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Drought in Africa - April 2025

GDO Analytical Report

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Drought in Africa - April 2025

JRC Global Drought Observatory (GDO) of the Copernicus Emergency Management Service (CEMS) - GDO data up to 31/03/2025

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Abstract

- Severe droughts are currently affecting most of northern Africa, large regions in southern Africa including in particular the Zambezi basin and northern Madagascar, and some regions in central-western Africa and East-Africa.
- The average temperature is abnormally higher than usual. Heatwaves and warm spells are exacerbating the impacts of the lack of precipitation.
- Soil moisture and vegetation conditions are severely affected, with negative anomalies over the aforementioned regions.
- In major basins, including the Zambezi, many rivers have registered very low discharge in 2023-2024.
- Water resources have been severely reduced in the Zambezi basin and in northern Africa with severe ecological, economic, and social impacts.
- Wildfire danger is high in northern sub-Saharan regions, most of the Zambezi basin and western South Africa, and some regions in northern Africa.
- Seasonal forecasts point to warmer than average conditions in the coming months. Precipitation forecasts for April-June 2025 are characterised by high uncertainty and variability, particularly for central and southern Africa. Drier than average conditions are forecasted for East Africa for a period coinciding with the long rains. Close monitoring of the drought evolution and proper water use plans are needed.

Introduction

This study is part of the collection *GDO analytical reports* focused on the analysis of drought events affecting Europe as well as the other regions of the world. These studies build on data and information retrieved and processed within the European and Global Drought Observatories (EDO and GDO) of the Copernicus Emergency Management Service (CEMS). The Observatories aim at detecting, monitoring, and predicting droughts by using a suite of indices and indicators characterising different aspects and phases of a drought. The information is usually complemented with additional sections on impacts, large-scale circulation, and other relevant factors.

Drought in Africa - April 2025

JRC Global Drought Observatory (GDO) of the Copernicus Emergency Management Service (CEMS) - GDO data up to 31/03/2025

Standardized Precipitation Index (SPI)[1]

Negative precipitation anomalies are currently affecting many parts of Africa. The SPI-3 (i.e. SPI for an accumulation period of 3 months) [2] shows dry conditions in northern Africa, Sierra Leone, Uganda, part of Zambezi basin, central Angola, South Africa, and most of Madagascar. The driest regions are around the Zambezi basin including central and northern Zambia, northern Malawi, northern Mozambique, and northern Madagascar (Fig. 1).

The longer accumulation SPI periods from 6 to 24 months ending in March 2025 are shown in Figure 2. These maps highlight the long-lasting lack of precipitation affecting directly water resources, river flows and the hydrology in general. The most affected regions are northern Africa (Morocco and Algeria northern regions), central Africa, most of the Zambezi basin, western southern Africa, and northern Madagascar. Additionally, by comparing the different accumulation periods including also SPI-3 (Fig. 1), a remarkable drought persistence, in term of duration and spatial pattern, emerges (despite a slight improvement in the recent months in terms of precipitation). The reduction of the extent and severity of the SPI-3 anomalies (Fig.1) compared to the SPI-6 (Fig.2 top-left) reveals that the last three months have been less critical than the previous ones. On the other hand, SPI-12 and SPI-24 are worse than SPI-6 (Fig. 2), showing that the most critical period in terms of meteorological drought was in 2023 and early 2024. Additionally, some parts of the Zambezi basin are showing some recovery. However, all the regions with extremely drier than normal SPI-24 values are severely affected by drought and in critical conditions in terms of water resources. These regions include most of northern and central-southern Africa.

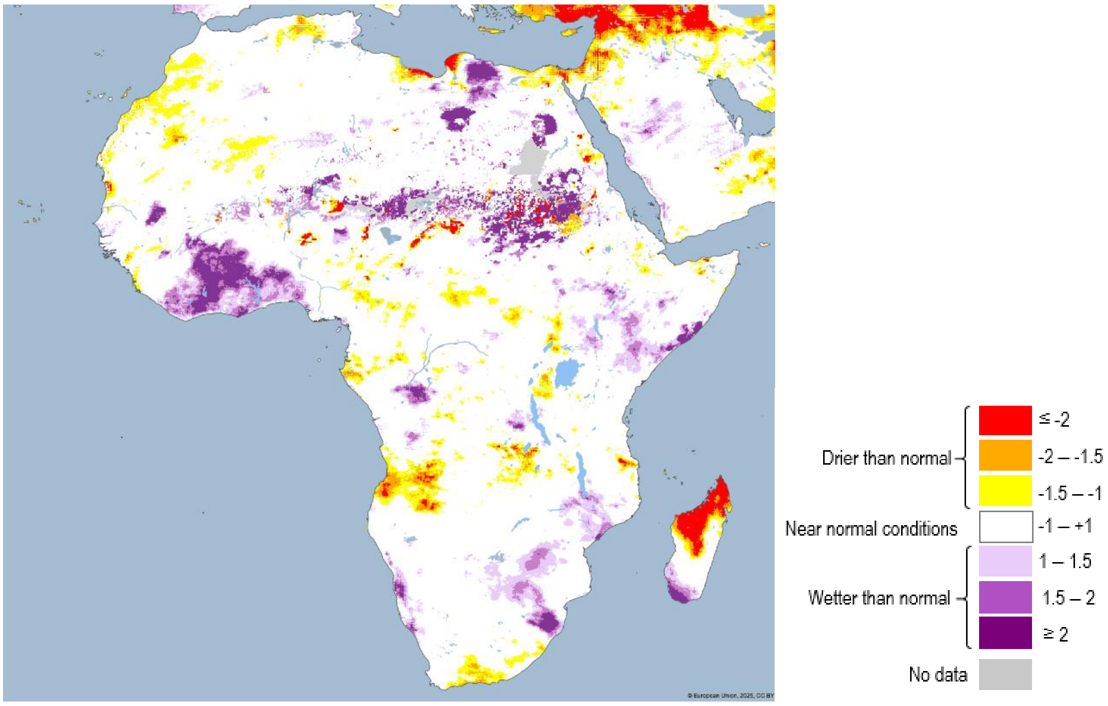

Figure 1: *Standardized Precipitation Index SPI-3 for the 3-month accumulation period ending on 30 March 2025.[2] Data source: data derived from CHIRPS[1]*

[1] The data source for SPI is CHIRPS (Climate Hazards Group InfraRed Precipitation with Station data): https://www.chc.ucsb.edu/data/chirps

[2] For more details on the SPI, and the other GDO and EDO indicators of drought-related information used in this report, see the Appendix at the end of the document.

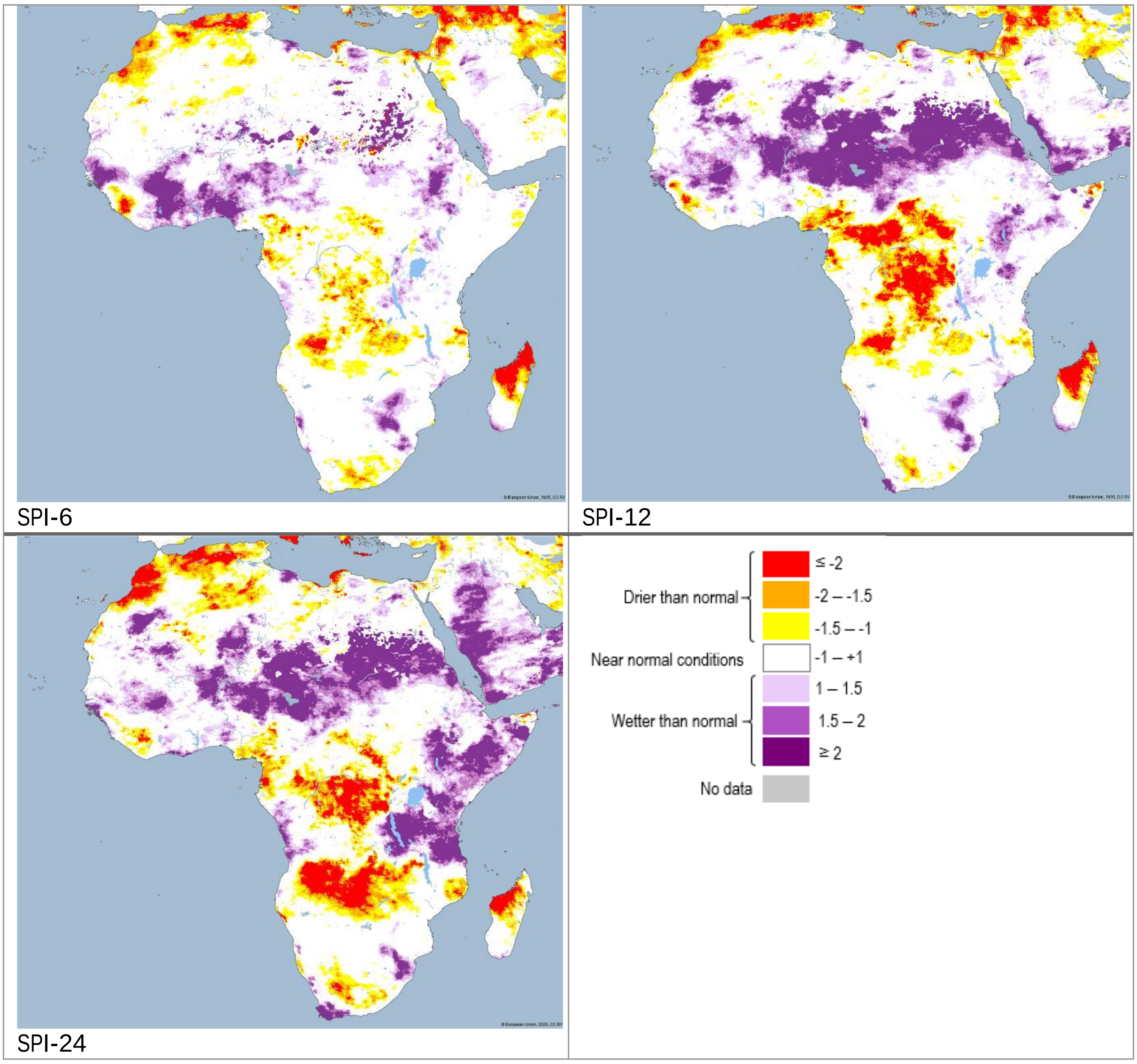

Figure 2: *Standardized Precipitation Index (SPI-6, 12, 24), for 6, 12, 24-month accumulation periods respectively ending on 30 March 2025.[2] Data source: data derived from CHIRPS[1]*

Different evolving phases of the meteorological droughts occurred during the period from March 2024 to February 2025 (Fig. 3). As of March 2024, the Zambezi basin was still severely affected by the drought that started in late 2023 (see the GDO Analytical Report Drought in Southern Africa - April 2024 for more details[3]). This drought continued to expand in April 2024. After that, conditions locally improved but have never fully recovered. At the beginning of 2025, the event split into two parts: one affecting the northern regions of Zambezi and the other one hitting southern Africa. Similarly, northern Africa has never fully recovered in the analysed period, even if precipitation provided some relief to the multiannual lasting drought event between September and November 2024. In December 2024, meteorological drought conditions suddenly became extremely dry exacerbating the impacts already affecting the region. At the same time, a new severe and extensive drought hit central-northern Madagascar. In early 2025, also western Africa regions have been affected by intense but short meteorological drought with impacts overlapping with critical conflict conditions.

[3] https://publications.jrc.ec.europa.eu/repository/handle/JRC137785

Finally, East Africa shows emerging meteorological drought conditions from February 2025 (see the section *Seasonal Forecast*).

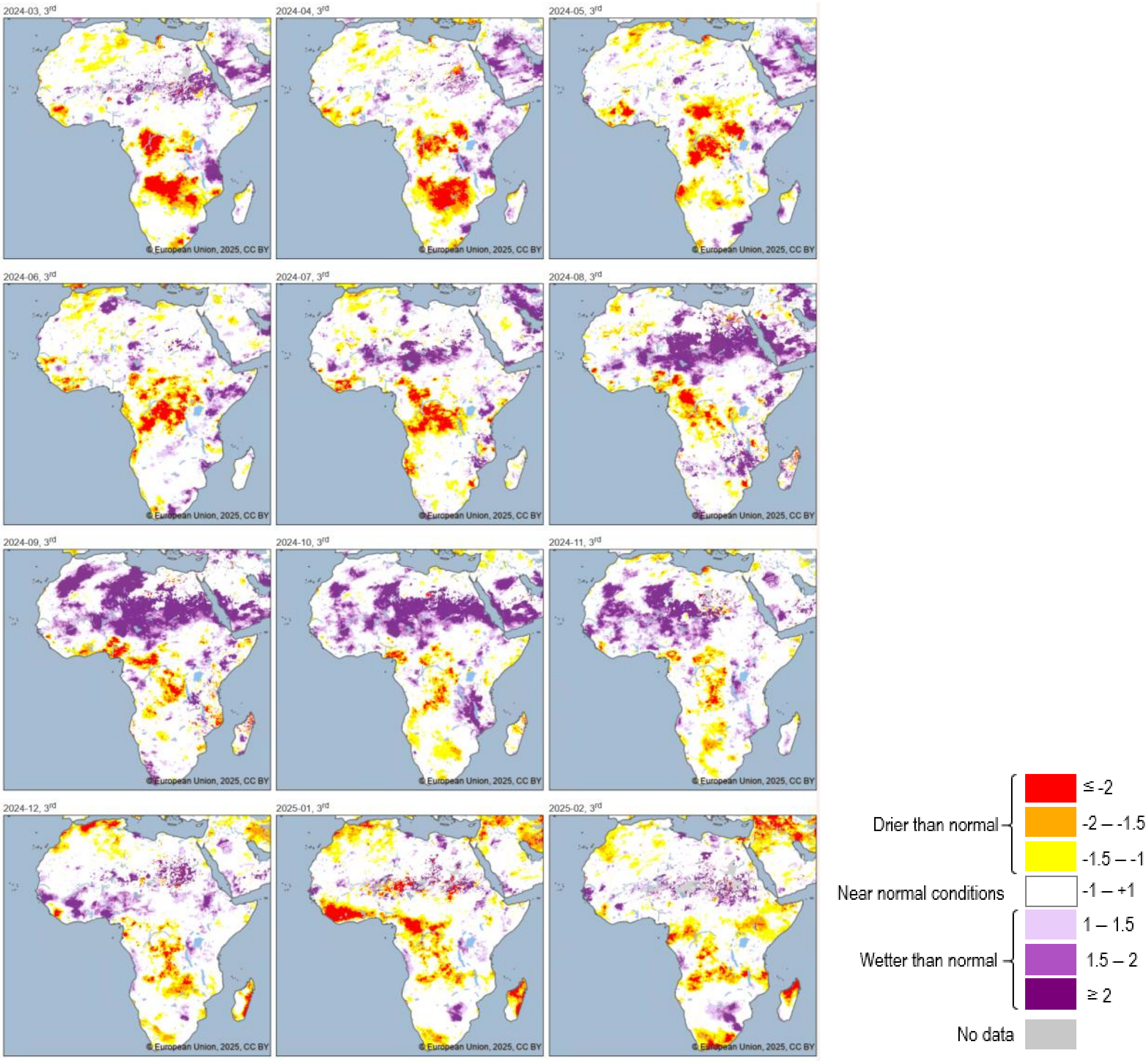

Figure 3: *Standardized Precipitation Index SPI-3 for the 3-month accumulation period at the end of each month from March 2024 to February 2025.*[2] *Data source: data derived from CHIRPS*[1]

The extent of the ongoing meteorological droughts covers some areas in Africa including southern Africa, parts of the Zambezi basin, and northern Madagascar (Fig. 4). Its spatial and temporal dynamics can be estimated by using a method for identifying and tracking drought events[4] and based on precipitation anomalies.

[4] The method is based on a generalized three-dimensional density-based clustering algorithm (DBSCAN). See: Cammalleri, C., and A. Toreti, 2023: A Generalized Density-Based Algorithm for the Spatiotemporal Tracking of Drought Events. J. Hydrometeor., 24, 537–548, https://doi.org/10.1175/JHM-D-22-0115.1.

Drought in Africa - April 2025

JRC Global Drought Observatory (GDO) of the Copernicus Emergency Management Service (CEMS) - GDO data up to 31/03/2025

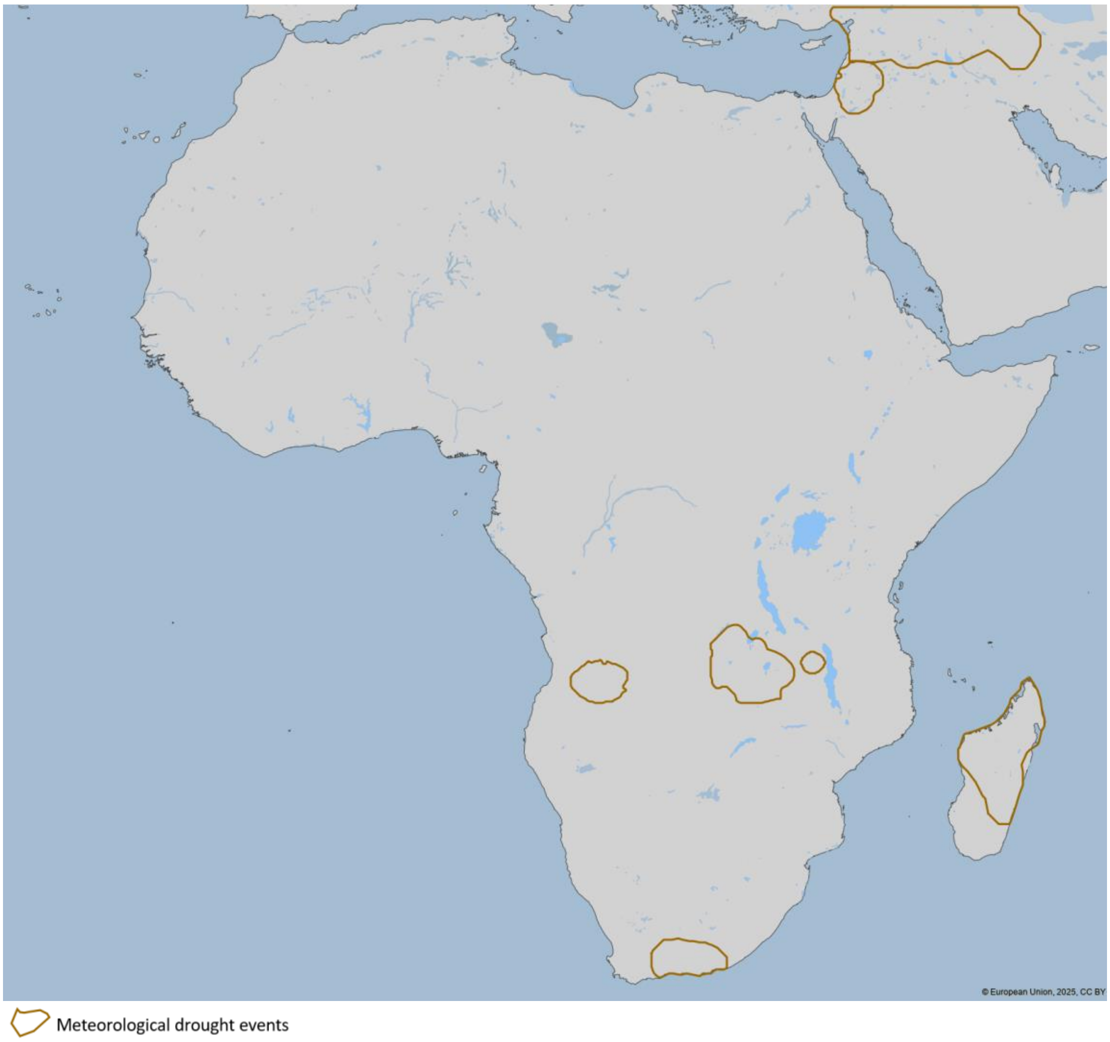

Figure 4: *Spatial-temporal tracking of the meteorological drought in early March 2025[4]. Data source: SPI-3 data derived from CHIRPS[1].*

During the period March 2024 – February 2025 a total of 15 drought events have been detected (Fig. 5), the major and long-lasting ones being identified over the Zambezi basin, central Africa, and western Africa. The events in central and southern Africa partially overlapped and split during the analysed period. In late 2024, a severe and sudden drought event occurred in Madagascar, an event that is still ongoing over most of the island. The multi-annual drought events affecting northern Africa are well visible from December 2024, driven mainly by previous precipitation deficit and partially by anomalous higher temperature. Figure 5 shows in detail the evolution of all the meteorological drought events detected over the African continent during the period from March 2024 to February 2025.

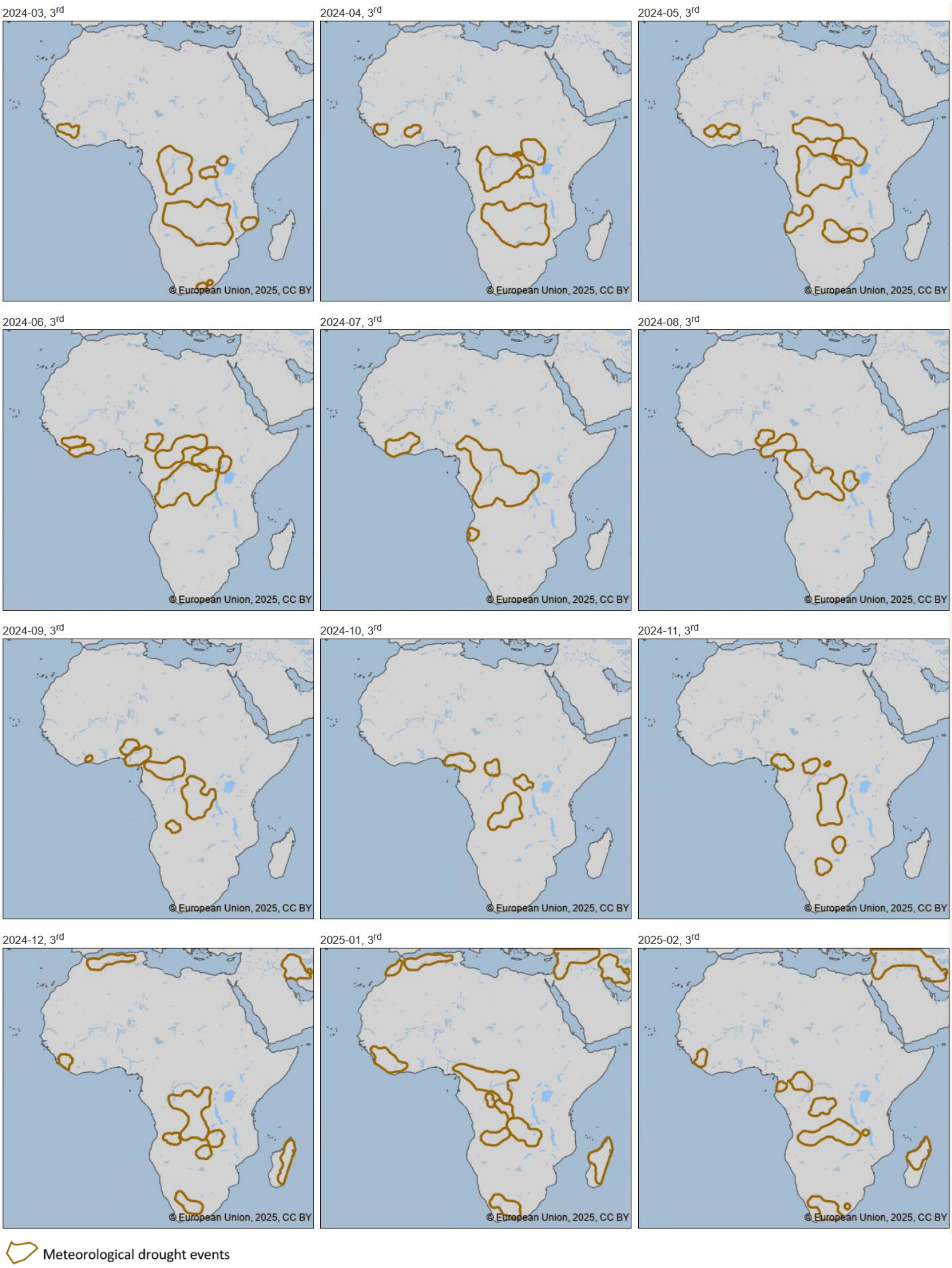

Figure 5: *Spatial-temporal tracking of the meteorological drought from late March 2024 (upper left panel) to late February 2025 (bottom right panel)[4]. Data source: SPI-3 data derived from CHIRPS[1].*

The impacts and the evolution of the meteorological drought events are directly connected with the amplitude of the precipitation anomaly but even more with its temporal persistence. This information, integrated into the longer accumulation period of the SPI (SPI-12 and SPI-24), can be also retrieved and visualized considering the total persistence applied to the drought tracking algorithm. The total persistence of meteorological drought events shows the count of 10-day periods when a certain area has been detected as part of a drought event at any moment during the period from March 2024 to March 2025 (Fig. 6)

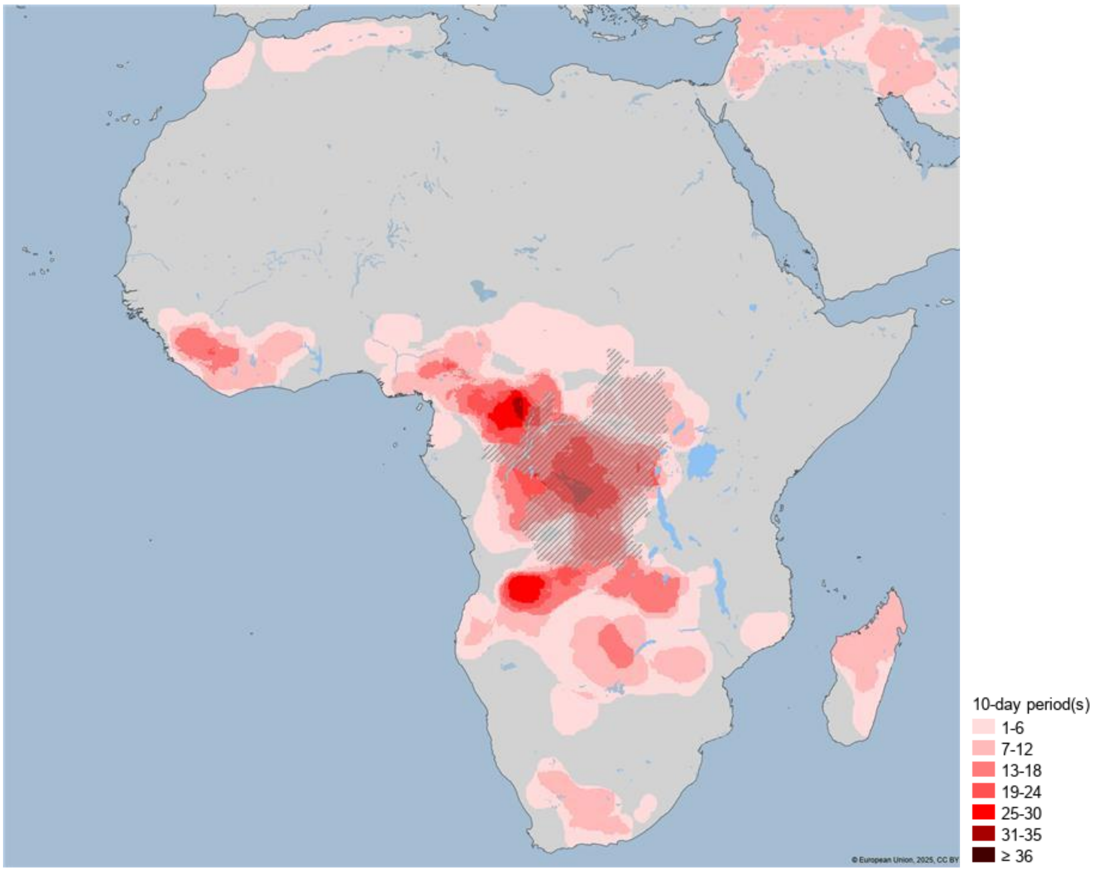

Figure 6: *Total persistence of the meteorological drought tracking in the period March 2024 – March 2025*[4]*. The shaded area highlights regions where the results are assumed to have a lower reliability due to a lower density of in-situ meteorological stations and thus higher uncertainties in the meteorological forcing. Data source: SPI-3 data derived from CHIRPS*[1]

Figure 6 clearly shows that meteorological drought events have persisted for most of the analysed period in the Zambezi basin, some regions in northern, western and central Africa, and for a shorter time (later onset) in northern Madagascar. The longest persistence of meteorological drought events occurred in the central-western part of the Zambezi basin.

Drought in Africa - April 2025

JRC Global Drought Observatory (GDO) of the Copernicus Emergency Management Service (CEMS) - GDO data up to 31/03/2025

Temperature

In February 2025, a significant portion of Africa - including some western and central Mediterranean regions, northern Africa, large regions in central Africa, and most of South Africa - experienced warmer-than–average temperatures (baseline 1991-2020), with anomalies higher than 1 °C (Fig. 7) in several areas. January 2025 registered high positive anomalies as well, especially in northern Africa with values above 2.5 °C (not shown here).

Similarly, during the period from March 2024 to February 2025, positive yearly average temperature anomalies characterized the study area. Most of northern Africa, a large spot in central Africa, and many areas in southern Africa saw yearly anomalies higher than 1 °C (Fig. 8).

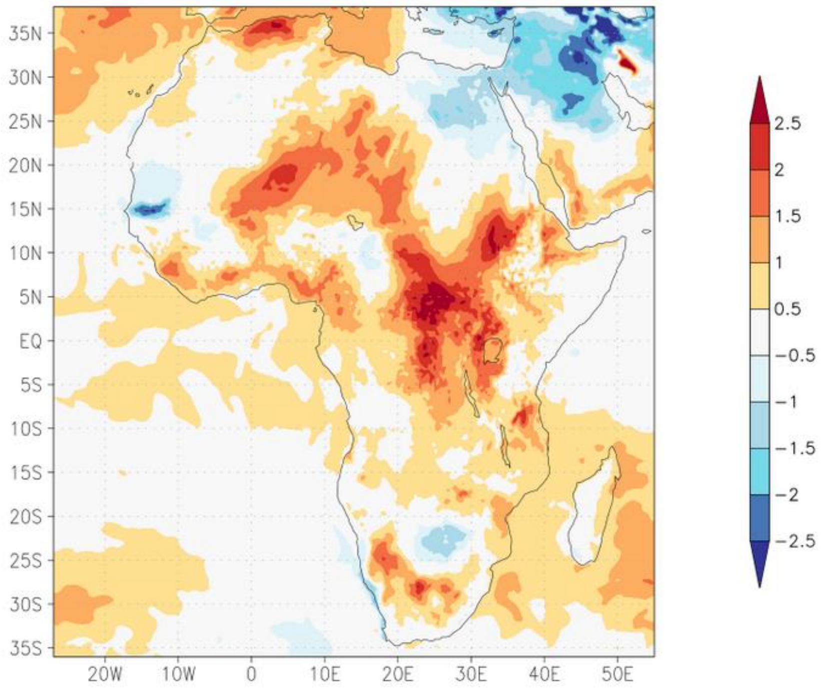

Figure 7: *Average temperature anomaly (ERA5, ECMWF Reanalysis v5) computed for February 2025. Baseline 1991-2020. Source: The KNMI Climate Explorer.*[5]

[5] The KNMI Climate Explorer https://climexp.knmi.nl

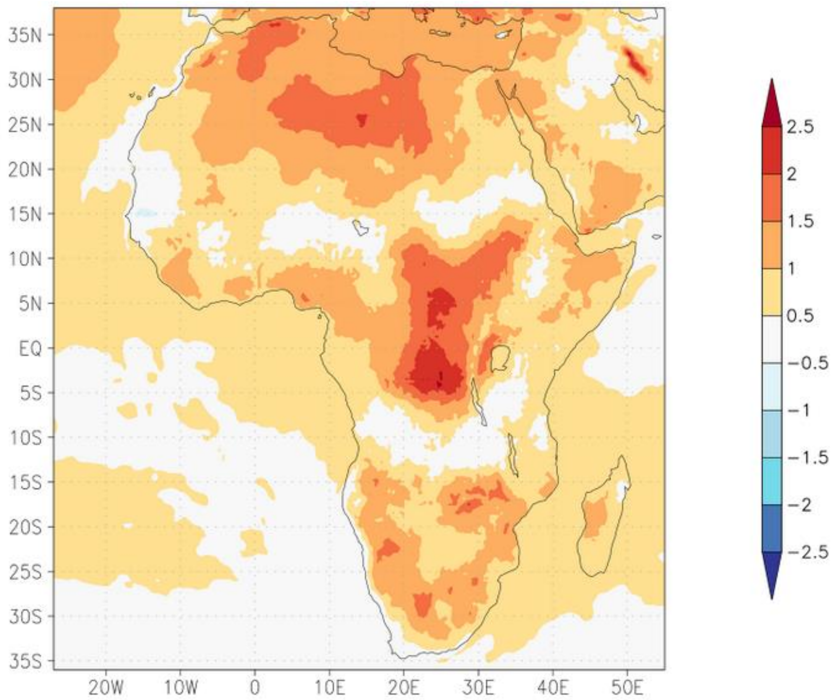

Figure 8: *Average yearly temperature anomaly (ERA5, ECMWF Reanalysis v5) computed for the period March 2024 - February 2025 (baseline 1991-2020). Source: The KNMI Climate Explorer.*[5]

These persistent positive temperature anomalies were linked with heatwaves and warm spells. For each detected event, we show two main key characteristics: duration and intensity[6].

In March 2025, a long-lasting heatwave hit several regions in northern Africa, with maximum duration longer than 15 days (Fig. 9).

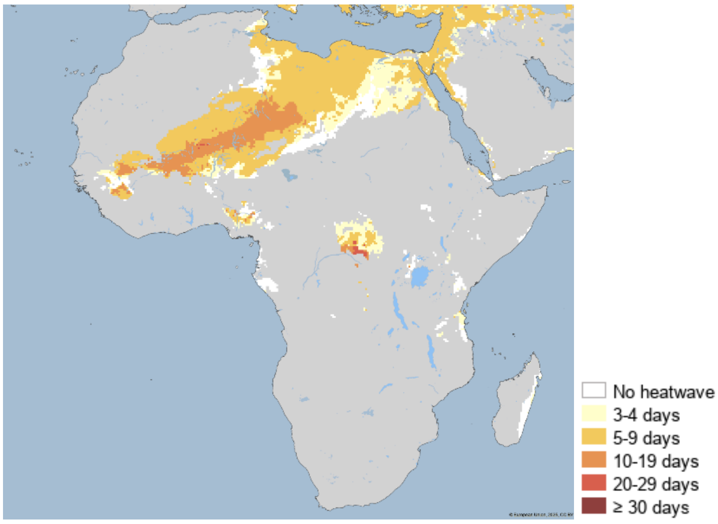

Figure 9: *Duration of the heatwaves/warm spells detected on 15 March 2025.*

[6] Lavaysse, C., Cammalleri, C., Dosio, A., van der Schrier, G., Toreti, A., and Vogt, J.: Towards a monitoring system of temperature extremes in Europe, Nat. Hazards Earth Syst. Sci., 18, 91–104, https://doi.org/10.5194/nhess-18-91-2018, 2018.

From March 2024 to March 16th 2025, the longest heatwaves/warm spells occurred in central Africa, lasting over 2 months. In northern, western, and eastern Africa, the Zambezi basin, and Madagascar durations exceeded 1 week. Almost the whole continent experienced at least a 3-day heatwave (Fig. 10). The intensity map shows spatial patterns similar to the ones of the duration map. However, the intensity map highlights northern Africa, central Africa, and the Zambezi basin more sharply. (Fig. 11).

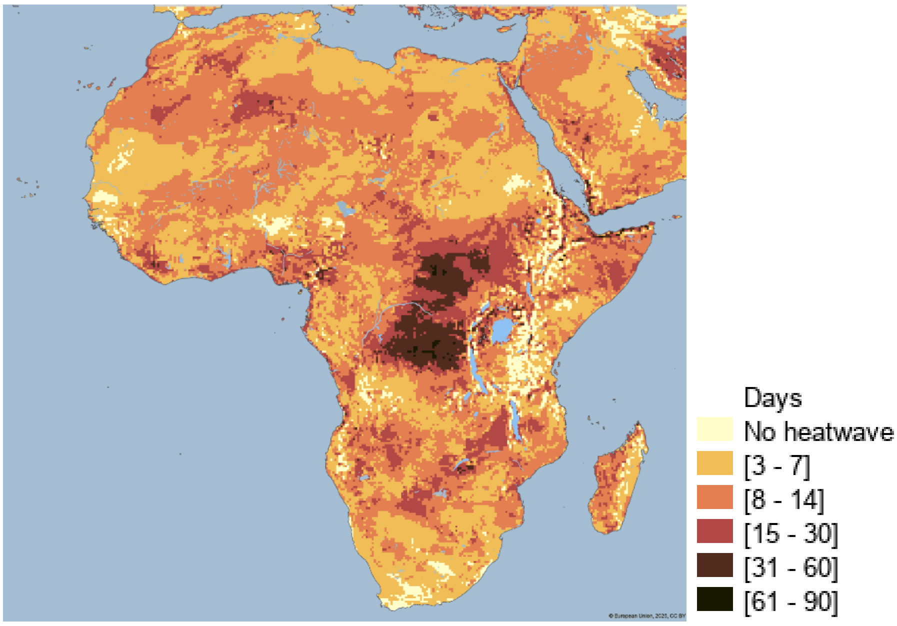

Figure 10: *Maximum duration of the heatwaves/warm spells detected during the period from March 2024 to March 16th, 2025.*

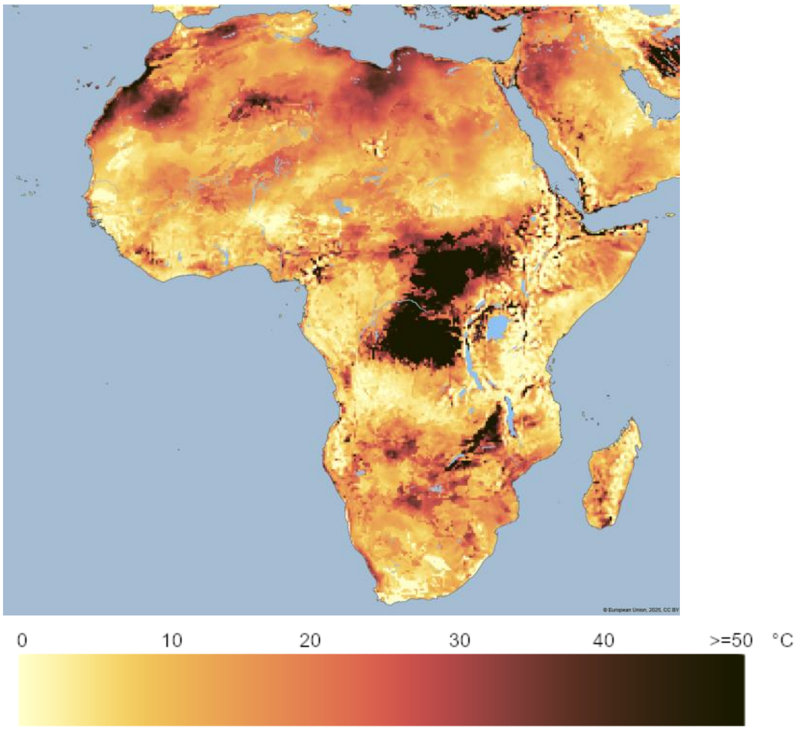

Figure 11: Maximum intensity of the heatwaves/warm spells detected during the period from March 2024 to March 16th, 2025.

Figure 12 displays the monthly duration maps from March 2024 to March 2025. From March to June 2024, the entire African continent experienced prolonged heatwaves, except for some areas in the southern regions. Northern Africa remained affected until November 2024, while central and southern Africa experienced heatwaves until September 2024. In December 2024, long-lasting heatwaves were detected in southern Africa, followed by shorter events across the whole continent in early 2025. February 2025 saw almost no heatwave, but conditions got worse in March 2025, especially in northern and central Africa.

Similar spatial and temporal patterns characterize the monthly intensity maps (Fig. 13). The highest intensities have been detected in March-June 2024 for central and northern Africa, in November 2024 for northern Africa, in December 2024 for southern Africa and Madagascar, and in March 2025 for northern Africa again.

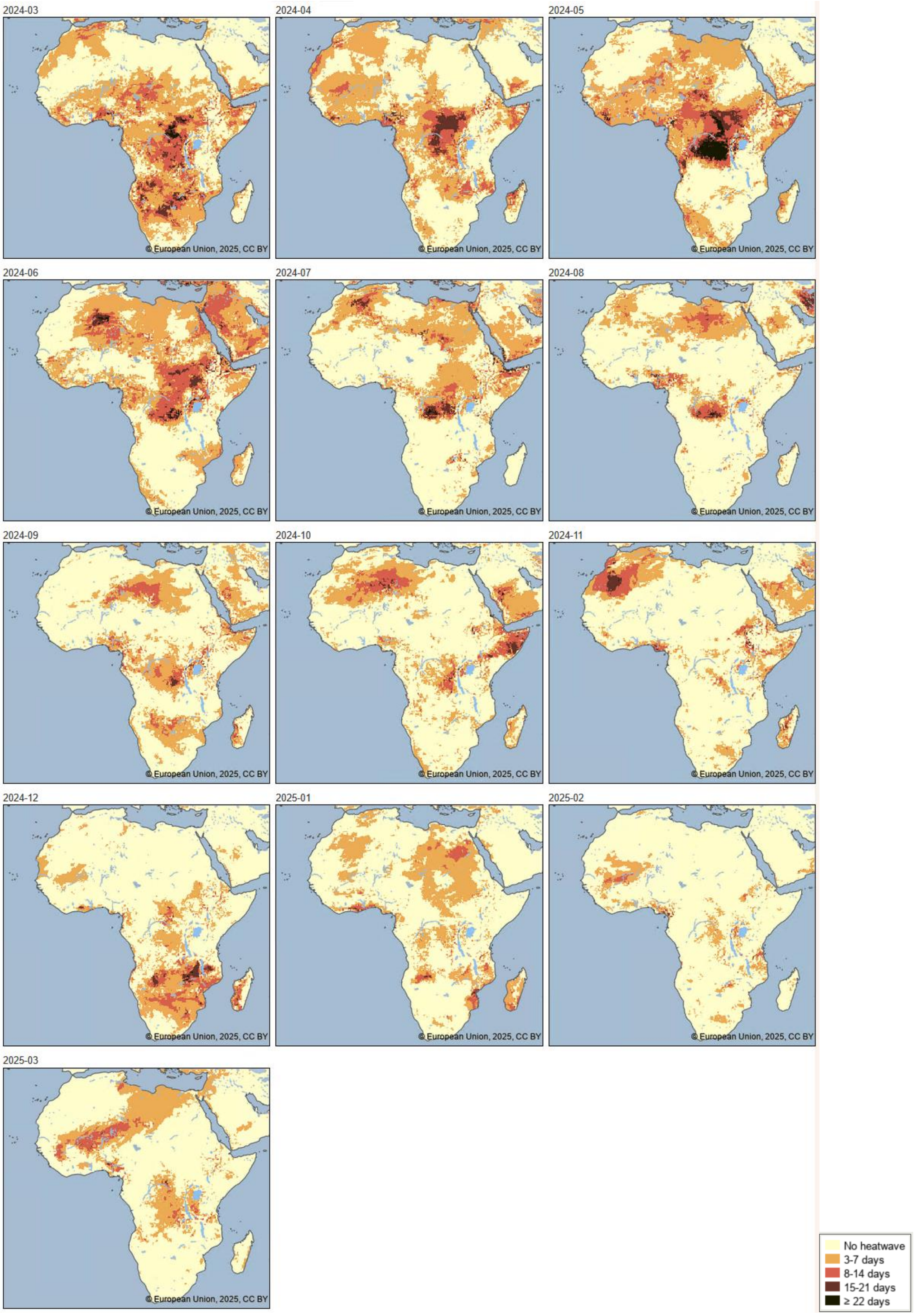

Figure 12: *Maximum duration of the heatwaves/warm spells within each month of the period from March 2024 to March 2025. In this case, the maximum duration of an event cannot exceed 31.*

Drought in Africa - April 2025

JRC Global Drought Observatory (GDO) of the Copernicus Emergency Management Service (CEMS) - GDO data up to 31/03/2025

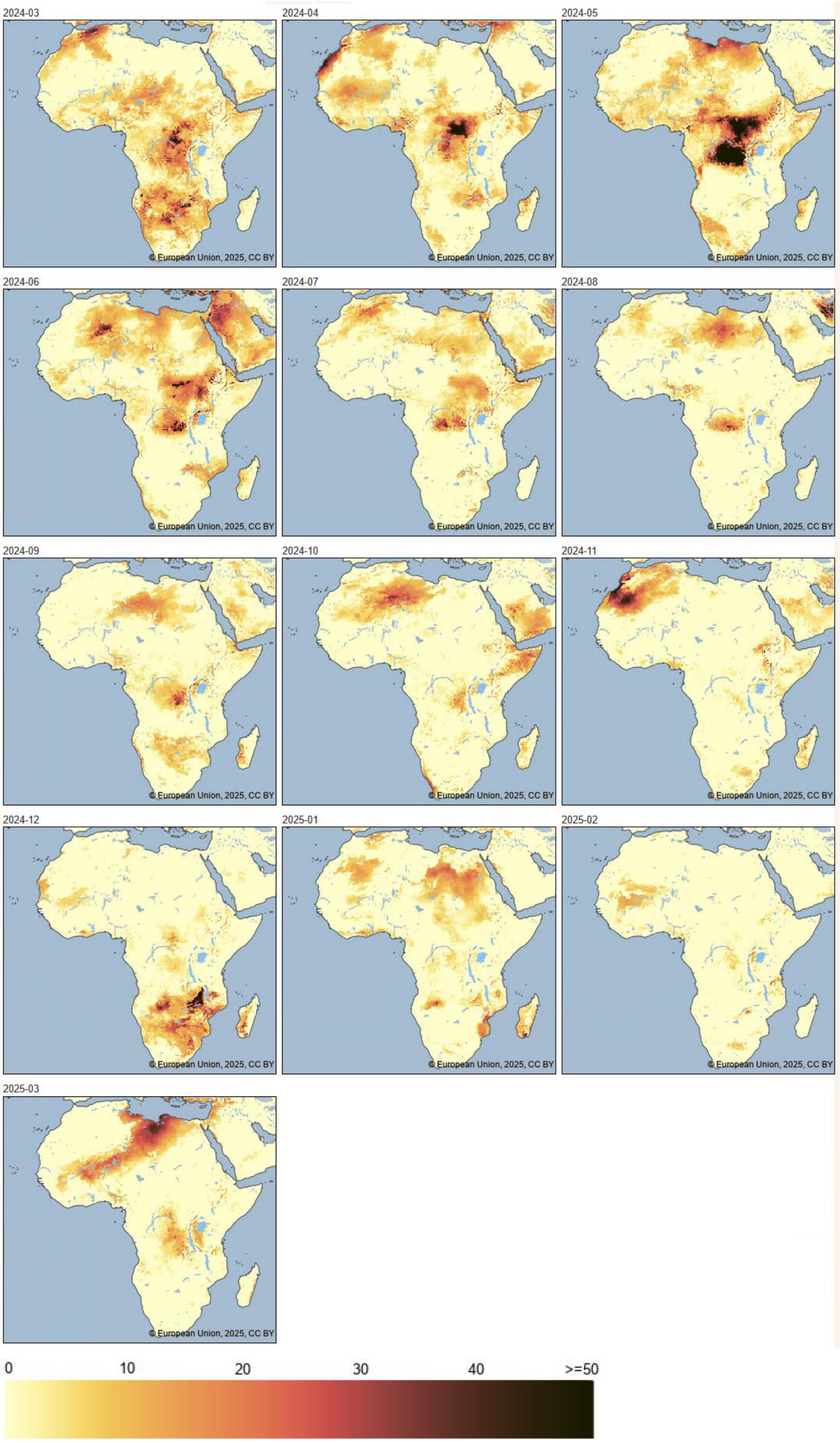

Figure 13: *Maximum intensity of the heatwaves/warm spells within each month of the period from March 2024 to March 2025.*

Soil moisture and groundwater

In late March 2025, soil moisture anomalies have been remarkably negative over almost the whole central Africa including western regions and central Madagascar, and over most of northern regions along the Mediterranean (Fig. 9). These conditions are the result of a combination of extremely low precipitation and high temperatures in the previous months. The drier-than-normal soil moisture pattern is partially consistent with the precipitation deficit of the previous months (see Fig. 2) and the differences in pattern highlight the relevance of temperature and evapotranspiration. In most of the cases, the regions with the strongest negative precipitation anomalies were also affected by positive temperature anomalies. These compound factors contributed to exacerbate water loss from the soil due to stronger evapotranspiration potential. Indeed, large areas in central Africa show soil moisture anomalies below -2, corresponding to the driest class of the GDO indicator (Fig. 14).[7]

Concerning the evolution of soil moisture anomalies (Fig. 15), a strong persistence with some spatial and temporal variability is estimated. At the continental scale many regions in Africa have been affected by dry soil moisture for long periods. The severe droughts of the previous years are somehow continuing. The continental total extent of the drier than normal area reached its maximum around June 2024. Afterwards, it reduced reaching its minimum in November 2024. Conditions quickly worsened again from December 2024 onward. More in details, the most relevant areas are: northern Africa having a very stable evolution (permanently critical with a reduction of the intensity in late 2024), the Zambezi basin characterised by a long persistence and just finally splitting in two minor events in early 2025, central and western Africa with very stable and dry conditions, and Madagascar almost always very dry and critical.

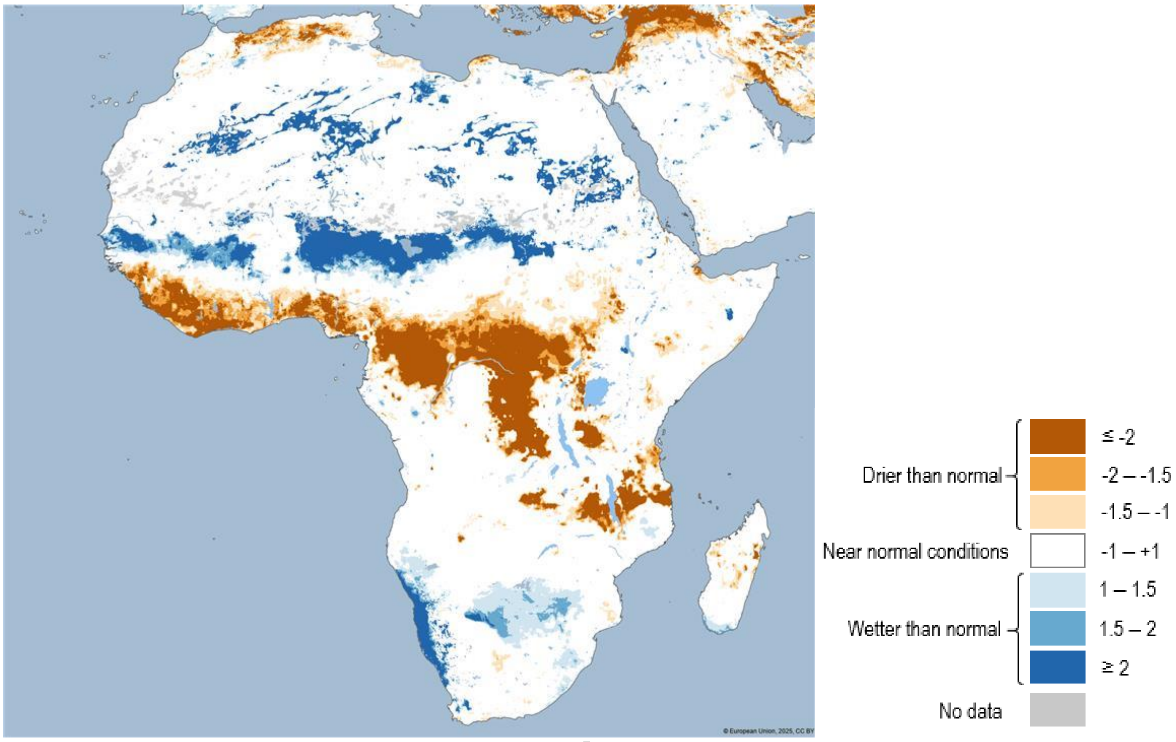

Figure 14: *Soil Moisture Index Anomaly, late March 2025.*[7]

[7] For more details on the Soil Moisture Anomaly, and the other GDO and EDO indicators of drought-related information used in the report, see the Appendix at the end of the document. Note that the map of the latest Soil Moisture Anomaly in figure 14 and those in Figure 15 have been produced using a provisional product including only the modelled data from the Lisflood model used in GloFAS. A new updated version of the ensemble product is under development.

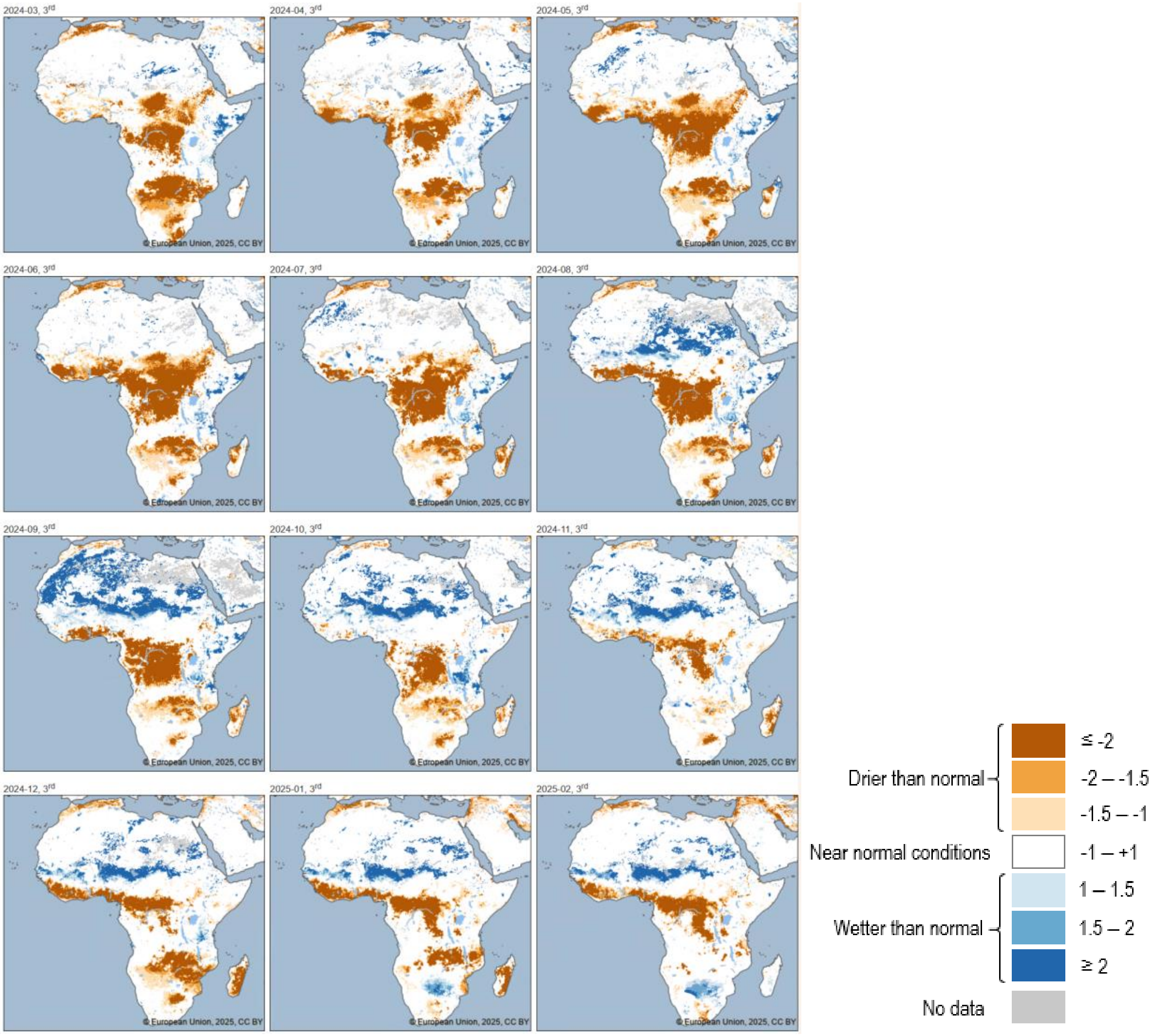

Figure 15: *Soil Moisture Index Anomaly, 10-day periods from March 2024 to February 2025.*[7]

The wide and persistent dry spot in central Africa should be considered with caution both in terms of precipitation and of soil moisture anomalies as the region is known to have higher uncertainties in precipitation products. In particular, it is worth to note the difference in west Africa between SPI and soil moisture anomalies. Indeed, the SPI here shown (Figs. 1 and 2) is based on CHIRPS while the forcing of Lisflood are based on ERA5 (having a dry bias compared to CHIRPS, not shown here).

By applying to soil moisture anomaly the drought tracking algorithm, it is possible to identify spatially and temporally regions that have been suffering from consistent below normal water availability in soil layers (Fig. 16). The results are consistent with the correspondent analysis based on SPI, highlighting the severity of drought events in northern Africa (driven not only be precipitation deficit) and clearly outlining the Zambezi basin extreme drought.

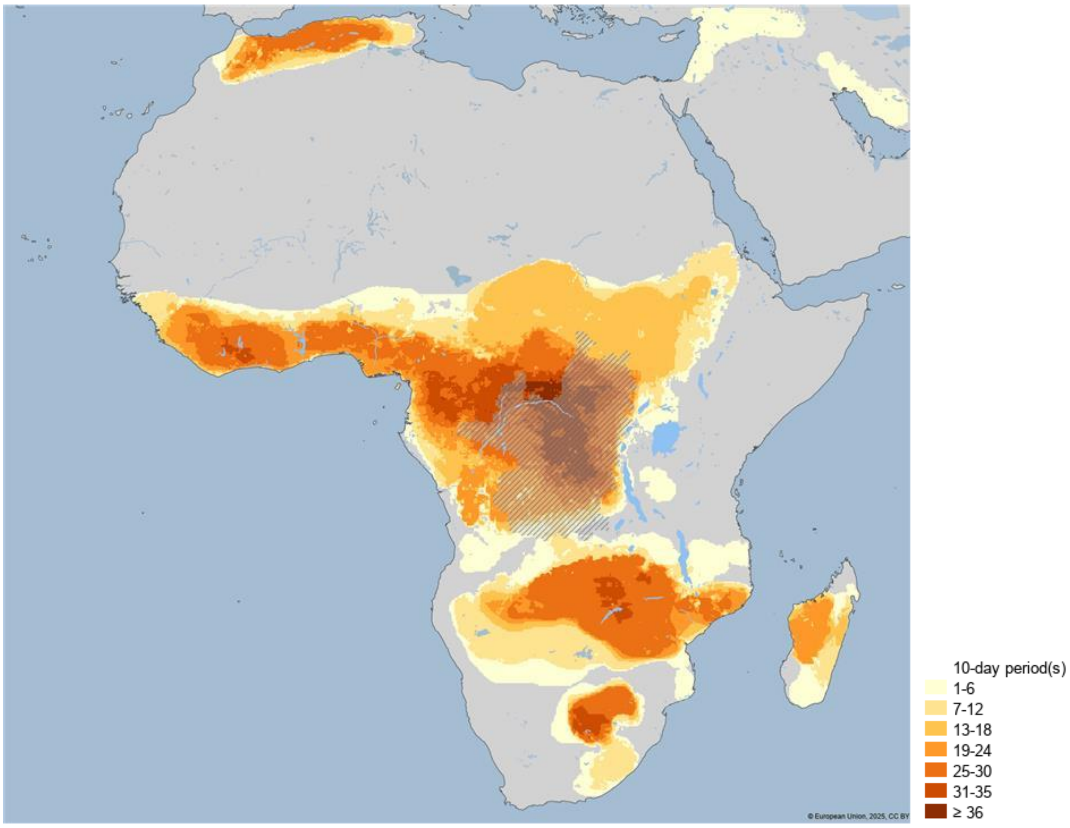

Figure 16: *Total persistence of the tracking applied to the soil moisture anomaly in the period March 2024 – March 2025.* [4] *The shaded area highlights regions where the results are assumed to have a lower reliability due to a lower density of in-situ meteorological stations and thus higher uncertainties in the meteorological forcing.*

The Total Water Storage (TWS) Anomaly indicator is used for determining the occurrence of long-term hydrological drought conditions and is often used as a proxy of substantial lowering of the groundwater level. This indicator is computed as anomalies of TWS data derived from the GRACE (Gravity Recovery and Climate Experiment) twin satellites.[8]

The TWS anomaly has a good correlation with long-term SPI (12, 24, 48 months).[9] The correlation is missing mainly in the central Africa (e.g. Congo) confirming the lower reliability of the precipitation data over that region. In January 2025, large areas of northern Africa and the Zambezi basins were suffering from severe negative anomalies, particularly affecting northern Morocco, northern Algeria, Tunisia, Zambia, Zimbabwe, and Mozambique (Fig. 17).[10]

[8] Landerer, F.W.; Swenson, S.C. Accuracy of scaled GRACE terrestrial water storage estimates. Water Resour.Res. 2012, 48, W04531

[9] Cammalleri, C., Barbosa, P., Vogt, J.V. 2019. Analysing the Relationship between Multiple-Timescale SPI and GRACE Terrestrial Water Storage in the Framework of Drought Monitoring. Water 11(8), 1672. https://doi.org/10.3390/w11081672.

[10] For more details on the GRACE-derived Total Water Storage (TWS) Anomaly indicator, and the other GDO and EDO indicators of drought-related information used in the report, see the Appendix at the end of the document.

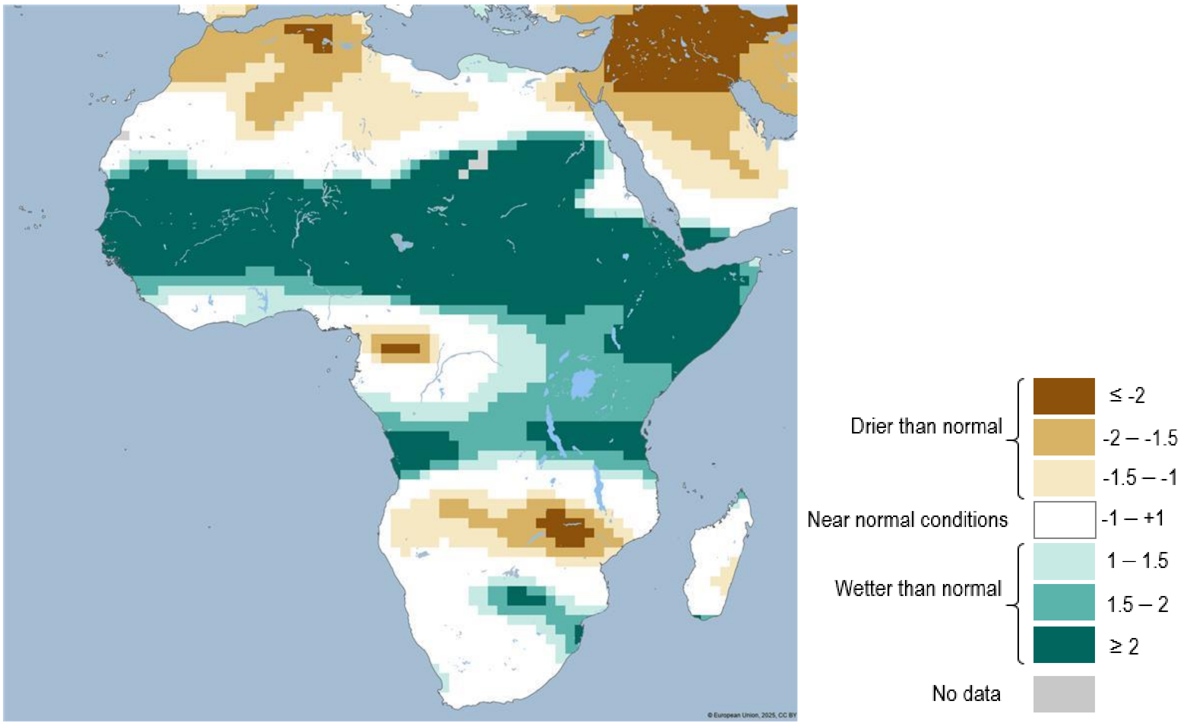

Figure 17: *GRACE-derived Total Water Storage (TWS) Anomaly, for January 2025.*[10]

Figure 18 shows the evolution of TWS anomaly from January to December 2024. Northern Africa has been almost constantly affected by dry conditions with the worst period in early and mid-2024. The onset of the Zambezi drought is visible in February 2024 and the conditions remain severe until November 2024. Additionally, it is visible a minor negative anomaly in the Gulf of Guinea from mid to late 2024.

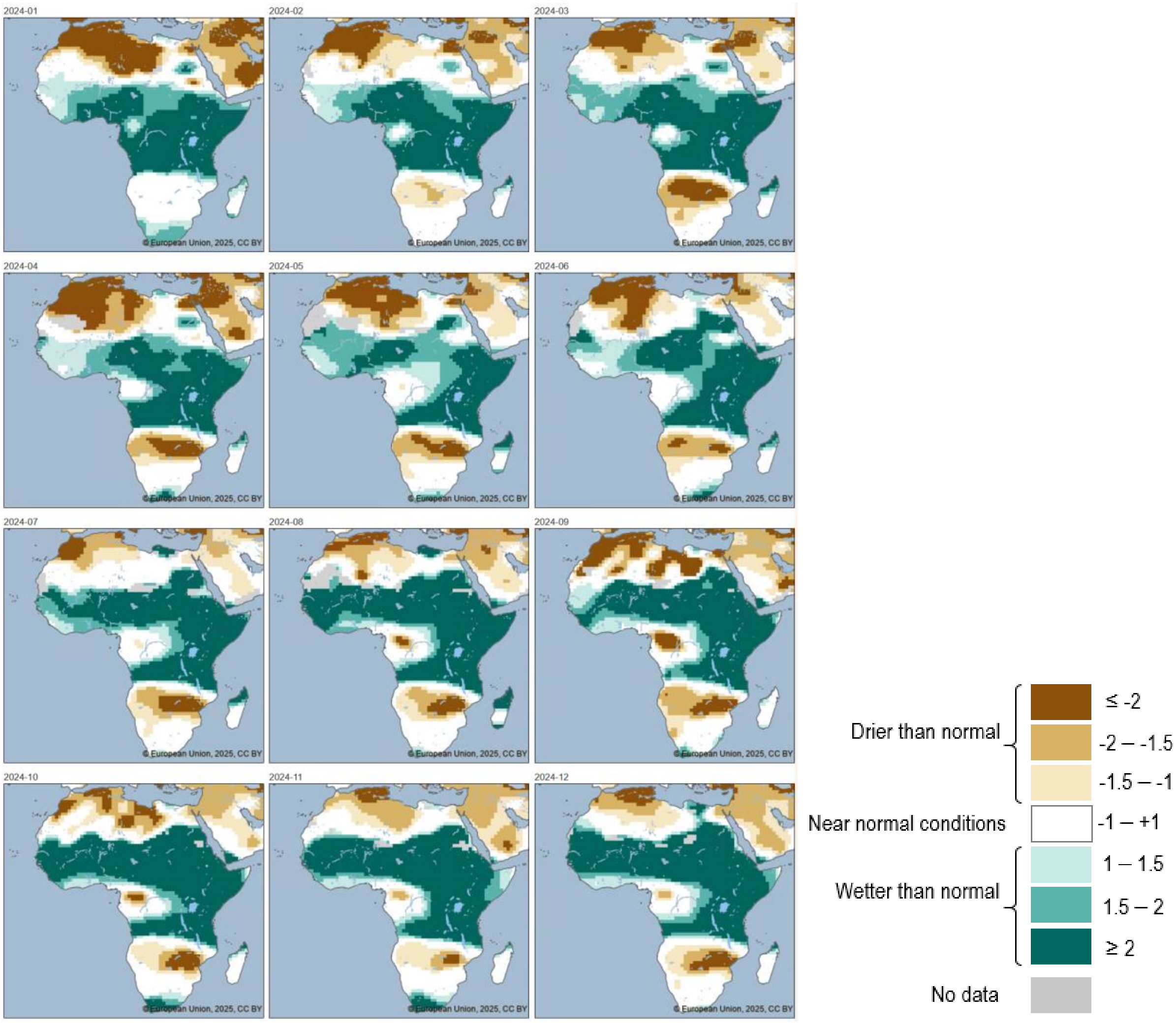

Figure 18: *GRACE-derived Total Water Storage (TWS) Anomaly, from January to December 2024.*[10]

Vegetation biomass

In mid-March 2025, the satellite-derived fAPAR (Fraction of Absorbed Photosynthetically Active Radiation) anomaly indicator[11] shows extremely critical vegetation stress over almost the whole northern regions of Africa and in particular of Morocco and Algeria. Large parts of the Zambezi basin, central Africa, and Madagascar are hit by negative anomalies, as well as some regions in west Africa, and some spots in Ethiopia and Somalia (Fig. 19).

The evolution of the fAPAR anomaly from March 2024 to February 2025 (Fig. 20) points to variable vegetation stress conditions, with relevant spatial and temporal differences. Alternating worsening and improving conditions are visible in sub-Saharan Africa, while the northern regions remained stably under very bad vegetation conditions. The Zambezi basin is similarly characterized by permanently negative anomalies, but in this case a strong variability in terms of anomaly magnitude is visible. Madagascar is experiencing slowly deteriorating vegetation conditions. At the continental scale the period when bad vegetation conditions reached the maximum extent was July 2024.

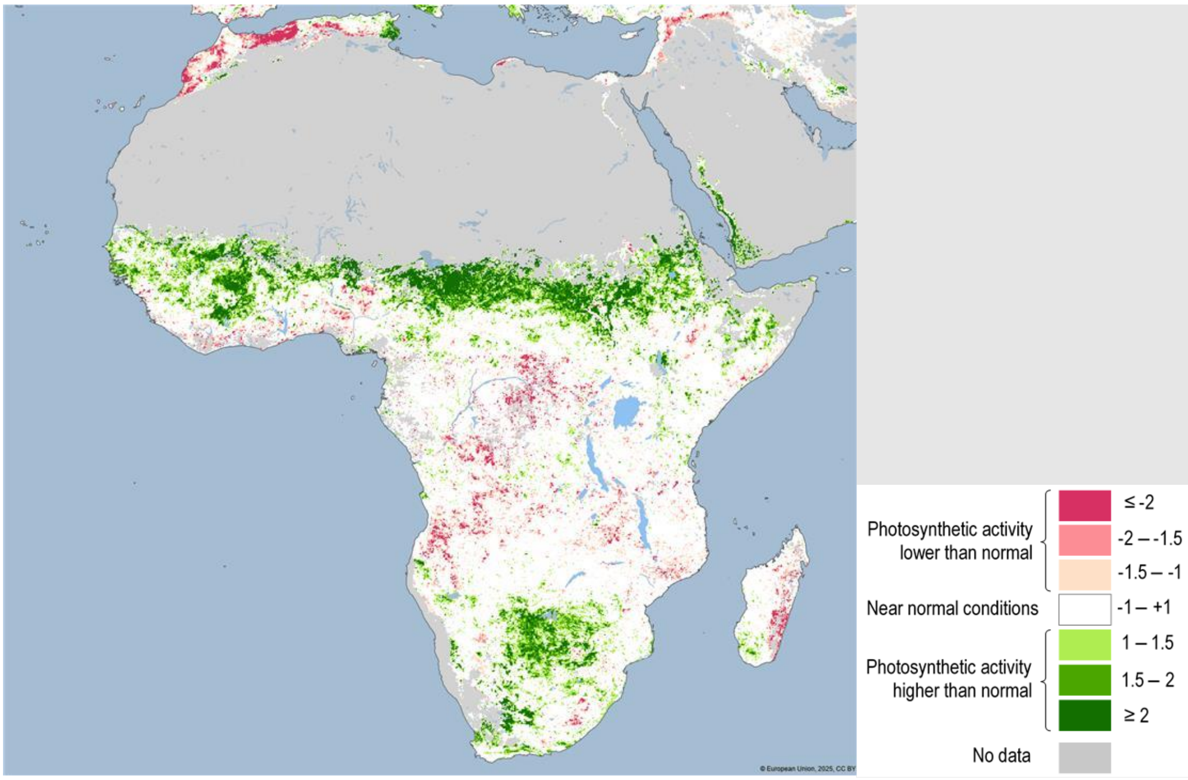

Figure 19: *Satellite-derived fAPAR anomaly indicator (measuring photosynthetic activity of vegetation) in early March 2025.*[11]

[11] For more details on the satellite-derived Fraction of Absorbed Photosynthetically Active Radiation (fAPAR) anomaly indicator, and the other GDO and EDO indicators of drought-related information used in the report, see the Appendix at the end of the document.

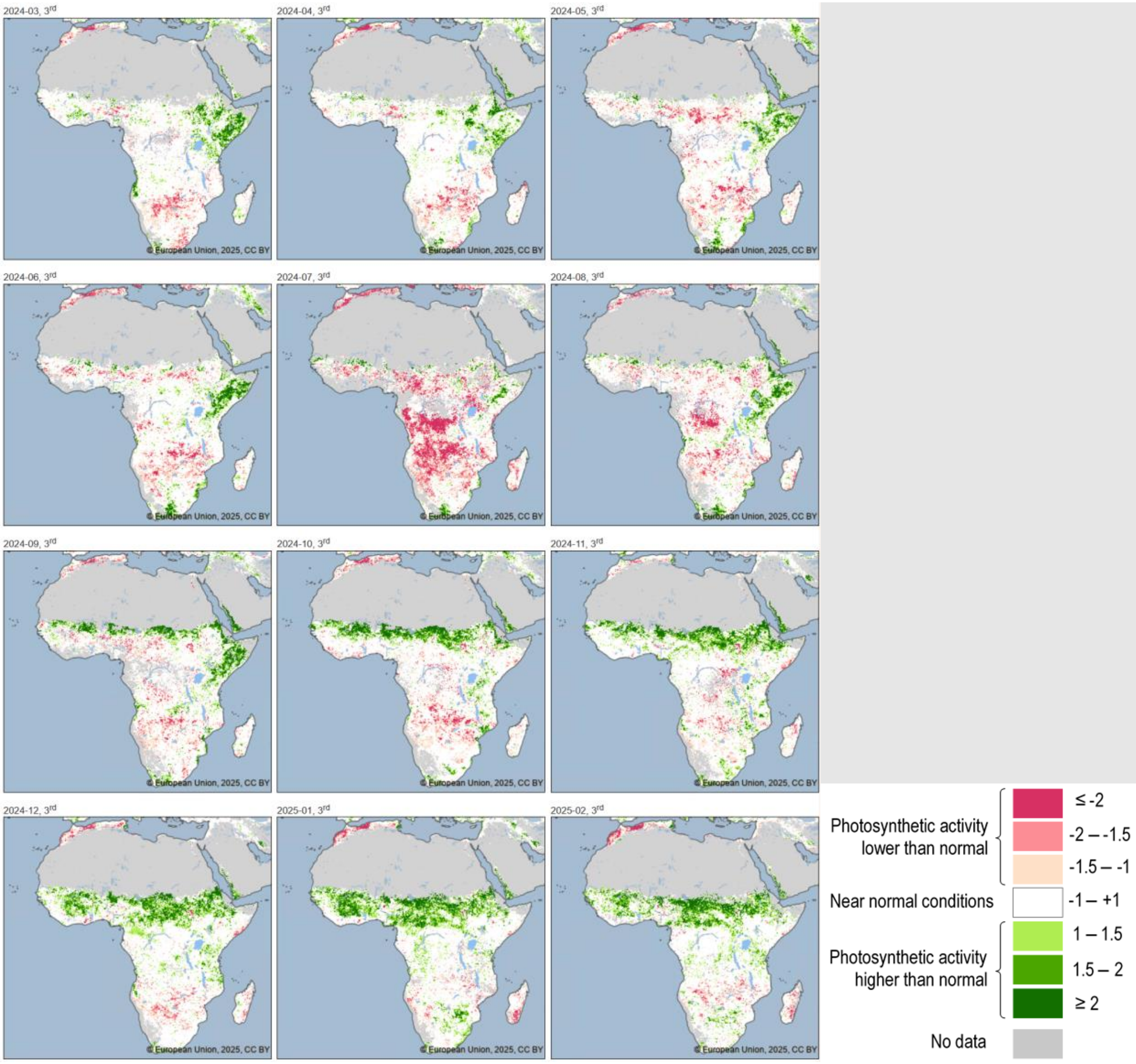

Figure 20: *Satellite-derived fAPAR anomaly indicator (measuring photosynthetic activity of vegetation) at the end of each month from March 2024 to February 2025.* [11]

Large-scale drivers

There are a wide range of different climatic zones in Africa[12] and the monsoon systems of Africa are influenced by oceanic drivers in the Pacific, Atlantic and Indian Oceans. El Niño is known to affect them, however the period between March 2024 and February 2025 was characterized by the decay of the El Niño into a neutral state. Additionally, an important oceanic driver of the East African climate variability, the Indian Ocean Dipole was also in a neutral phase during the same 12-month period. The Tropical North Atlantic however, which predominantly influences West African rainfall by driving shifts in the position of the Intertropical Convergence Zone (ITCZ), showed a large temperature gradient between the north and the south during the extended monsoon season (May-October) in 2024 (Fig. 21 - top). This positive gradient can typically induce a northward shift of the ITCZ leading to more precipitation in the north (Sahel) and less in the south (southern part of West Africa and Central Africa). This dipole of precipitation anomalies was indeed observed during May-October 2024 (Fig. 21 - bottom left).

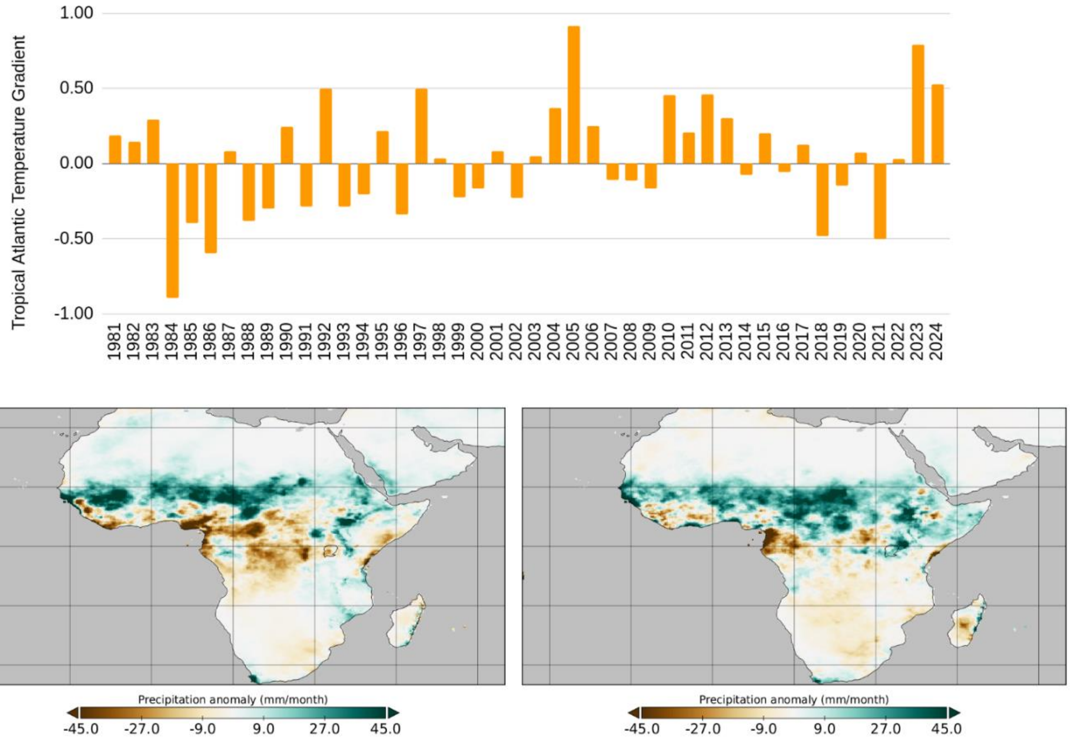

Figure 21: *Top: March-to-October Tropical Atlantic Temperature Gradient defined as the difference between the Tropical North Atlantic and the Tropical South Atlantic Indices[13]. Bottom left: March-to-October rainfall anomalies in 2024. Bottom right: Composite of March-to-October rainfall computed as the difference between the top 2 and bottom 2 years with highest (2005 and 2023) and lowest (1984 and 1986) values of the Tropical Atlantic Temperature Gradient.[14]*

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[12] The Köppen-Geiger climate classification reveals Africa's diverse climate zones, ranging from arid deserts in the north to tropical rainforests in central Africa. The continent's climate varies by region, with temperate, savanna, and tropical monsoon climates also present in southern, western, and eastern Africa. Beck, H.E.; Zimmermann, N.E.; McVicar, T.R.; Vergopolan, N.; Berg, A.; Wood, E.F. Present and future Köppen-Geiger climate classification maps at 1-km resolution. Sci. Data 2018, 5, 180214

[13] https://psl.noaa.gov/data/climateindices/list/

[14] Chirps v2

To complement the analysis, we show the difference between the two years with highest (2005, 2023) and lowest (1984, 1986) Atlantic temperature gradients, respectively. They reveal a similar pattern of precipitation anomalies to the one of 2024. This indicates that the 2024 precipitation anomalies were up to a certain degree likely driven by the state of the tropical Atlantic Ocean. However, additional drivers (e.g. internal variability of the monsoon system) may have also played an important role.

Fire danger forecast

The wildfire hazard is a direct consequence of the elevated temperature anomalies and surface dryness, combined with the availability of fuel (i.e. dry litter and wood). The CEMS Global Wildfire Information System (GWIS) provides mapping services of the fire danger forecast all over the world.[15] A moderate-to-very high danger is shown over northern sub-Saharan regions, most of the Zambezi basin and western South Africa, and some regions in northern Africa up to 31 March 2025 (Fig. 22).

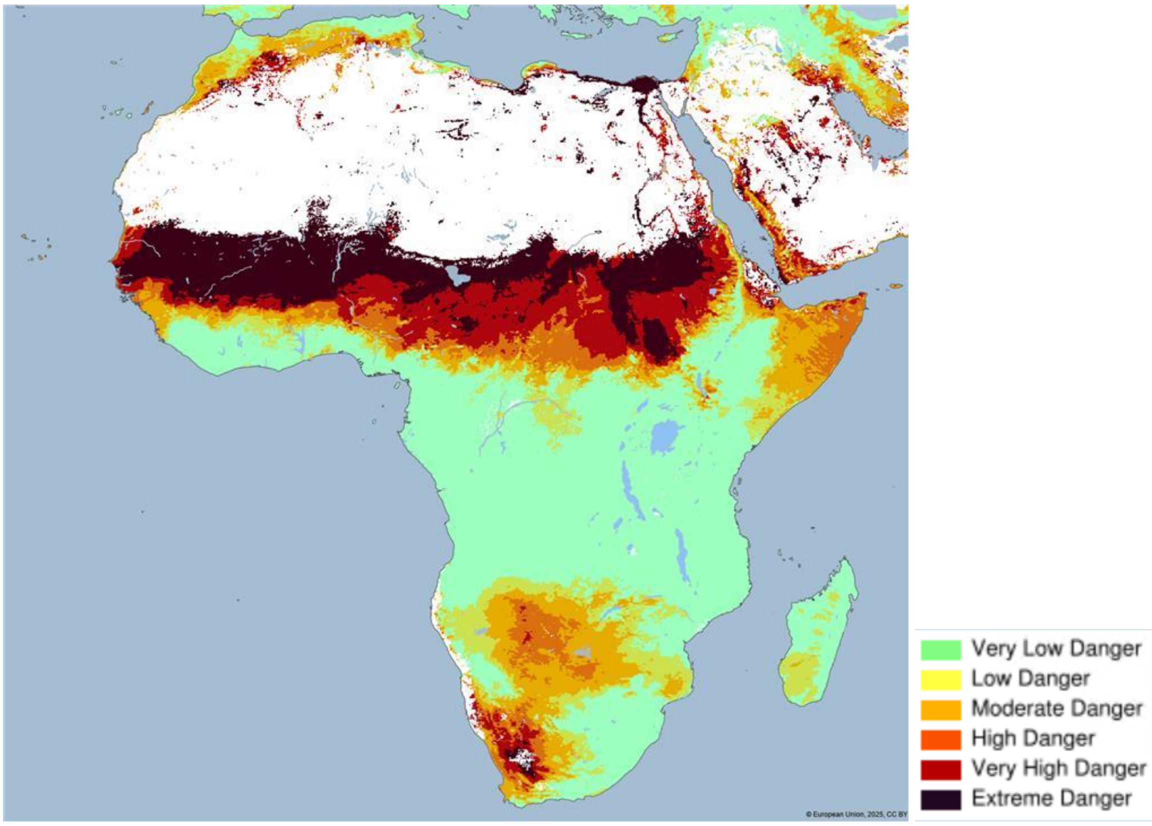

Figure 22: *Fire danger forecast expressed by the Fire Weather Index up to 31 March 2025. Data source: Global Wildfire Information System (GWIS)* [15].

[15] https://gwis.jrc.ec.europa.eu/

Seasonal forecast

From March to May 2025, drier than average conditions (baseline 1981-2016) are predicted over western Africa, southern East Africa and eastern southern Africa. Wetter than average conditions are predicted over most of northern Africa (Fig. 23).

According to the Copernicus C3S (Copernicus Climate Change Service) seasonal forecasts[16], warmer than usual conditions are likely to occur in the whole Africa up to June 2025. Precipitation forecasts (April-June 2025) are lower than average for the whole continent except for central-eastern Africa. Strong differences and great variability between models give a relevant uncertainty for seasonal precipitation forecast, in particular for central and southern Africa. As for East Africa, instead, there is a good agreement on drier than normal conditions, and the period from March to May corresponds to the long rains for that region, giving a particular relevance to this forecast. Close monitoring is required to assess the severity and the extent of the impacts over the coming season.

According to ICPAC[17] (IGAD[18] Climate Prediction and Application Centre) regional climate centre (RCC) forecast shows lower-than-average rainfall conditions in most of East Africa for the March-May rainfall season.

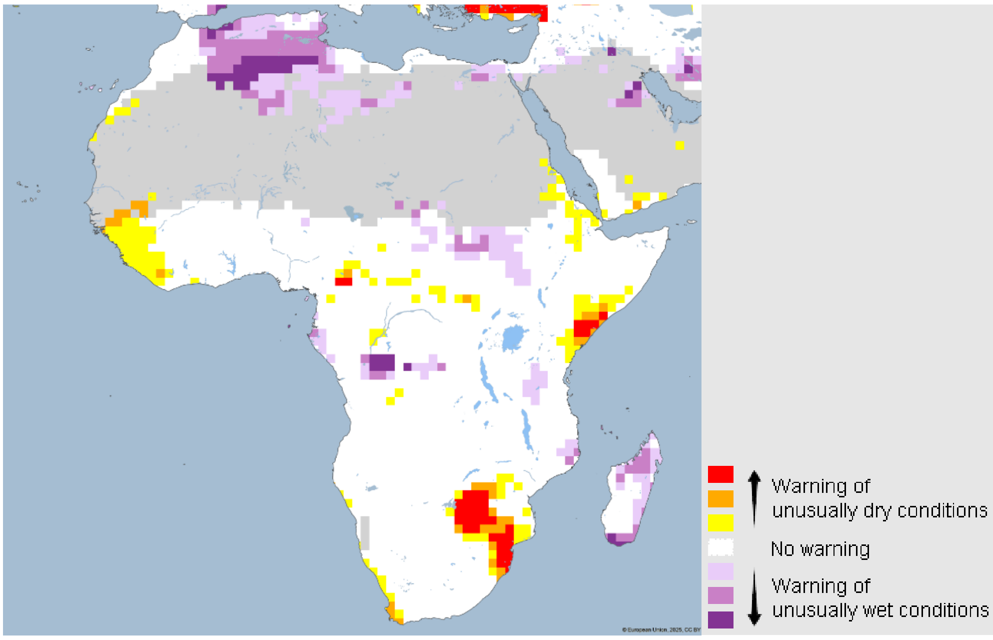

Figure 23: *Multi-system Indicator for Forecasting Unusually Wet and Dry Conditions, March 2025 – May 2025, based on dynamic forecasting systems from seven producing centres : ECMWF (European Centre for Medium-Range Weather Forecasts), CMCC (Centro Euro-Mediterraneo sui Cambiamenti Climatici), DWD (Deutscher Wetterdienst), ECCC (Environment and Climate Change Canada), Météo France, NCEP (USA National Centers for Environmental Prediction), UKMO (UK Meteorological Office).*[19]

[16] https://climate.copernicus.eu/seasonal-forecasts

[17] https://www.icpac.net/

[18] Intergovernmental Authority on Development https://igad.int/

[19] For more details on the Indicator for Forecasting Unusually Wet and Dry Conditions, and the other GDO and EDO indicators of drought-related information used in the report, see the Appendix at the end of the document.

The probability of occurrence of low river flows anomalies (compared with the seasonal discharge thresholds generated by using the CEMS GloFAS, Global Flood Awareness System, seasonal reforecast[20]) from March to June 2025 is high in some parts of central Africa. Medium probability is forecasted for north-west Africa, north-eastern Africa, and some parts of central Africa. Medium-low probability is forecasted in western Africa and in the upper Zambezi basin, as shown in Figure 24[21]. The figure shows the maximum probability of high flow or low flow anomaly, averaged for each major basin, and at any point in the forecast lead time.[22] The prolonged lack of precipitation, severe heatwaves, and warmer-than-average forecast are likely to reduce river flows further, with direct impacts on agriculture, ecosystems and energy production. Water resource management should be cautiously planned to limit impacts.

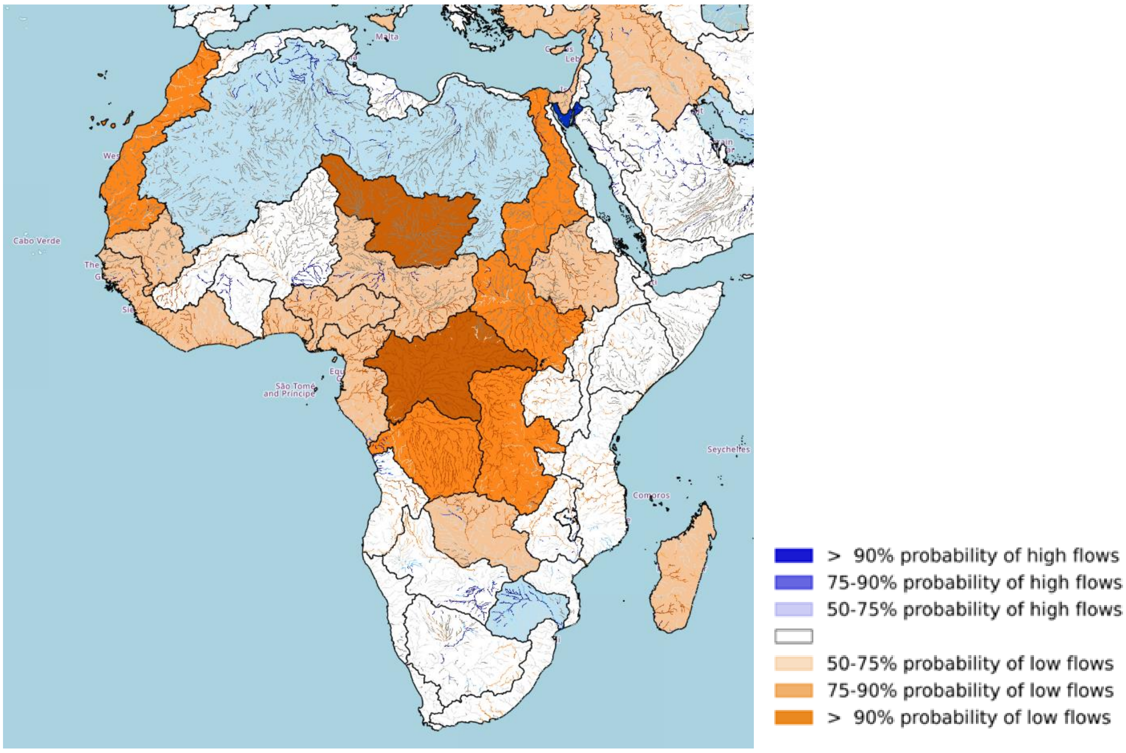

Figure 24: *Maximum probability [%] of high (> 80th percentile) or low (< 20th percentile) river flow, during the 4-month forecast horizon (March 2025 – June 2025) for basins and river network. Source: CEMS Global Flood Awareness System (GloFAS).*[23]

[20] https://global-flood.emergency.copernicus.eu/technical-information/glofas-seasonal/

[21] The analysis is based on the CEMS GloFAS global implementation of open source LISFLOOD hydrological model outputs driven by 51 ensemble members of the ECMWF SEAS5 forecast. For more information: https://ec-jrc.github.io/lisflood/

[22] The Basin Overview gives a quick global overview, for more detailed information across the river network, and sub-basin differences, it is recommended to refer to the Seasonal Outlook - River Network and Seasonal Outlook - Reporting Points products.

[23] https://global-flood.emergency.copernicus.eu/

Reported impacts

According to GEOGLAM (Group on Earth Observations Global Agricultural Monitoring) Crop Monitor bulletins of February 2025[24], at the end of February drier than normal conditions were affecting various regions in Africa, with significant impacts on agricultural production and food security. The drought situation in different parts of the continent can be summarised as follows:

- East Africa: a delayed and below-average start of the Belg rains (short rainy season from February to April) in northern East Africa is affecting planting and development of main season cereals in Ethiopia. In southern East Africa, dry conditions represent a concern in most areas, with below-average yields expected in Kenya and Tanzania.
- West Africa: although harvesting of the main and second season cereals is complete, rainfall deficits in northern Ghana resulted in below-average yields. Land preparation for the 2025/2026 main cropping season is underway, with planting expected to begin in March.
- North Africa: expanding dry conditions are causing concern for wheat production in Morocco, north-western Algeria, and other parts of the region. Severe water deficits have been reported, with wheat yields expected to be 28% below-average in Morocco and 5% below-average in Algeria.
- Southern Africa: significant rainfall event since January have improved cropping prospects in parts of Namibia, Zimbabwe, Zambia, Malawi, and Mozambique. However, poor rainfall outcomes are expected to degrade overall yield prospects in some of the main producing areas of South Africa, with yields expected to be 7% below-normal.

Additionally, GEOGLAM in the same report assesses the regional outlook for Africa and indicates that drought conditions are expected to persist or worsen in several areas, with below-average March to May rains forecasted for East Africa, potentially hindering cultivation. In West Africa, dry conditions are expected to continue, with the 2025/2026 main cropping season set to begin in March. The Middle East and North Africa are also expected to see expanding dry conditions with impacts on wheat production, particularly in Morocco and Algeria, where severe water deficits have been reported. In contrast, Southern Africa has seen significant rainfall improvements since January, boosting cropping prospects, although poor rainfall outcomes in some areas of South Africa may still degrade yield prospects.

Drivers of the critical conditions are summarized in Figure 25 together with the regions where drought plays a relevant role in reducing yield projection, namely: northern Africa, some regions of East Africa, Madagascar, and southern Africa.

[24] https://www.cropmonitor.org/

Drought in Africa - April 2025

JRC Global Drought Observatory (GDO) of the Copernicus Emergency Management Service (CEMS) - GDO data up to 31/03/2025

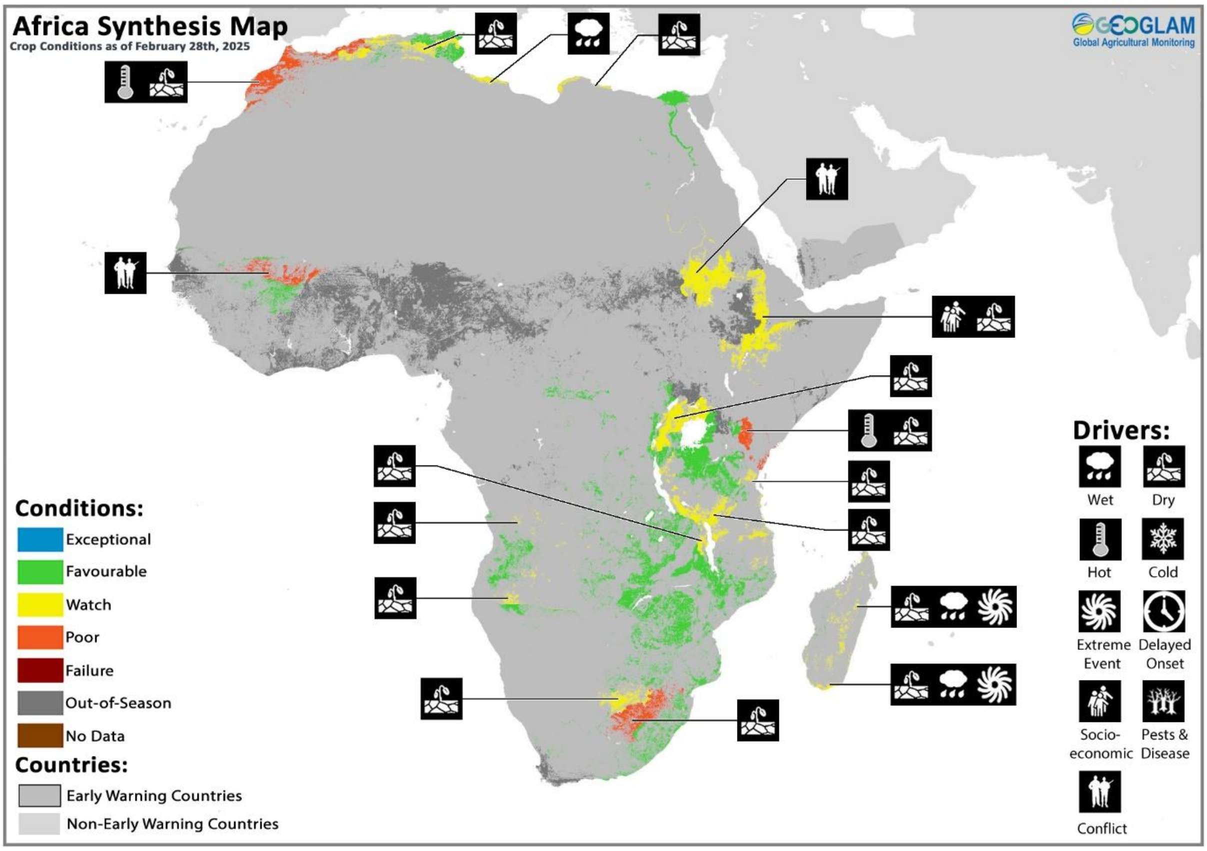

Figure 25: *Crop condition map as of February 28th 2025. Crop conditions over the main growing areas are based on a combination of inputs including remotely sensed data, ground observations, field reports, national, and regional experts. Crops that are in other than favourable conditions are labelled on the map with their driver. Source: GEOGLAM Crop Monitor, Licensed under CC BY 4.0.*[24]

According to GEOGLAM Crop Monitor bulletins of March 2025[24], at the end of March drier than normal conditions have affected crop development in several African countries, including Morocco, Algeria, Ethiopia, Rwanda, Burundi, Uganda, Kenya, and Tanzania. Yield forecasts are below-average in Morocco (27% below average) and Algeria due to poor rainfall outcomes. Rainfall deficits have also affected crops in southern Angola, northern Madagascar, and northern Malawi. However, mid-season rainfall has been beneficial for crop development in eastern Angola, central parts of southern Africa, and central Madagascar. Recently rainfall improved in Morocco, particularly in the north, which helped to partially refill some reservoirs. Rainfall also improved in parts of Ethiopia, particularly in the southwest and north-centre, which helped to alleviate dry conditions. Storm impacts, including Cyclone Jude, have affected parts of Mozambique and Madagascar, potentially influencing final yields.

Concerning the regional outlook:

- Eastern Africa: below-average rains are expected to continue across eastern areas throughout June, which may impact crop development in parts of Kenya, Ethiopia, and Somalia.
- Southern Africa: mid-season rainfall is expected to significantly improve crop production prospects from the previous year, with 2025 cereal production expected to be near-average.
- West Africa: agro-climatic conditions remain favourable, with near-average to above-average rainfall expected in the Sahel region throughout July.
- North Africa: Generally poor rainfall outcomes at the beginning of the season are expected to result in below-average production across Morocco and Algeria.

Drivers of the critical conditions are summarized in Figure 26 and the regions together with the regions where drought plays a relevant role in reducing yield projection, i.e. northern Africa, some regions of East Africa, and Madagascar. An improvement of the conditions is visible in southern Africa.

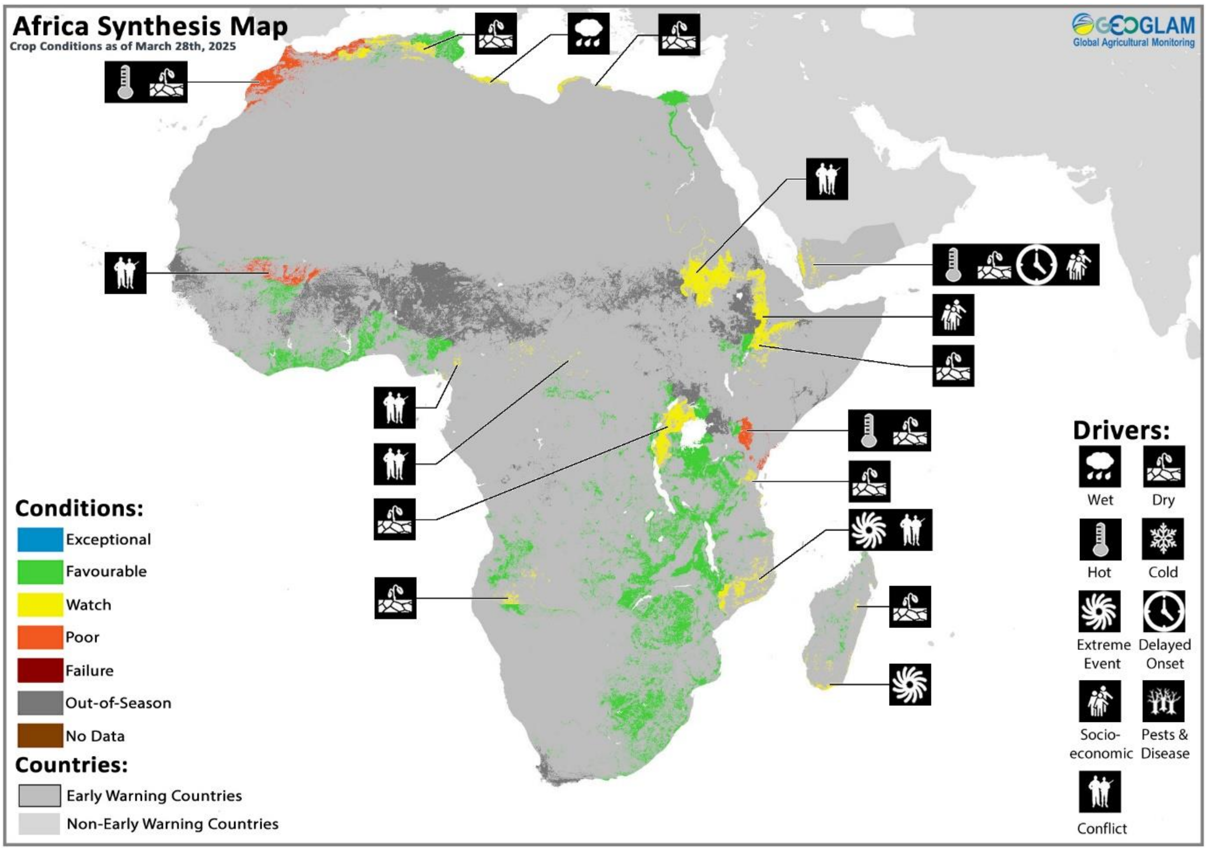

Figure 26: *Crop condition map as of March 28th 2025. Crop conditions over the main growing areas are based on a combination of inputs including remotely sensed data, ground observations, field reports, national, and regional experts. Crops that are in other than favourable conditions are labelled on the map with their driver. Source: GEOGLAM Crop Monitor, Licensed under CC BY 4.0.*[24]

According to the JRC MARS (Monitoring Agricultural ResourceS) Bulletin of 24 March 2025, severe dry conditions have damaged crops in Morocco and western Algeria, with yield forecasts 25% and 6% below average, respectively. However, some Algerian regions have recovered due to February rainfall, and Tunisia's crops are thriving with above-average biomass accumulation, leading to higher yield forecasts.[25]

A heatwave struck East Africa in March 2024, forcing South Sudan to close schools for two weeks due to temperatures reaching 41-45 °C. The extreme heat led to power cuts and reported deaths, with temperatures expected to drop with the arrival of the rainy season. The heatwave is part of a larger trend of unusually higher temperatures across the continent, which scientists attributed to climate change.[26]

[25] https://publications.jrc.ec.europa.eu/repository/handle/JRC141319

[26] https://earthobservatory.nasa.gov/images/152600/heat-wave-in-east-africa#:~:text=The%20darkest%20reds%20indicate%20temperatures,school%20closures%20in%20South%20Sudan.

Morocco's 2023-2024 agricultural season marked its sixth consecutive drought year with particularly severe conditions. The season began with delayed rainfall, causing prolonged dry spells that disrupted autumn cereal sowing and stunted crop development. Extreme temperature fluctuations—notably a November heatwave coinciding with water deficit—triggered significant crop losses. These compounded stresses reduced cereal-sown areas by 33% versus 2022-2023, with production of the three main cereals plummeting to 31.2 million quintals, a 43% decrease from the previous season[27]. The drought conditions continued with available water resources totalling approximately 4,677 million m³, resulting in an overall dam filling rate of just 27.8% as of March 3, 2025. Fortunately, March brought some wet conditions that increased water availability to approximately 6,351 million m³, raising the dam filling rate to 37.7% by March 26, 2025[28]. The country faces worsening drought severity, critically threatening water security, agricultural productivity, and ecosystem health. The compounding impacts include acute water stress affecting food security and rural livelihoods, along with progressive ecosystem degradation from prolonged dry conditions. In response, Morocco has initiated robust policy measures including enhanced water management through drip irrigation expansion, dam construction, desalination projects, and wastewater reuse systems. The government is integrating climate risk assessments into agricultural planning while developing comprehensive adaptation frameworks like the National Climate Plan and National Adaptation Strategy. Complementary local actions feature community-based early warning systems and improved drought modelling that incorporates socio-economic factors. These existing efforts—particularly irrigation modernization and water transfer infrastructure— point to proactive governance[29].

The drought in southern Africa, driven by 2023/24 El Niño, is considered one of the worst in the region, leading to reduced agricultural production in 10 countries in the region. Maize production across the region was five percent below five-year average[30]. In 2024, five countries in southern Africa declared states of national disaster due to the drought, these include, Zambia, Zimbabwe, Malawi, Namibia and Lesotho. The Southern Africa Development Authority on May 2024, launched a regional appeal of US$5.5billion targeting 61 million people affected by drought[31]. National appeals were also launched by respective countries.

In addition to increased food insecurity due to wide-spread poor and failed agricultural production, the El Niño induced drought of 2023-2024 led to severe hydropower production shortages. The Kariba dam on the Zambezi basin, the largest man-made lake, recorded record-breaking critical low water levels that led to severe power disruptions, with countries like Zimbabwe, Zambia and South Africa intensifying load shedding as a strategy to manage power shortages. The sporadic and intense rains received since January 2025 have improved the water levels in Kariba Dam, reducing power cuts in both Zambia and Zimbabwe. The power supply in South Africa has also improved.

The long-term hydrological drought depicted in Fig. 2 (SPI 6, 12, and 24) and Fig. 18 (GRACE-derived Total Water Storage -TWS) was evidenced by boreholes, dams and water sources drying out limiting agricultural production through irrigation, despite government incentives promoting irrigation to mitigate the impacts of the El Niño-induced drought.

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[27] https://www.agriculture.gov.ma/

[28] https://www.maadialna.ma/

[29] Moutia, S.; Sinan, M., Lekhlif, B.; Ilmen, R. Projection of Future Drought Characteristics in Morocco under CMIP6 Scenario SSP2-4.5, Bulletin de l'Institut Scientifique, Rabat, Section Sciences de la Terre, 2024, n° 46, 83–96

[30] SADC Regional Humanitarian Appeal – Addendum on El Nino-Induced Drought (November 2024): https://reliefweb.int/report/zimbabwe/sadc-regional-humanitarian-appeal-addendum-el-nino-induced-drought-november-2024

[31] SADC Regional Humanitarian Appeal – Response to El Nino-induced Drought and Floods (May 2024): https://reliefweb.int/report/zimbabwe/sadc-regional-humanitarian-appeal-response-el-nino-induced-drought-and-floods-may-2024

Appendix: GDO and EDO indicators of drought-related information

The Standardized Precipitation Index (SPI) provides information on the intensity and duration of the precipitation deficit (or surplus). SPI is used to monitor the occurrence of drought. The lower (i.e., more negative) the SPI, the more intense is the drought. SPI can be computed for different accumulation periods: the 3-month period is often used to evaluate agricultural drought and the 12-month (or even 24-month) period for hydrological drought, when rivers fall dry and groundwater tables lower.

Lack of precipitation induces a reduction of soil water content. The Soil Moisture Anomaly provides an assessment of the deviations from normal conditions of root zone water content. It is a direct measure of drought associated with the difficulty of plants in extracting water from the soil.

The satellite-based fraction of Absorbed Photosynthetically Active Radiation (fAPAR) monitors the fraction of solar energy absorbed by leaves. It is a measure of vegetation health and growth. Negative fAPAR anomalies with respect to the long-term average are associated with negative impacts on vegetation.

The Multi-system Indicator for Forecasting Unusually Wet and Dry Conditions provides early risk information for Europe. The indicator is computed from forecasted SPI-1, SPI-3, and SPI-6 derived from seven components: ECMWF (European Centre for Medium-Range Weather Forecasts), CMCC (Centro Euro-Mediterraneo sui Cambiamenti Climatici), DWD (Deutscher Wetterdienst), ECCC (Environment and Climate Change Canada), Météo France, NCEP (USA National Centers for Environmental Prediction), UKMO (UK Meteorological Office).

Check https://drought.emergency.copernicus.eu/factsheets for more details on the indicators.

Glossary of terms and acronyms

C3S	Copernicus Climate Change Service
CEMS	Copernicus Emergency Management Service
CHIRPS	Climate Hazards Group InfraRed Precipitation with Station
CMCC	Centro Euro-Mediterraneo sui Cambiamenti Climatici
DWD	Deutscher Wetterdienst
EDO	European Drought Observatory of CEMS
EC	European Commission
ECCC	Environment and Climate Change Canada
ECMWF	European Centre for Medium-Range Weather Forecasts
ERA5	ECMWF Reanalysis v5
ERCC	European Emergency Response Coordination Centre
fAPAR	Fraction of Absorbed Photosynthetically Active Radiation
GDO	Global Drought Observatory of CEMS
GEOGLAM	Group on Earth Observations Global Agricultural Monitoring
GloFAS	Global Flood Awareness System of CEMS
GRACE	Gravity Recovery and Climate Experiment
GWIS	Global Wildfire Information System
ITCZ	Intertropical Convergence Zone
JRC	Joint Research Centre
KNMI	Koninklijk Nederlands Meteorologisch Instituut
MARS	Monitoring Agricultural ResourceS
NCEP	USA National Centers for Environmental Prediction
SEAS5	Seasonal Forecasting System 5
SMA	Soil Moisture Index Anomaly
SPI	Standardized Precipitation Index
TWS	Total Water Storage

UK	United Kingdom of Great Britain and Northern Ireland
UKMO	UK Meteorological Office
UN	United Nations
USA	United States of America
VIIRS	Visible Infrared Imaging Radiometer Suite

Drought in Africa - April 2025

JRC Global Drought Observatory (GDO) of the Copernicus Emergency Management Service (CEMS) - GDO data up to 31/03/2025

GDO and EDO indicators versioning

The GDO and EDO indicators appear in this report with the following versions:

GDO, EDO indicator	Versions
▪ Soil Moisture Index Anomaly (SMA)	*v. 3.0.1*
▪ Fraction of Absorbed Photosynthetically Active Radiation (fAPAR) Anomaly (VIIRS, Visible Infrared Imaging Radiometer Suite)	*v. 3.0.0*
▪ GRACE-derived Total Water Storage (TWS) Anomaly	*v. 2.1.0 and 2.1.1*
▪ Multi-System Indicator for Forecasting Unusually Wet and Dry Conditions	*v. 1.2.0*
▪ Standardized Precipitation Index (SPI, CHIRPS)	*v. 2.0.0*

Check https://drought.emergency.copernicus.eu/download for more details on indicator versions.

Distribution

For use by the ERCC and related partners, and publicly available for download at GDO website: https://drought.emergency.copernicus.eu/reports

List of Figures

Drought in Africa - April 2025

JRC Global Drought Observatory (GDO) of the Copernicus Emergency Management Service (CEMS) - GDO data up to 31/03/2025

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