FAMINE EARLY WARNING SYSTEMS NETWORK

South Sudan

Monthly Climate and Weather

21 November 2024

Highlights

- El Niño Southern Oscillation (ENSO)-neutral conditions continued during October 2024. According to the outlook, a weak and short-duration La Niña is most likely to emerge during October – December 2024 and persist through January – March 2025.

- Based on historical records, La Niña conditions are associated with near-average rainfall and mean temperatures in South Sudan during December - February season.

- During October 2024, most of South Sudan received 100-500 mm rainfall that exceeded the average by more than 50 mm in many areas.

- The North American Multi-Model Ensemble (NMME) models indicate that no dominant tercile category emerges during December 2024 or December 2024 – February 2025 season.

- Maximum temperatures were 1 to 3°C above average, particularly in southern Lakes, southern Jonglei, eastern Western Equatoria, and Central Equatoria. Minimum temperatures in the western, southern, and eastern regions were 1 to 2°C above average, while northern and central areas saw near-normal temperatures.

- The NMME models suggest most of South Sudan is expected to experience above-average temperatures in December 2024, with probabilities exceeding 40% in parts of Western Bahr el Ghazal and at isolated places in Central Equatoria and Jonglei states.

The FEWS NET Monthly Climate and Weather information bulletin is based on current weather and climate information and monthly and seasonal outlooks from the NOAA CPC. Information on crops, soil moisture, flooding, and evapotranspiration data were produced by FEWS NET, USGS, NASA and USDA. Various sources were used to assess impacts of extreme conditions. Questions or comments about this product may be directed to Dr. Wassila Thiaw, Head, International Desks/NOAA, wassila.thiaw@noaa.gov. Questions about the USAID FEWS NET activity may be directed to Dr. James Verdin, Program Manager, FEWS NET/USAID, jverdin@usaid.gov.

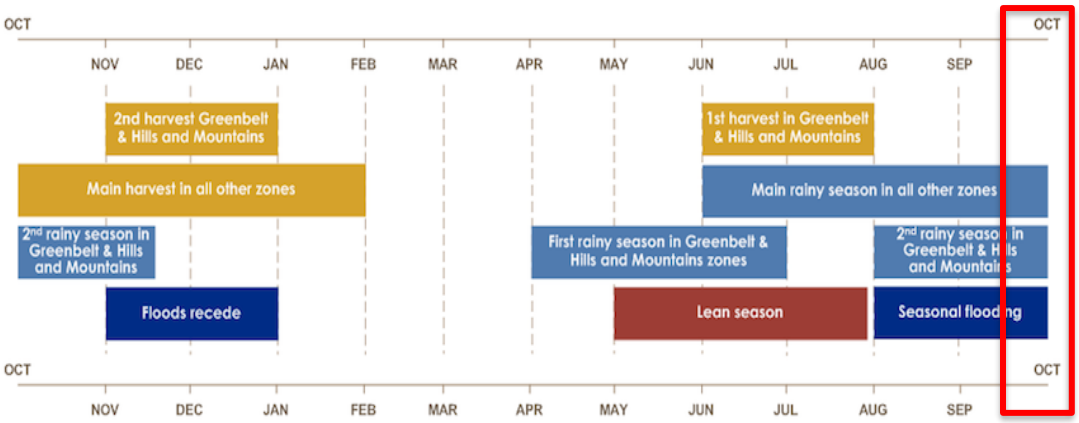


Figure 1: Seasonal calendar for South Sudan. **Source: FEWS NET**

Current Climate Modes and Teleconnections

- As of mid-November, SSTs were near-average across the central and eastern equatorial Pacific. Negative subsurface temperature anomalies persisted across the east-central and eastern Pacific. Low-level wind anomalies were easterly over a small region of the east-central equatorial Pacific, while upper-level wind anomalies were near-average, reflecting ENSO neutral conditions.
- The latest outlook indicates a weak and short-duration La Niña over the upcoming few seasons. La Niña is most likely to emerge with a 57% chance during October – December 2024 and persist through January – March 2025 (Fig. 2). The latest update of the NOAA Climate Prediction Center's El Niño/Southern Oscillation diagnostic discussion can be found here.
- La Niña conditions are typically associated with near-average rainfall and mean temperatures in South Sudan during the December-February (DJF) season (**Fig. S1**).

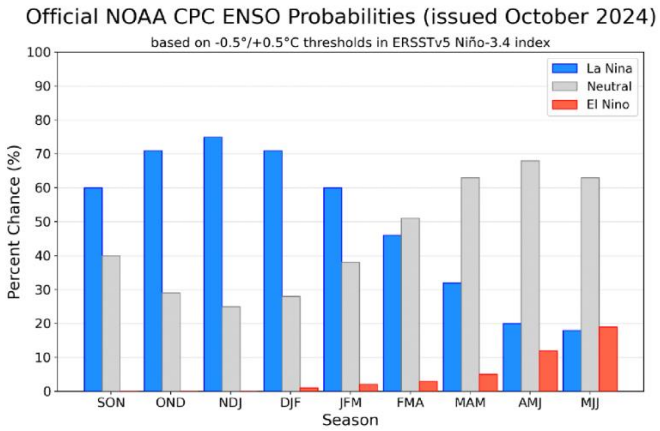


Figure 2: Official CPC ENSO probabilities outlook. **Source: NOAA/NCEP**

Extreme Events

- Inundation has continued in the Sudd wetlands of South Sudan with improvements along the upstream White Nile.
- There were no notable forest fires over the past 30 days across South Sudan.
- South Sudan had no notable wind anomalies over the past 30 days.

Rainfall/Precipitation

Past 3 Months (August 2024 to October 2024):

- **Totals:** Much of South Sudan received 300-500 mm of rainfall over the last 3 months. Localized places in the Western Bahr el Ghazal experienced the highest rainfall (750 mm). In contrast, northern and eastern parts of Eastern Equatoria state recorded the lowest rainfall of 75-300 mm **(Fig. 3a)**.

- **Anomalies:** Rainfall was above-average in most places in South Sudan with high rainfall surpluses (100-200 mm) in the northern and southern borders and central states. On the other hand, isolated areas in southern Bahr el Ghazal, northwestern Western Equatoria, eastern Upper Nile, southern Jonglei, and northern Eastern Equatoria states experienced below-average rainfall of 10-100 mm **(Fig. 3b)**.

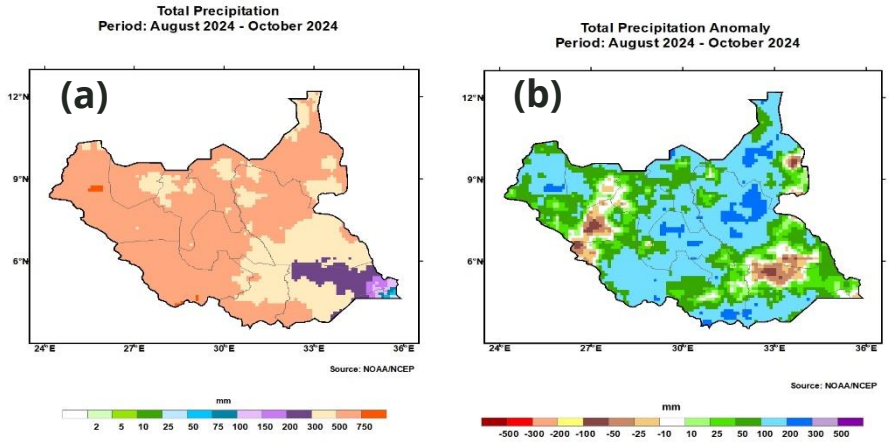


Figure 3: Spatial distribution for August-October 2024: (a) total precipitation and (b) total precipitation anomaly. **Source: NOAA/NCEP**

Past 1 Month (October 2024):

- **Totals:** Much of South Sudan received 100-300 mm rainfall over the past month, with the highest rainfall (300-500 mm) occurring in Western Equatoria and localized places in Western Bahr el Ghazal and Upper Nile states. In contrast, northern and southeastern parts of Eastern Equatoria state experienced the lowest rainfall between 10-75mm **(Fig. 4a)**.

- **Anomalies:** Rainfall was 10-100 mm above-average over much of South Sudan. Southern Warrap, central Western Equatoria, central and southern parts of Central Equatoria, south-central Eastern Equatoria, and isolated places in the northern region experienced well above-average rainfall of 100-200 mm. However, below-average rainfall (10-50 mm) was observed in a few places in central Western Bahr el Ghazal, northern and southern parts of Jonglei, southern Upper Nile, and northern and southeastern parts of Eastern Equatoria states (**Fig. 4b**).

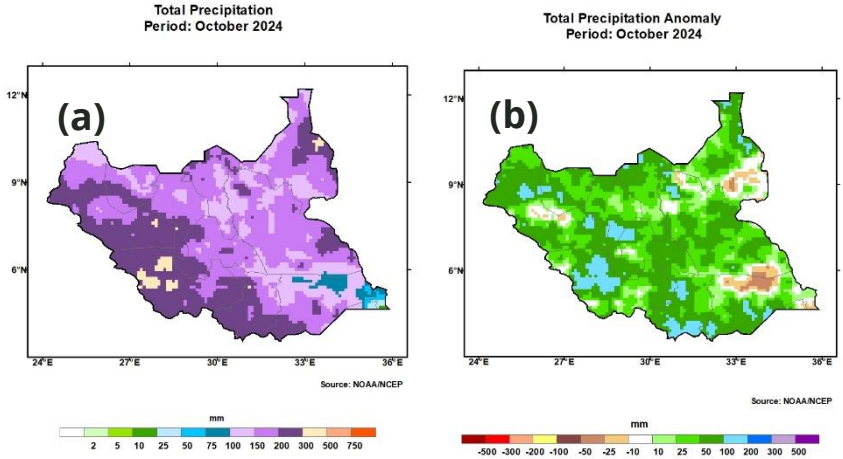


Figure 4: Spatial distribution for October 2024: (a) total precipitation and (b) total precipitation anomaly. **Source: NOAA/NCEP**

Monthly and Seasonal Forecasts (December 2024 and Dec 2024-Feb 2025):

- **Monthly:** The NMME model forecast suggests equal chances of occurrence for the above-, near-, and below-average rainfall across most parts of the country, indicating low skill of prediction for climatologically dry season (**Fig. 5a**).
- **Seasonal:** The NMME seasonal forecast indicates that there is no dominant tercile category during the next dry season across much of South Sudan. Isolated areas in southern Central Equatoria, southeastern Jonglei, and northeastern Eastern Equatoria state may have enhanced probability for below-normal rainfall (**Fig. 5b**).

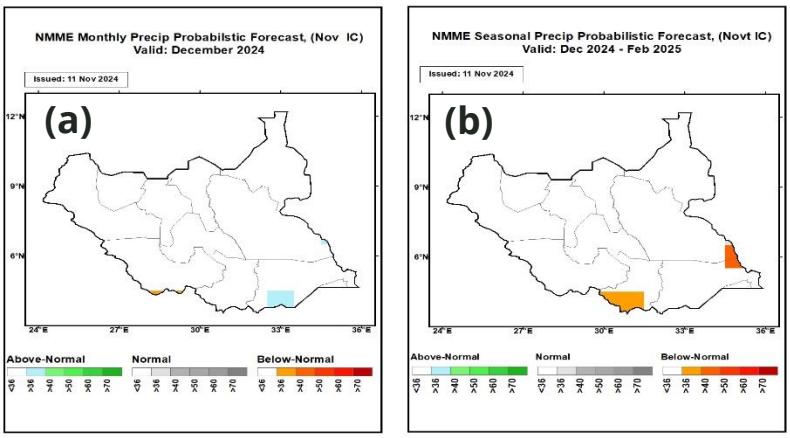


Figure 5: Rainfall forecast for (a) December 2024 and (b) December 2024 – February 2025. **Source: NOAA/NCEP**

Temperature

Past 3 months (August 2024 – October 2024):

- **Maximums:** Most of South Sudan recorded mean maximum temperatures of 30°C. Compared to the long-term average, many areas experienced above-average mean maximum temperatures (1-2°C), except eastern part of Eastern Equatoria state which observed near-average conditions (**Fig. 6a**).
- **Minimums:** From August to October, much of South Sudan had a mean minimum temperature of 20°C, while pocket areas in Central Equatoria and Eastern Equatoria states recorded 15°C. The western, southern, and eastern regions saw above-average temperatures of 1 to 2°C, whereas the northern, central, and parts of southeastern areas experienced near-normal conditions (**Fig. 6b**).

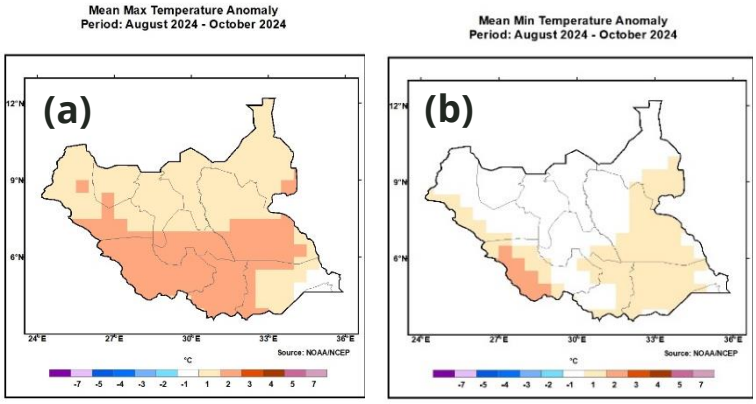


Figure 6: Spatial map for August – October 2024: (a) mean maximum temperature anomaly and (b) mean minimum temperature anomaly. **Source: NOAA/NCEP**

Past 1 month (October 2024):

- **Maximums:** In October, South Sudan reported average maximum temperatures of 30°C, with parts of the northern and southern regions reaching up to 35°C. Temperatures were generally 1 to 3°C above average, particularly in southern Lakes, southern Jonglei, eastern Western Equatoria, and Central Equatoria, where anomalies reached 3°C (**Fig. 7a**).

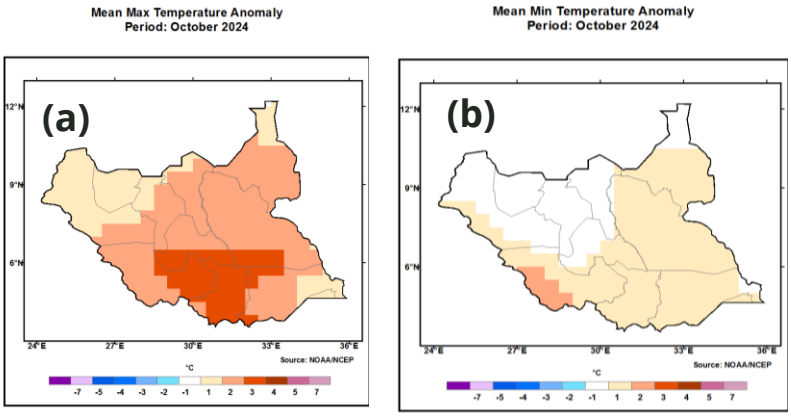


Figure 7: Spatial map for October 2024: (a) maximum temperature anomaly and (b) mean minimum temperature anomaly. **Source: NOAA/NCEP**

- **Minimums:** In October, much of South Sudan had a mean minimum temperature of 20°C, with some areas in Western Bahr el Ghazal, Central Equatoria, and Eastern Equatoria reporting 15°C. Southeastern regions recorded a higher mean minimum temperature of 25°C. The western, southern, and eastern regions were 1 to 2°C above

average, while the northern and central regions experienced near-normal temperatures (**Fig. 7b**).

Monthly and Seasonal Forecasts (December and December 2024– February 2025):

- **Monthly:** Above-average mean temperatures are forecasted over most parts of South Sudan during December 2024. Probabilities for above-average temperatures are greater than 40% across northeastern, and parts of southern and eastern regions (**Fig. 8a**).
- **Seasonal:** Above-average mean temperatures are expected over the northern, central and isolated places in the southern regions. Probabilities for above-average temperatures greater than 40% are expected across Unity, Upper Nile, Warrap, Lakes, Western Equatoria and southern Eastern Equatoria states (**Fig. 8b**).

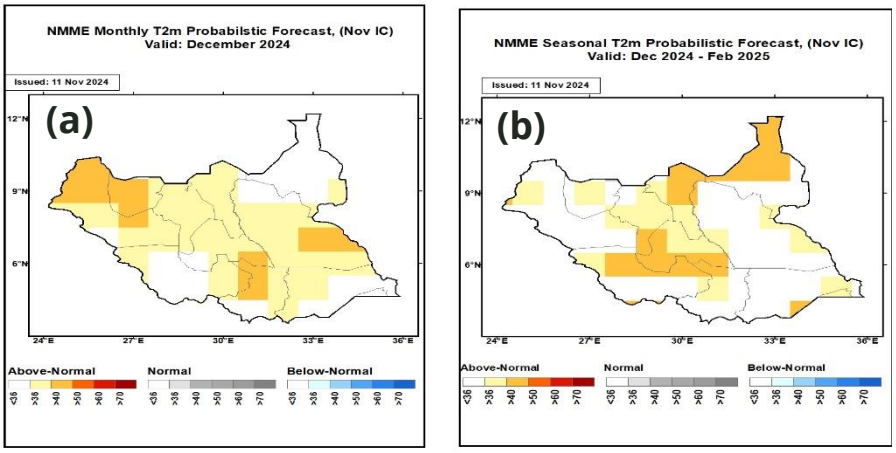


Figure 8: Spatial map for (a) December 2024 mean temperatures forecast and (b) December 2024 – February 2025 mean temperatures forecast. **Source: NOAA/NCEP**

Flooding and Areas of Inundation

- Inundation has increased in the Sudd wetlands of South Sudan due to persistent flooding since May, particularly in Jonglei, Unity, and Warrap states along the Sudd Wetlands.
- Flooding continues to affect and displace people across the country. About 893,000 people are flood-affected in 42 counties and the Abyei Administrative Area, with Unity and Warrap states accounting for over 40 per cent of the affected population.

More than 241,000 people are flood displaced in 16 counties and the Abyei Administrative Area, seeking shelter on higher ground. Heavy rainfall and floods have rendered 15 main supply routes impassable, restricting physical access.

Drought and Dryness

The Standardized Precipitation Index (SPI) is used to characterize meteorological drought. SPI compares the precipitation over a specific period of time with the climatology from that same period. Therefore, the SPI values can be thought of as the number of standard deviations that the observed anomaly deviates from the climatology. The 1-month SPI values are a good representation of the monthly precipitation anomaly as well as the soil moisture and vegetation health. The 3-month SPI values are a good representation of seasonal precipitation anomalies. The Standardized Precipitation Evapotranspiration Index (SPEI) is similar to the SPI, but it also takes evapotranspiration into account (and therefore the impact of temperatures on water demand).

Past 3 months (August-October 2024):

- The SPI analysis for August to October 2024 indicated drier-than-average conditions across much of South Sudan, with the exception of a few areas in southeastern Jonglei, the eastern part of Eastern Equatoria, and some pockets in the north that experienced near-average to wetter-than-average conditions (**Fig. 9a**).

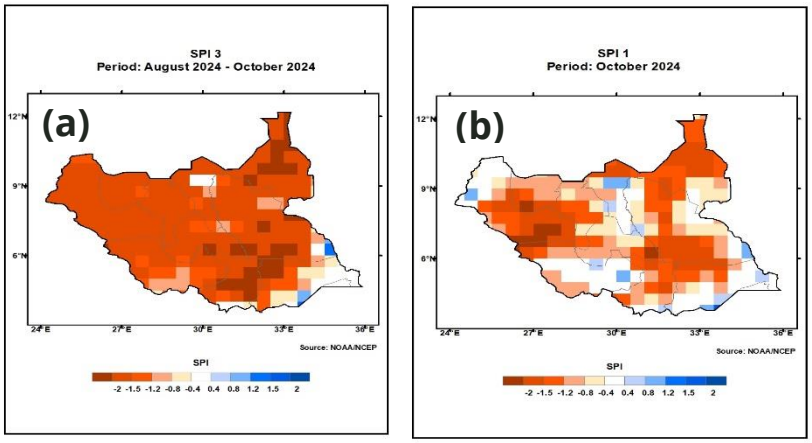


Figure 9: Spatial structure of Standardized Precipitation Index (SPI) (a) August – October 2024 (b) October 2024. Source: NOAA/NCEP. **Source: NOAA/NCEP**

Past 1 month (October 2024):

- The SPI analysis for October 2024 indicates that drier-than-average conditions were recorded over many places in South Sudan. Few areas in northwestern, central, eastern and southern regions experienced near-normal to wetter-than-average conditions (**Fig. 9b**).

Current/Forecast (05 September 2024 to 03 December 2024):

- The SPI forecast suggests that drier-than-average conditions will cover much of South Sudan, while near-average to wetter-than-average conditions will cover isolated places in Eastern Equatoria and Unity states.

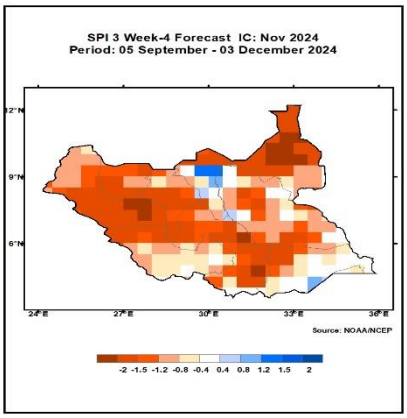


Figure 10: Spatial structure of SPI constructed from observations for 5 September to 5 November 2024 and 4 weeks forecast ending on 3 December 2024. **Source: NOAA/NCEP**

Water Requirement Satisfaction Index (WRSI)

- WRSI values during the 3rd Dekad of October indicated *very good* crop conditions in eastern part of Eastern Equatoria state.

GEOGLAM Crop Monitor

In South Sudan, harvesting of first season cereals is now underway in unimodal regions in the center and north of the country, and conditions are mixed as overly wet conditions are expected to result in yield declines. Conversely, conditions in Kapoeta region located in the southeast remain favorable. The June to September rainy season was categorized by near-normal but temporally erratic rainfall. Near to below-normal June and July rains were followed by a shift to torrential rains in August. This heavy sporadic precipitation in combination with the overflow of Lake Tanganyika has caused the Nile River to burst its banks and resulted in river overflows and widespread flooding, particularly in Unity, Warrap,

Lakes, and Jonglei states located in the center of the country where substantial crop losses are reported. The flooding has affected 42 of the country's 78 countries as of late October, and the capital of Juba located in the center-south is experiencing some of the worst flooding in decades. The country is expected to issue a formal declaration of a national disaster regarding catastrophic flooding impacts since July of this year. The flooding will likely worsen by November as a combination of forecast above-average rainfall and river overflows from Uganda could result in record-breaking floods. Furthermore, second season maize and sorghum crops continue to develop in bimodal regions of Central Equatoria and Western Equatoria located in the south of the country under favorable conditions.

Additional Resources

https://www.inam.gov.mz/index.php/pt/

https://www.sadc.int/pillars/meteorology

https://fews.net/node/32023/print/download

Annex:

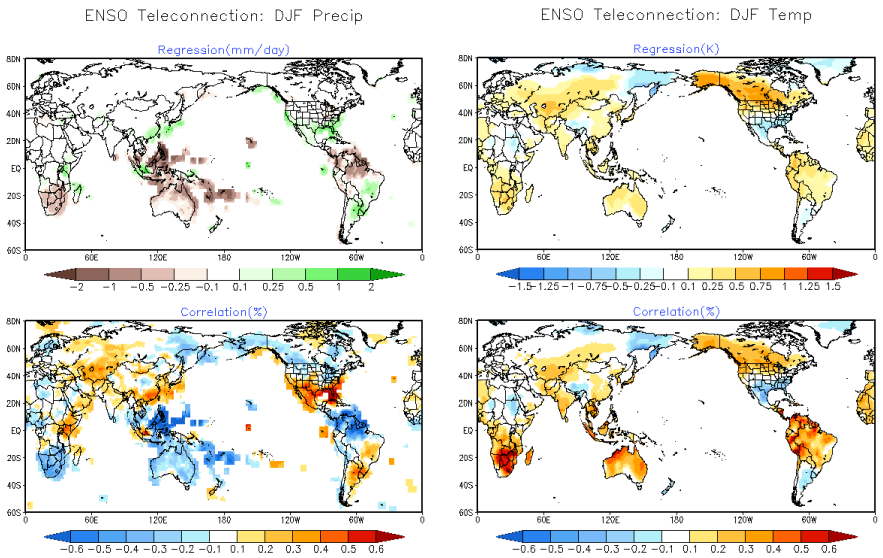
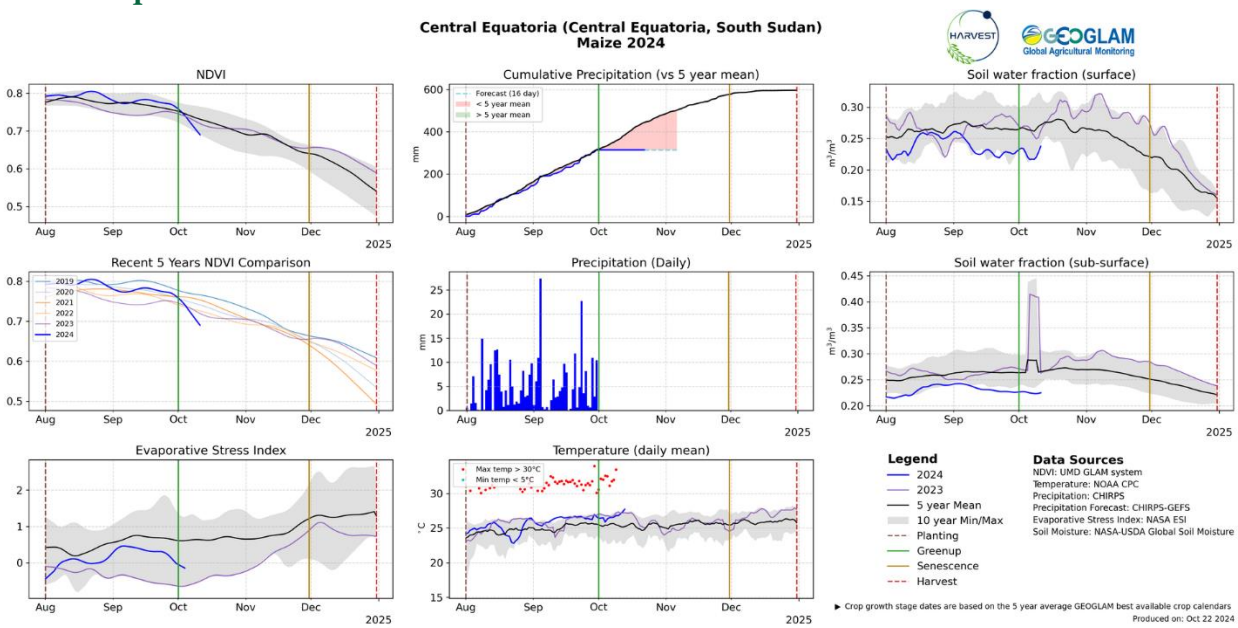


Figure S1: For three month season (DJF), precipitation and temperature anomalies are regressed onto the standardized Niño-3.4 index (upper panel). In the bottom panel, the correlation is calculated between Nino-3.4 and the anomalies.

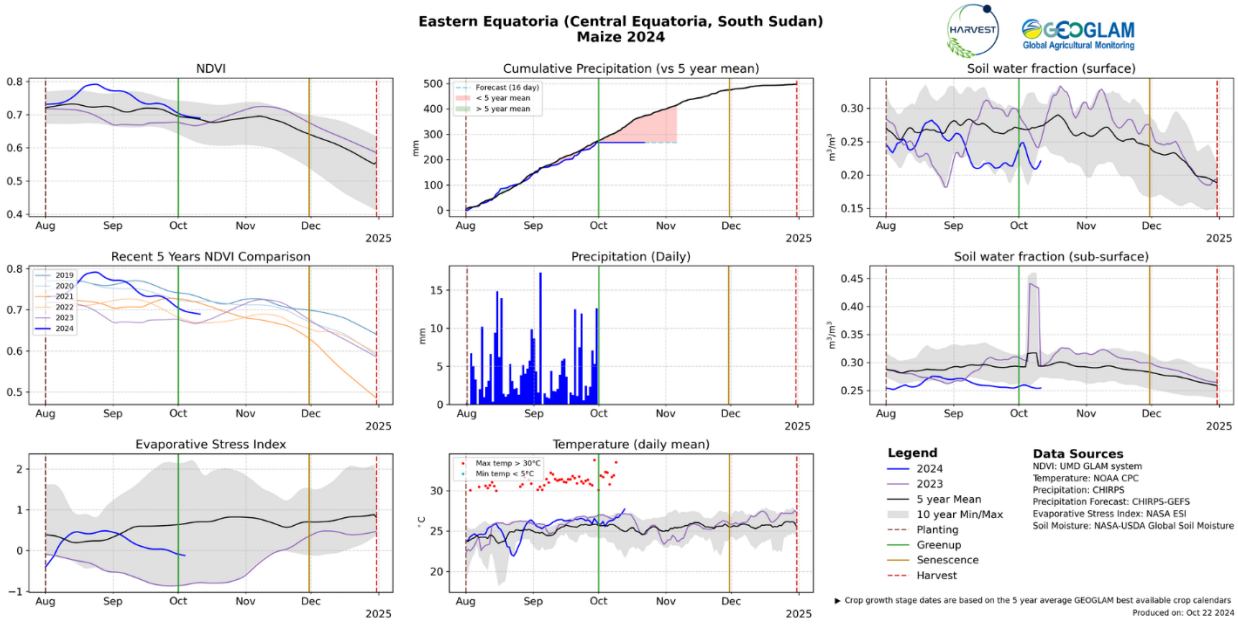
GEOGLAM Agro-meteorological Earth Observation Indicators:

Second-Season Maize

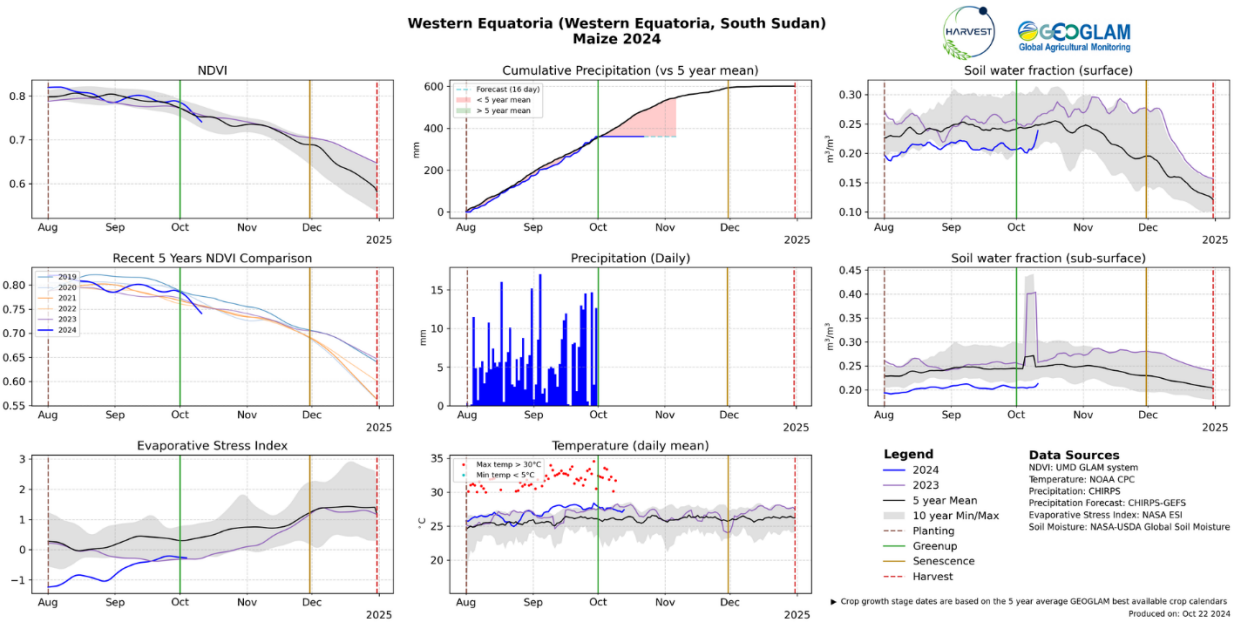
Central Equatoria:



Eastern Equatoria:



Western Equatoria:


Western Equatoria (Western Equatoria, South Sudan)
Maize 2024
HARVEST
GEOGLAM
Global Agricultural Monitoring
NDVI
Cumulative Precipitation (vs 5 year mean)
Forecast (16 day)
< 5 year mean
> 5 year mean
mm
Soil water fraction (surface)
m³/m³
Recent 5 Years NDVI Comparison
2019
2020
2021
2022
2023
2024
Precipitation (Daily)
Soil water fraction (sub-surface)
Evaporative Stress Index
Temperature (daily mean)
Max temp > 30°C
Min temp < 5°C
°C
Aug
Sep
Oct
Nov
Dec
2025
Legend
2024
2023
5 year Mean
10 year Min/Max
Planting
Greenup
Senescence
Harvest
Data Sources
NDVI: UMD GLAM system
Temperature: NOAA CPC
Precipitation: CHIRPS
Precipitation Forecast: CHIRPS-GEFS
Evaporative Stress Index: NASA ESI
Soil Moisture: NASA-USDA Global Soil Moisture
► Crop growth stage dates are based on the 5 year average GEOGLAM best available crop calendars
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