Fig. S1. Percentage of missing daily values for each climate variable over the 2000-2021 period. Data to impute (in the red rectangle) were measured at Yasuní Forest Dynamic Plot (YFDP). Imputation robustness was improved by including weather station data (2010 to 2022) for maximum and minimum temperature (tempmax, tempmin) and average relative humidity (humidity), obtained from a station located ~115km east of the YFDP (Visualcrossing data: https://www.visualcrossing.com). IRRA = irradiance; RAIN = rainfall; TMIN/TMAX = minimum/maximum temperature; RHAVE = average relative humidity.

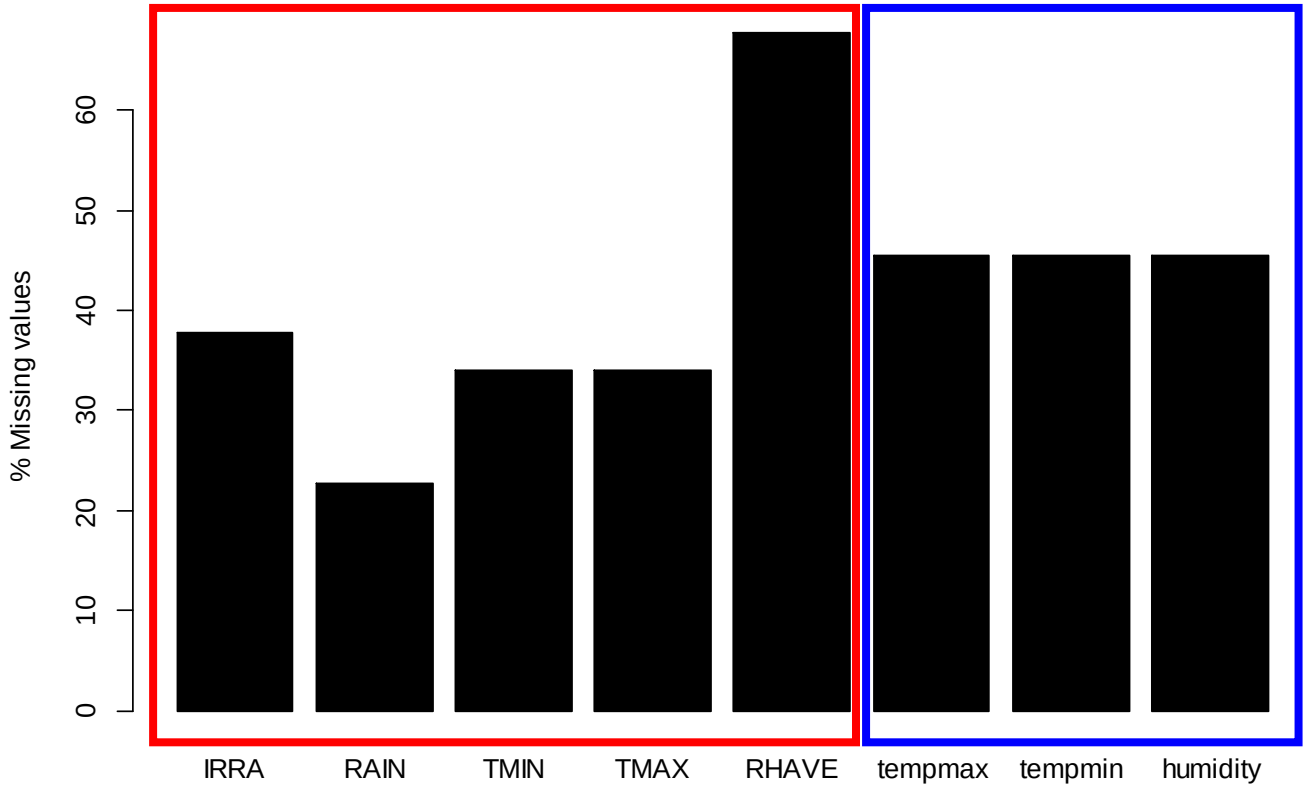


Fig. S2. Percentage of missing values for each day of the month and each climate variable, calculated over the whole study period (2000-2021). TMIN/TMAX = minimum/maximum temperature; RHAVE = average relative humidity.

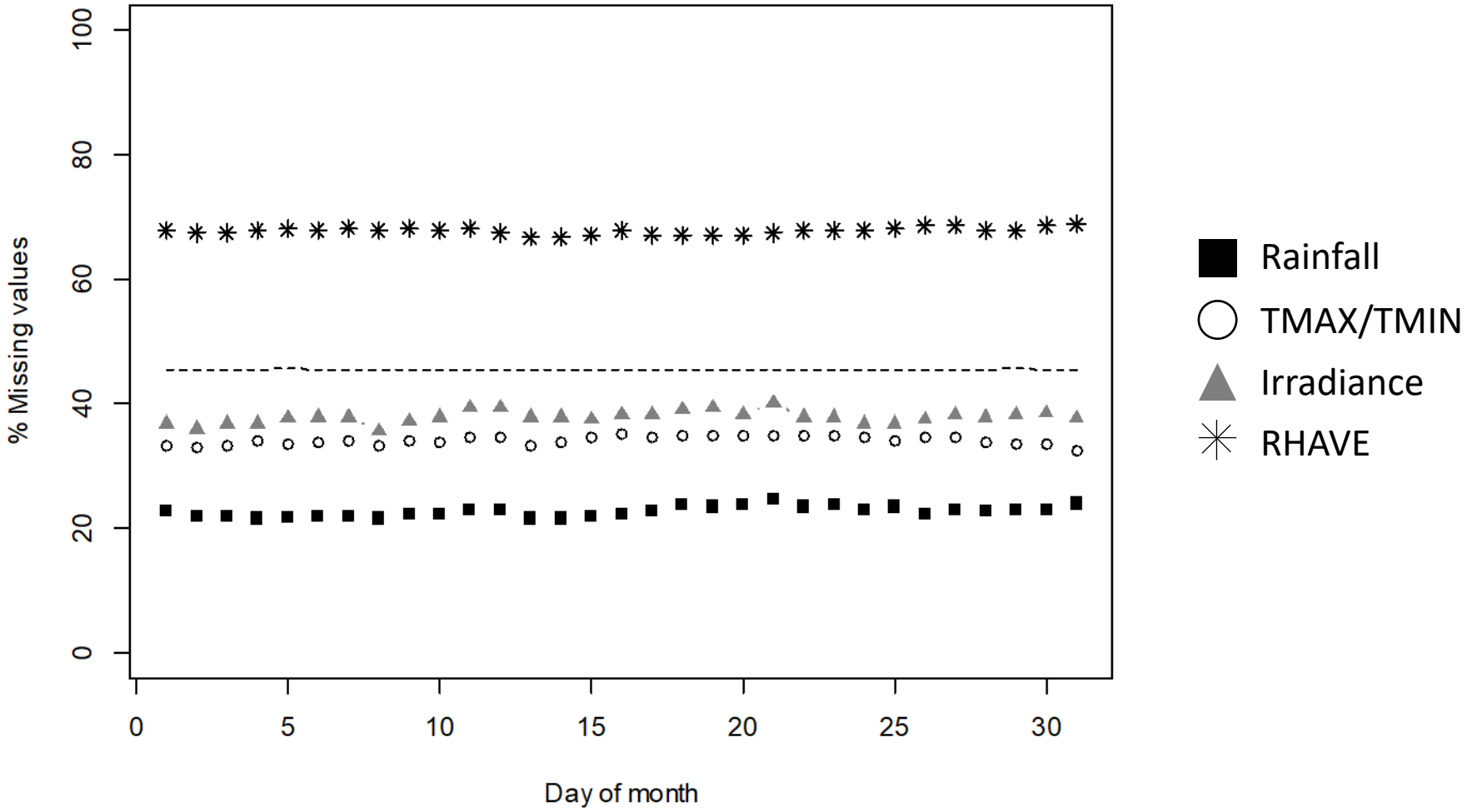


Fig. S3. Percentage of days with 0 to 8 missing values across climate variables, calculated over the 2000-2021 period.

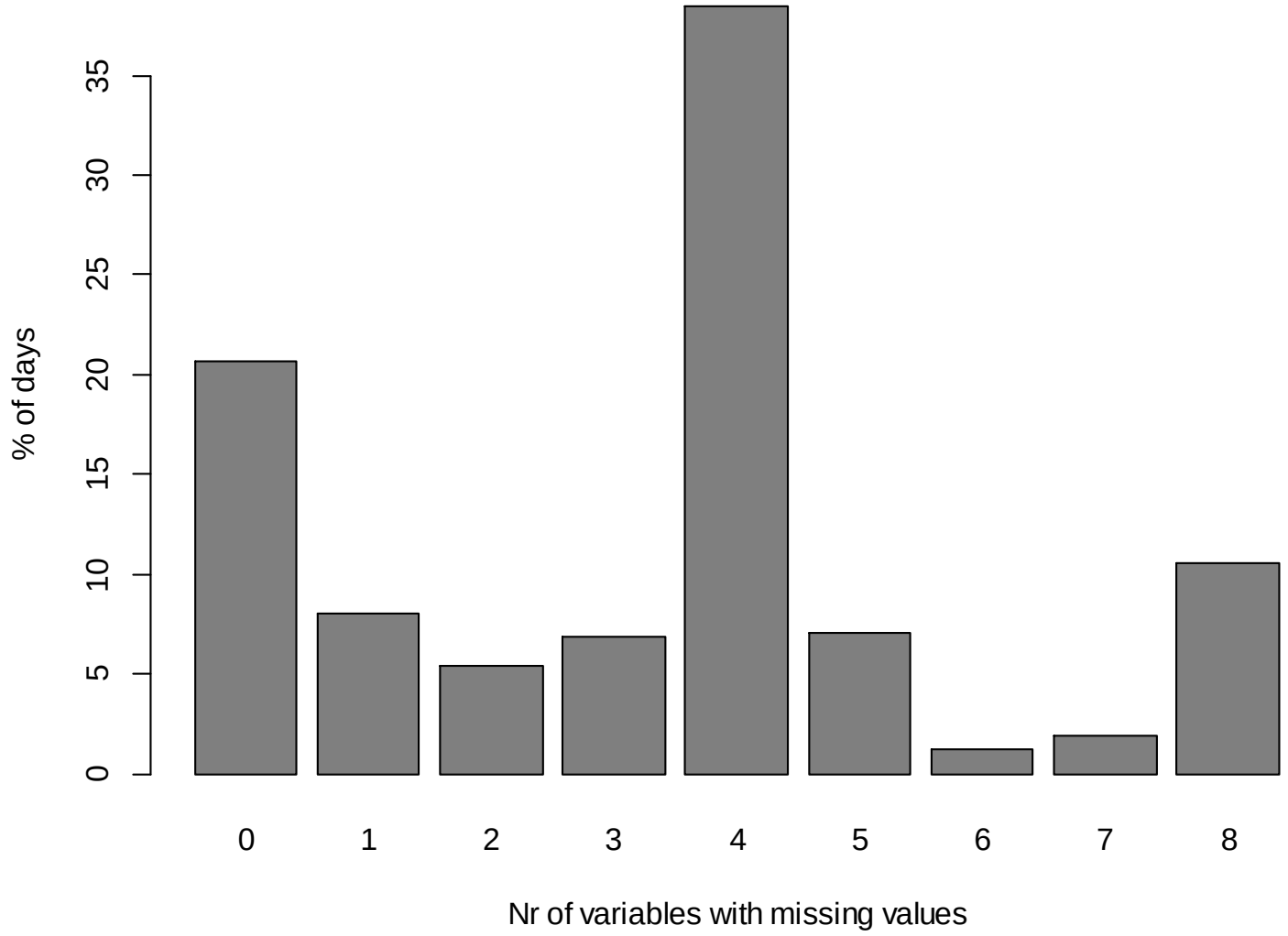


Fig. S4. Percentage of days with two missing values for each pair of climate variables, including the maximum and minimum temperature (tempmax, tempmin) from the Nuevo Rocafuerte weather station (see Fig. S5). TMIN/TMAX = minimum/maximum temperature; RHAVE = average relative humidity.

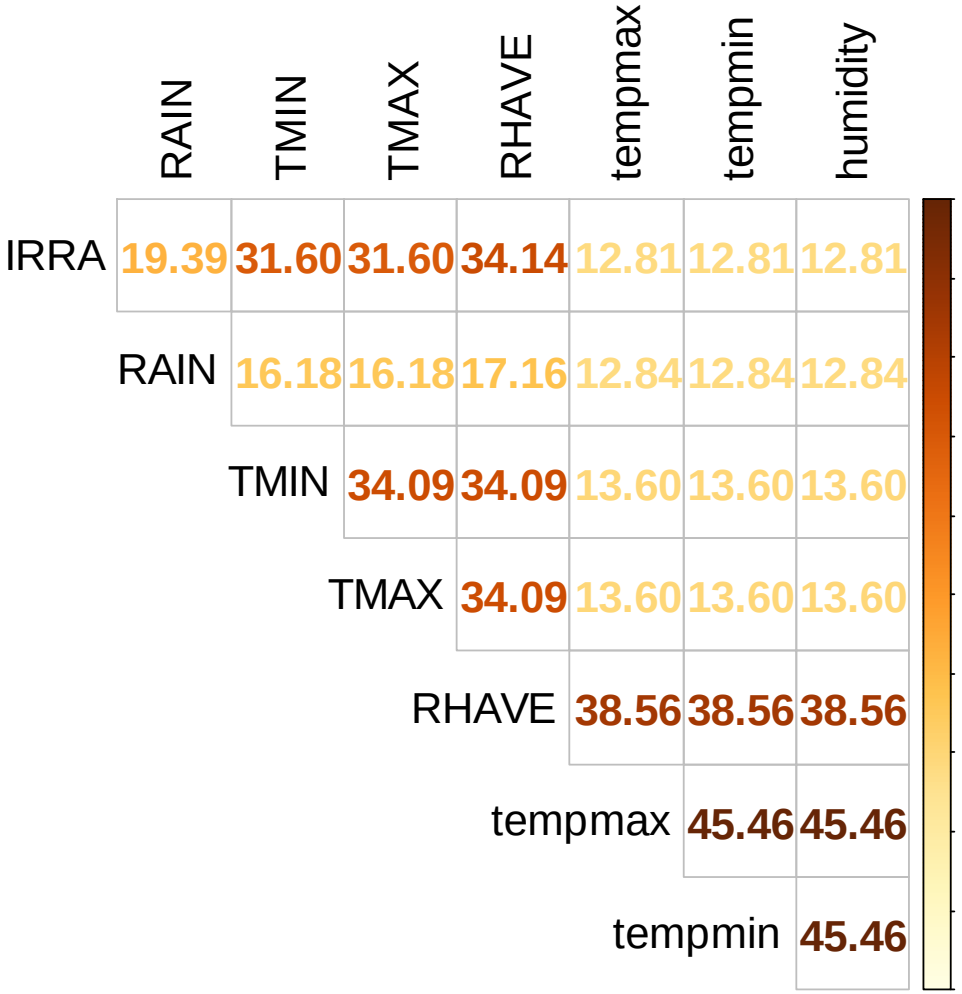
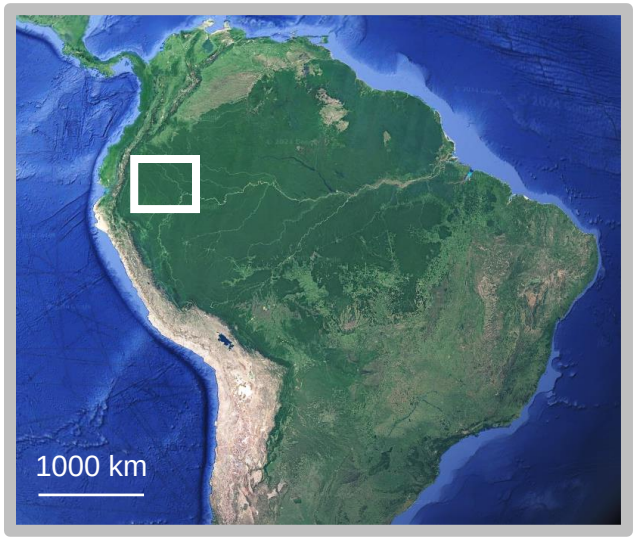


Fig. S5. Map showing the geographical location of the Yasuní Forest Dynamic Plot (YFDP) and the Nuevo Rocafuerte weather station from which we obtained daily data for three climate variables (see Fig. S1).



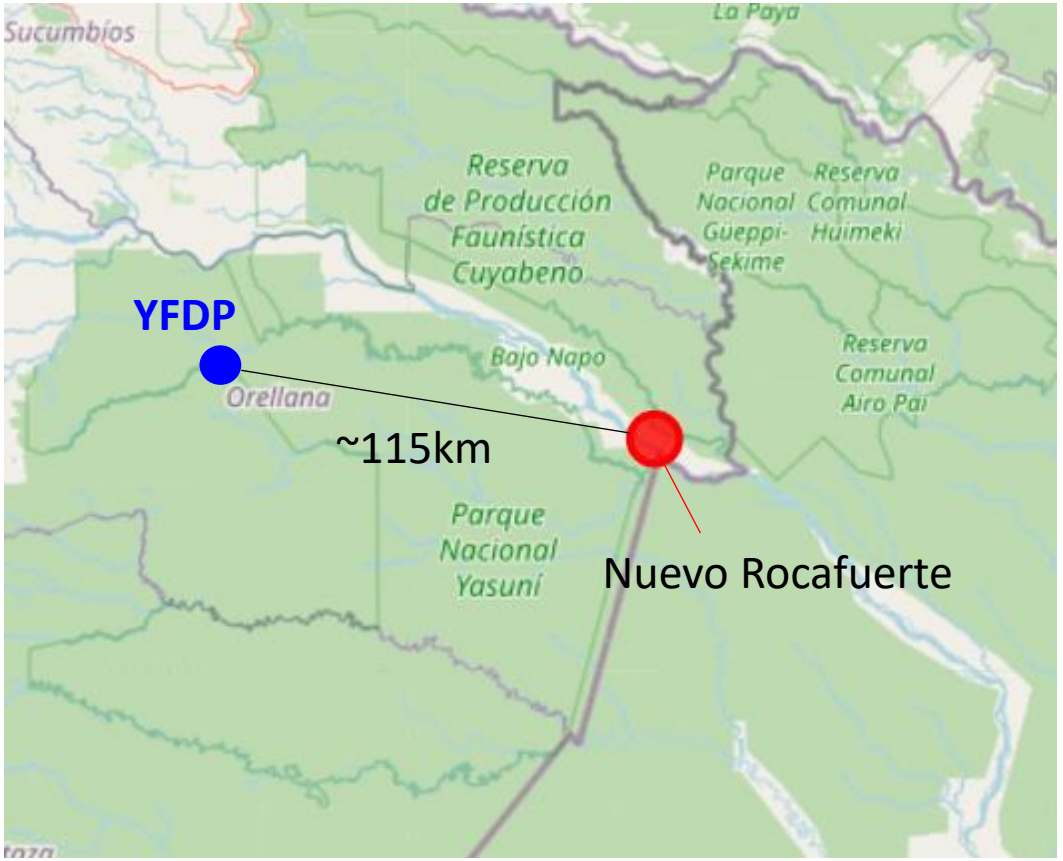


Fig. S6. Pearson correlations among observed daily values of normalized and standardized (z-score) variables, before imputation. IRRA/RAIN/TMIN/TMAX/RHAVE = irradiance / rainfall / minimum temperature / maximum temperature / average relative humidity at the Yasuní Forest Dynamic Plot (YFDP); tempmin/tempmax/humidity = minimum temperature / maximum temperature / average relative humidity at the Nuevo Rocafuerte weather station (see Fig S2).

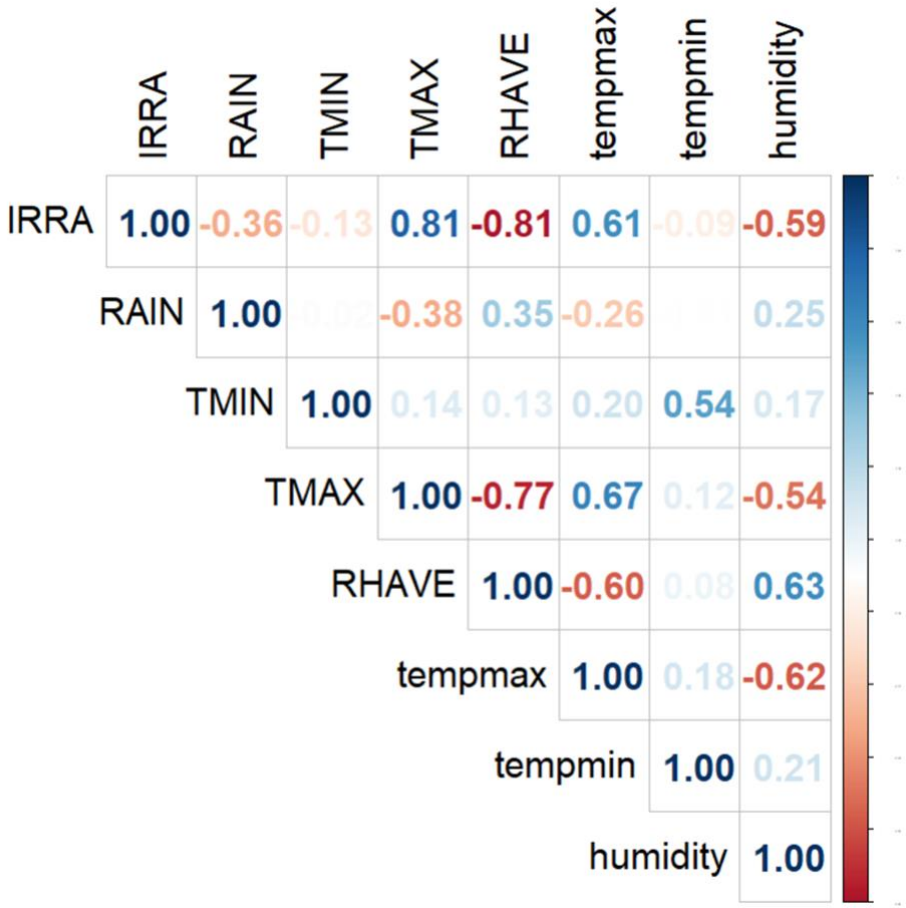


Fig. S7. Post-Hoc analysis evaluating the reliability of the imputations of the missing climate data obtained with the BHPMF procedure, through the Average RMSE (Root Mean Square Deviation) value plotted against the percentage of imputed data having a higher standard deviation from one iteration of gap filling ("fold") to the next (see Schrodt et al. 2015 for details). The more linear the relationship is, the more stable the model is, and thus the more accurate the imputation (F. Schrodt, pers. communication). All standard deviation values of imputed data were < 0.96 (not shown).

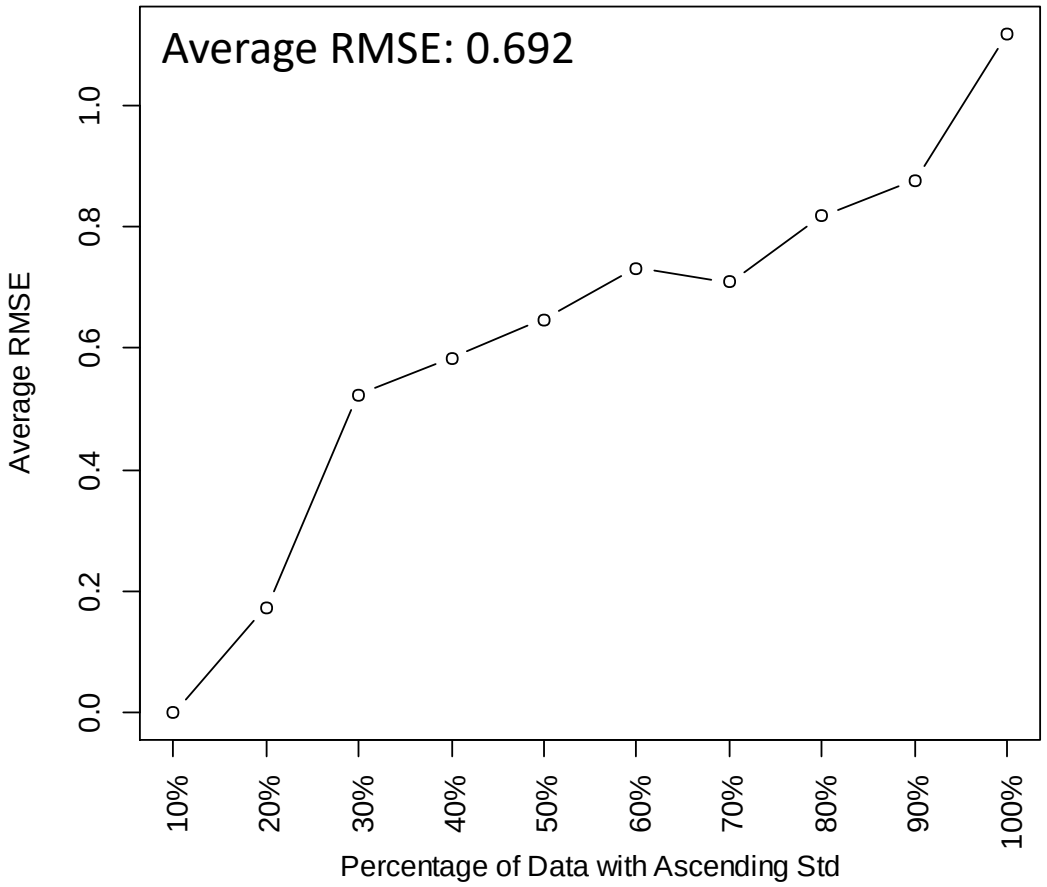


Fig. S8. Post-Hoc analyses evaluating the reliability of the imputations of the missing climate data obtained with the BHPMF procedure. **(a)** Comparison of the correlation values among climate variables before and after imputation, showing a strong consistency (r-Pearson = 0.99). **(b)** Same as in (a) but showing correlations obtained with each climate variable. Coloured symbols emphasize the seven pair-wise correlation values for each climate variable. All correlation values were > 0.994.

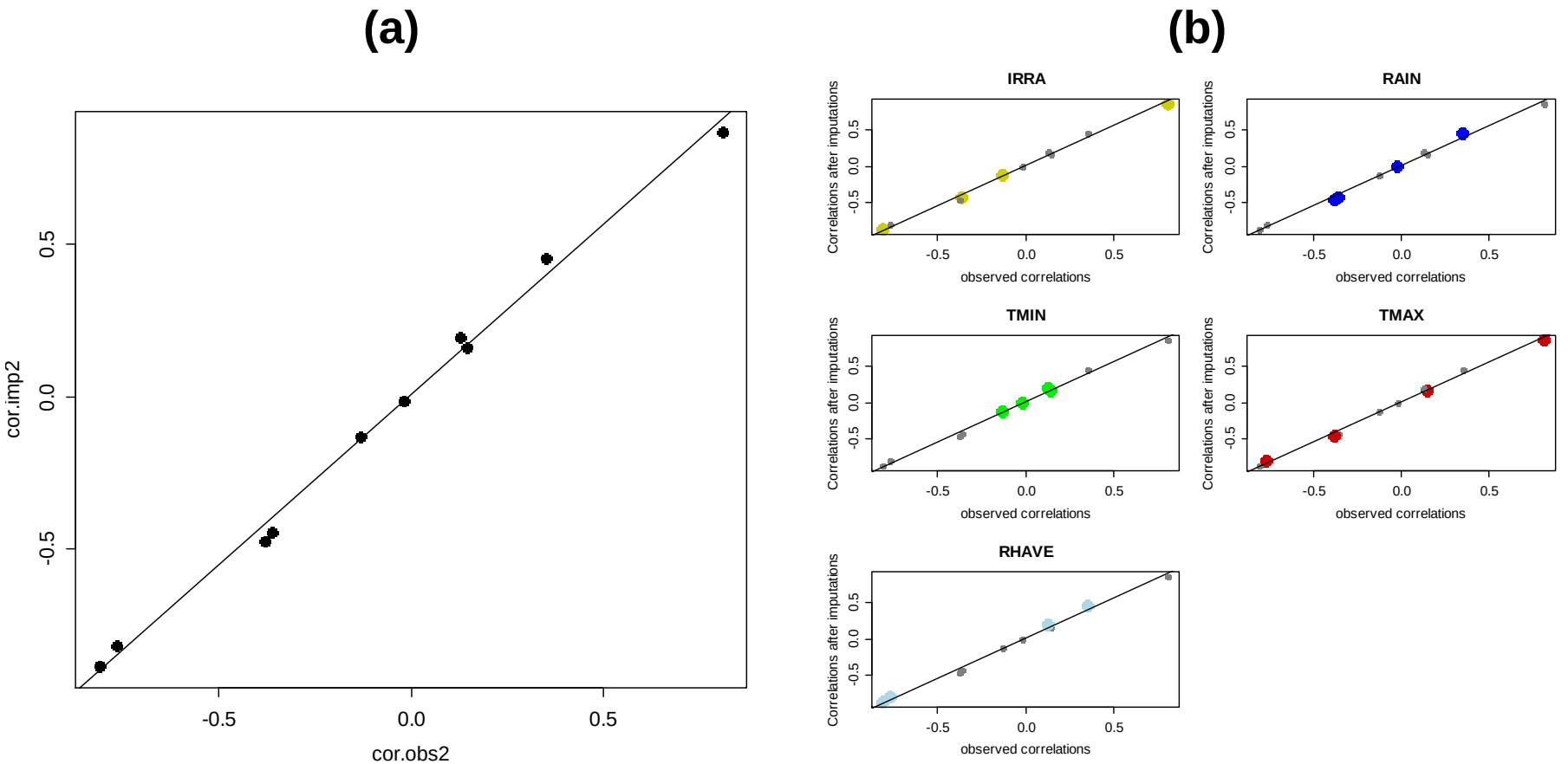
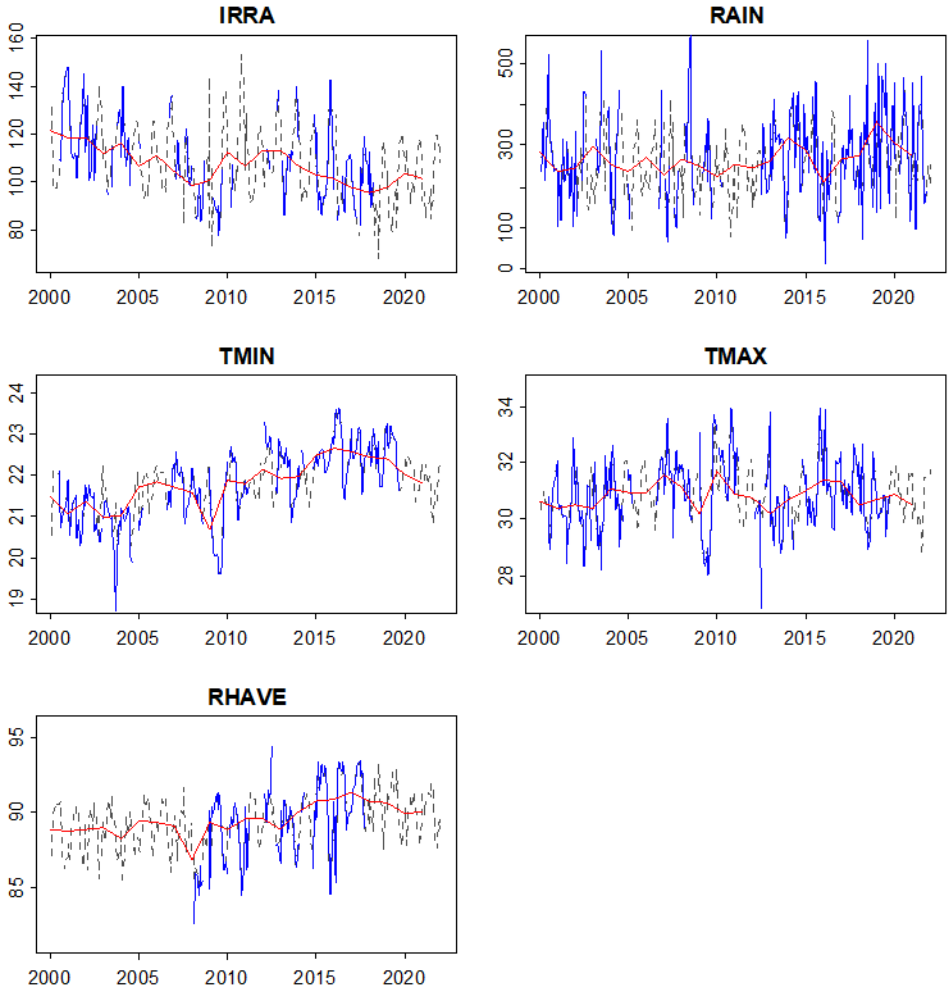



Fig. S9. Observed (blue) and imputed (black) mean monthly values of each climate variable across the 2000-2021 study period. The red curve shows the inter-annual trend obtained from Seasonal-Trend by LOESS (STL) decomposition of imputed climate values. IRRA/RAIN/TMIN/TMAX/RHAVE = irradiance / rainfall / minimum temperature / maximum temperature / average relative humidity at the Yasuní Forest Dynamic Plot.