Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2016-484-RC2, 2016

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Vegetation dynamics and climate seasonality jointly control the interannual catchment water balance in the Loess Plateau under the Budyko framework" *by* Tingting Ning et al.

Anonymous Referee #2

Received and published: 1 December 2016

This paper evaluates the dependence of Budyko parameter w on vegetation coverage and the climate seasonality on inter-annual timescale. It is interesting to quantitatively estimate the contribution of intra-annual climate variability to annual water balance factors. This manuscript is well written and falls within the scope of HESS. However, some revisions are required, which are given as follows:

The major concern is that the inter-annual water storage change is assumed to be negligible even though hydrologic year is used. The estimated value of w could be affected by this assumption of storage change. Since the purpose of this study is to evaluate

the contribution of vegetation and seasonal climate variability to inter-annual variability of water balance, this assumption is important and needs to be further invsetigated and discussed.

To develop the semi-empirical formula of parameter w, the limiting conditions of M and S were considered in this paper, which is significant for understanding the variability of water balance under the extremely hydrometeorological conditions. However, I think the limiting condition of S is not exactly right: when âĹĚ$\rightarrow\infty$ and δ_(ãĂŰETãĂů_0)$\neq$0 in the equation (3), i.e. P$\rightarrow$0, and monthly ET0 is not uniform distributed within a year, w can also be close to unity.

It has been reported that the first-order approximation (ignoring the higher orders of the Taylor expansion) in the Equations (4-6) will bring errors (Yang et al. 2014, WRR); furthermore, the function of P and ET0, and their interaction may play some roles in the attribution analysis. Thus, it is better to consider these errors in the paper.

In previous attribution analyses of variation in runoff or ET based on the climate elasticity method, the study period was first divided into two periods, and then the contribution of a variable on the change in runoff or ET from the first period to second period was defined as the product of the elasticity coefficient and the variation of this variable. While in this study, the climate elasticity method was used to explain the change trend of ET for the whole study period. Even the comparisons of these two methods was conducted in the discussion section, there still need more data to support this estimation.

Line 64. Also cite Donohue et al. 2012 JOH.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-484, 2016.