water

MDPI

Supplementary Materials

Coupling Process-Based Models and Machine Learning Algorithms for Predicting Yield and Evapotranspiration of Maize in Arid Environments

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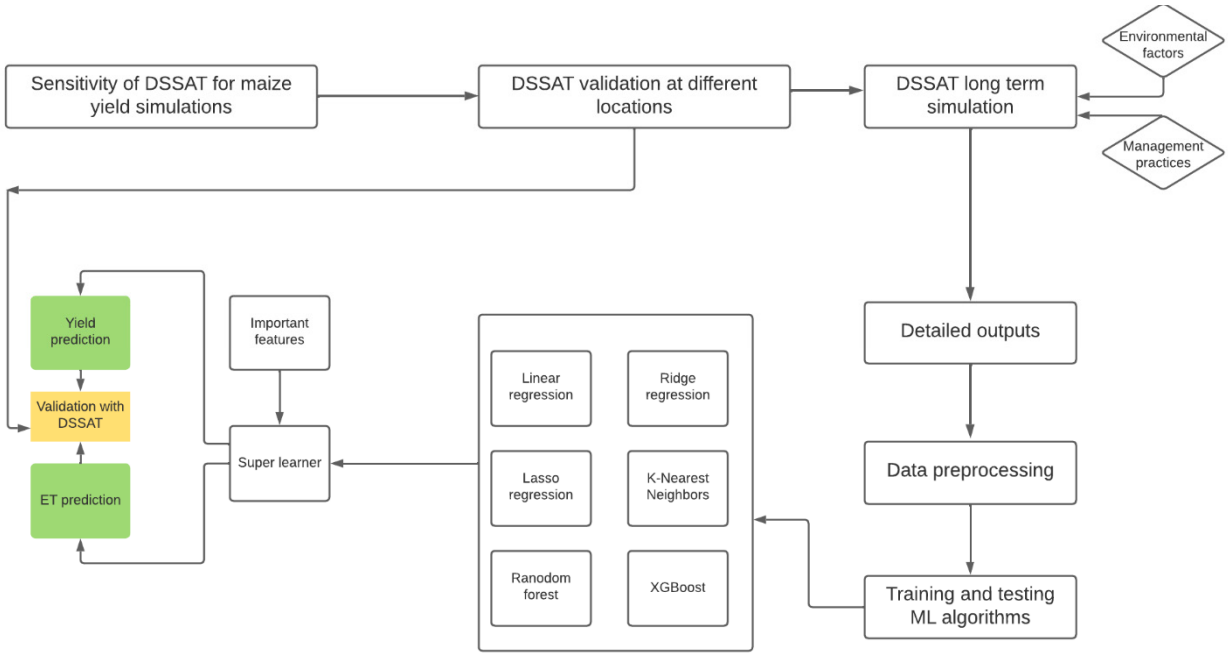

Figure S1. Flowchart summarizes the study road map for modeling and machine learning simulations.

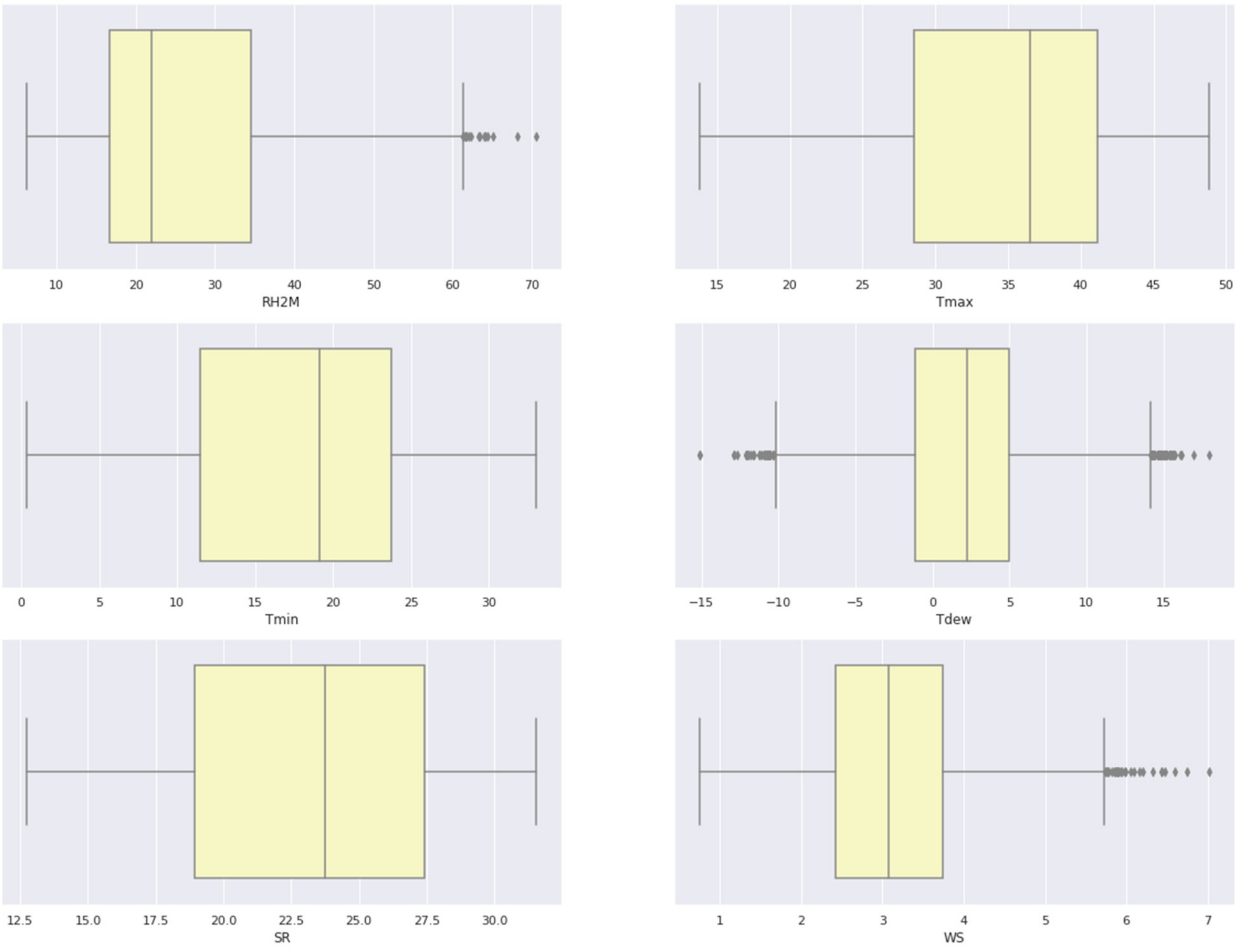

Figure S2A. Box plots of relative humity, RH2M (%), maximum temperature, Tmax (^{0}C), Tmin, Tmin (^{0}C), dew point temperature, Tdew (^{0}C), solar radiation, SR (MJ m^{-2} day^{-1}), and wind speed, WS (m s^{-1}) for Aswan location over 31 years (1991–2020).

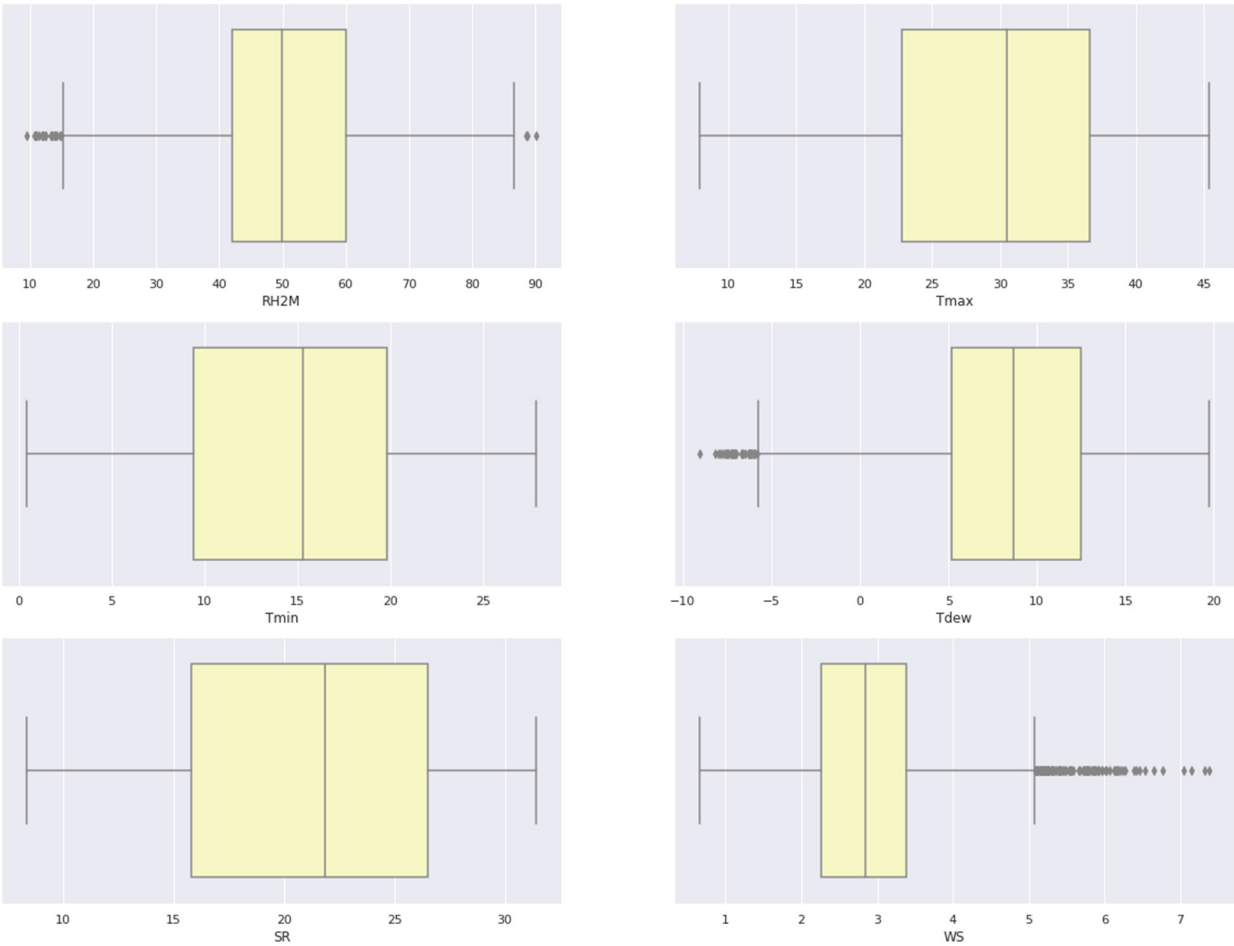

Figure S2B. Box plots of relative humity, RH2M (%), maximum temperature, Tmax (^{0}C), Tmin, Tmin (^{0}C), dew point temperature, Tdew (^{0}C), solar radiation, SR (MJ m^{-2} day^{-1}), and wind speed, WS (m s^{-1}) for Giza location over 31 years (1991–2020).

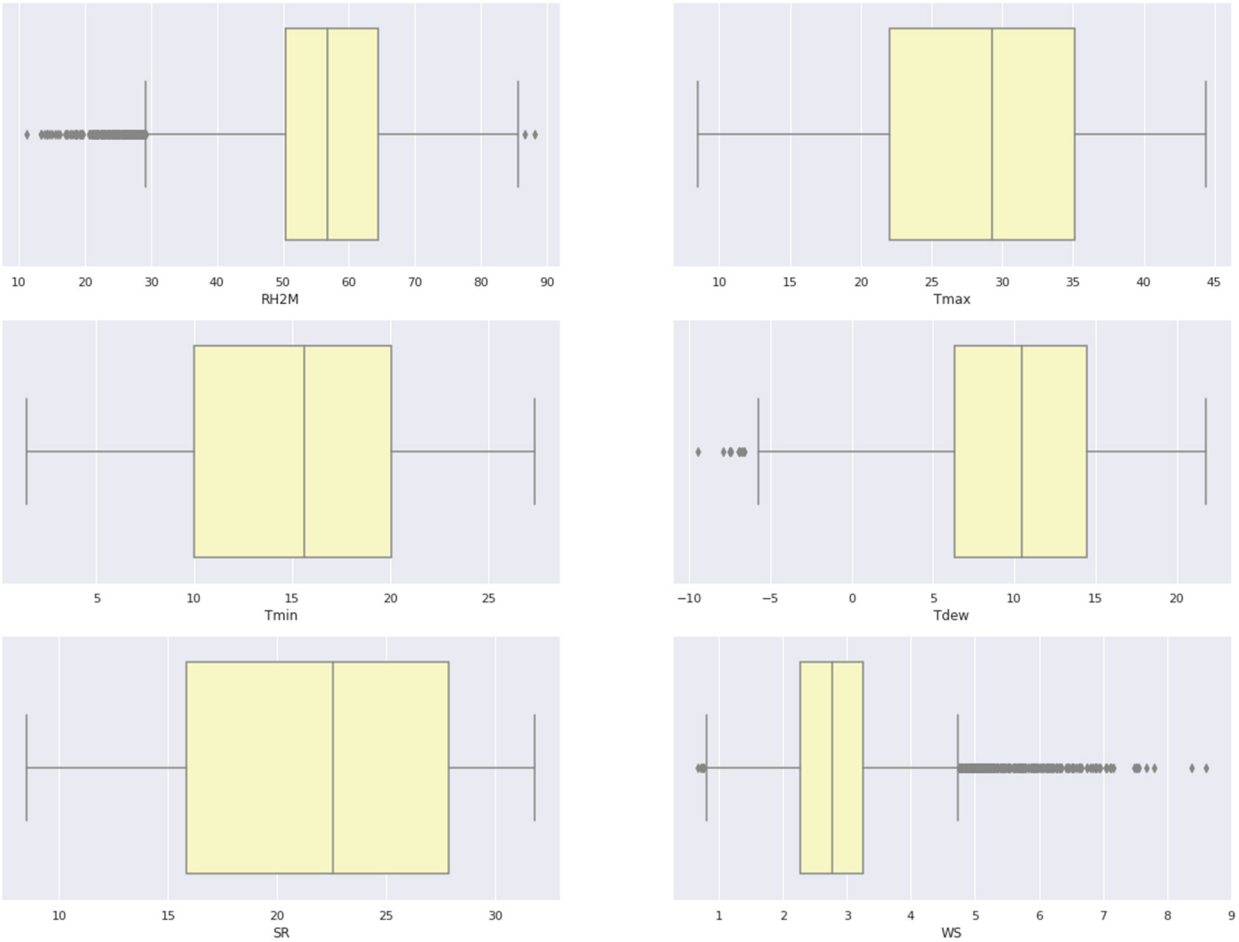

Figure S2C. Box plots of relative humity, RH2M (%), maximum temperature, Tmax (^{0}C), Tmin, Tmin (^{0}C), dew point temperature, Tdew (^{0}C), solar radiation, SR (MJ m^{-2} day^{-1}), and wind speed, WS (m s^{-1}) for Ismalia location over 31 years (1991–2020).

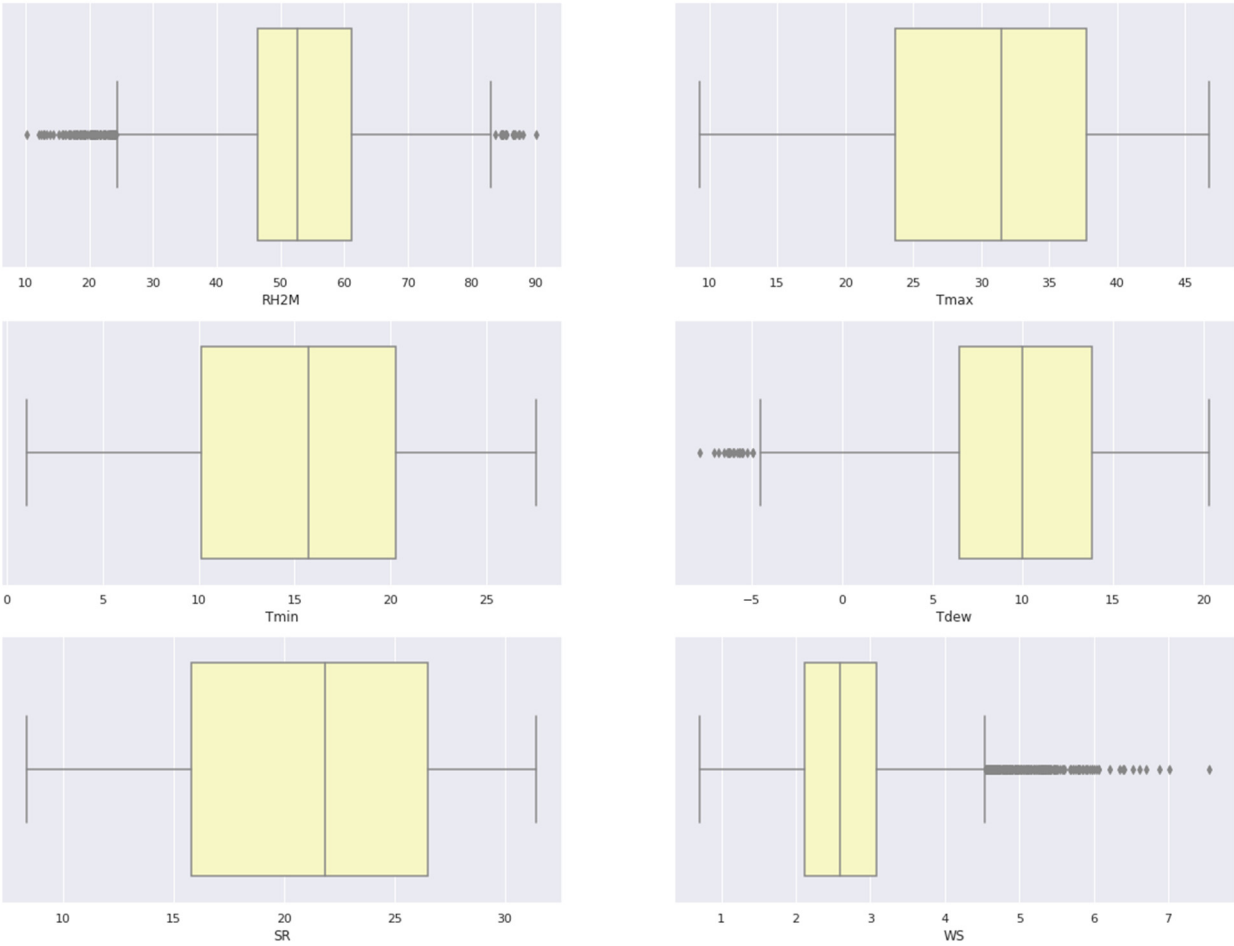

Figure S2D. Box plots of relative humity, RH2M (%), maximum temperature, Tmax (^{0}C), Tmin, Tmin (^{0}C), dew point temperature, Tdew (^{0}C), solar radiation, SR (MJ m^{-2} day^{-1}), and wind speed, WS (m s^{-1}) for Sharqia location over 31 years (1991–2020).

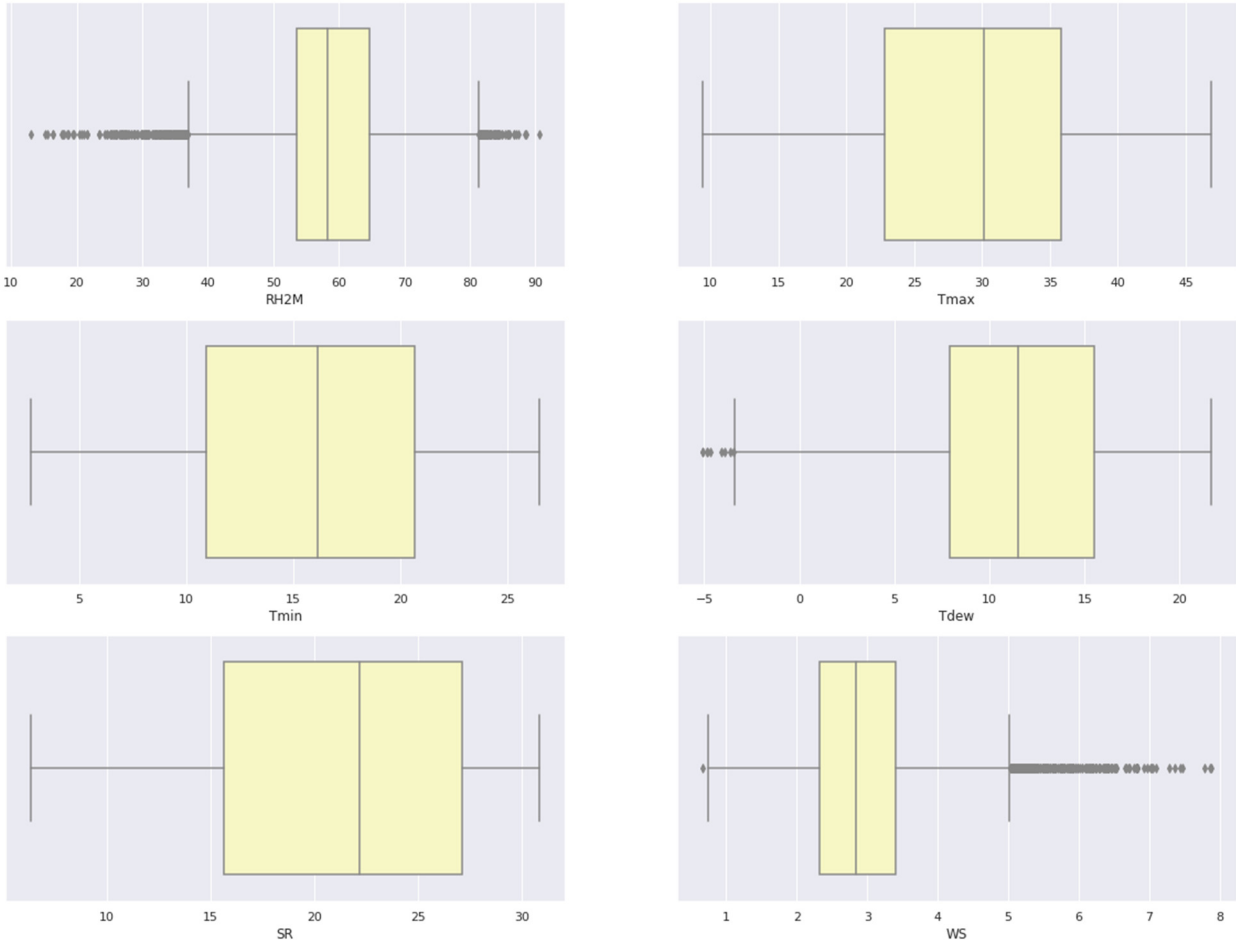

Figure S2E. Box plots of relative humity, RH2M (%), maximum temperature, Tmax (^{0}C), Tmin, Tmin (^{0}C), dew point temperature, Tdew (^{0}C), solar radiation, SR (MJ m^{-2} day^{-1}), and wind speed, WS (m s^{-1}) for Sakha location over 31 years (1991–2020).

Table S1. Goodness-of-fit statistics of calibration and evaluation of the DSSAT model of anthesis and maturity dates, maximum leaf area index (Max LAI), final biomass, grain yield, and evapotranspiration (ET, mm) under non-stress (I1) and stress (I2) conditions.

Feature	RMSE	nRMSE (%)	MPE (%)
Anthesis	5.2 days	9.4	8.8
Maturity	4.6 days	5.1	1.9
GY	680 kg/ha	15.7	1.16
Biomass	1300 kg/ha	30.7	29.9
LAIx	0.33	12.8	10.4
ET(I1)	53 mm	8.8	-4.0
ET(I2)	80 mm	17.9	-7.0