Supplementary Information

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Material S1-The procedure to estimate wind speed at 2 m height and radiations

To adjust wind speed data obtained from instruments placed other than 2 m, wind profile relationship may be used for measurements:

$$u_2 = u_z \frac{4.87}{ln\left(67.8z - 5.42\right)} \quad \text{(S1)}$$

where u_2 and u_z, measured wind speed at 2 m and z m above ground surface, respectively (m·s^{-1}), z, height of measurement above ground surface (m), z =10 in this study.

The radiations are given by:

$$R_a = \frac{24\times60}{\pi}\times G_{sc}\times d_r\times\left[\omega_s\times sin\left(\varphi\right)\times sin\left(\delta\right)+cos\left(\varphi\right)\times cos\left(\delta\right)\times sin\left(\omega_s\right)\right] \quad \text{（S2）}$$

$$R_s = \left(a_s + b_s\frac{n}{N}\right)R_a \quad \text{（S3）}$$

$$R_{so} = \left(a_s + b_s\right)R_a \quad \text{（S4）}$$

$$R_{ns} = \left(1-\alpha\right)R_s \quad \text{（S5）}$$

$$R_{nl} = \sigma\left[\frac{T^4_{max,K} + T^4_{min,K}}{2}\right]\left(0.34 - 0.14\sqrt{e_a}\right)\left(1.35\frac{R_s}{R_{so}} - 0.35\right) \quad \text{（S6）}$$

$$R_n = R_{ns} - R_{nl} \quad \text{（S7）}$$

where, R_a, extraterrestrial radiation (MJ·m^{-2}·day^{-1}); R_s, solar radiation (MJ·m^{-2}·day^{-1}); R_{so}, clear-sky solar radiation (MJ·m^{-2}·day^{-1}); R_{ns}, net solar radiation (MJ·m^{-2}·day^{-1}); R_{nl}, net outgoing longwave radiation (MJ·m^{-2}·day^{-1}); G_{sc}, solar constant (0.0820 MJ·m^{-2}·min^{-1}); d_r, inverse relative distance Earth-Sun; ω_s, sunset hour angle (rad); δ, solar declination (rad); φ, latitude (rad); n, actual duration of sunshine; N, maximum possible duration of sunshine or daylight hours; a_s, regression constant, expressing the fraction of extraterrestrial radiation reaching the earth on overcast days (n = 0); $a_s + b_s$ fraction of extraterrestrial radiation reaching the earth on clear days (n = N); α, albedo (0.23); σ, Stefan-Boltzmann constant (4.903×10^{-9} $MJ\cdot K^{-4}\cdot m^{-2}\cdot day^{-1}$); $T_{max,K}$, maximum absolute temperature during the 24-hour period (K); $T_{min,K}$, minimum absolute temperature during the 24-hour period (K); e_a, actual vapour pressure (kPa).

Material S2-The equation of the Penman method

The Penman method for calculating daily potential evapotranspiration can be expressed as:

$$\text{PET} = \frac{\Delta\left(R_n - G\right) + 6.43\gamma(1 + 0.536u_2)\left(e_s - e_a\right)}{(\Delta + \gamma)\lambda} \quad \text{(S8)}$$

where PET is the potential evapotranspiration ($mm\cdot day^{-1}$); R_n is the net radiation at the surface ($MJ\cdot m^{-2}\cdot day^{-1}$); G is the soil heat flux ($MJ\cdot m^{-2}\cdot day^{-1}$); u_2 is the wind speed at a height of 2 m ($m\cdot s^{-1}$); Δ is the slope of the saturated water vapor pressure curve ($kPa\cdot °C^{-1}$); e_s is the saturation vapor pressure (kPa); e_a is the actual vapor pressure (kPa); and λ is the latent heat of evaporation ($MJ\cdot kg^{-1}$):

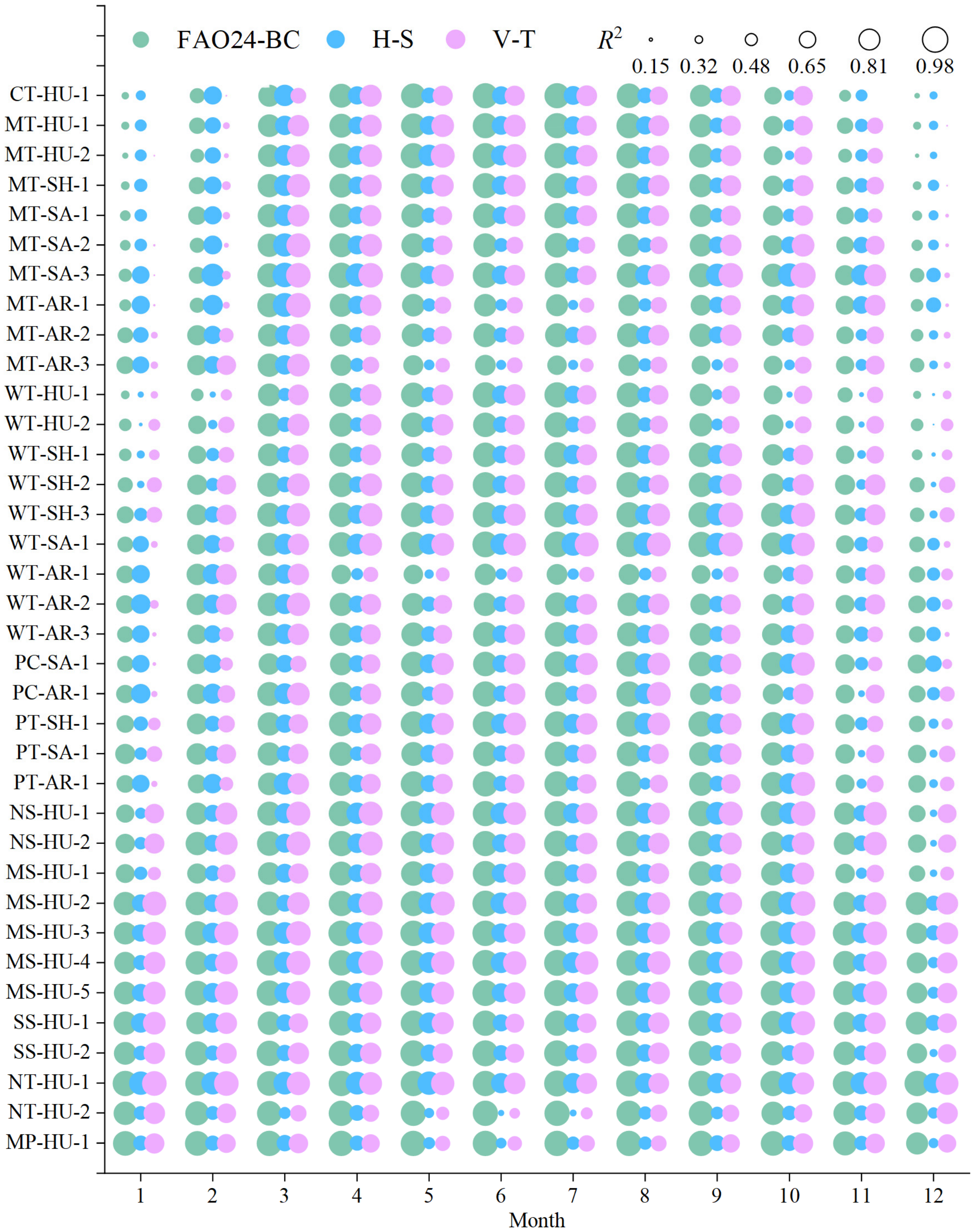

Figure S1. Monthly variation of the coefficient of determination (R^2) values obtained using the three temperature-based reference evapotranspiration methods and the FAO56-PM method in the 36 agricultural zones.

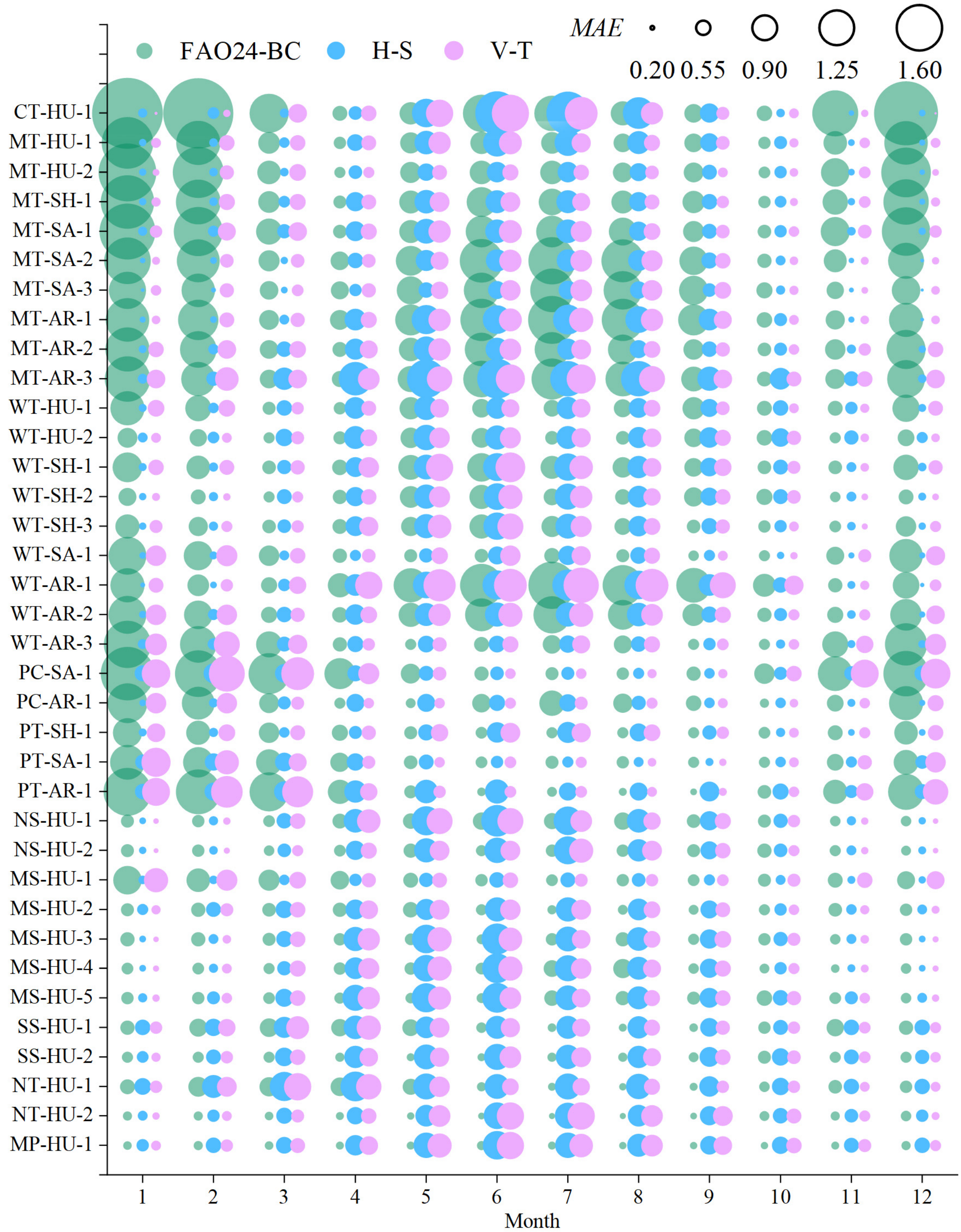

Figure S2. Monthly variation of the mean absolute error (*MAE*, mm·day^{-1}) values obtained using the three temperature-based reference evapotranspiration methods and the FAO56-PM method in the 36 agricultural zones.

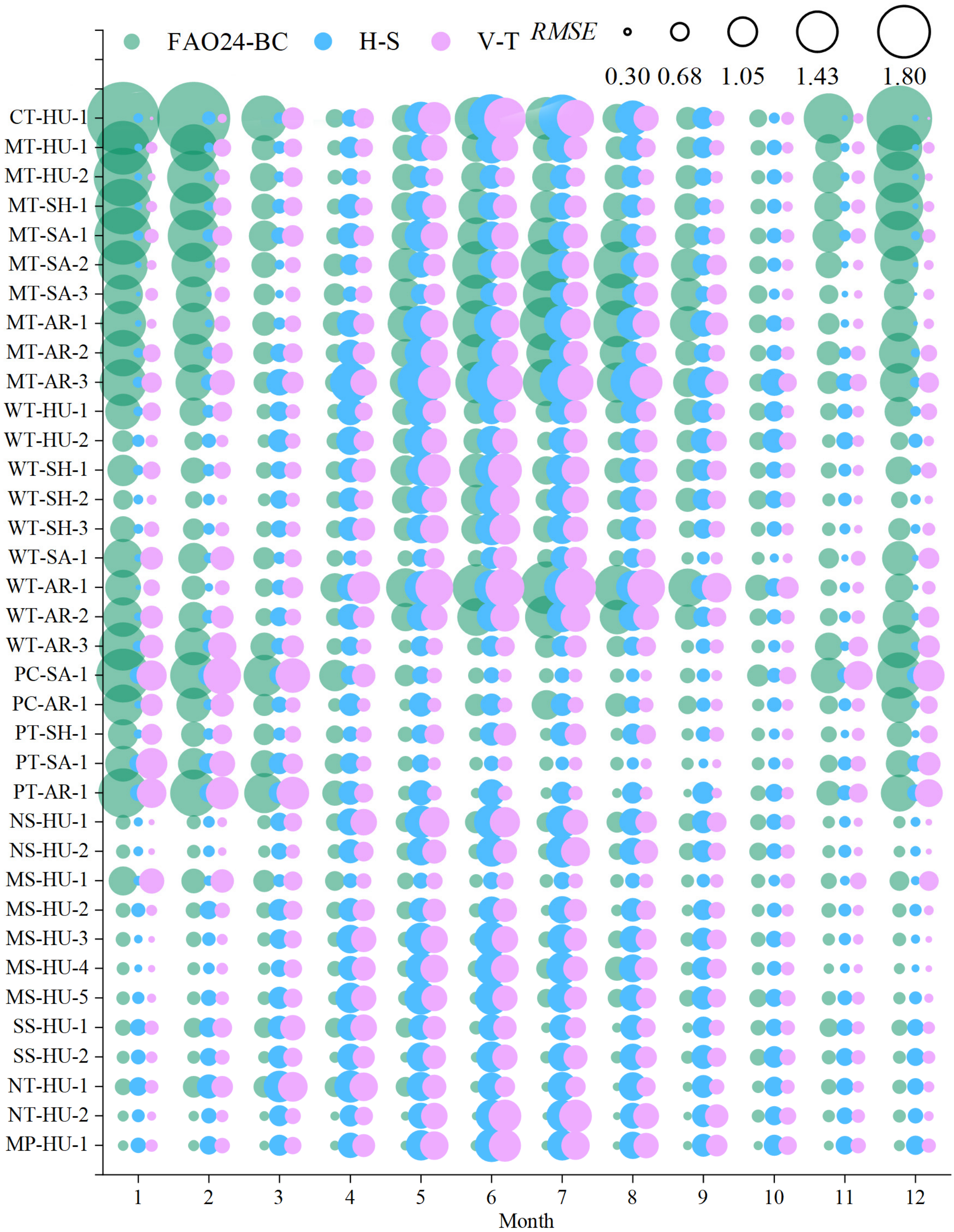

Figure S3. Monthly variation of the root mean square error (*RMSE*, mm·day^{-1}) values obtained using the three temperature-based reference evapotranspiration methods and the FAO56-PM method in the 36 agricultural zones.

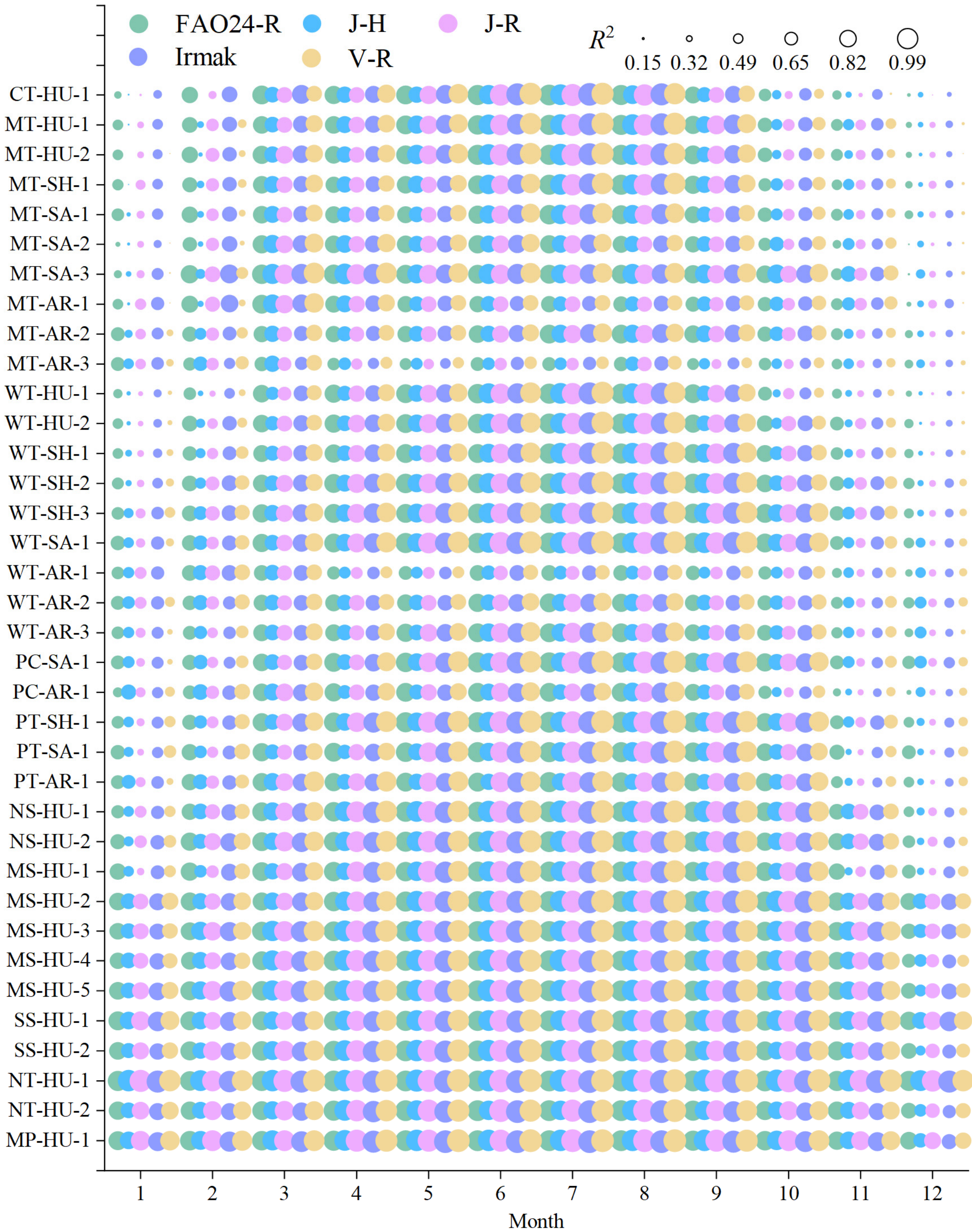

Figure S4. Monthly variation of the coefficient of determination (R^2) values obtained using the five radiation-based reference evapotranspiration methods and the FAO56-PM method in the 36 agricultural zones.

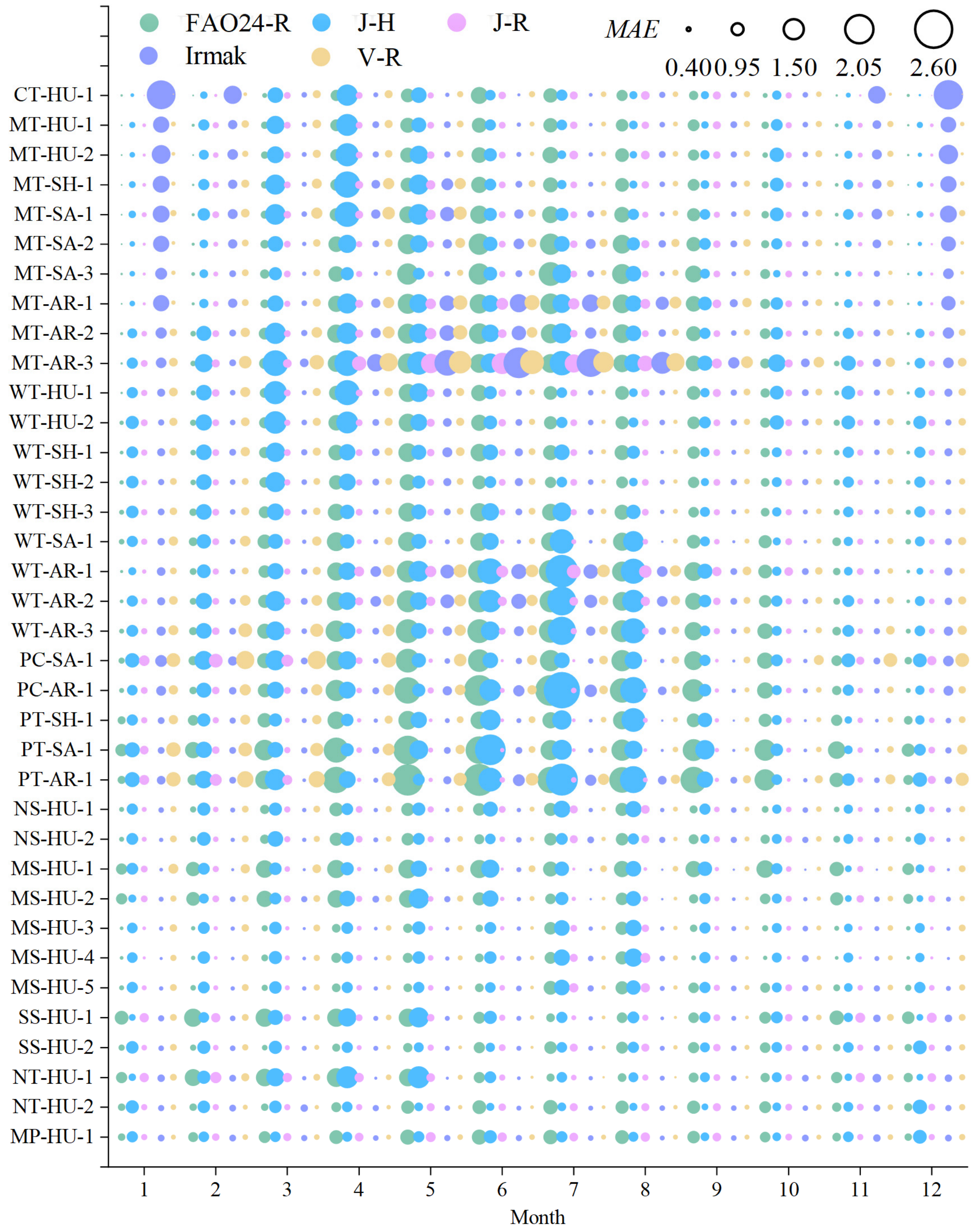

Figure S5. Monthly variation of the mean absolute error (*MAE*, mm·day^{-1}) values obtained using the five radiation-based reference evapotranspiration methods and the FAO56-PM method in the 36 agricultural zones.

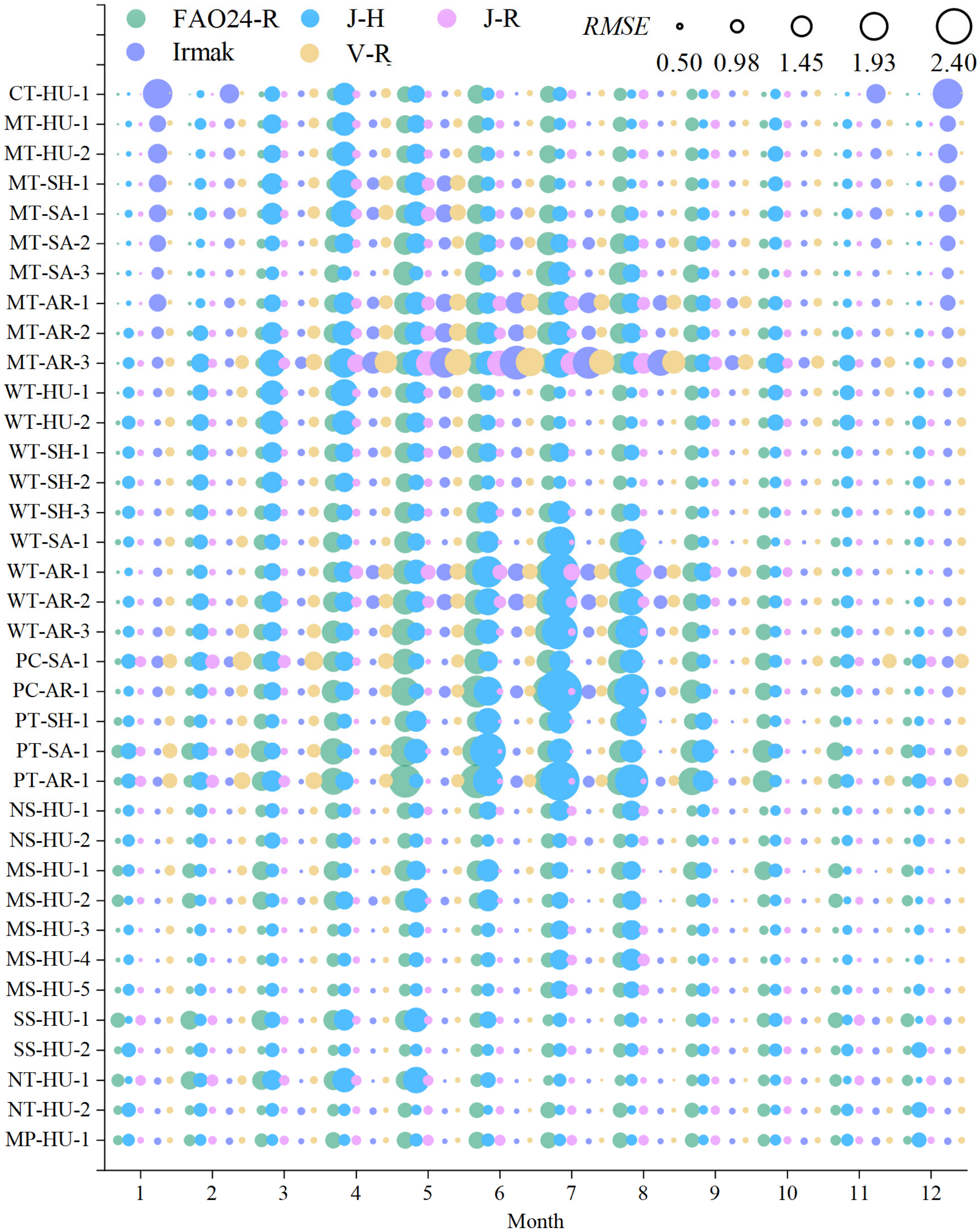

Figure S6. Monthly variation of the mean root mean square error (*RMSE*, mm·day^{-1}) values obtained using the five radiation-based reference evapotranspiration methods and the FAO56-PM method in the 36 agricultural zones.

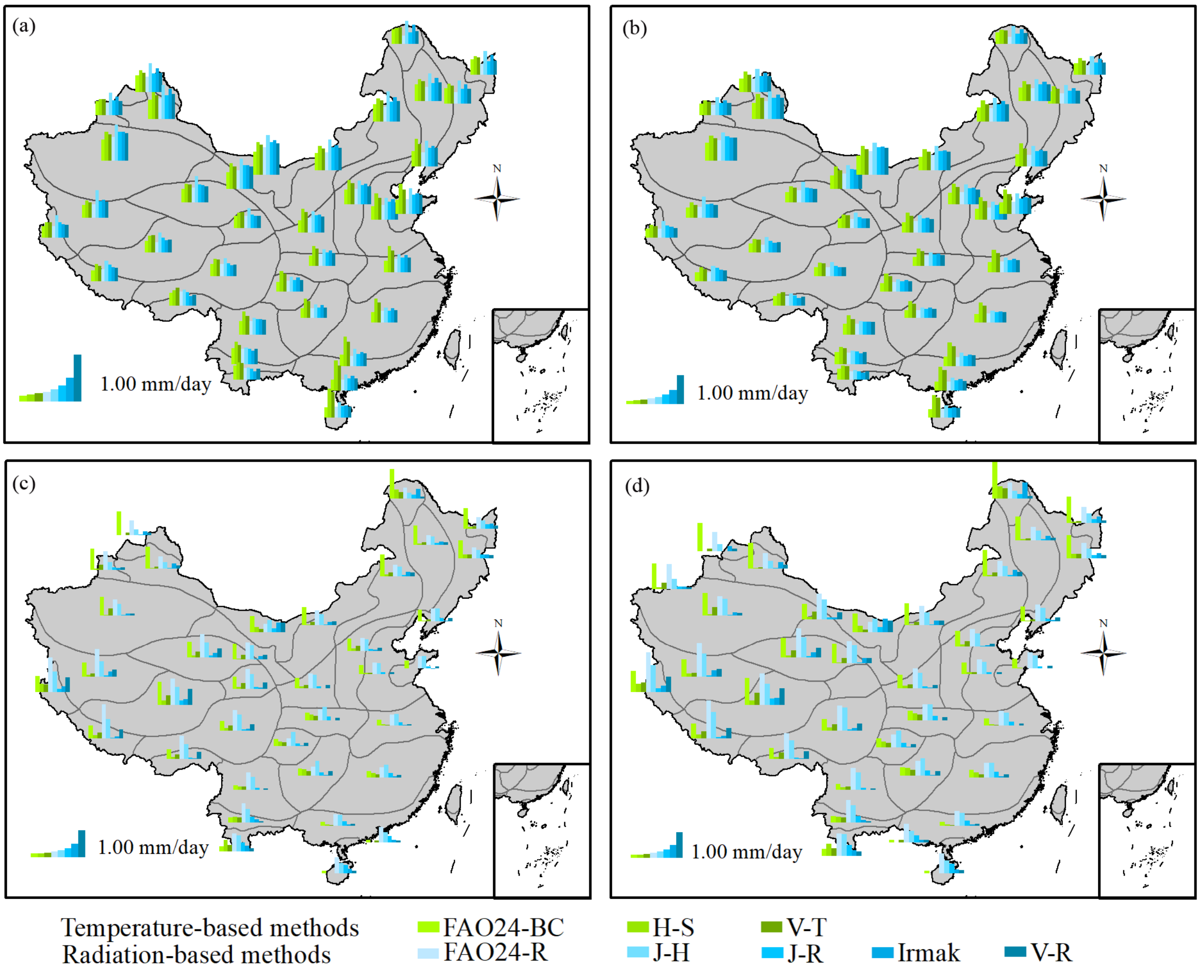

Figure S7. Mean absolute error *MAE* (a) and root mean square error *RMSE* (b) obtained from the daily reference evapotranspiration calculated using the eight calibrated methods versus daily reference evapotranspiration calculated using the FAO56-PM method, the difference between the *MAE* (c) and *RMSE* (d) from the original methods minus those from the calibrated methods in 36 agricultural zones of China.