

CUMULUS

SEASON 2023/2024

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YOUNG PEOPLE SEE THE FUTURE

Differently

“THE FUTURE OF AGRICULTURE... A CERTAIN FUTURE”



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Summary

Warmer, drier conditions expected

The cool to cold, cloudy conditions with widespread rain over large parts and snow in some of the higher-lying eastern interior, especially along the Drakensberg, is now over and it has warmed significantly since early this week. Compared to the forecasts for the cut-off low earlier, the system underperformed with regard to rain over the central parts of the country, with large parts of the western to central maize-production region receiving less than 10 mm of rain. However, towards the east, large parts of Mpumalanga received between 30 and 60 mm of rain with totals exceeding 20mm also in parts of the eastern Free State.

Cold events, such as seen earlier this week, during early or mid-summer, are not indicative of a large-scale atmospheric circulation pattern over the southern African region that favors the intrusion of large amounts of tropical moisture over the summer rainfall region. It therefore happens fairly often that such a cold, rainy event is followed by dry and sometimes hot weather – as mentioned in the previous newsletter. During the next few days, a band of thundershowers will develop over the central parts of the country and will slowly move towards the east and northeast, but thundershowers are expected to be isolated to scattered at best and the rainfall totals will, for the most part, remain below 20 mm. Coupled with high temperatures or windy conditions at times, this period may be associated with some short-term water stress over parts of the interior. Yet another cold front is expected to influence the interior early next week, but this system should be associated with cooler, dry air moving in from the west, resulting in drier conditions over the interior.

Looking further ahead, forecasts don't yet indicate the formation of another significant rainfall event and instead favors a continuation of relatively dry conditions for about a 2-week period. On a large scale in the African region, the convergence zone for tropical moisture around 17 - 20°S is still very weakly defined currently, while much more action is located around 7°S, far to the north of our region, implying that large-scale circulation patterns result in less tropical moisture available in our region. This usually results in relatively dry conditions, with thundershowers not being able to produce the rainfall amounts as would be seen when tropical moisture is available in abundance in our region. Furthermore, the occurrence of upper-air troughs far to the southwest of South Africa, indicated for the next 2 weeks by weather models, is rather supportive of a high-pressure system over southern Africa, further strengthening a drier pattern. The cold front expected to move into the interior from the west next week is yet another indication that the circulation patterns in our region are not conducive to above-normal rainfall over the interior. On a global scale, the areas of more intense convection along the equator have moved from the favorable region for rainfall in southern Africa to an unfavorable area and are expected to remain there for at least the next 2 weeks.

Late November is traditionally a period when rainfall more often occurs over the summer rainfall region, and it can be expected that forecasts will turn favorable later this month.

The following is a summary of weather conditions during the next few days:

General:

- Temperatures will on average be above normal over the interior and below normal over the winter rainfall region.
- Rainfall is expected to be below normal over most areas, but some parts of the central interior together with the western parts of the winter rainfall region will receive normal to above-normal rainfall.
- Isolated to scattered thundershowers will occur in a band over the central to southeastern parts until Sunday. This band is expected to move slowly eastwards during the weekend. Thundershowers are expected to relocate to the eastern and northeastern parts from Monday onwards as cooler, dry air is expected to invade the interior from the west, according to current forecasts, pushing the band of thundershowers to the far eastern and northeastern parts.
- A cold front may result in fairly widespread showers over the winter rainfall region on Monday.
- The cold front is expected to move into the interior from the west, with cool dry westerlies invading the interior with the system and pushing the band of thundershowers to the northeastern and eastern parts as mentioned above.
- While cooler, windy conditions will invade from the west on Monday, frost is not expected over the summer grain production region.
- It will become warm to hot and dry by the middle of next week over the interior, according to current forecasts.

- The winter-grain-production region in the southwest will experience some showers early in the weekend and also widespread showers on Monday and early Tuesday, according to current forecasts. The rest of the period is expected to be mild with light to moderate winds with a westerly (towards the east) component.

Overview of expected conditions over the main agricultural production areas

A weak upper-air trough over the southern parts together with the interior surface trough will support a band of isolated to scattered thundershowers over the central to southeastern areas until Sunday. With a cold front moving in from the west over the country on Monday, thundershowers will move eastwards, into the eastern to northeastern parts of the country on Monday, with dry air invading the western to central parts and little to no rain expected from Monday over the central parts.

The cold front moving into the interior by Monday may result in widespread showers over the winter rainfall region which should otherwise be partly cloudy and mild, expect for some light showers also into this weekend.

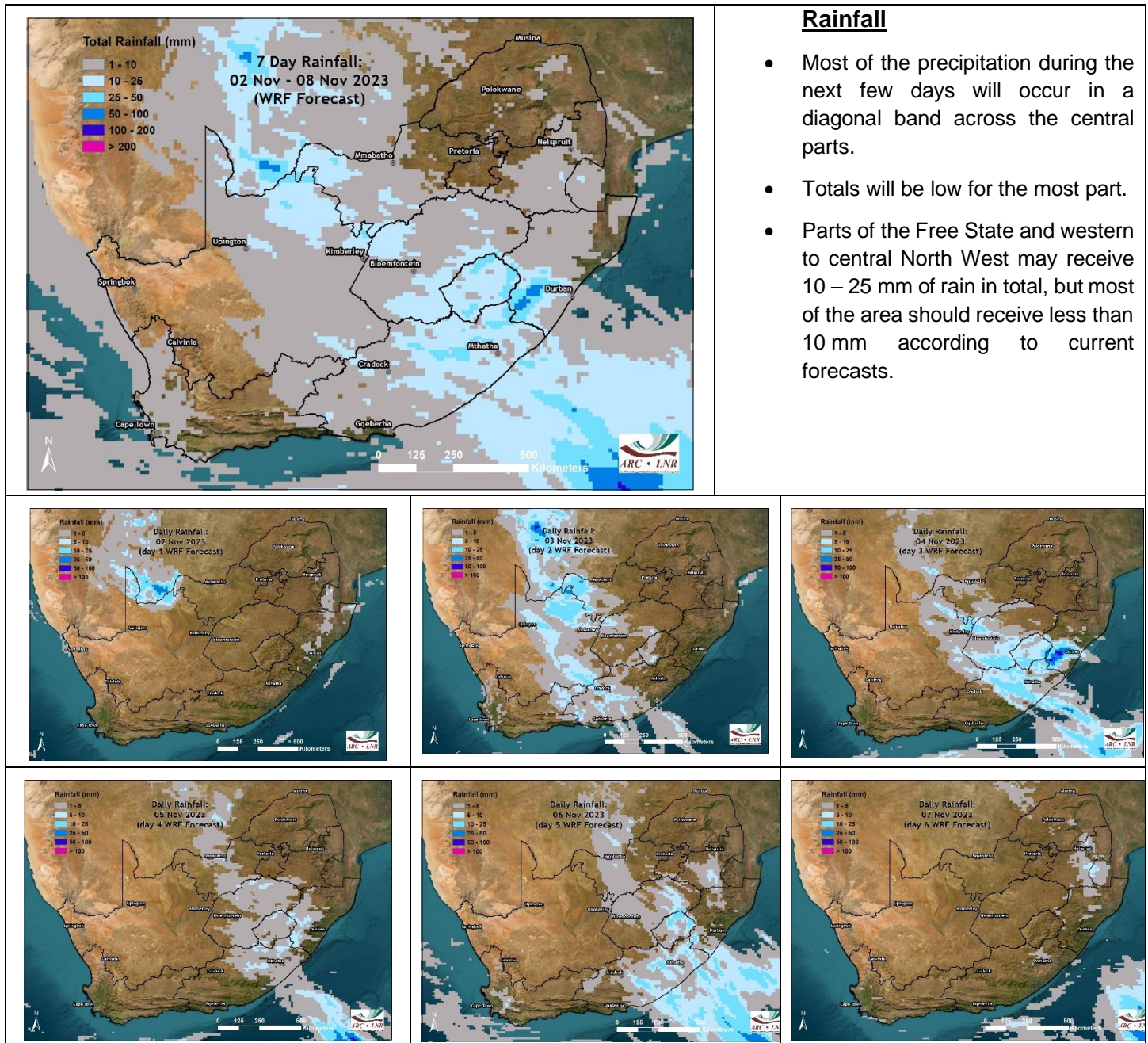
Maize production region: Temperatures will generally increase during the period over the summer grain production region, but cooler, dry air from the west may cause somewhat lower temperatures again early next week, followed by a recovery in temperatures by the middle of the week:

- Maximum temperatures over the western maize-production areas will be in the order of 25 – 35°C. Minimum temperatures will be in the order of 13 – 18°C.
- Maximum temperatures over the eastern maize-production region will range between 21 and 31°C, with the lower temperatures early in the period. Minimum temperatures will be in the order of 9 - 16°C.
- **Thursday (2nd):** Partly cloudy and mild, but cool in the east.
- **Friday (3rd):** Partly cloudy and mild, but warm and windy in the west where isolated thundershowers are expected later.
- **Saturday (4th):** Partly cloudy and mild to warm, with scattered thundershowers over the western to central parts where it will be windy, but isolated in the east.
- **Sunday (5th):** Partly cloudy and warm with isolated thundershowers. It will remain windy over the western to central parts.
- **Monday (6th):** Partly cloudy, warm and windy with scattered thundershowers moving across the region from the west, clearing in the west according to current forecasts. Fresh to strong north-westerly winds, turning westerly later, are expected over the western parts.
- **Tuesday (7th):** Sunny and warm, but mild in the west, with westerly winds. It should be dry according to current forecasts.
- **Wednesday (8th):** Partly cloudy and warm, becoming hot in the northwest. Isolated afternoon thundershowers are possible in the northeast.

Cape Wine Lands and Ruens: Except for hot conditions initially, at least two frontal systems in or around the region during the period will have a moderating effect on temperatures. While the traditional summer south-easterly winds will be absent for the most part, westerly to southwesterly winds will dominate. These winds will keep the western to northwestern parts relatively cool on most days, but will sometimes result in warm conditions further east over the Karoo and eastwards along the Garden Route. A weak trough and cold front will result in light showers on Friday and Saturday especially in the southwest. Current forecasts indicate a more significant cold front moving in from the west, resulting in cool to cold, windy conditions and widespread showers on Monday, clearing during the day on Tuesday.

Daily summary of expected conditions

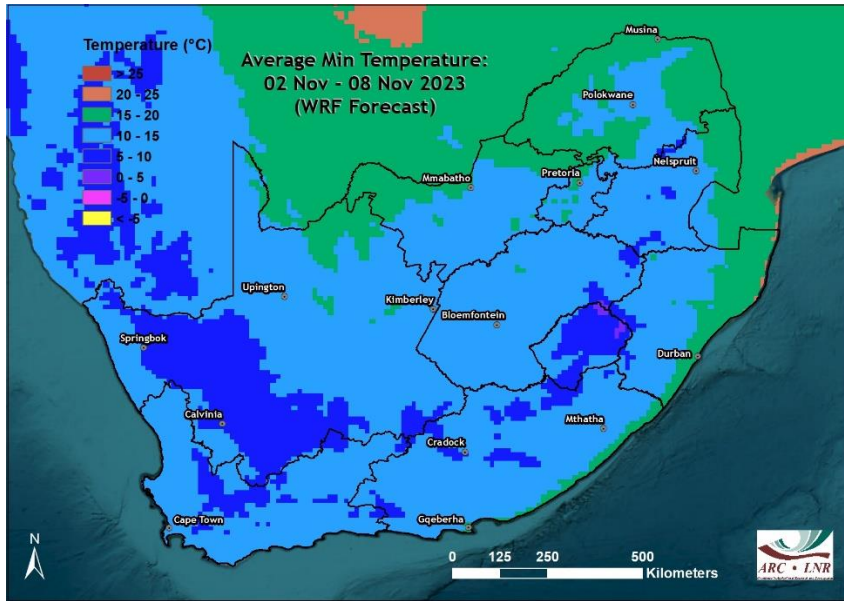
(GFS forecast downscaled using WRF)



Rainfall

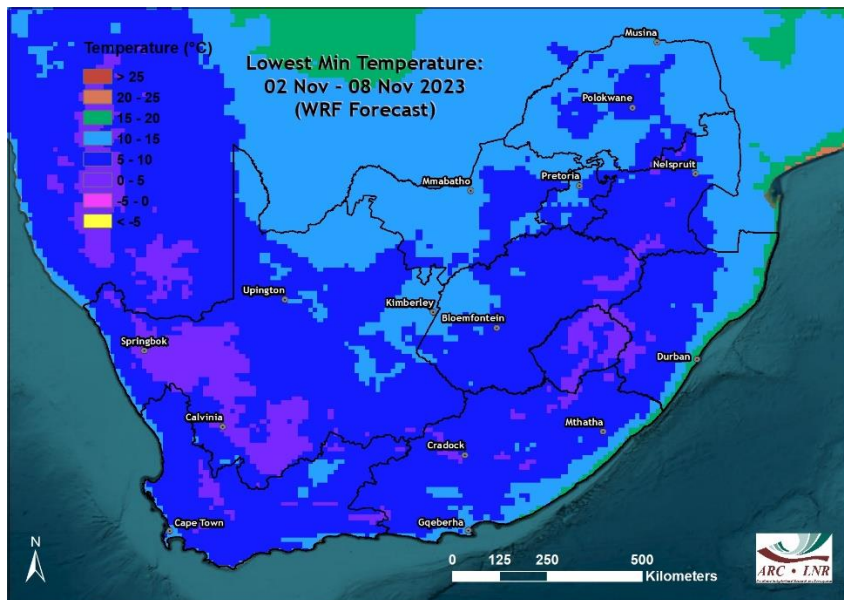
- Most of the precipitation during the next few days will occur in a diagonal band across the central parts.
- Totals will be low for the most part.
- Parts of the Free State and western to central North West may receive 10 – 25 mm of rain in total, but most of the area should receive less than 10 mm according to current forecasts.

- The band of thundershowers over the central to southeastern parts will slowly move eastwards during the next few days.
- On Monday, dry and cooler air invading the interior in the form of westerly winds, will result in clearance over the central parts, with the thundershowers expected to be relocated further east, over the far eastern to northeastern parts, while the rest of the interior is expected to be dry.
- Showers are expected over the winter rainfall region on Friday (isolated and light) and again by Monday/Tuesday (more widespread).



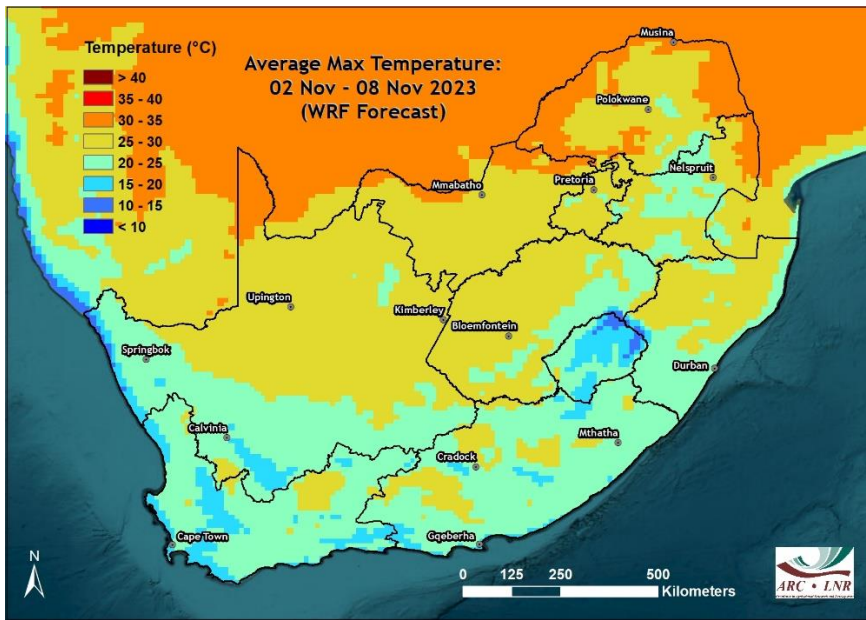
Average minimum temperatures

- Average minimum temperatures over the interior will be close to 10°C.
- Average minimum temperatures will be lowest along the Lesotho Drakensberg and southern escarpment (5 to 10°C).
- Average minimum temperatures in the Lowveld and eastern seaboard will exceed 15°C.



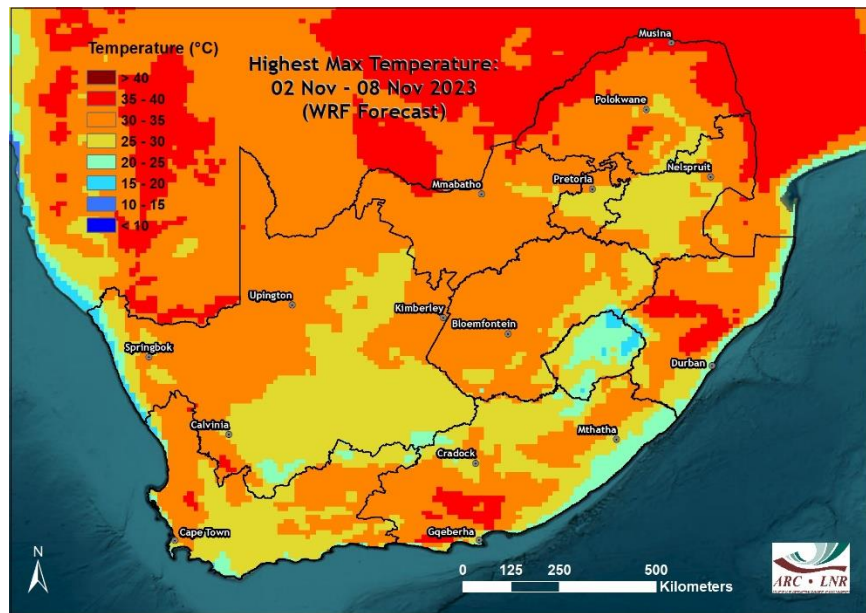
Lowest minimum temperatures

- Lowest minimum temperatures over the Drakensberg and high-lying adjacent areas of the Free State, Mpumalanga, KZN and Eastern Cape as well as along the southern escarpment could be in the order of 5°C initially (morning of the 2nd), but the rest of the period should be warmer in the mornings.
- Lowest minimum temperatures indicated for the western to southern and central interior may occur early next week behind the cold front expected to move across the western to southern and central parts.



Average maximum temperatures

- Average maximum temperatures will be relatively low in the south and are not expected to exceed 20°C over the southern escarpment.
- As can be expected, maximum temperatures will be higher towards the north, and will exceed 30°C over the northern to northeastern low-lying areas.

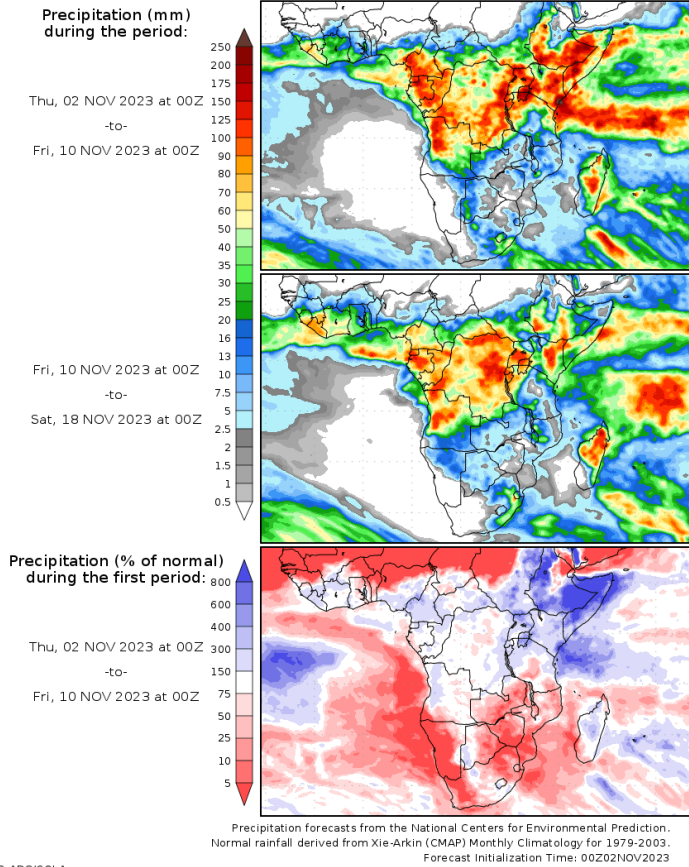


Highest maximum temperatures

- Hot conditions (>35°C) will occur initially (2nd) over the west coast and Karoo as berg-wind conditions dominate.
- Hot conditions (>35°C) will occur over the central to southern parts of the Eastern Cape as berg-wind conditions shift east on the 3rd.
- Hot conditions (>35°C) will shift to the central to northern parts of KZN and the northeastern low-lying areas (Limpopo River Valley and Lowveld) on Monday and Tuesday.

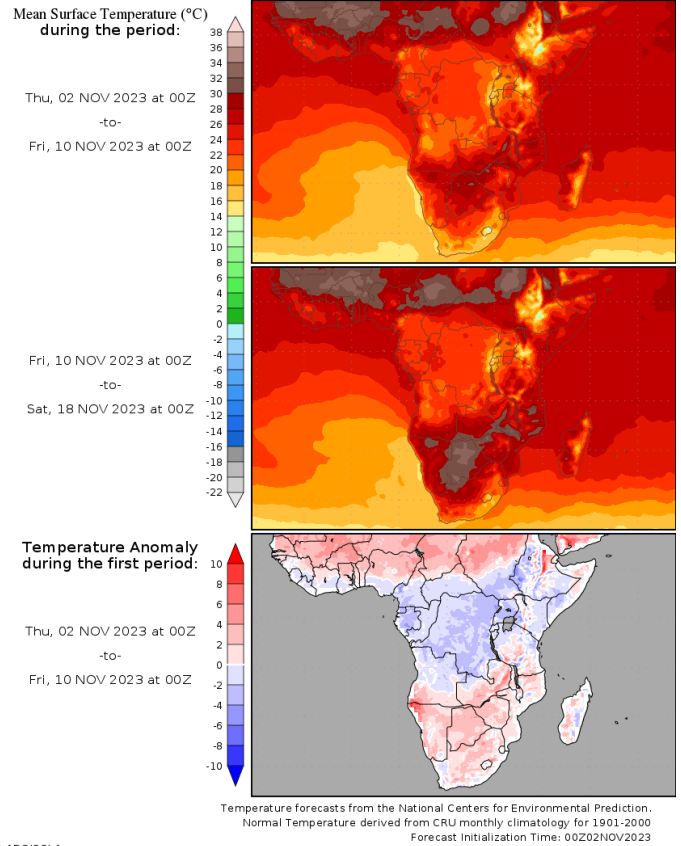
Medium term rainfall and temperature summary

Precipitation Forecasts

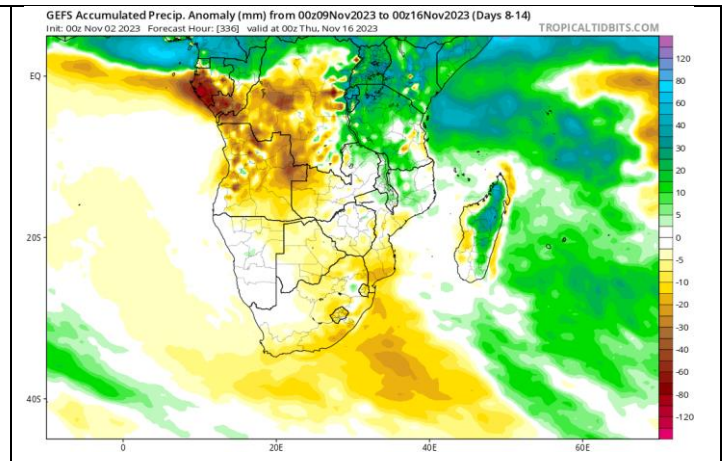
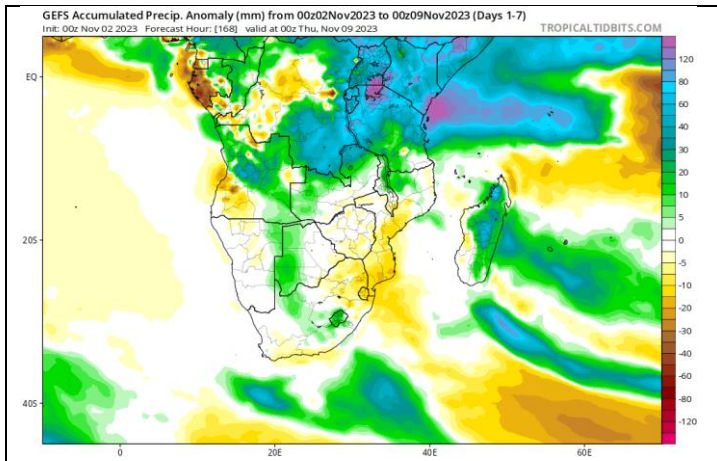


GRADS/COLA

Temperature Forecasts



GRADS/COLA



The GFS ensemble forecast (consisting of several forecasts with small initialization differences) favors relatively wet conditions over the central parts, where the band of thundershowers will be located until Sunday/Monday. Following the invasion of dry air currently expected by Monday, associated with a cold front moving into the interior from the west, models indicate relatively dry (and warm) conditions over the interior.

Possible extreme conditions - relevant to agriculture

The South African Weather Service issues warnings for any severe weather that may develop, based on much more information (and in near-real time) than the output of only 2 weather model (GFS and the ECMWF model) considered here in the beginning of a week-long (starting 2 November) period. It is therefore advised to keep track of warnings that may be issued by the SAWS (www.weathersa.co.za) as the week progresses.

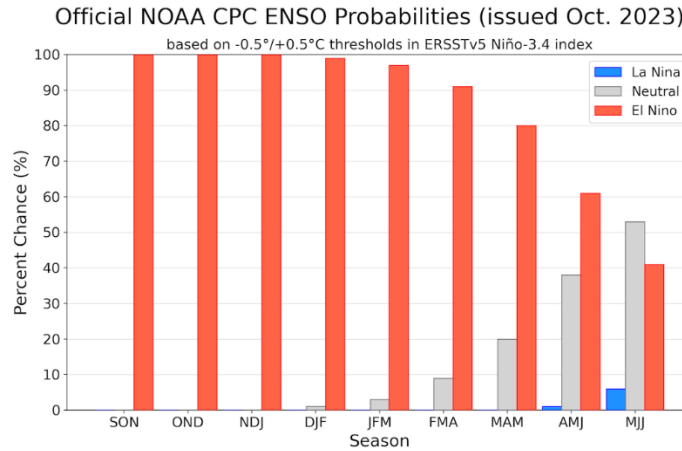
According to current model projections (GFS / ECMWF models) of weather conditions during the coming week, the following may negatively affect agricultural activities and production:

- **It will be hot:**
 - Western interior, western to northern parts of the Western Cape, Karoo: **Thursday (2nd).**
 - Karoo: **Friday (3rd).**
 - Central to northern and eastern KZN: **Monday and Tuesday (6th, 7th).**
 - Limpopo River Valley, Lowveld: **Monday and Tuesday (6th, 7th).**
- **It will be windy, enhancing the fire hazard where vegetation is dry:**
 - Central to southern interior: **Friday (3rd).**
 - Central to southern and western interior: **Monday to Tuesday (6th – 7th).**
- **It will be cool, wet and windy, interfering especially with harvest activities:**
 - Winter rainfall region: **Friday to Saturday (3rd – 4th).**
 - Winter rainfall region: **Monday to Tuesday (6th – 7th).**

Seasonal forecast

Current ENSO conditions:

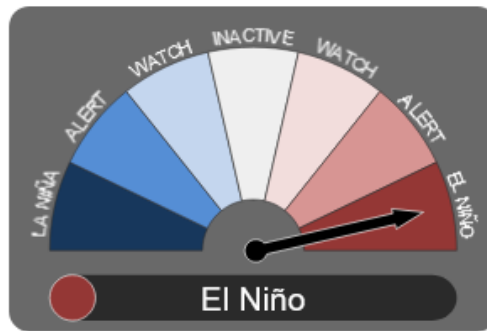
The current El Niño event is expected to last through our summer at least into early 2024. Various international institutions indicate the expectation of further intensification. The Australian Bureau of Meteorology has now also reported that observed trade winds in the Equatorial Pacific are weaker than average and even reversed direction in certain areas, showing atmospheric anomalies consistent with a full-fledged El Niño with ocean-atmosphere coupling. The IRI's latest ENSO forecast still maintains the expectation of a continuation into autumn:



International Research Institute for Climate and Society- <http://iri.columbia.edu/>

Likewise, the Australian Bureau of Meteorology keeps their outlook to “El Niño”

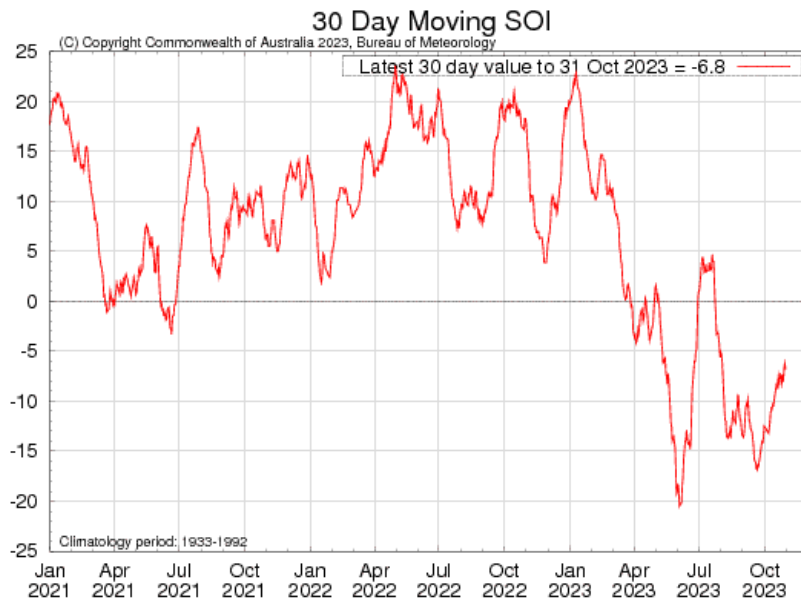
El Niño under way in the tropical Pacific



Australian Bureau of Meteorology - <http://www.bom.gov.au>

The Australian Bureau of Meteorology also note that 3 out of 4 indicators they use to determine the state of ENSO, are in ENSO territory:

- Sea surface temperature: Temperatures in the NINO3 or NINO3.4 regions of the Pacific Ocean are 0.8 °C warmer than average.
- Models: A majority of surveyed climate models show sustained warming to at least 0.8 °C above average in the NINO3 or NINO3.4 regions of the Pacific until the end of the year.
- SOI: The three-month average Southern Oscillation Index is -7 or lower (the most recent SOI is on the border of what is classified of being representative of El Niño and neutral conditions).



Australian Bureau of Meteorology - <http://www.bom.gov.au>

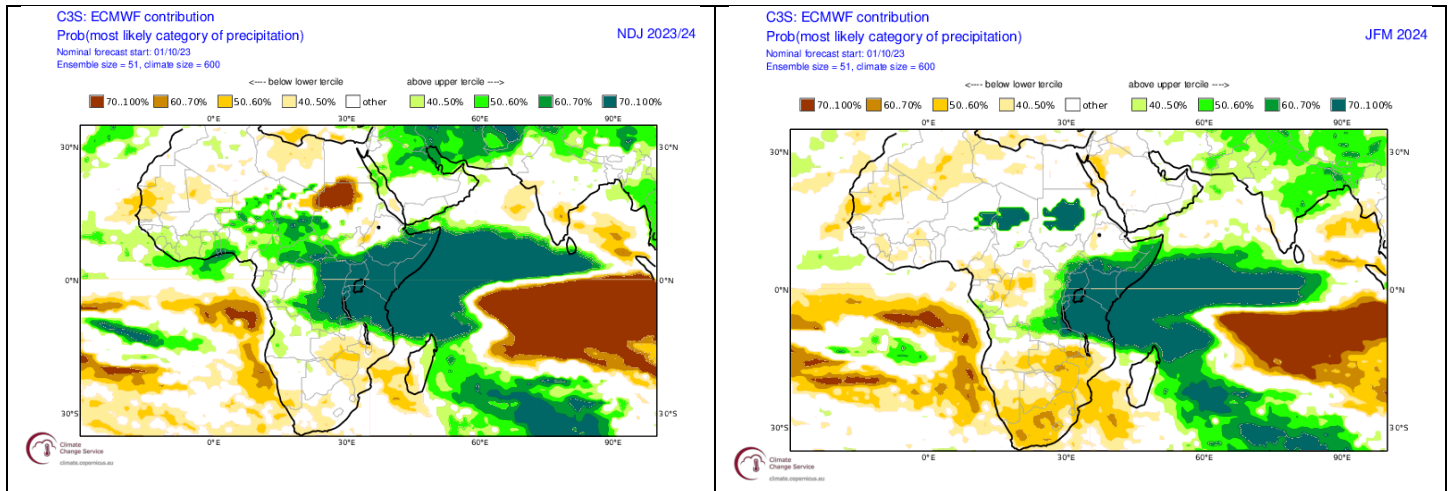
However, they (the Australian Bureau of Meteorology) do note that the trade winds have not yet been weaker than average in the western or central equatorial Pacific Ocean during any three of the last four months, which is the 4th criterion used. It is weaker currently, and if this will persist, the 4th criterion will be met later.

In their most recent update (24 October), the BOM further notes the “Oceanic indicators exhibit a clear El Niño state. Central and eastern Pacific sea surface temperatures (SSTs) continue to exceed El Niño thresholds, with warmer than average waters beneath the surface supporting the warmth at the surface. Models indicate some further warming of central to eastern Pacific SSTs is likely, with SSTs remaining above El Niño thresholds into the early southern hemisphere autumn 2024” Australian Bureau of Meteorology - <http://www.bom.gov.au>.

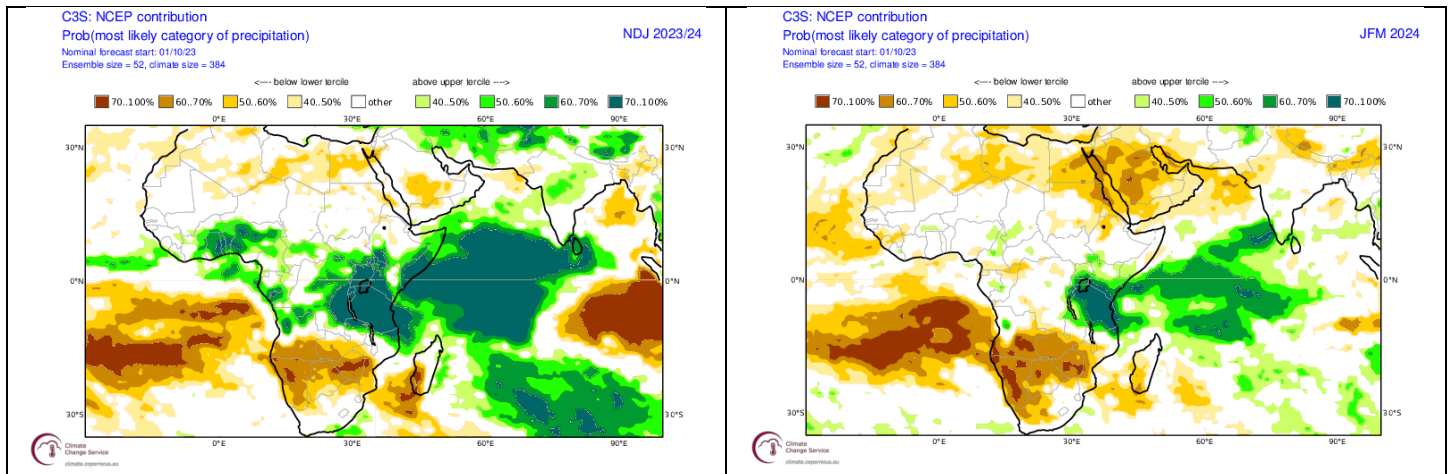
Regarding the atmospheric component, they also note that “Broadscale pressure and cloudiness patterns over the Pacific reflect El Niño. Trade wind strength over the past fortnight has been weaker than average over most of the Pacific” - Australian Bureau of Meteorology - <http://www.bom.gov.au> .

Seasonal forecasts issued by various international institutions

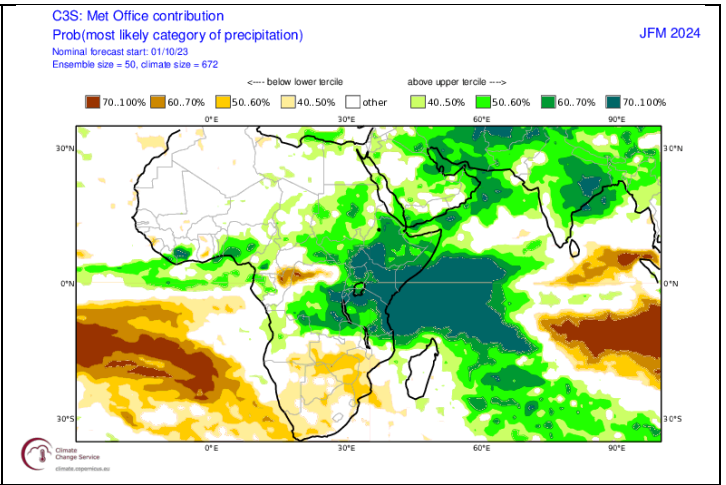
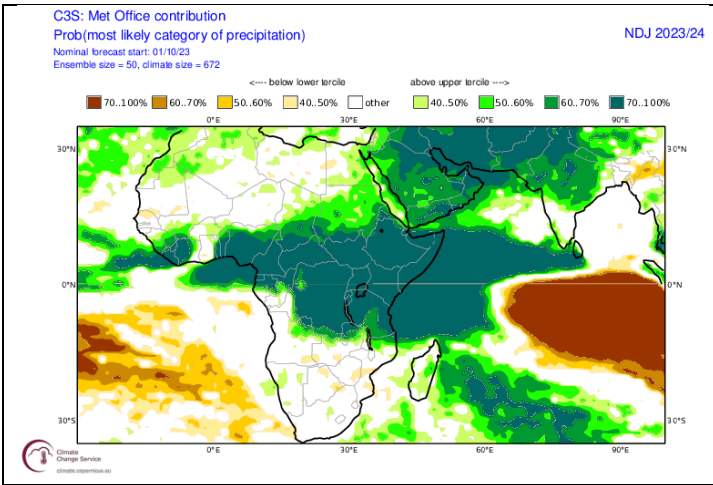
Seasonal forecasts (updated in October 2023) by various institutions, as published by the COPERNICUS Programme (<https://climate.copernicus.eu/seasonal-forecasts>) and by the IRI, still expect drier conditions towards late summer compared to during early and mid-summer. Moreover, the forecasts for late summer have drifted drier with the most recent (October-issued) forecasts. The drier pattern over southern Africa is to be expected with regard to seasonal forecasts given the current El Niño event. During the December – February and January – March period, forecasts still lean more strongly towards drier than normal conditions over the central to western parts of the country while the somewhat wetter signal over the eastern parts have weakened and mostly leans towards drier conditions.



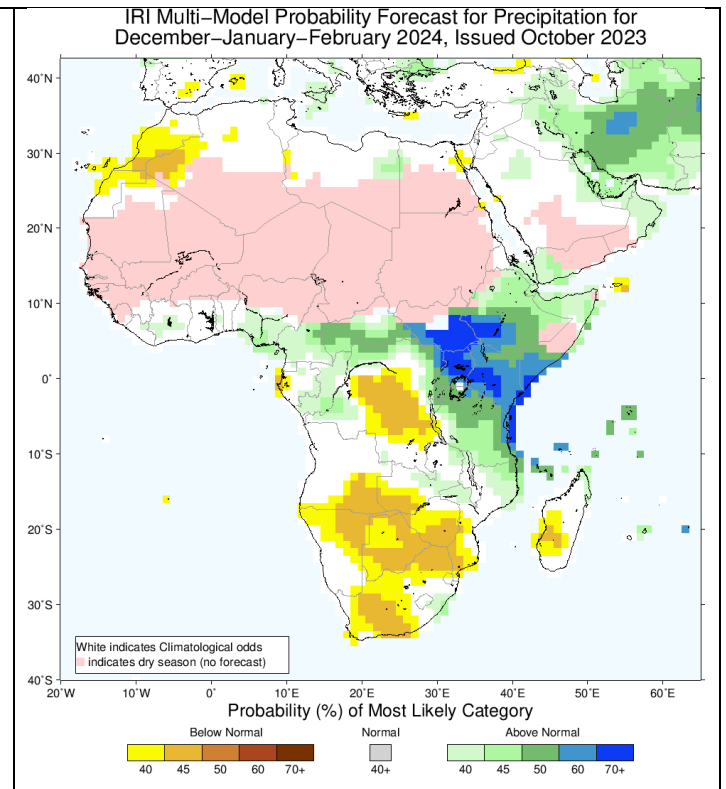
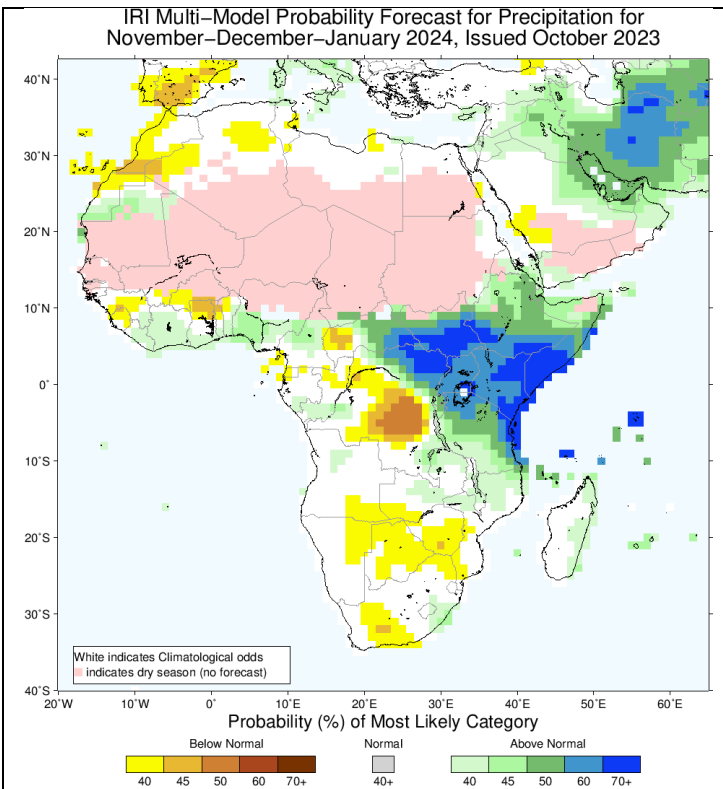
Probabilistic forecasts by the European Centre for Medium-Range Weather Forecasts for rainfall for mid-summer (November-January 2023/24; left - Forecast issued in 2023-10) and mid-to-late summer (January to March 2024; right).



Same as above, but forecasts issued by the National Centres for Environmental Prediction.



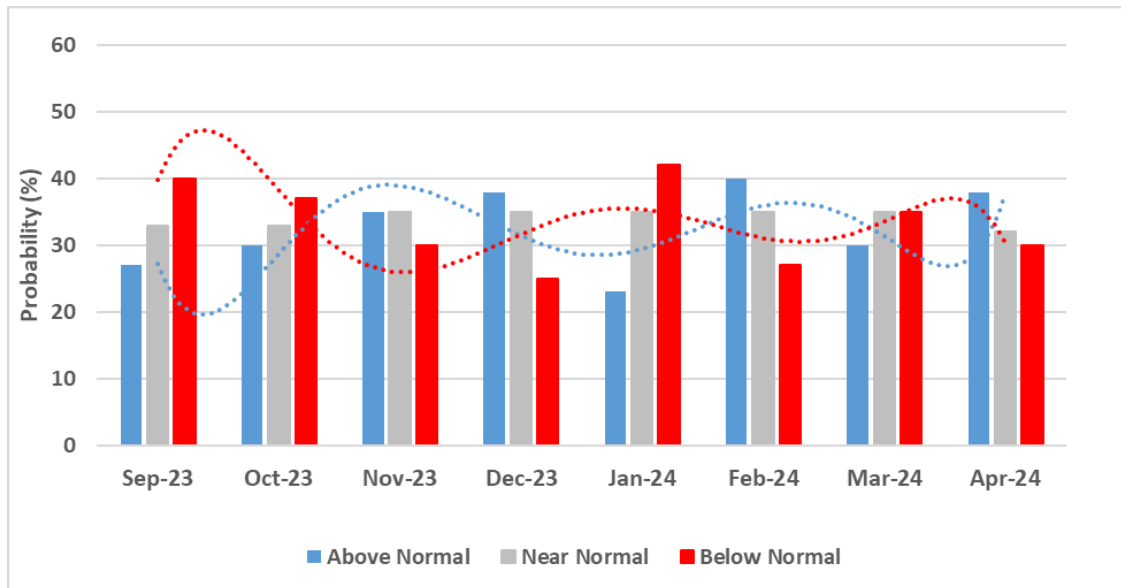
Same as above, but forecasts issued by the UK Met Office.



Probabilistic forecasts by the International Research Institute for Climate and Society (IRI) for rainfall for mid-summer (November-January 2023/24; left - Forecast issued in 2023-10) and mid-to-late summer (December to February 2023/24; right).

CUMULUS seasonal outlook

This outlook is based on the typical observed rainfall patterns over the **north-eastern half** of the country (including most of the summer grain production region), as associated with the cyclic variability of the global climate system. Summers that are similar to 2023/24 usually experience near normal to below normal rainfall in total, with alternating wet and dry periods throughout the summer rather than one half of the summer being dry while the other half is wet.



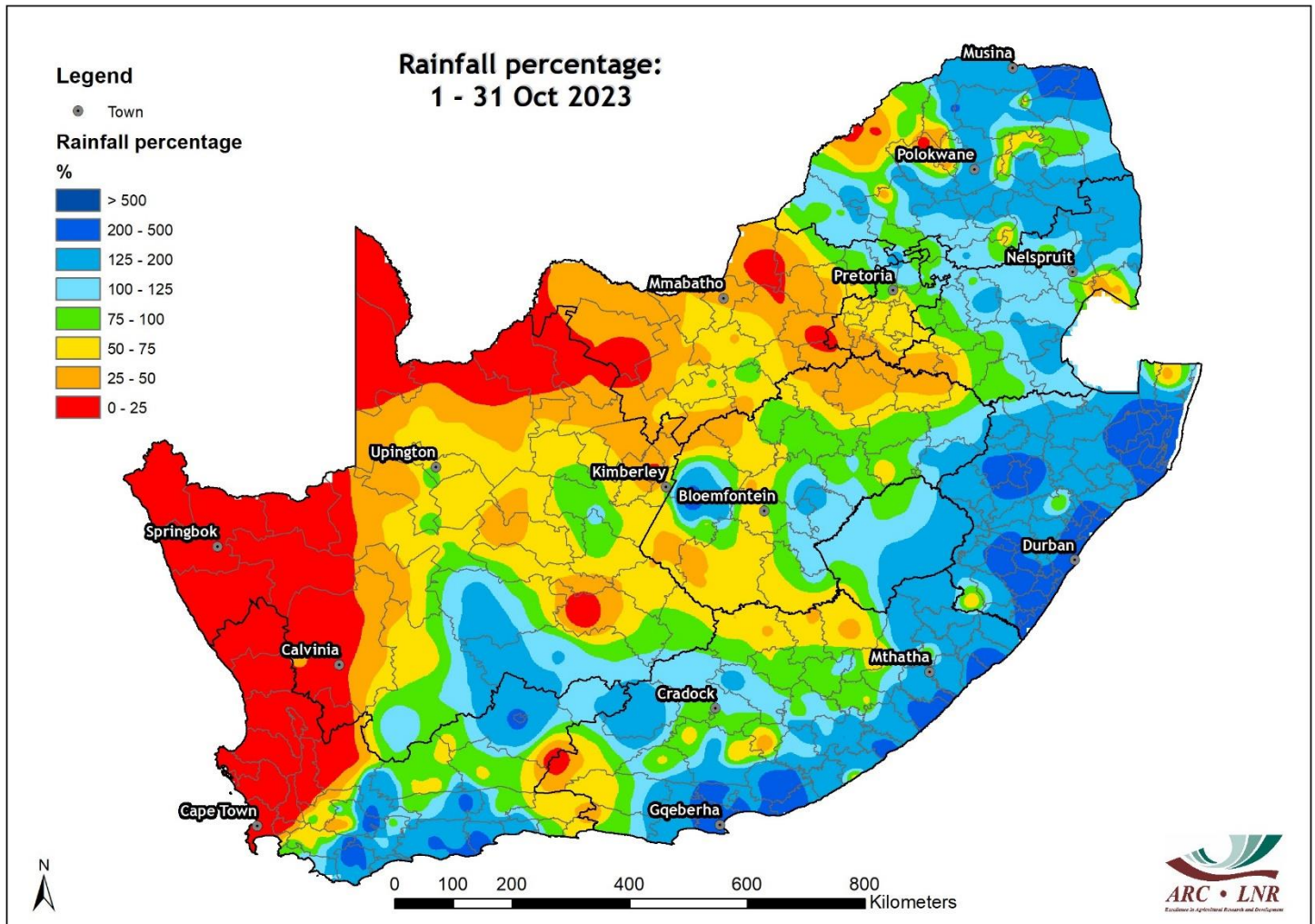
Probabilistic forecast for rainfall over the summer rainfall region, based on the natural cyclic nature of the climate system as seen in decadal variability, per month for the period September 2023 – April 2024 (Forecast issued in 2023-09).

Typical patterns during similar summers, over the north-eastern half of the summer rainfall region, are:

- September – first half of October: Relatively dry conditions over the north-eastern half of the summer rainfall region
- Second half of October – early November: Near-normal rainfall over the north-eastern half of the summer rainfall region
- First half of November: Near-normal to below-normal rainfall over the north-eastern half of the summer rainfall region
- Late November and December to early January: Above-normal rainfall over the north-eastern half of the summer rainfall region
- Rest of January: Below-normal rainfall over the north-eastern half of the summer rainfall region
- February: Normal to above-normal rainfall over the north-eastern half of the summer rainfall region
- Late February and early March: Below-normal rainfall over the north-eastern half of the summer rainfall region
- Late March into Early April: Normal to above-normal rainfall over the north-eastern half of the summer rainfall region

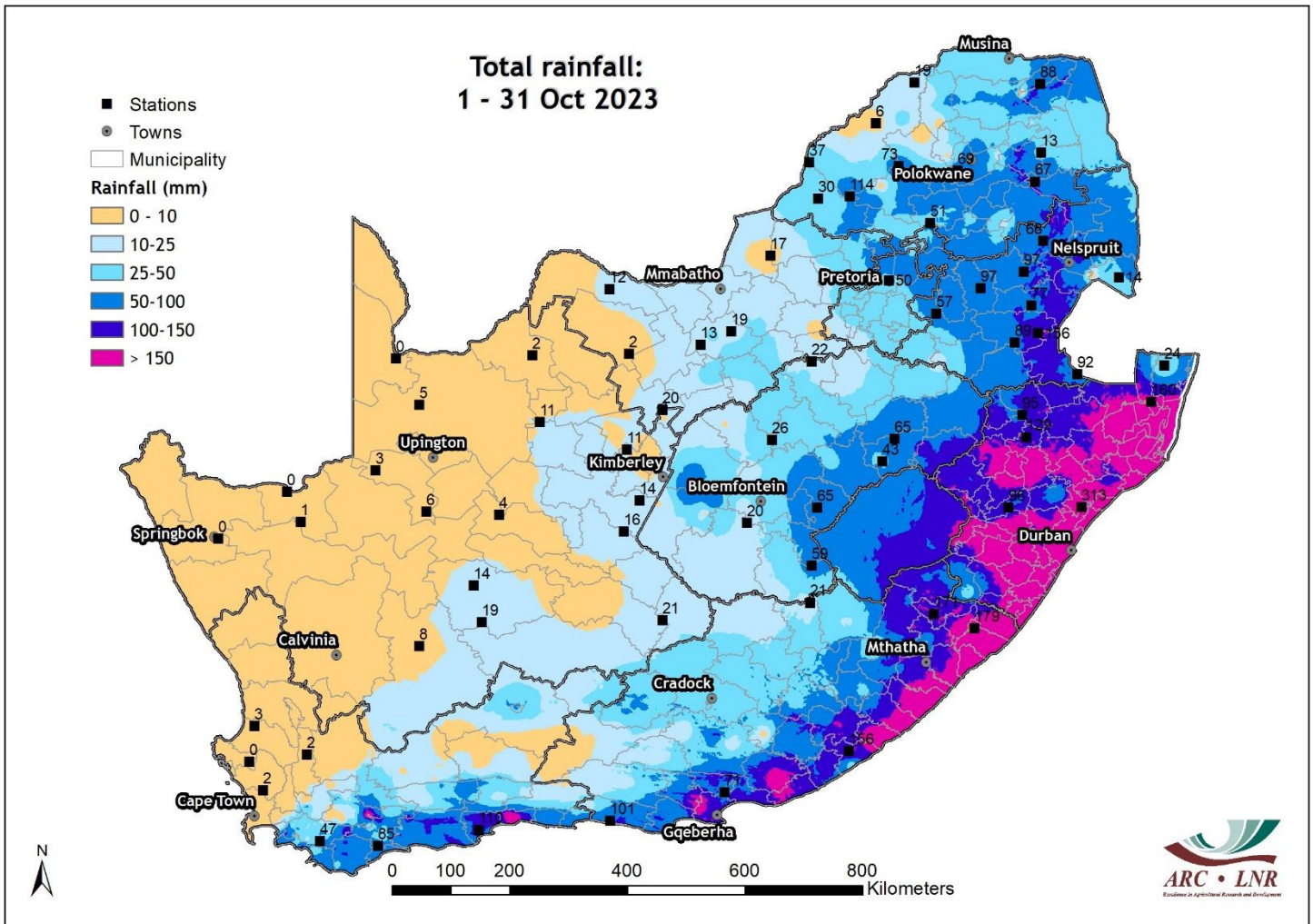
Observed conditions

Rainfall (% of long-term mean): October 2023



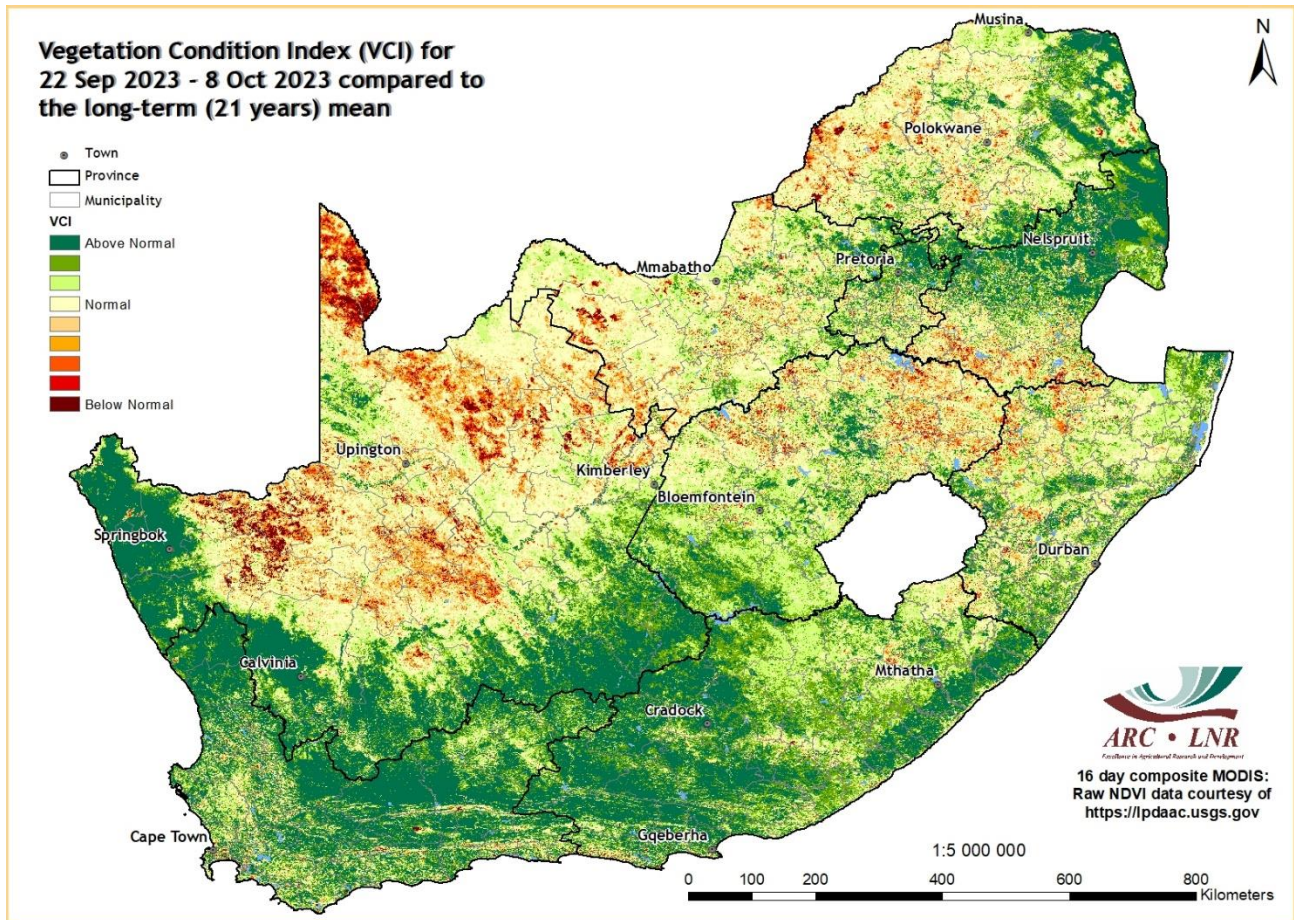
The pattern of a relatively dry northern to northwestern interior with anomalously high rainfall over the southern to southeastern and far eastern to far northeastern parts continued during October. This pattern is in contrast to the rainfall pattern observed during the 2021-2023 La Niña, when the interior was wet and the southern parts dry.

Rainfall (mm): October 2023



The central to northern interior and western parts of the country were relatively dry during October. Totals however exceeded 50 mm over KZN, large parts of the Mpumalanga, southern Limpopo, eastern Free State and northern to eastern Gauteng. Higher totals (exceeding 150 mm) were recorded over KZN, the eastern to southern parts of the Eastern Cape and some areas along the Garden Route.

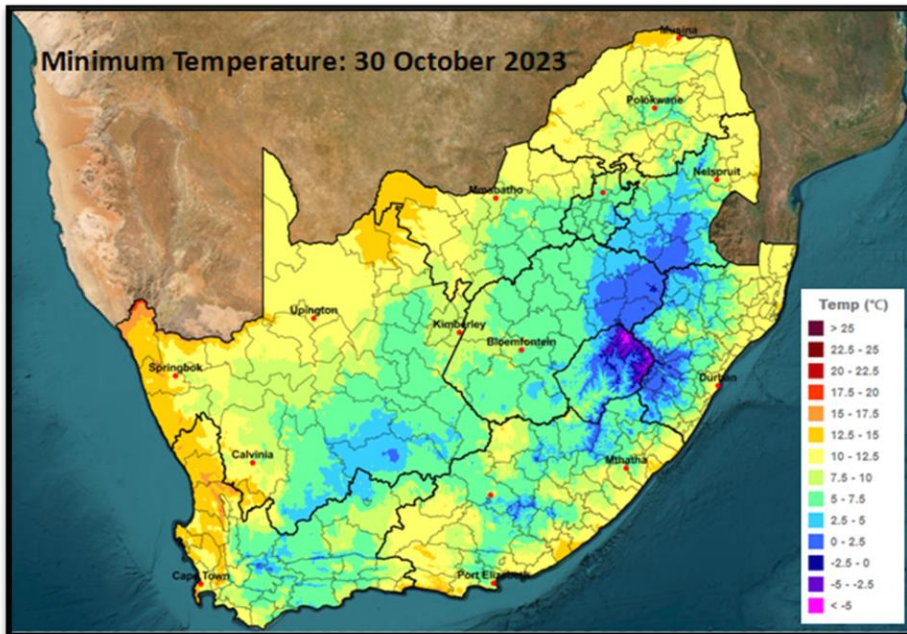
Vegetation Condition Index: September to early October 2023



By early October, drier conditions earlier over the Northern Cape interior and western Limpopo resulted in below-normal vegetation activity over these areas. Wetter than normal conditions supported above-normal vegetation activity over the rest of the country, especially the winter rainfall- and all-year rainfall regions in the south and southwest together with the southern interior. The northeastern parts of the summer-grain-production region (northern half of Mpumalanga), where above-normal rainfall occurred since September, also experienced above-normal vegetation activity while large areas further west and south in the region experience below-normal vegetation activity.

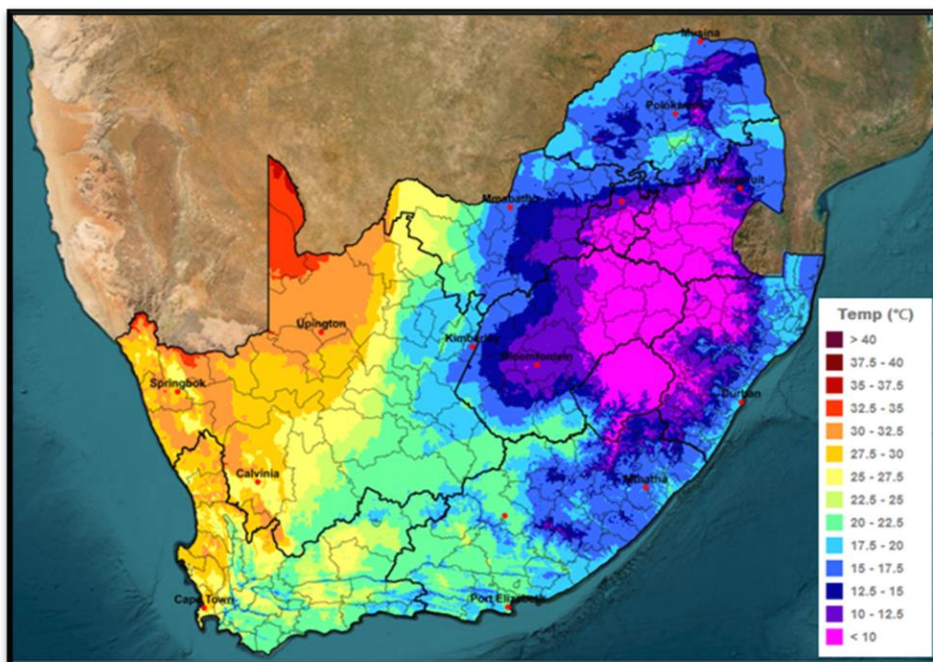
Cold conditions observed on Monday

The cold and rainy conditions early this week, with snow in parts of the Drakensberg and adjacent areas in the eastern Free State and Mpumalanga, were widely reported. These conditions were expected and discussed in the previous newsletter. The following maps show the recorded minimum and maximum temperatures for Monday, 30 October. Minimum temperatures over the higher parts of the eastern Free State, western KZN and southern Mpumalanga were around 0 – 2.5°C (map below).



Minimum temperature recorded on 30 October 2023.

Large parts of the eastern Free State, Gauteng, Mpumalanga and western KZN recorded maximum temperatures below 10°C, with the higher areas within this larger region, where the lower minimum temperatures were recorded, recording maximum temperatures below 5°C (map below).



Maximum temperature recorded on 30 October 2023.

Sources of information

Seasonal forecasts: Published by the COPERNICUS Programme (<https://climate.copernicus.eu/seasonal-forecasts>)

Rainfall, temperature and wind maps over South Africa for the past week:

Agricultural Research Council - Institute for Soil, Climate and Water (ISCW) – Climate Data Bank. Data recorded by the automatic weather station network of the ARC-ISCW.

Vegetation condition maps: Copernicus Global Land service, distributed by VITO.

Information related to: ENSO, IOD and SOI:

Australian Bureau of Meteorology - <http://www.bom.gov.au>

Climate Prediction Center - <http://www.cpc.ncep.noaa.gov>

International Research Institute for Climate and Society- <http://iri.columbia.edu/>

Information related to the SAM:

The Annular Mode Website - <http://www.atmos.colostate.edu/ao/index.html>

SST map:

NOAA Climate Prediction Center - <http://www.cpc.ncep.noaa.gov>

Daily conditions over South Africa:

Accumulations of GFS 6-hourly rainfall fields, done in Google Earth Engine

Tropical cyclone/hurricane/typhoon information:

Weather Underground - <http://www.wunderground.com>

Cooperative Institute for Meteorological Satellite Studies (CIMMS) - Tropical Cyclone Group -<http://tropic.ssec.wisc.edu/>

Tropical Cyclone Centre La Reunion -http://www.meteo.fr/temps/domtom/La_Reunion/webcmrs9.0/anglais/index.html

Information on drought conditions over the USA:

NOAA National Weather Service - <http://www.weather.gov>

United States Drought Monitor - <http://droughtmonitor.unl.edu>

Precipitation and temperature outlooks for the coming week:

Center for Ocean-Land-Atmosphere Studies (COLA) and Institute of Global Environment and Society (IGES) – <http://Wxmaps.org>

“COLA and IGES make no guarantees about and bear no responsibility or liability concerning the accuracy or timeliness of the images being published on these web pages. All images are generated by COLA and do not represent the actual forecasts issued by the National Weather Service. These products are not a substitute for official forecasts and are not guaranteed to be complete or timely. The underlying data are the direct product of the various operational forecast models.

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