

Interactive comment on “A scaling approach to Budyko’s framework and the complementary relationship of evapotranspiration in humid environments: case study of the Amazon River basin” by A. M. Carmona et al.

Comments:

This paper by A. M. Carmona et al. provides a new perspective on Budyko framework and finds the physical inconsistency of the Budyko curve for humid environments using $\Omega=E/E_p$ and $\Phi=E_p/P$. A simple but new scaling approach was proposed to overcome this inconsistency. The results are important and interesting. This manuscript has been well written and I recommend to accept after including comments listed as follows:

Specific Comments:

1. I found Figure 3 not very helpful as one could not justify how it behaves.
2. Line 3-4 in Page 10532, I would not agree. In Yang et al. 2008, it was assumed that the P and E_p are independent, which is obviously not true in reality. But to my best knowledge, in Fu's derivation, there is no such assumption. That is the reason why Sun (2007) and Yang et al. (2006) used mathematical derivative (your Fig.8) based on Fu's equation instead of using Choudhury 1999 equation to reconcile the complementary relationship and the Budyko curve. Therefore I would suggest to use Fu's equation when expressing Fig.8 for theoretical consistency.

Sun, F.: Study on Watershed Evapotranspiration based on the Budyko Hypothesis, Doctor of Engineering, Tsinghua University, 147 pp., 2007.

3. Line 18-22 in Page 10519, again I don't agree with that. I don't think anyone could ever demonstrate there is a unique solution. Otherwise how to explain there are many Budyko curves.
4. In terms of the complementary relationship, I think it is more about $\partial E_p / \partial E$ rather than $\partial E / \partial E_p$.
5. Page 10536 Move the description of topography, groundwater levels and vegetation in Section 3.3.4 to Section 2.2 Data sets.
6. The focus of study area in the manuscript should be humid environment. There is a jump between using the global agro-climatic stations or the data of the arid area in US and China and humid environment.