Making agricultural research data accessible for agriculture and climate research

These data were digitized through generous funding from the International Growth Centre (MOZ-23030). In this project, we aimed to increase access to existing climate and weather data by digitizing paper records from 1970 to 2023 at one agricultural research station in Mozambique. We also view this as a proof-of-concept project to demonstrate the feasibility and utility of such efforts in other parts of Mozambique and across Africa.

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The Sussundenga Agricultural Station is an experimental unit that makes up the Agricultural Research Institute of Mozambique (IIAM), in the Central region of Mozambique. IIAM is a research institution that is responsible for implementing strategic policy and agricultural research projects financed by public and non-public funds.

The digitized data include daily and monthly observations. Wind speed, air temperature, atmospheric pressure, and relative humidity measurements were recorded three times each day (at 9:00, 15:00 and 21:00). The description of the daily variables and numbers of observations is provided in Table 1. There are a few years in the mid-1990s and the mid-2000s with more than 100 days missing, but the data are mostly complete.

There are a number of ways these data can be used. First, the data could be analyzed on their own by climate scientists to assess whether and how the weather patterns have shifted in the last fifty years in this area. This might also help scientists predict future changes and inform agricultural policy in the region. Second, the data might be used to validate similar data extracted from satellite observations. Satellite data are only available from 1983 onwards and not for the full range of measurements collected at the station. Third, the data could be combined with agricultural yield or socio-economic data. While such data would not be available for the entire period, having a number of years of overlap could provide some suggestive evidence of the effect of weather on

various outcomes. Third, if other stations are able to digitize their records, having observations over several locations over such a long period would greatly expand the potential research questions, particularly for socio-economic outcomes.

These data are currently publicly available at https://github.com/mosercm/Mozambique-agricultural-station-data/tree/main. We are working on having a local governmental organization or IGC-Mozambique host the data to make it more visible. We plan to have at least one virtual event coordination with IGC-Mozambique in 2025 to promote the newly accessible data and to discuss how local researchers might use them.

Table 1. Description of daily variables[1]

Variable name	Description	Obs	Mean	Std. dev.	Min	Max
prov	Province	19111	MANICA			
dist	District	19111	SUSSUNDENGA			
year	Year	19111			1970	2023
month	Month	19111	6.45	3.44	1	12
day	Day	19111	15.73	8.80	1	31
p09	Atmospheric pressure at 09:00	18986	18.79	3.04	10	30
p15	Atmospheric pressure at 15:00	19032	19.85	2.94	10	30
p21	Atmospheric pressure at 21:00	19012	18.33	3.09	5	30
t09	Air temperature at 09:00 in Celsius	19095	22.44	3.49	5.4	36
t15	Air temperature at 15:00 in Celsius	19093	26.75	3.84	5	40
t21	Air temperature at 21:00 in Celsius	19012	22.33	3.55	6.6	37.3
tday	Air temperature daily in Celsius	17995	21.86	3.40	5.7	37.1
tmax	Air temperature (max) in Celsius	18455	27.83	3.75	12.8	40
tmin	Air temperature (min) in Celsius	18202	15.93	4.20	5	32.2
tgrass	Air temperature of the grass (min)	13538	7.39	7.46	0	29.6
u09	Relative humidity of the air at 09:00	19097	69.98	13.89	20	100
u15	Relative humidity of the air at 15:00	19094	52.50	17.12	20	100
u21	Relative humidity of the air at 21:00	19095	67.54	15.85	20	100
f09	Wind speed at 09:00 (km/h)	18983	4.37	5.70	0	89
f15	Wind speed at 15:00 (km/h)	18981	4.65	5.94	0	89
f21	Wind speed at 21:00 (km/h)	18976	4.13	5.15	0	89
fdia	Daily wind speed	15166	5.02	5.39	0	81
v15	Horizontal visibility at 15:00	19111	8.43	0.67	0	9
n09	Total cloudiness at 09:00	19095	4.83	3.46	0	10

[1] Not included in the table are the non-numeric variables-- daily windspeed directions collected at 9:00, 15:00, and 21:00

n15	Total cloudiness at 15:00	19095	4.74	3.08	0	10
n21	Total cloudiness at 21:00	19094	4.95	3.67	0	10
itotal	Total insolation (h)	19070	2.50	4.32	0	83
iperc	Insolation (percentage)	19098	20.52	34.00	0	99
e09	Estado do Solo 09 horas	19111	0.30	0.53	0	9
r0909	Rainfall 09h-09h (mm)	19020	3.29	10.14	0	90
e0909	Evaporation 09h-09h (mm)	18587	3.71	2.47	0	81