Experimental analysis of depending on temperature and solar radiation evapotranspiration empirical models at Republic of Ecuador.

Materials and Methods. Data of Evaporation (ETo), solar radiation (R_s), average temperature (T_m), maximum temperature (T_{max}) and minimum temperature (T_{min}), where taken for $n = 268$ days (during 2021).

Results.

Model	Equation	R
Jensen-Haise (1963)	$ETo = R_s(0.0252T_m + 0.078)$	0.81
Stephens (1965)	$ETo = R_s(0.0158T_m + 0.09)$	0.81
Hargreaves-Samani (1985)	$ETo = R_s \cdot 0.0023 \cdot (T_{max} - T_{min})^{1/2} \cdot (T_m + 17.8)$	0.79
Abtew (1996)	$ETo = 0.01786 \cdot R_s \cdot T_{max}$	0.84
Irmak *et al* (2003)	$ETo = -0.611 + 0.149 \cdot (2.451) \cdot R_s + 0.079 \cdot \frac{T_{max} - T_{min}}{2}$	0.81
del Vigo *et al* (2023)	$\boldsymbol{ETo = 0.258 \cdot T_m + 0.111 \cdot R_s - 4.307}$	**0.86**

Table 1. Linear fit to previous empirical models.
Last row presents the new empirical model proposed for this region.

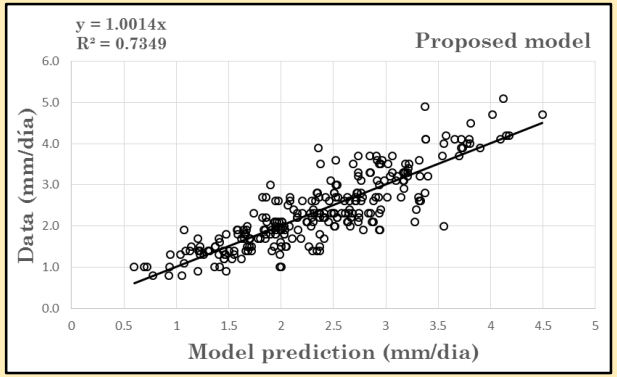

Figure 1. Data fit to the proposed model.

Location. (Wikipedia) Imbabura province, Republic of Ecuador.

Future application. Implement this empirical equation in physical based flow numerical model (del Vigo *et al*, 2020; del Vigo *et al* 2022) to encourage irrigation prediction at this area.

Thank you!

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Supplementary material.

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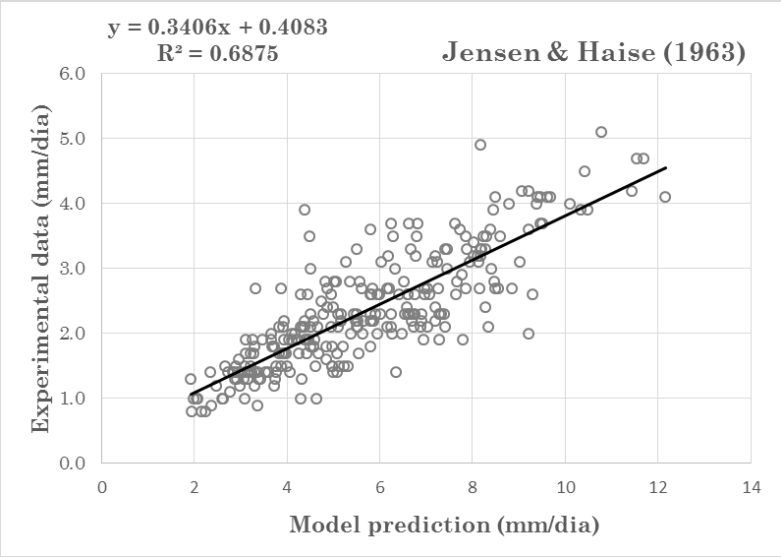

Figure s1. Data fit to Jensen & Haise model (1963).

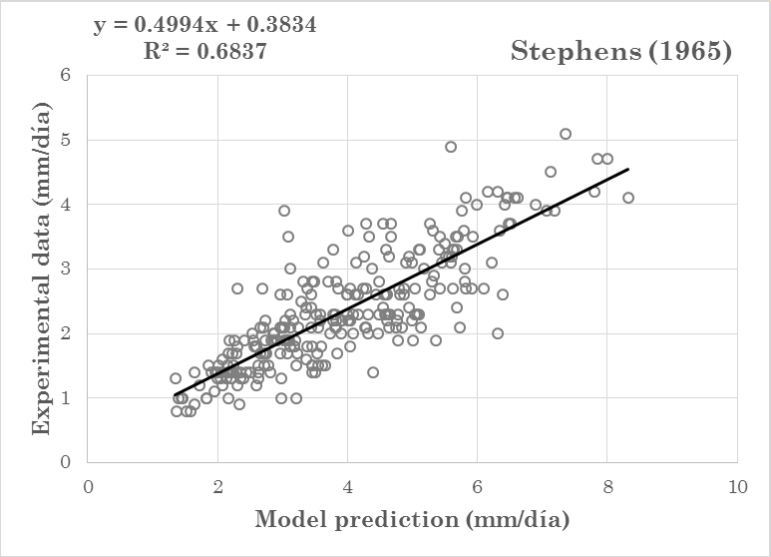

Figure s2. Data fit to Stephens model (1965).

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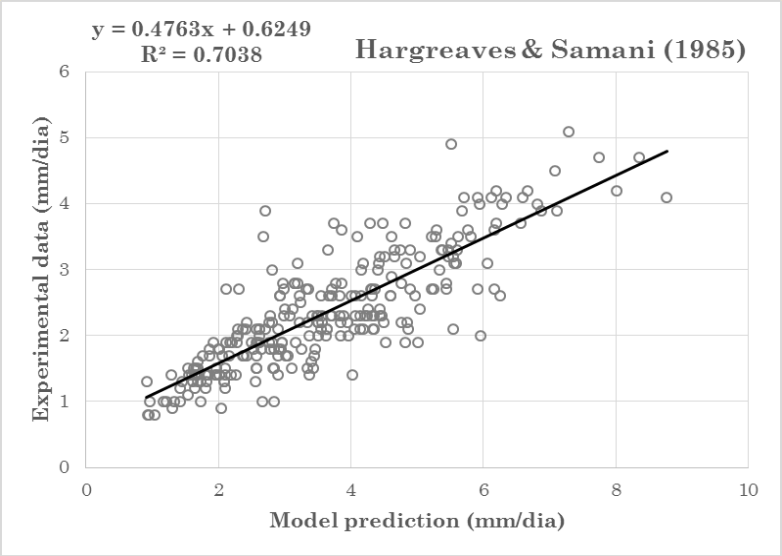

Figure s3. Data fit to Hargreaves & Samani model (1985).

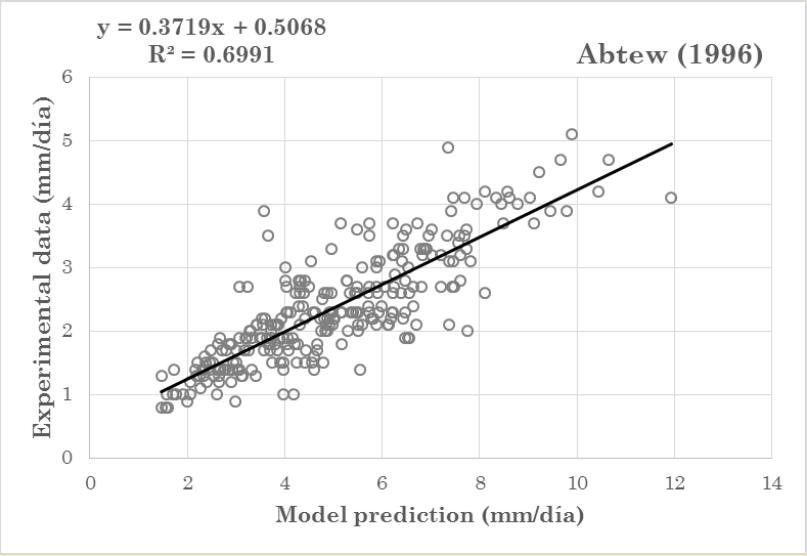

Figure s4. Data fit to Abtew model (1996).

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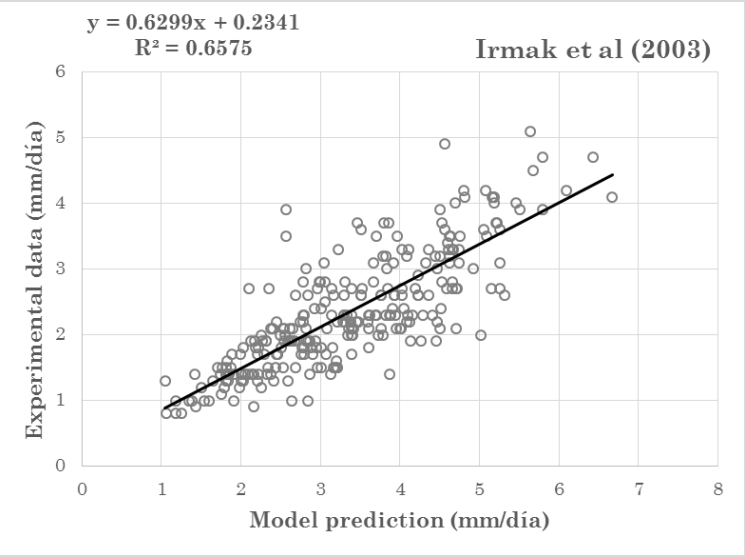

Figure s5. Data fit to Irmak model (2003).

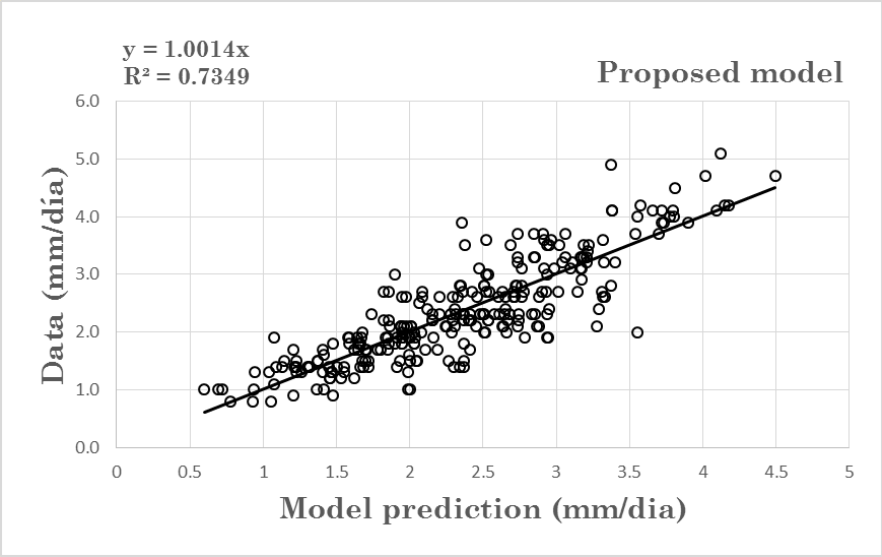

Figure 1. Data fit to proposed model (2023).

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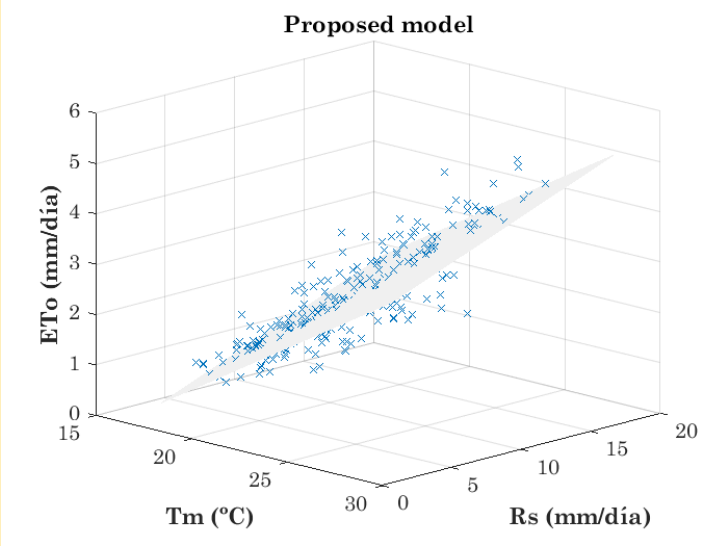

Figure s6. 3-D Data fit to proposed model (2023):

$$ETo = (0.258 \pm 0.025) \cdot T_m + (0.111 \pm 0.017) \cdot R_s - (4.307 \pm 0.442)$$

	a [mm/(día·ºC)]	b [adim]	c [mm/día]
Parameter	0.258	0.111	-4.307
Absolute deviation	0.025	0.017	0.442
Relative deviation	9.7%	15.3%	10.2%

Table s1. Model parameters (2023):

Comments.

- All the analyzed models overestimate the experimental measured evapotranspiration.
- Apart from the proposed model, Irmak (2003) is the model better fit to measured data in this region.

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