

Interactive comment on “New interpretation of the role of water balance in an extended Budyko hypothesis in arid regions” by C. Du et al.

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Dear Referee #1,

Thank you very much for your prompt response and a further comment.

Referee #1’s question

“Thank authors for your responses. I have a quick comment for Figure A1. Since S_0 and S_1 , and b are from abcd model, Figure A1 is plotting the equation (9) in the manuscript ($W=P+S_0$; $Y=ET+S_1$). For a given parameter value of a , equation (9) follows a Budyko curve. Authors may explain the reason that data points in Figure A1 do not following Budyko-type curve (i.e., equation (9)). E.g., Why is $(ET+S_1)/(P+S_0)>1$? (Since $Q \geq 0$, $(ET+S_1)/(P+S_0) \leq 1$).

The reason for that $(ET+S_1)/(P+S_0)>1$ is that $(ET+S_1)/(P+S_0)$ in Figure A1 did not consider the inflow water from the upper sub-basin. The available water ($W=P+S_0$) in abcd model is the sum of the local precipitation and soil moisture storage at the beginning of a period, that did not include the inflow water from the upper sub-basin. With the inflow water from the upper sub-basin considered in the available water, the $(ET+S_1)/(P+S_0)$ should be less than one. We plotted the relationships of $(ET+S_1)/(P+Q_{in}+S_0)$ VS $b/(P+Q_{in}+S_0)$ are plotted in Figure B1. That is in fact one of our contributions to applying Budyko-type curves in unclosed basins, like in this study area.

Hope our explanation above can make the necessary clarification.

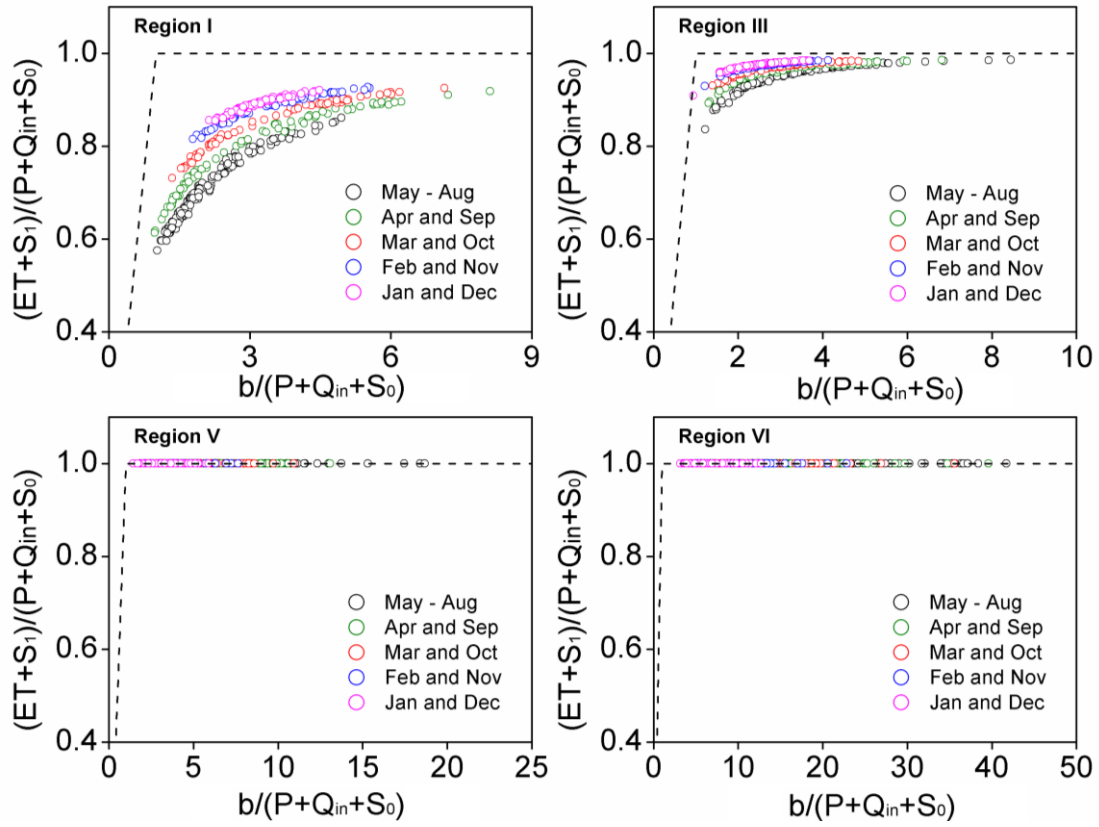


Figure B1. The relationship of $\frac{(ET+S_1)}{(P+Q_{in}+S_0)}$ VS $\frac{(ET_0+S_{max})}{(P+Q_{in}+S_0)}$.