Title: Matching the Turc-Budyko functions with the complementary evaporation relationship: consequences for the drying power of the air and the Priestley-Taylor coefficient
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This manuscript aimed to relate the Budyko curve with the complementary relation of evaporation and then explore the varying coefficient alfa in the Priestley-Taylor equation (which was redefined) to calculate potential evaporation. Furthermore, a function was proposed to relate this coefficient with the shape parameter of the Budyko hypothesis and aridity index. It is an interesting research. However, some improvements are required. Especially the significance needs further highlighting.

Detailed comments

1. In this manuscript, the authors introduced a new parameter $\alpha_0$ into the complementary relationship between potential evaporation and actual evaporation. In fact, E0 estimated by equation (3) and Ep estimated by equation (2) are equivalent in this manuscript. Therefore, $\alpha_0$ represents the ratio between radiative item and aerodynamic item in the potential evaporation calculated by the Penman equation. The variation in $\alpha_0$ can be revealed according to Penman equation. Therefore, more discussion was required to show the theoretical significance of this manuscript. In application of estimating actual evaporation, this method has a precondition, which is to determine $\alpha_0$ according to Budyko curve. However, the Budyko curve has an ability of estimating actual evaporation. What is the objective of estimating $\alpha_0$ using the Budyko curve and then estimating actual evaporation using the CE?
2. According to equations (6), (7) and (3) (If E0 and Ep are equivalent), it can yield

   $$E = \left(2\alpha_w - \alpha_0\right)\frac{\Delta}{\Delta+\gamma}R_n .$$

   Where $\alpha_w = 1.26$, $\alpha_0$ is determined by aridity index and the parameter λ, which is a constant in a special catchment because of constant aridity index and the parameter λ. Therefore, E only depends on Rn (temperature has a small impact on $\Delta$ and $\gamma$). The rationality needs more discussion.
3. In this manuscript, $\alpha_0$ was named the Priestley-Taylor coefficient to calculate potential evaporation, and at the same time, another Priestley-Taylor coefficient $\alpha_w = 1.26$ in the Priestley-Taylor equation was used to calculate the wet environment evaporation. It is likely to cause confusion.

4. The timescale should be pointed out when relate the BT to CE, because the BT is general used on the long-term time scale or annual scale.
5. Turc-Budyko curves should be replaced with Budyko-Type curves.
6. P.4, line 24, more explanation on $\alpha$ $w \leqslant \alpha 0 \leqslant 2\alpha w$ are required.