topography effect was considered for interpolation, it still resulted in bias in areal rainfall. The best method to improve the quality of spatial rainfall estimation is to increase the density of the monitoring network. However, this process is limited by harsh environment and funds (Buytaert et al., 2006). The error of rainfall will be transferred to contribution quantification of ET variance by underestimating rainfall contribution, while overestimating Qm and ΔS contribution.***

As for the number of dots, it should be 15 dots. The period of "ETmap" data is from May to September during 2012–2016, thus there are 15 dots in Fig.S4. The "April to September" has been corrected as "May to September" in Line 150, 152 and 442, please check.

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