Supplementary Information for: Calculation and data source of potential evapotranspiration and effective precipitation

Mengzhu Cao [1,2], Yaning Chen [1,*], Weili Duan [1,2,*], Yaqi Li [1,2] and Jingxiu Qin [1,2]

[1] State Key Laboratory of Desert and Oasis Ecology, Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, Urumqi 830011, China; caomengzhu20@mails.ucas.ac.cn (M.C.); liyaqi20@mails.ucas.ac.cn (Y.L.); qinjingxiu17@mails.ucas.ac.cn (J.Q.)
[2] University of Chinese Academy of Sciences, Beijing 10049, China
* Correspondence: chenyn@ms.xjb.ac.cn (Y.C.); duanweili@ms.xjb.ac.cn (W.D.)

The following supplementary information (SI Appendix) covers the source and calculation process of potential evapotranspiration and effective precipitation data.

1 Data sources

The CRU precipitation data and potential evapotranspiration data from 2000 to 2016 were used in this study. The effective precipitation was calculated by multiplying precipitation by an effective coefficient as mentioned in (1.1). The daily reference evapotranspiration (ET0) was estimated using the FAO56 Penman- Monteith method. The FAO56 Penman-Monteith method was adopted because it was considered to be the basic method for calculating the reference ET0 of the Food and Agriculture Organization of the United Nations in 1998. It has strong theoretical and computational precision. The FAO56 Penman-Monteith method is widely used around the world. Climate factors include average temperature, minimum temperature, maximum temperature, average wind speed, sunshine duration, and average relative humidity are the basic input data for this method. The monthly and annual values of ET0 are derived by summing up the daily value.

2 Specific calculation steps

$$Pe = \begin{cases} P \times \frac{(125-0.2\times P)}{125}, \ P < 250mm \\ 125 + 0.1 \times P, \ P \geq 250mm \end{cases} \tag{1.1}$$

Pe is effective precipitation, and P is monthly precipitation.

$$ET_0 = \frac{0.408\Delta(R_n - G) + \gamma \times \frac{900}{T+273} \times u_2 \times (e_s - e_a)}{\Delta + \gamma(1 + 0.34u_2)} \tag{1.2}$$

Where Δ is the slope of the vapor pressure curve, R_n is net radiation, G is the soil heat flux density, γ is the psychrometric constant, T is the average air temperature, u_2 is the wind speed measured at a height of 2 m, e_s is the actual vapor pressure, and e_a is the actual vapor pressure.