



*Supplement of*

## **Attribution of global evapotranspiration trends based on the Budyko framework**

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Table S1. Comparisons of landcover types data used by the four ET products

ET product	Landcover types data	Period
GLEAM3.0a	MOD44B	Static
GLDAS2.0-Noah	MCD12Q1	Static
MERRA-Land	Global Land Cover Characterization	Static
W3RA	MOD44B	Static
HTESSEL-CaMa		Static
JULES	Global Land Cover Characterization	Static
Earth2Observe-En PCR-GLOBWB		Static
LISFLOOD		Static
HBV-SIMREG	GlobCover2009	Static
WaterGAP3	MOD12Q1	Static

Note: However, regarding Earth2Observe-En, the LUC datasets used by seven (in this table) and two models (i.e., ORCHIDEE and SURFEX-TRIP) are available and unavailable, respectively; the LUC is not the necessary input for SWBM.

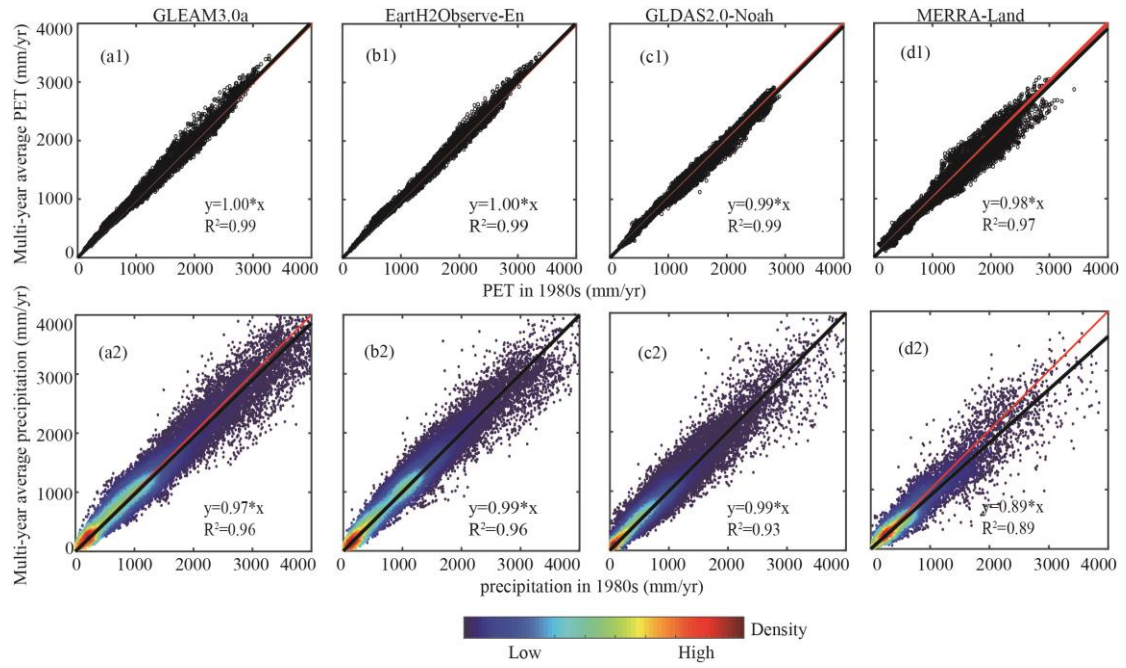


Figure S1. The pixel-wise scatterplots of PET in 1980s against multi-year average PET for GLEAM3.0a (a1), Earth2Observe-En (b1), GLDAS2.0-Noah (c1), and MERRA-Land (d1) and precipitation in 1980s against multi-year average precipitation for GLEAM3.0a (a2), Earth2Observe-En (b2), GLDAS2.0-Noah (c2), and MERRA-Land (d2).

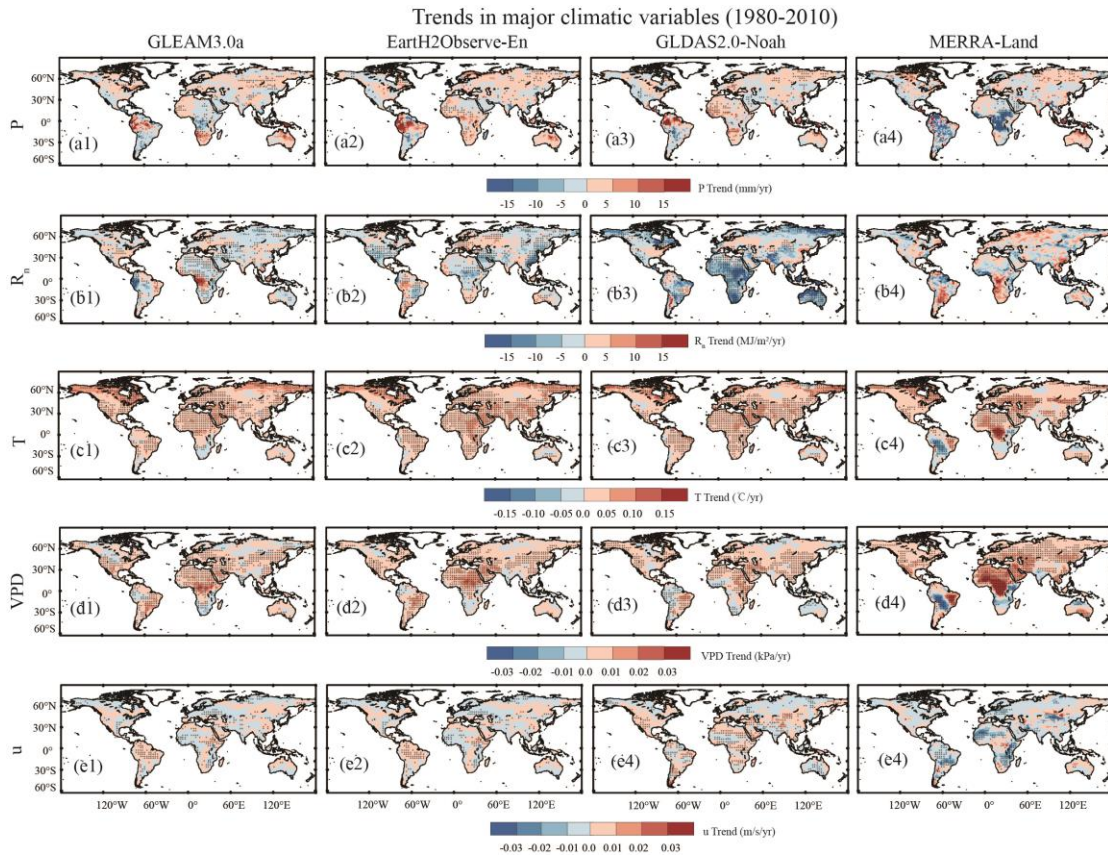


Figure S2. Spatial distribution of annual linear trend in each driving factor during 1980-2010. Small letters (a-e) respectively indicate P,  $R_n$ , T, VPD, and u and numbers (1-4) represent GLEAM3.0a, Earth2Observe-En, GLDAS2.0-Noah, and MERRA-Land. Dotted area indicates the trend passes significance level ( $p < 0.05$ ).

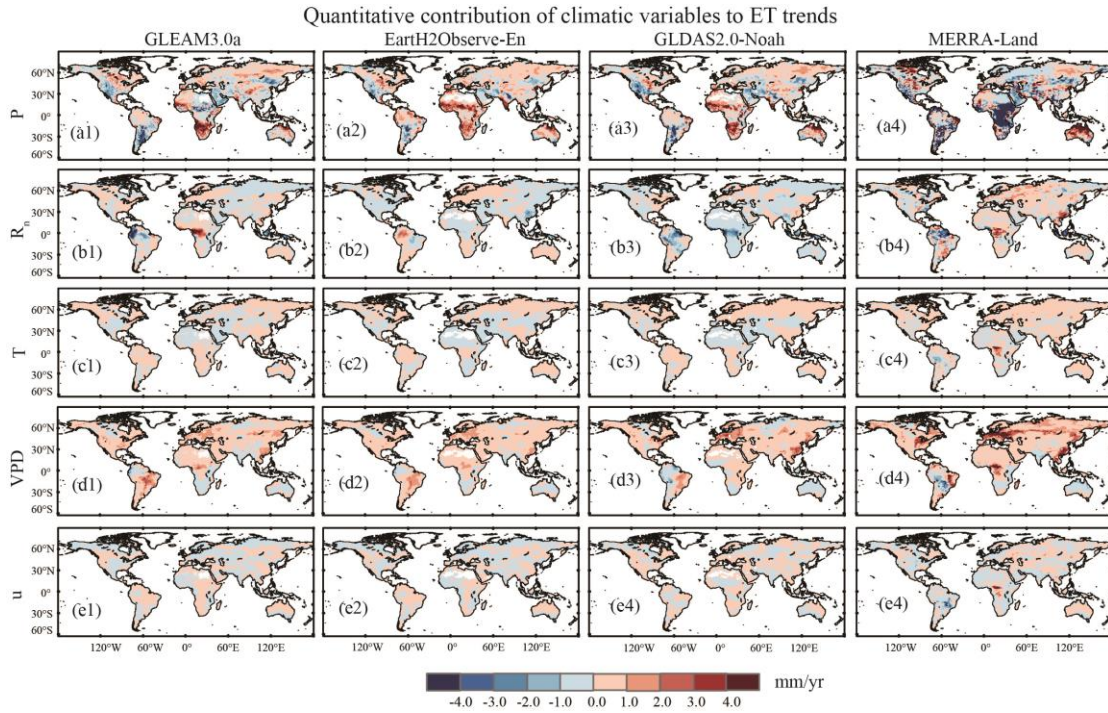


Figure S3. Attributions of the global long-term annual ET linear trend during 1980-2010. Small letters (a-e) indicate P,  $R_n$ , T, VPD and u respectively; and numbers (1-4) indicate the ET products of GLEAM3.0a, Earth2Observe-En, GLDAS2.0-Noah and MERRA-Land respectively.

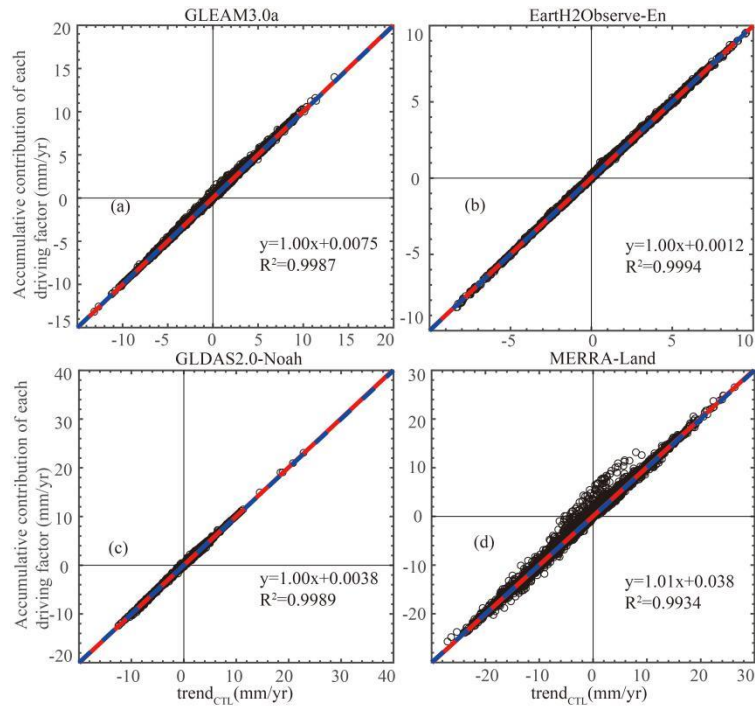


Figure S4. The pixel-wise scatterplots of the accumulative contributions of five selected driving factors against the control trend ( $\text{trend}_{\text{CTL}}$ ) in ET for GLEAM3.0a (a), Earth2Observe-En (b), GLDAS2.0-Noah (c), and MERRA-Land (d). The red line indicates a fitted line of the scatter points along with the 1:1 blue dotted line.



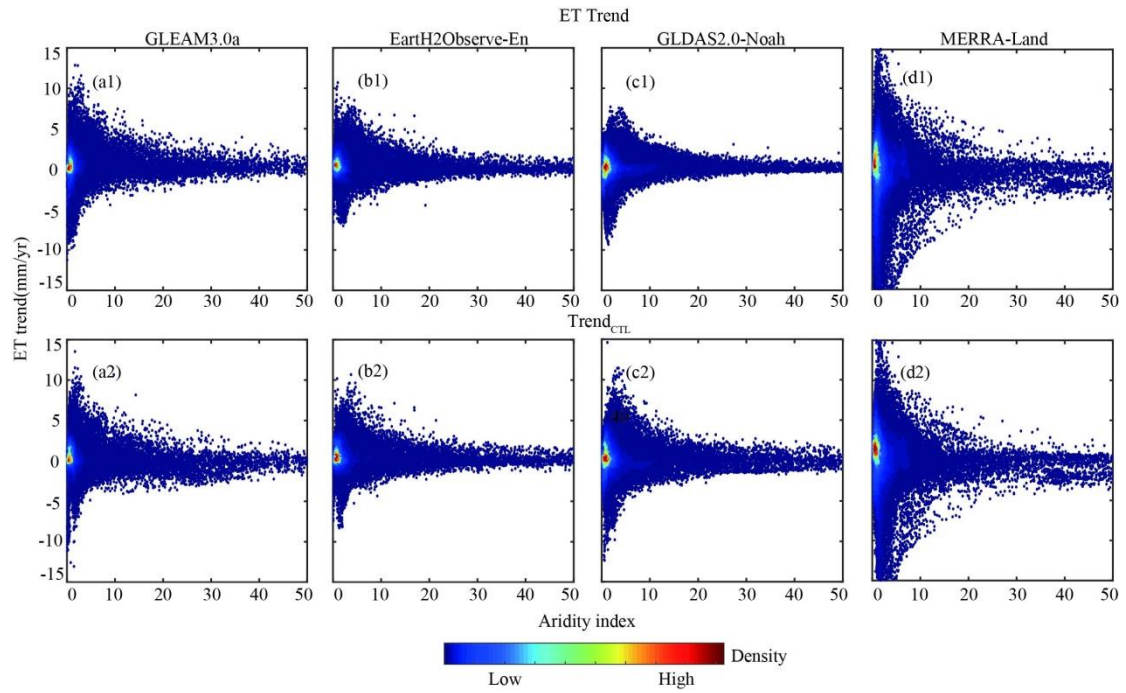


Figure S5. The pixel-wise scatterplots of multi-year average aridity index against actual ET annual values for GLEAM3.0a (a1), Earth2Observe-En (b1), GLDAS2.0-Noah (c1), and MERRA-Land (d1), the control ET trend (trend<sub>CTL</sub>) for GLEAM3.0a (a2), Earth2Observe-En (b2), GLDAS2.0-Noah (c2), and MERRA-Land (d2). Aridity index (PET/precipitation) in each product is calculated with respective precipitation and PET data.