

# Mitigating Low Agricultural Productivity of Smallholder Farms in Africa: Time-Series Forecasting for Environmental Stressors

## Experimental Settings

This section provides details on the experimental settings and hyper-parameter tuning to enable reproducing our work. All experiments are run on a machine with NVIDIA Tesla T4 GPU and 30 GB RAM. Additionally, Adam optimizer with learning rate of 0.001,  $\beta_1$  of 0.9, and  $\beta_2$  of 0.999 is used for training the neural models. To have a fair comparison between CLIMATES and other base-lines, we conducted hyper-parameter tuning using the grid search approach and selected the model with the best predictive performance (CV) on the validation set. Table 1 shows the hyper-parameters and ranges of values that have been tried for hyper-parameter tuning.

**Table 1.** List of hyper-parameters tuned for each model.

Model	Hyper-parameter	Range of Values
SARIMA	p, P	p, P: {1, 2, ..., 10}
	q, Q	q, Q: {1, 2, ..., 10}
	d, D	d, D: {0, 1, 2}
Random Forest	# Estimators	25, 50, 100, 200
	Max depth	2, 4, 8, 16
XGBoost	# Estimators	25, 50, 100, 200
	Max depth	2, 4, 8, 16
SVM	Kernel	linear, poly, rbf, sigmoid
LSTM	# States	32, 64, 128, 256, 512
SFM	# States	32, 64, 128, 256, 512
	# Frequencies	5, 10, 15, 20
TCN	# Filters	32, 64, 128, 256, 512