

## ***Interactive comment on “Seasonal variability in evapotranspiration partitioning and its relationship with crop development and water use efficiency of winter wheat” by Ying Ma et al.***

### **Anonymous Referee #2**

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Review of " Seasonal variability in evapotranspiration partitioning and its relationship with crop development and water use efficiency of winter wheat", submitted to HESS by Ma et al. Paper number: hess-2018-234

Summary: This manuscript used an isotope tracing technique based on water/mass balance to partition ET and quantify the root water uptake sources of winter wheat during the 2014 and 2015 growing seasons in Beijing, China. They discovered leaf area index overrides other climatic and biological factors such as WUE and crop yield, acting as a dominating role in the variability of seasonal T/ET. The seasonal variability in T/ET could be effectively explained via a power-law function of the LAI. It is also

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found that to conserve water, the irrigation wetting layer should be controlled at a depth of 70 cm.

Comments: 1. Lacking long term observational water vapor isotope, the authors choose to partitioning ET using mass balance model. It is no problem in common sense. However, as shown in L248-L251,  $\delta E$  is assumed to be isotopic equilibrium with the soil water. This is not correct and it is the fatal flaw of this study. Both kinetic fractionation and equilibrium fractionation should be considered in this calculation. In addition, the value of  $\delta T$  is determined using the measured  $\delta$  of stem water is also questionable. Many studies have shown that it is important to include non-steady state in  $\delta T$  estimation. These perhaps mean that the results should be considered in a qualitative sense and not trusted fully.

2. There is no any validation can be found in this study. Additional validations are required for mass balance model results. At least, simple model such as two-source model should be applied for comparing isotope method (e.g. Wang et al., 2015; Iso-SPAC), if direct measurement is not available. At the same time, how the author gets ET data? based on Eq 1? Is there any eddy-correlation measurement available?

3. Moreover, the sensitivity analysis should also be conducted, since T/ET is very sensitive to the bias of  $\delta T$  and  $\delta E$ .

4. About root water uptake depth, e.g. L294-L295: detailed result of ANOVA analysis is required. I think time series plots of isotopic compositions shown in Fig 1 are important and should be presented in somewhere of the manuscript.

By these reasons, I'd recommend rejecting this manuscript and give them plenty time for improving this manuscript and resubmission.

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