

# Ngorongoro Crater Weather Report. Graphical representation of the trends in temperature and rainfall in the Ngorongoro Crater, Tanzania

Ngorongoro Hyena Project

20/04/2023

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## Citation

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Bailey LD, Naman P, Oltumo L, Courtiol A, Davidian E, Höner OP. 2023 Ngorongoro Crater Weather Report - Graphical representation of the trends in temperature and rainfall in the Ngorongoro Crater, Tanzania. Downloaded on 2023-04-20 from <https://github.com/hyenaproject/NgoroWeather>

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## Introduction

This report gives a summary of weather data collected in Ngorongoro Crater by the Ngorongoro Hyena Project between 29/09/2021 - 20/04/2023. We now have a network of 4 weather stations installed at different sites around the Ngorongoro Crater. These weather stations have been collecting data on temperature, rainfall, and humidity, giving us a detailed picture of weather conditions in Ngorongoro Crater that can help inform conservation management. Below are some key facts from our data collection so far:

**568 days**  
of weather data collected

**31.09°C**  
Highest recorded temperature  
Ngoitokitok  
13/01/2022

**1.89°C**  
Lowest recorded temperature  
Lemala (Rim)  
30/10/2022

**66.6mm**  
Highest recorded daily rainfall  
Ngoitokitok  
18/04/2023

## Weather station details

### Location of weather stations

Lines show elevation contours at 100m



## Technical specifications



Figure 1: Weather station photos. Top Left: Acacia. Top Right: Ngoitokitok. Bottom Left: Lemala (Rim). Bottom Right: Jackal Hill

Table 1: Technical specifications

	Data.Logger	Temperature.Sensor	Rain.Gauge
Company	Meter Group	Meter Group	Meter Group
Model	ZL6	ATMOS 14	ECRN-100
Data collection frequency	-	30min	30min
Resolution	-	0.1°C	0.2mm
Details	Solar powered data logger with inbuilt GPS and 8MB of data storage	Temperature and humidity sensor with radiation shielding	Tipping bucket rain gauge

Note:

Data from Meter Group

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## Data summary (29/09/2021 - 20/04/2023)

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### Temperature

#### Mean temperature (°C) over time

The below plot shows temperature on the floor of Ngorongoro Crater between 29/09/2021 - 20/04/2023. It shows the daily mean temperature calculated across all stations (solid black line) and the daily temperature range (shaded areas). The table beneath the plot shows monthly mean temperature for each station separately, including data collected on the Ngorongoro Crater rim. Cell colours help to distinguish cooler months (yellow) from warmer months (red).

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## Warning: Removed 1 rows containing missing values (`geom_text()`).
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#### Temperature on Ngorongoro Crater floor ranged between 5°C - 31°C

Grey shaded area shows daily range.  
Solid black line is the daily mean temperature across all stations.

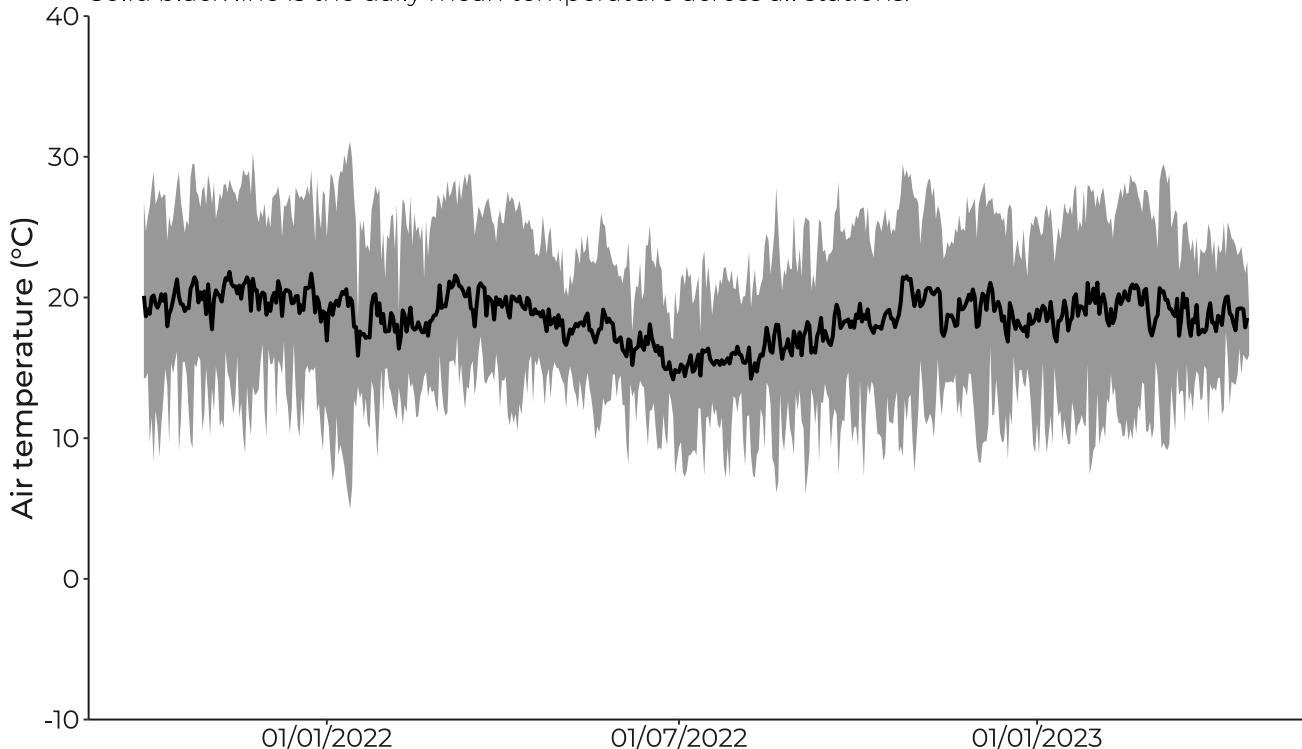


Table 2: Monthly mean temperature (°C)

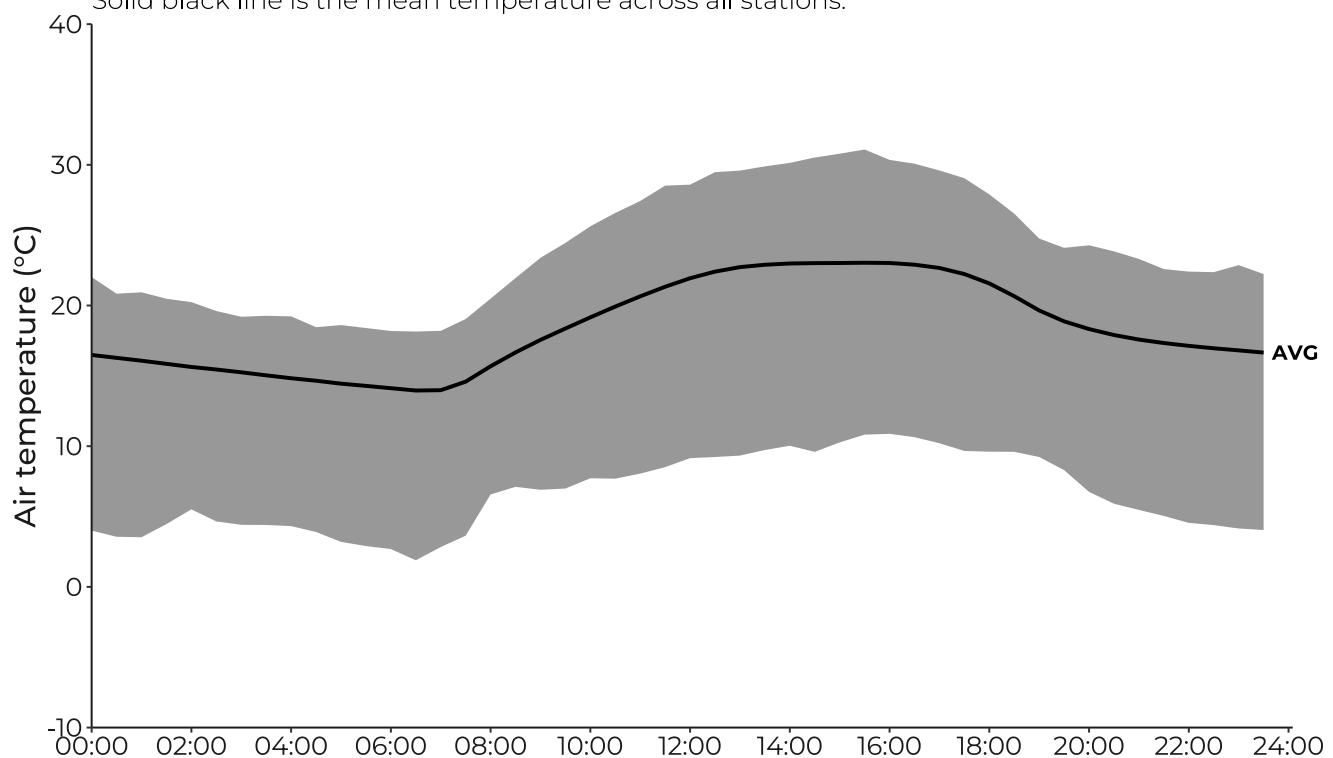
	ACACIA	NGOITOKITOK	JACKAL HILL	LEMALA (RIM)
OCT 2021	19.98	19.65	NA	NA
NOV 2021	20.62	20.23	NA	NA
DEC 2021	19.83	19.89	NA	NA
JAN 2022	19.24	18.28	NA	NA
FEB 2022	18.40	NA	NA	NA
MAR 2022	20.17	NA	NA	NA
APR 2022	19.60	19.05	18.64	14.58
MAY 2022	18.05	17.82	17.54	13.14
JUN 2022	16.14	16.22	16.00	11.12
JUL 2022	15.53	15.65	15.30	10.37
AUG 2022	16.25	16.40	16.11	10.98
SEP 2022	17.69	17.74	17.56	12.29
OCT 2022	19.31	19.13	18.78	13.75
NOV 2022	19.77	19.50	19.16	14.67
DEC 2022	19.13	18.44	18.66	14.07
JAN 2023	19.46	18.57	NA	14.24
FEB 2023	20.26	19.18	NA	14.72
MAR 2023	19.22	18.35	NA	14.16

### Daily temperature variation (°C)

The below plot shows temperature variation within Ngorongoro Crater over a 24h observation period using data collected from 29/09/2021 - 20/04/2023. The plot shows mean temperature calculated across all stations on the Crater floor (solid black line) and the temperature range (shaded areas) at 30 minute intervals.

**Over a 24h observation period temperature on Ngorongoro Crater floor ranged between 2°C - 31°C**

Grey shaded area shows range at 30 minute intervals.  
Solid black line is the mean temperature across all stations.



## Rainfall

### Mean rainfall (mm)

The below plot shows the mean daily rainfall on the floor of Ngorongoro Crater in each month using data collected from 29/09/2021 - 20/04/2023. The table beneath the plot shows the mean daily rainfall values for each station separately. Cell colours help to distinguish drier months (light blue) from wetter months (dark blue).

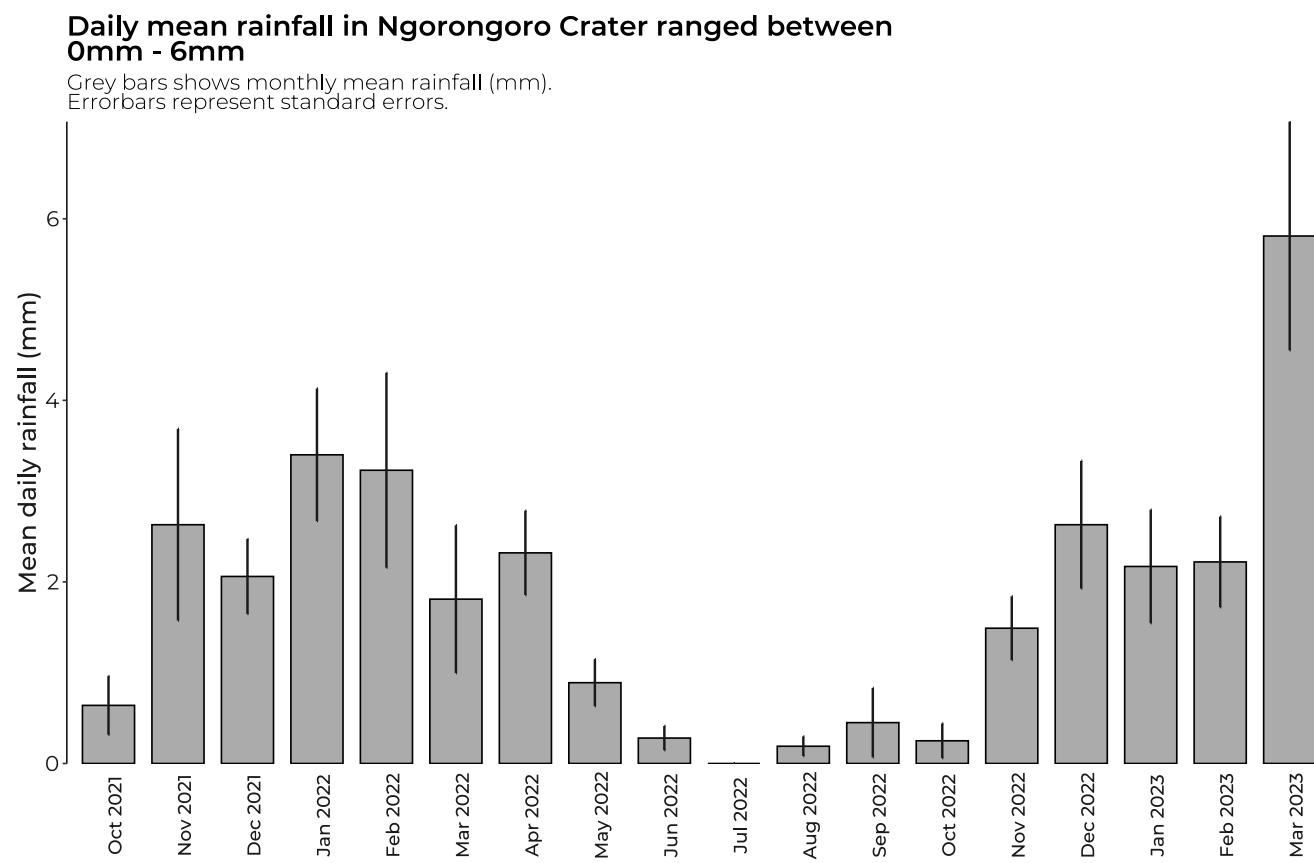


Table 3: Monthly mean rainfall (mm)

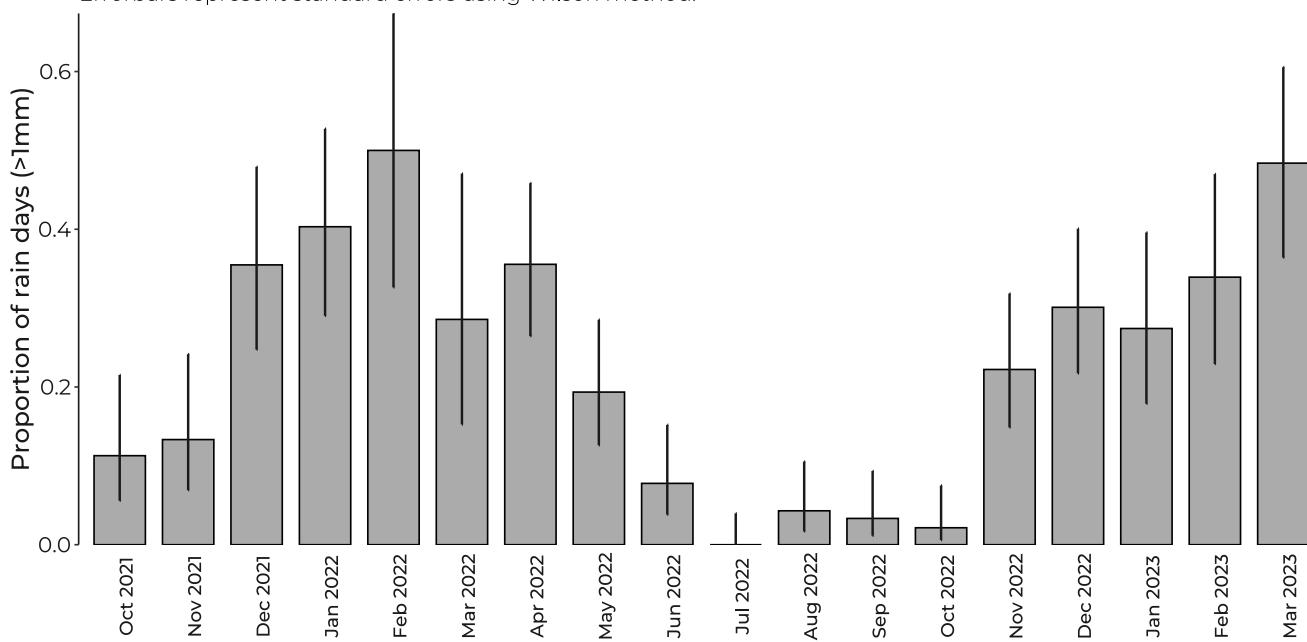
	ACACIA	NGOITOKITOK	JACKAL HILL	LEMALA (RIM)
OCT 2021	0.57	0.71	NA	NA
NOV 2021	2.53	2.73	NA	NA
DEC 2021	1.86	2.26	NA	NA
JAN 2022	2.75	4.05	NA	NA
FEB 2022	3.23	NA	NA	NA
MAR 2022	1.81	NA	NA	NA
APR 2022	3.15	2.04	1.77	5.93
MAY 2022	0.27	0.99	1.41	2.30
JUN 2022	0.04	0.71	0.07	0.51
JUL 2022	0.01	0.00	0.01	0.34
AUG 2022	0.05	0.18	0.34	0.47
SEP 2022	0.11	1.17	0.06	0.19
OCT 2022	0.02	0.72	0.00	0.01
NOV 2022	0.42	2.68	1.37	0.53
DEC 2022	2.92	1.68	3.29	0.28
JAN 2023	1.25	3.09	NA	2.88
FEB 2023	1.96	2.48	NA	3.04
MAR 2023	5.54	6.09	NA	6.96

#### Proportion of rain days (>1mm)

The below plot shows the proportion of rain days recorded each month on the floor of Ngorongoro Crater (days with rainfall >1mm) using data collected from 29/09/2021 - 20/04/2023.

#### Proportion monthly rain days (>1mm) in Ngorongoro Crater ranged between 0 days - 0.5 days

Grey bars shows proportion of rain days (>1mm) observed in a month.  
Errorbars represent standard errors using Wilson method.

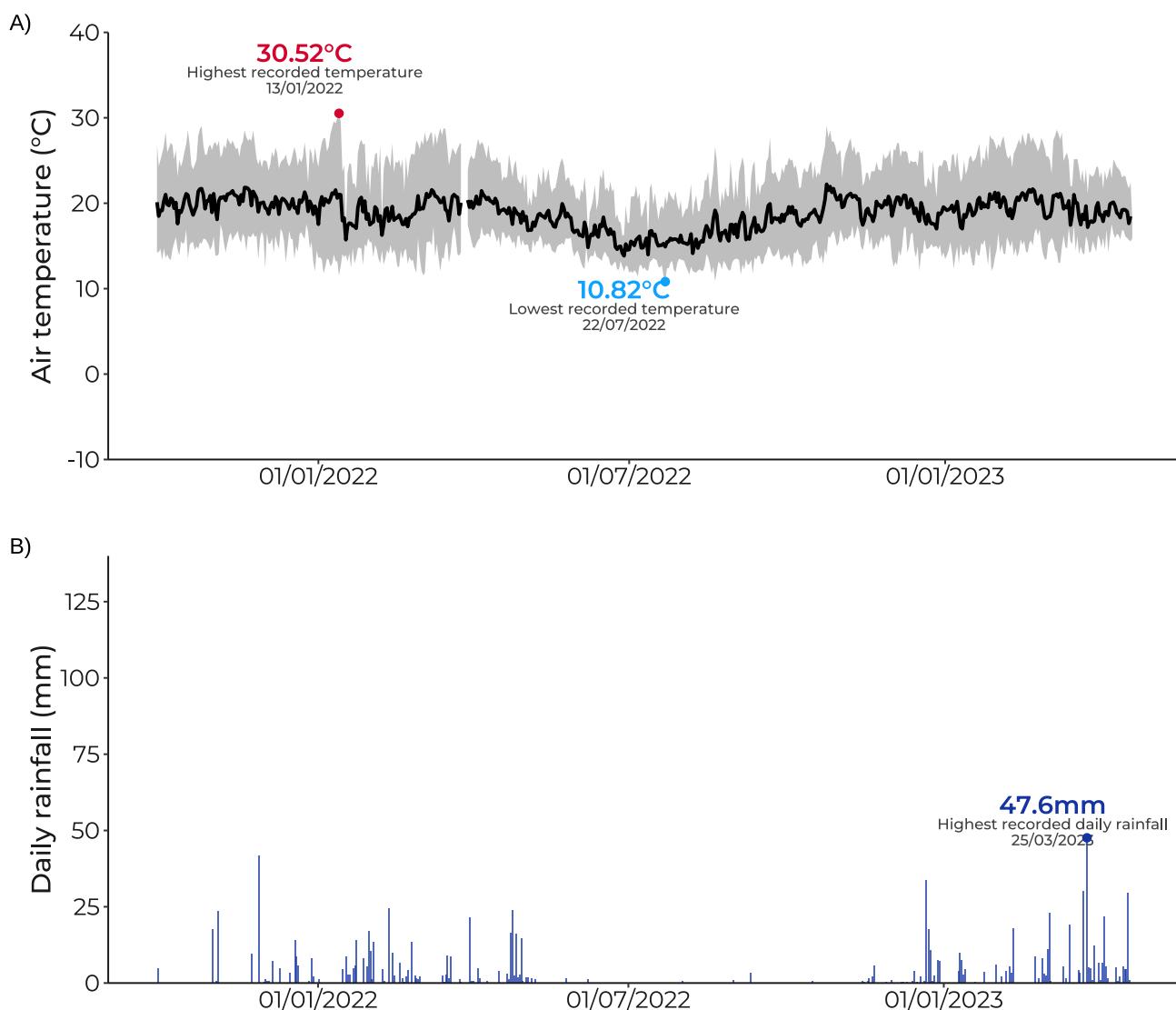


## Detailed weather data by site

Below we provide more detailed temperature and rainfall plots for each of our 4 stations. For each station two plots are provided: A) Temperature plot. Daily mean temperature (solid black line) and daily temperature range (shaded area). Highest and lowest recorded temperatures are highlighted on the plot. B) Daily rainfall (mm). Highest daily rainfall recorded is highlighted on the plot.

### Acacia

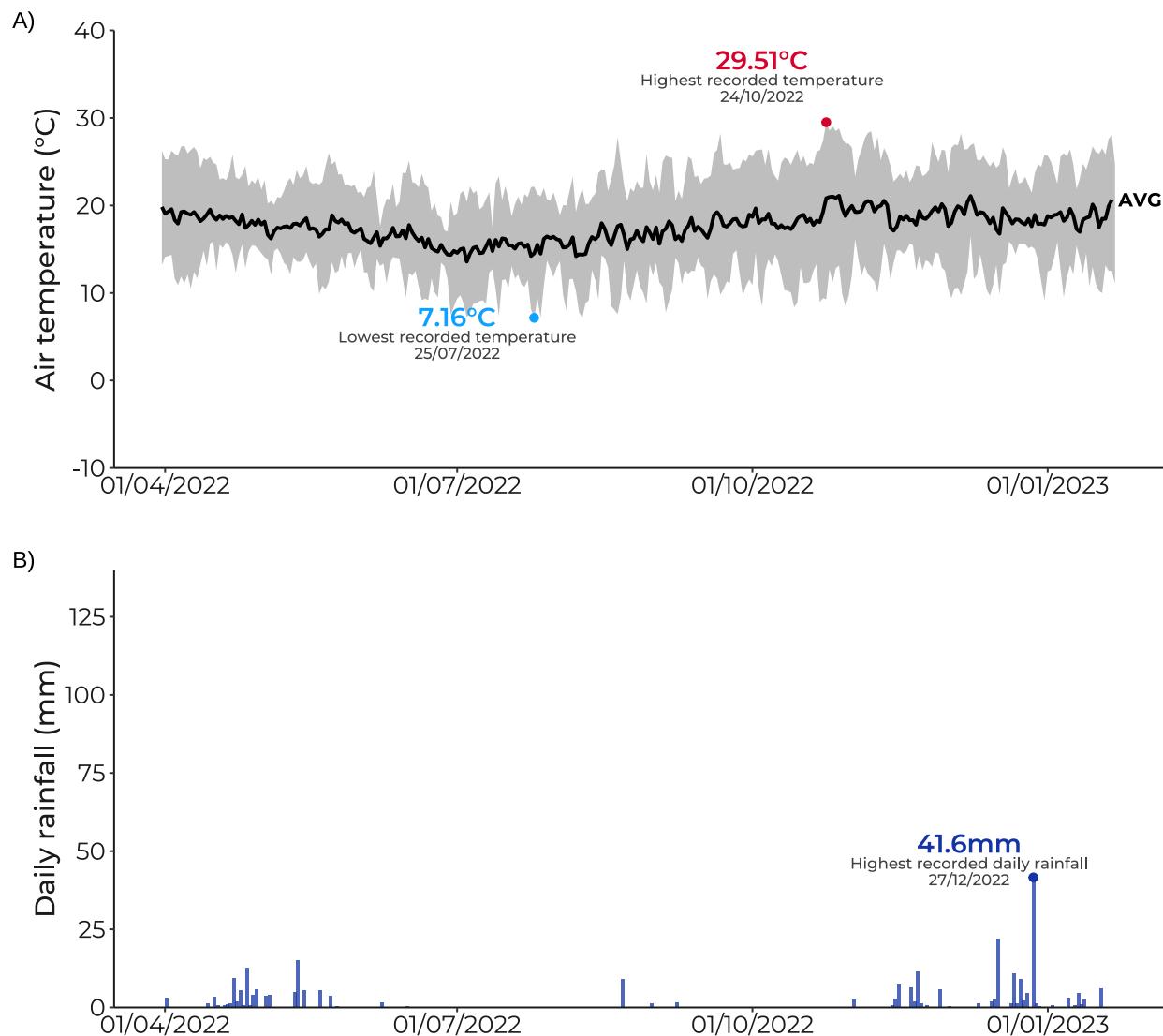
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Data: Acacia weather station collected at 30 min intervals

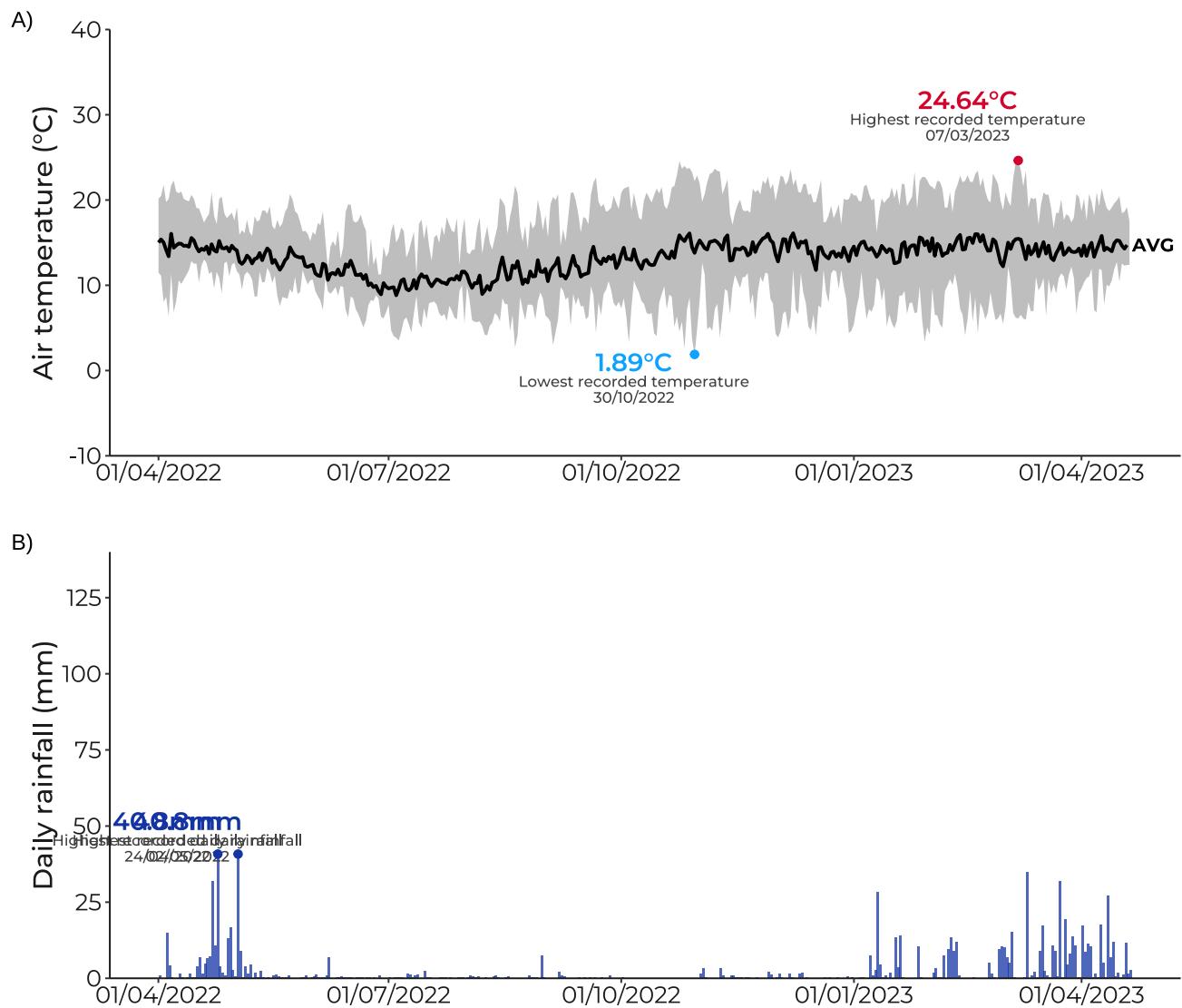


## Jackal Hill



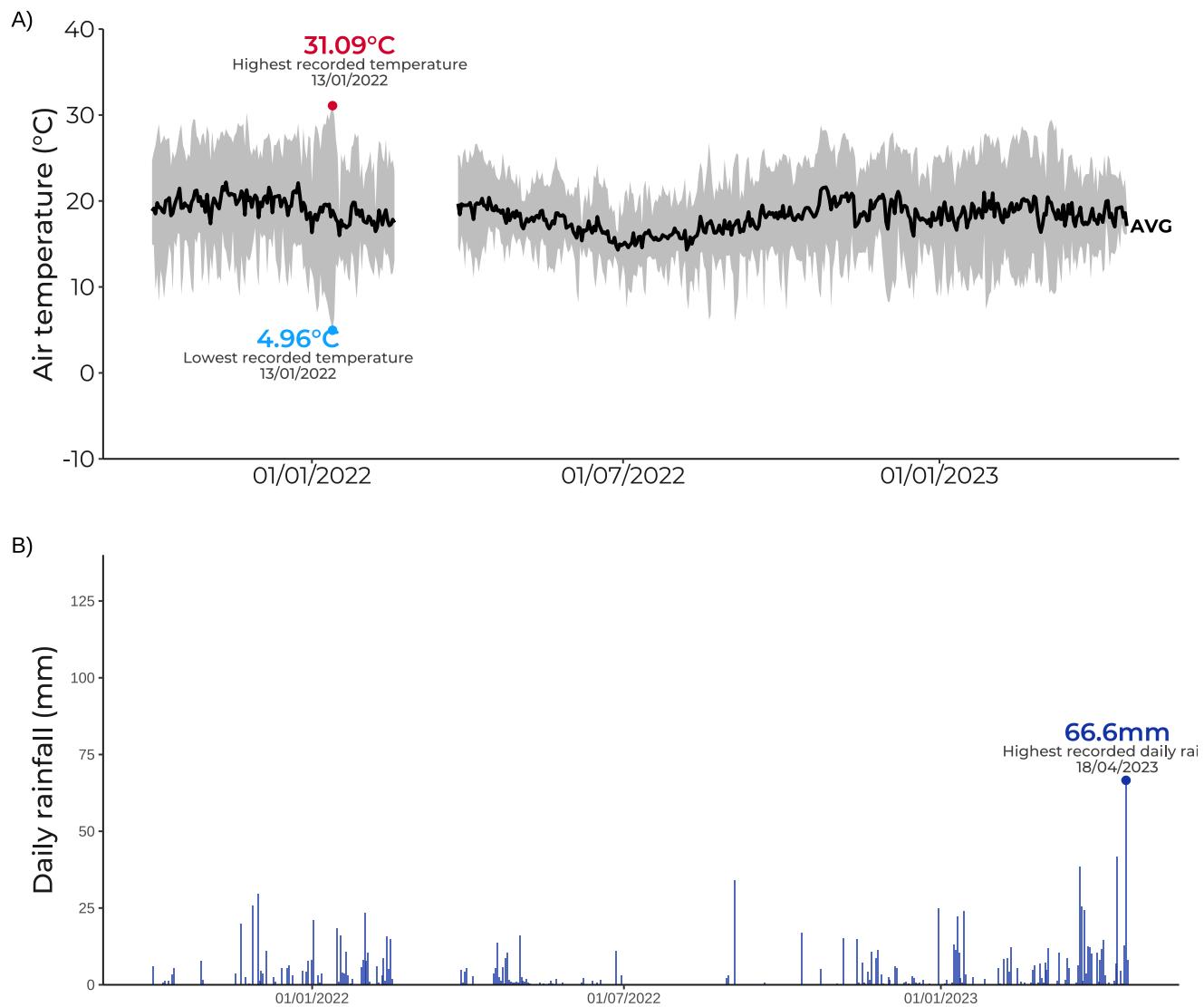
Data: Jackal Hill weather station collected at 30 min intervals

## Lemala (Rim)



Data: Lemala (Rim) weather station collected at 30 min intervals

## Ngoitokitok



Data: Ngoitokitok weather station collected at 30 min intervals