# CUMULUS

## SEASON 2023/2024

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## 07 December 2023

# Contents

# Summary

## Milder, wetter conditions ahead

The hot and dry conditions of the last few weeks will be replaced by milder weather with a good chance of rain over especially the eastern to northeastern summer rainfall region. Two rain-bearing weather systems will be active during the next few days and widespread rain is possible over large parts of the summer rainfall region.

The first will be a weak upper-air cut-off low moving across the southern interior and that will bring scattered thundershowers to the southern to eastern interior.

The second system is a deeper cut-off low that is expected by Sunday over the central interior. This second system is expected to result in more widespread showers and thundershowers over the interior, according to current forecasts.

However, the location and intensity of this system is not yet certain and will largely determine where rainfall will focus. Increased cloud cover and easterly to northeasterly winds over the central to eastern interior will result in a drop in the maximum temperatures to normal or below normal for this time of the year in contrast to the heatwave conditions earlier.

At this stage, the chances are particularly good for rain over the Free State and further north and east. However, depending on the exact positioning of the second system, rain may or may not be significant over the western grain production areas such as the western to northwestern Free State and the central parts of North West.

Rainfall during the next few days will be associated with west-wind upper-air lows.

These systems are more typical during the spring and autumn seasons when they contribute a significant proportion of rainfall. While they can result in widespread rainfall over the interior during mid-to late summer, they are not necessarily indicative of a large-scale circulation patterns that has now turned favorable for the rest of the summer in terms of tropical moisture availability and tropical systems in the region.

It sometimes happens that extended hot and dry conditions return across the interior following these systems. However, the more favorable large-scale circulation patterns that now dominate further south over the ocean may result in more such systems to cause further rain for the time being. It is also worth noting that the tendency for more severe storms to develop is enhanced in association with these west-wind upper-air systems as opposed to tropical systems that dominate our region during generally wet mid-to-late summers.

At this stage, forecast models indicate persistence of favorable pressure patterns over the Atlantic Ocean for about the next two-week period. This should result in at least near normal rainfall over large parts during this time. However, forecasts beyond a week ahead can change drastically in a short time and as mentioned earlier, the occurrence of the upper-air lows causing the current rainfall events are not necessarily an indication of a permanent change going forward.

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

- Temperatures will be near normal to slightly below normal over the interior for this time of the year.
- It will be cooler with more cloud cover than during the previous few weeks.
- Rainfall will be normal to above normal over the central to eastern and northeastern parts, but below normal in the west where little to no rain is expected according to current forecasts.
- Rainfall over the central to eastern parts will be more widespread on Thursday and again from Saturday to Monday.
- The winter rainfall region may receive some rain during the period, especially going into the weekend and again early next week, with especially the Garden Route favored as opposed to the west coast where it should remain mostly dry.
- **The summer-grain production region** will be mild to warm on most days, but mild to cool and cloudy from late Saturday until at least Monday with widespread showers or thundershowers. The western parts of the region are expected to be hot on Friday and Saturday.

# Overview of expected conditions over the main agricultural production areas

Upper air troughs or lows in the westerlies will replace the anti-cyclonic circulation that dominated the interior the last few weeks. This will be associated with an on-shore flow from the east at the surface and enhanced cloud cover, having a moderating effect especially on the day-time temperatures as well as more widespread rainfall across the summer rainfall region at times.

***Maize production region:***

**It will be mild to warm on most days, with showers or thundershowers focussing on Thursday (7th) and again later this weekend into early next week. It will become hot over the western parts of the production region on Friday and Saturday, between the two rain-bearing systems. Current forecasts indicate the possibility of significant totals that may be accumulated until early next week over especially the central to eastern parts, but this may change as the exact positioning and intensity of the upper-air low by Sunday becomes clear:**

- Maximum temperatures over the western maize-production areas will range between 20 and 37°C, with highest temperatures early this weekend and lowest temperatures early next week. Minimum temperatures will be in the order of 14 – 20°C.
- Maximum temperatures over the eastern maize-production region will range between 16 and 31°C, with lowest temperatures early next week and highest temperatures early this weekend. Minimum temperatures will be in the order of 11 - 16°C.

- **Thursday (7th):** Partly cloudy and mild with moderate to fresh northerly winds. Scattered thundershowers are expected, but isolated in the west.

- **Friday (8th):** Partly cloudy and warm, but hot and windy in the west. Isolated thundershowers are expected in the east.

- **Saturday (9th):** Partly cloudy and warm, but hot and windy in the west. It will become partly cloudy to cloudy over the central to eastern parts with scattered thundershowers later.

- **Sunday to Monday (10th – 11th):** Partly cloudy to cloudy and mild with widespread showers and thundershowers. It is not clear yet if the western parts will also receive widespread and significant rainfall, but forecasts during the weekend will provide clarity.

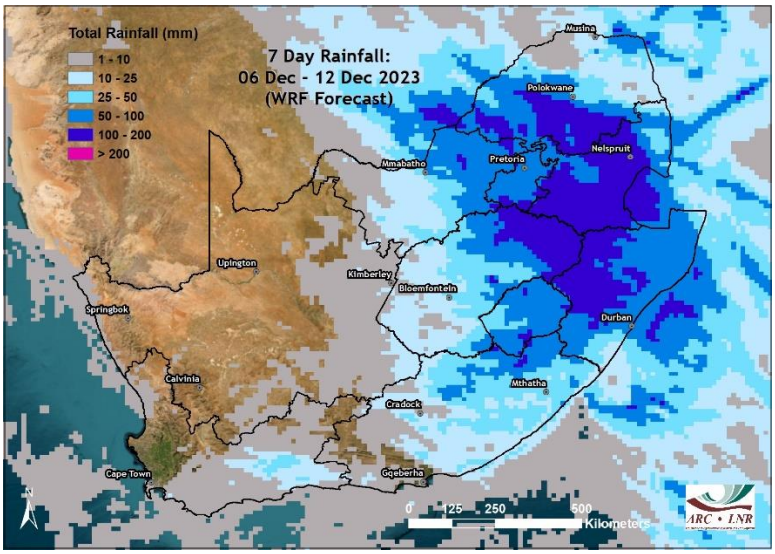
- **Tuesday (12th) to Wednesday (13th):** Current forecasts indicate that is will clear from the west, with drier conditions setting in and maximum temperatures recovering as it will become sunny.

### *Cape Wine Lands and Ruens:*

Southerly to southeasterly winds will dominate during this period, keeping the southern parts generally cooler while the northwestern parts will be warmer. Showers are expected along the Garden Route by Friday and into Saturday, with showers or thundershowers also possible over the interior. It will clear later on Saturday, with southerly to southeasterly winds keeping the southern parts cooler while the northwestern parts of the region become warmer to hot until Monday. There are early indications that a cold front may influence the southwestern parts and Garden Route early next week, with light showers over these areas late Monday and early Tuesday and generally cooler conditions across the region.

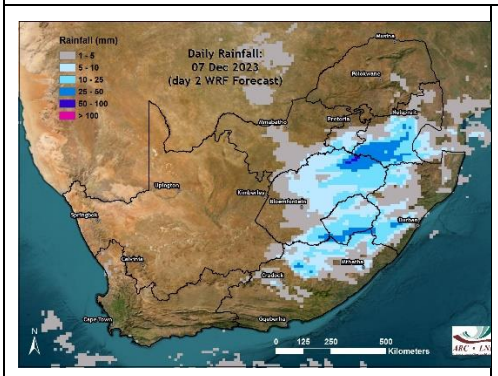
# Daily summary of expected conditions

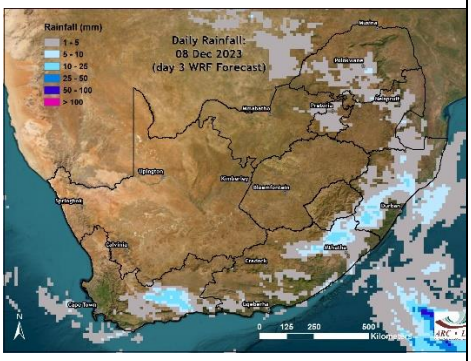
**(GFS forecast downscaled using WRF)**

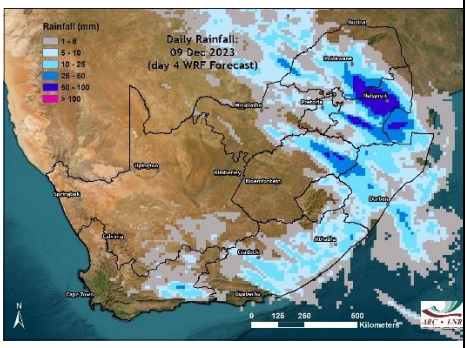


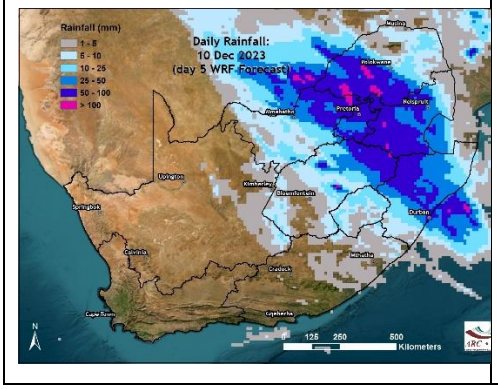

## Rainfall

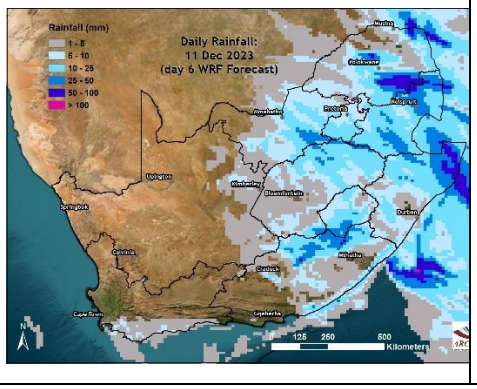
- Widespread showers and thundershowers will result in significant totals over the central to northeastern parts of the country during the next few days.
- Large parts of the northern to eastern Free State, North West, Gauteng, Mpumalanga, KZN and Limpopo may accumulate upwards of 50 mm of rain by Tuesday (12th). The exact location of heaviest rainfall will however only become clear during the weekend.

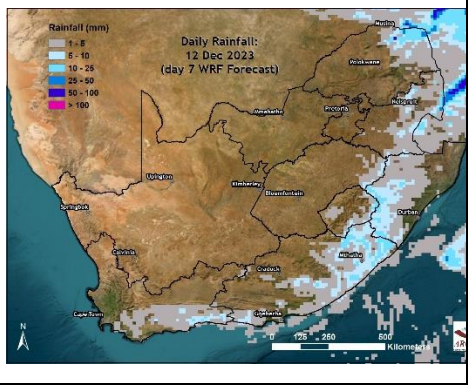


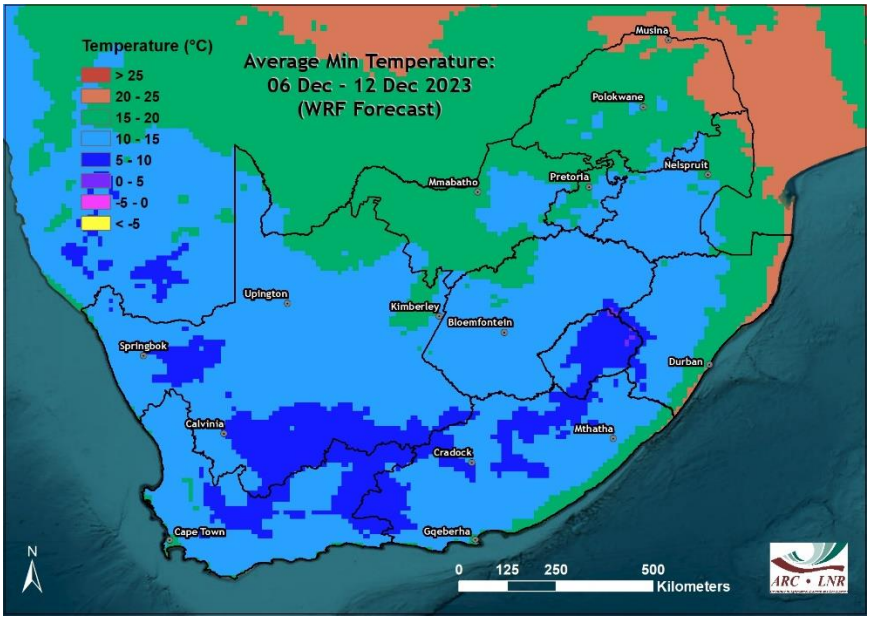



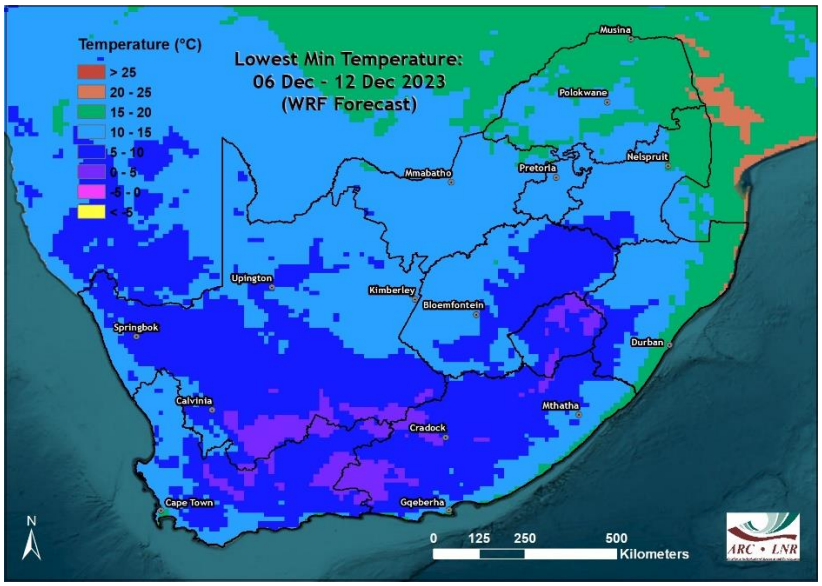




- Scattered thundershowers will occur over the eastern parts on Thursday.
- It will be drier over the interior on Saturday, but showers will occur along the Garden Route with showers or thundershowers also possible further inland in the southwestern interior.
- Widespread showers will occur over the central to eastern and northeastern parts from Saturday to Monday, with accumulation of significant totals during this time.




**Average minimum temperatures**

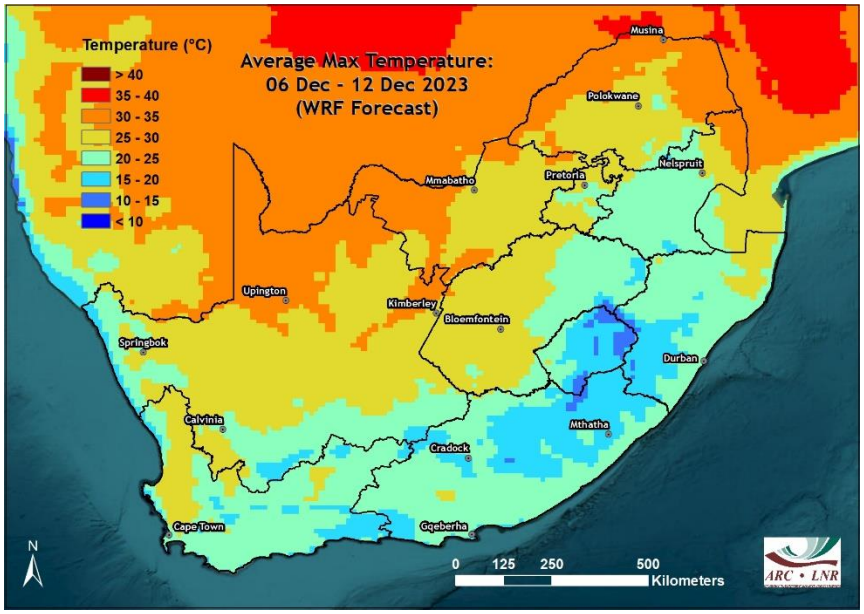
- Average minimum temperatures over the interior will range between 10 and 20°C, with highest temperatures in the north and lower temperatures over Lesotho and mountainous parts of the Western Cape.
- Average minimum temperatures will exceed 20°C over the Lowveld and Limpopo River Valley.




**Lowest minimum temperatures**

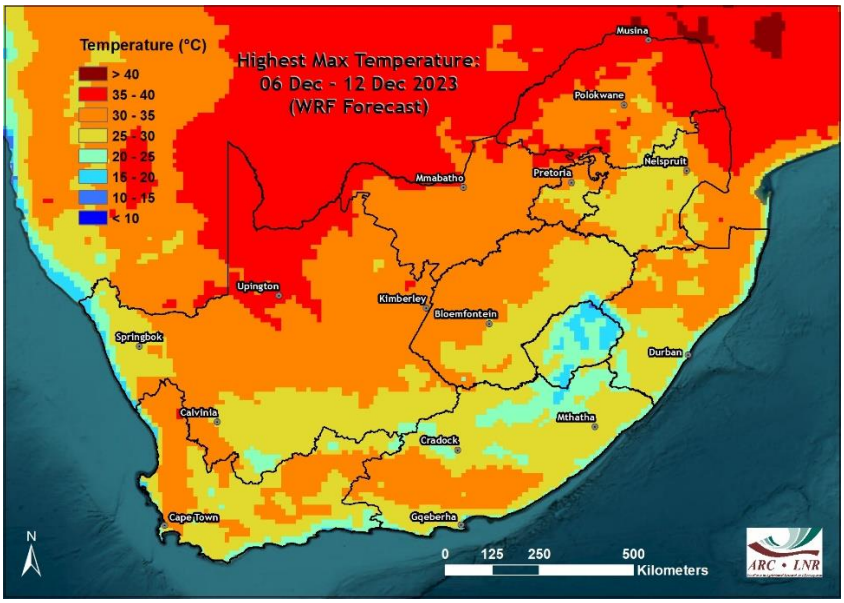
- Lowest minimum temperatures will over the high-lying southern interior, and will remain above 0°C.
- Lowest minimum temperatures over the summer-grain production region will exceed 5°C, but should remain above 10°C over most of the region.

- It should clear by Tuesday depending on the movement of the low over the interior.




## Average maximum temperatures

- Average maximum temperatures will be lower than the previous period.
- Maximum temperatures will exceed 30°C over most of the northern extremes, including the Lowveld and Limpopo River Valley.
- The western to southern coastal belt will be relatively cool with average maximum temperatures ranging between 20 and 25 °C.




## Highest maximum temperatures

- Hot conditions, with maximum temperatures exceeding 35°C, will occur over the Lowveld and Limpopo River Valley and northern North West on Friday and Saturday.
- Hot conditions with maximum temperatures close to or exceeding 35°C will occur over the central to northern and eastern parts of the Northern Cape, western to northern parts of North West and western Free State from Thursday to Saturday.

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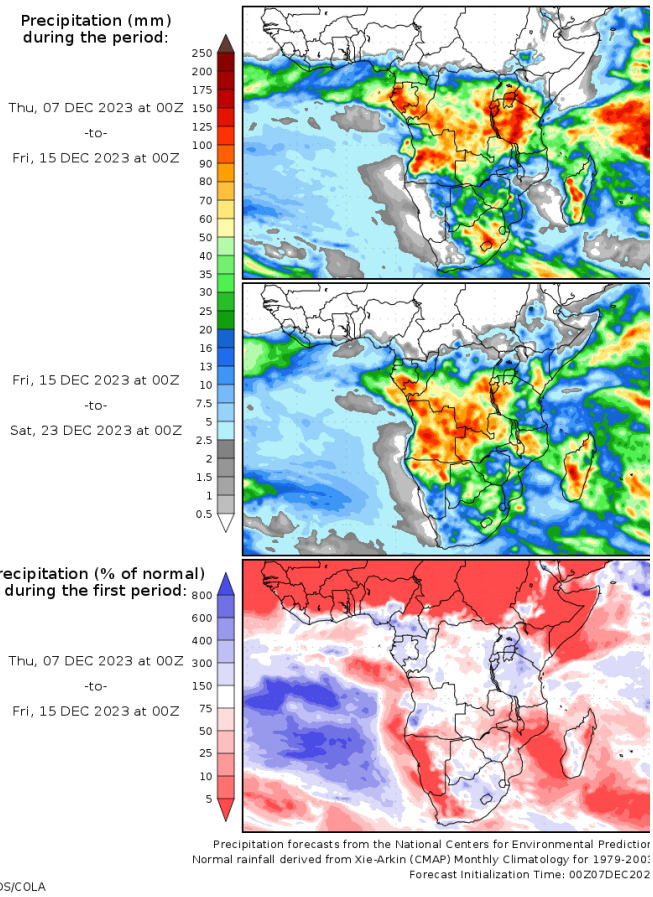
# Medium term rainfall and temperature summary

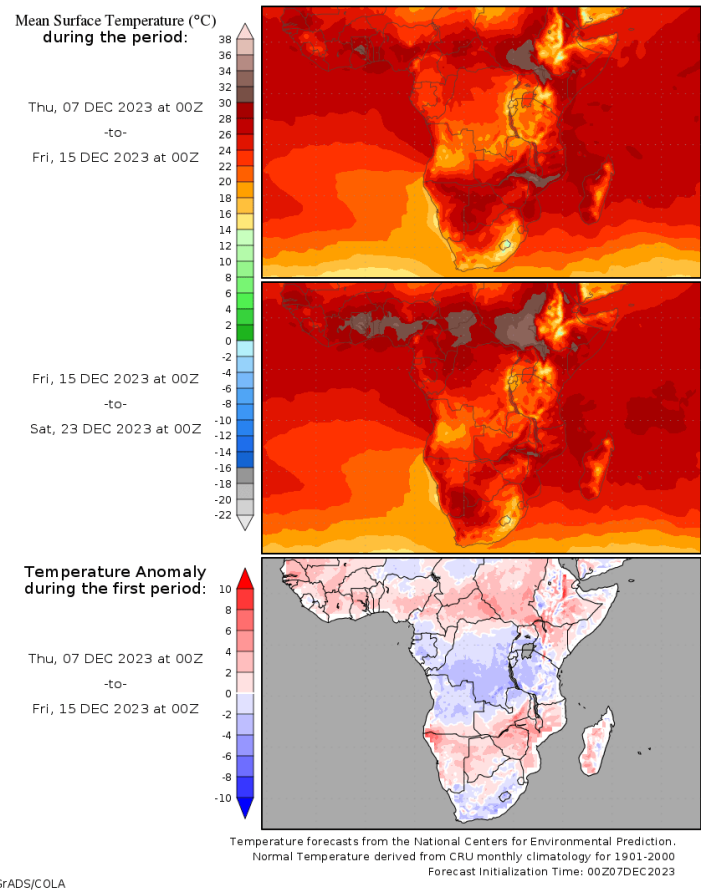
## Precipitation Forecasts




Precipitation forecasts from the National Centers for Environmental Prediction
Normal rainfall derived from Xie-Arkin (CMAP) Monthly Climatology for 1979-200
Forecast Initialization Time: 00Z07DEC202

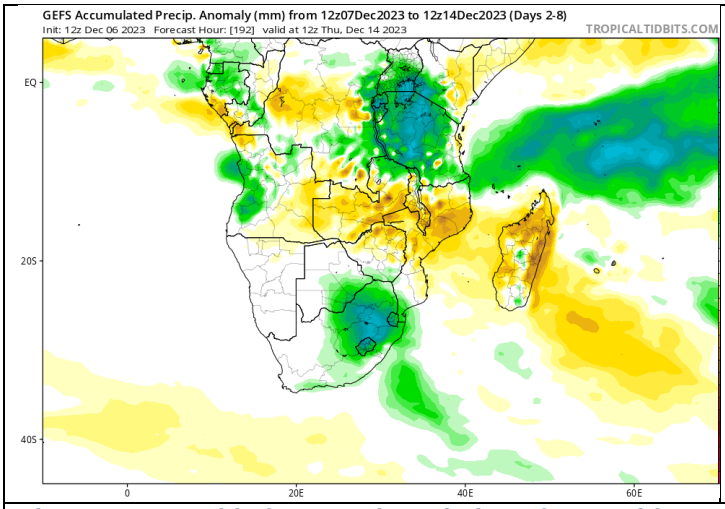
GrADS/COLA

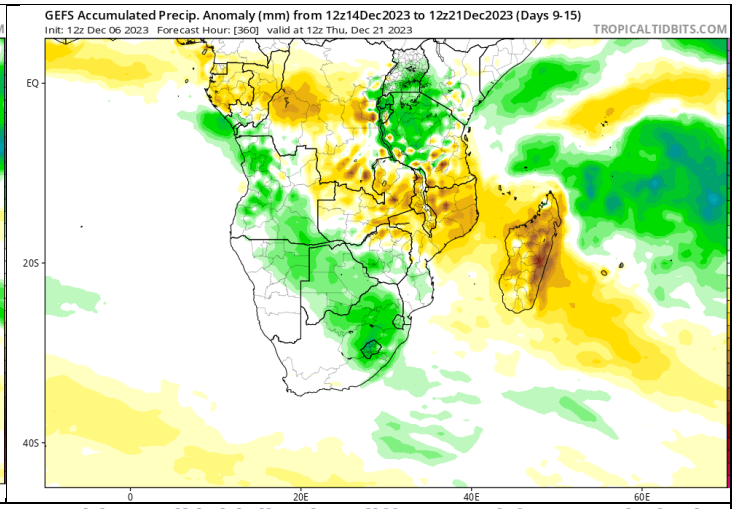
## Temperature Forecasts




Temperature forecasts from the National Centers for Environmental Prediction.
Normal Temperature derived from CRU monthly climatology for 1901-2000
Forecast Initialization Time: 00Z07DEC2023

GrADS/COLA




**The GFS ensemble forecast (consisting of several forecasts with small initialization differences) favors relatively wet conditions over the central to eastern parts of the country during the next few days (left) and possibly continuing through mid-December (right).**

# 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 7 December) 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 and humid:**
  - Limpopo River Valley and Lowveld: **Friday to Sunday (8th to 10th).**
  - Central to northeastern KZN: **Friday to Saturday (8th to 9th).**

- **It will be hot:**
  - Central to western North West, western and northern Free State, interior of the Northern Cape: **Friday and Saturday (8th to 9th).**
  - West coast, Swartland and western escarpment: **Monday and Wednesday (11th, 13th).**
  - Interior of the Northern Cape: **Wednesday (13th).**

- **It will be dry and windy, enhancing the fire hazard where vegetation is dry:**
  - Southern to western interior: **Saturday to Tuesday (9th - 12th).**

- **Some thundershowers may become severe:**
  - Eastern to northeastern Free State, Gauteng and Mpumalanga: **Thursday (7th).**
  - Western edges of the rain band on Sunday afternoon and Monday. At this stage, these areas are indicated to be the western parts of the Free State, large parts of North West, possibly the northeastern parts of the Northern Cape. This area of severe storms may be somewhat further east, depending on the position of the low, in which case it will focus on the eastern parts of North West, Gauteng, southern Limpopo, western Mpumalanga: **Sunday and Monday (10th – 11th).**

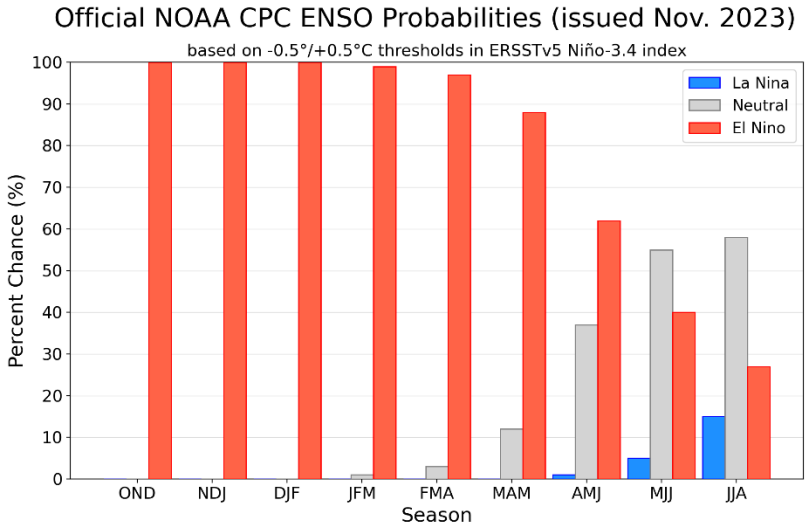
- **Significant daily rainfall totals are possible:**
  - This will be associated with the low on Sunday and Monday, and will depend on the position and intensity of the low. Areas currently indicated for significant totals on Sunday and Monday are central to eastern North West, Gauteng, northern to eastern Free State, western Mpumalanga and southwestern Limpopo. However, a westward location of the low will result in this area to shift to the central and western Free State and western North West: **Sunday to Monday (10th – 11th)**. Forecasts during the weekend will provide better insight on the exact location of expected significant totals**.**

- **Cloudy, wet and cool conditions may result in the development and spread of fungal pathogens:**
  - Summer rainfall region, including the grain production region: **Saturday to Monday (9th - 11th).**

# Seasonal forecast

## Current ENSO conditions:

The current El Niño event is expected to last through our summer at least into early 2024 and it is unlikely that this outlook will change much during the next few months. Atmospheric indicators are consistent an event where coupling between the ocean and atmosphere is present, showing a mature state of the event. Observed trade winds in the Equatorial Pacific weaker than average, showing atmospheric anomalies consistent with a full-fledged El Niño. The International Research Institute for Climate and Society (IRI)'s latest ENSO forecast also maintains the expectation of a continuation into autumn:



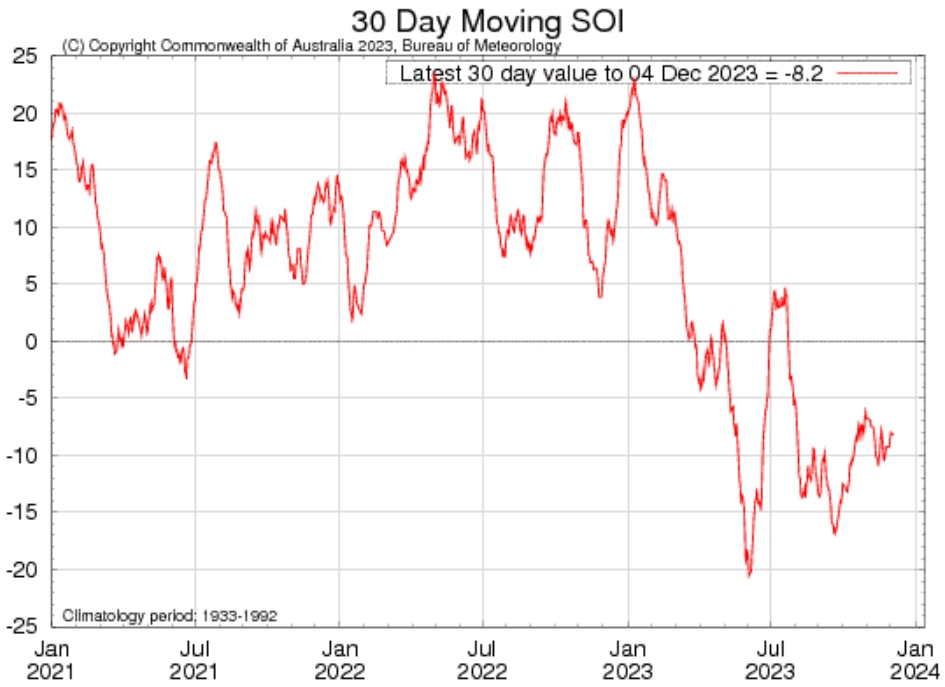

***International Research Institute for Climate and Society*- http://iri.columbia.edu/**

**Likewise, the Australian Bureau of Meteorology keeps their outlook to "El Niño" ……**


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

**In their most recent update (5 December), the BOM notes regarding Sea Surface Temperatures: "El Niño continues in the tropical Pacific. Indicators of the El Niño–Southern Oscillation (ENSO), including tropical Pacific sea surface temperatures (SSTs), cloud, wind, and pressure patterns are consistent with El Niño conditions. Climate model forecasts indicate some further warming of central to eastern Pacific SSTs is possible, with SSTs remaining above El Niño thresholds early into the second quarter of 2024."** *Australian Bureau of Meteorology* - http://www.bom.gov.au**.**

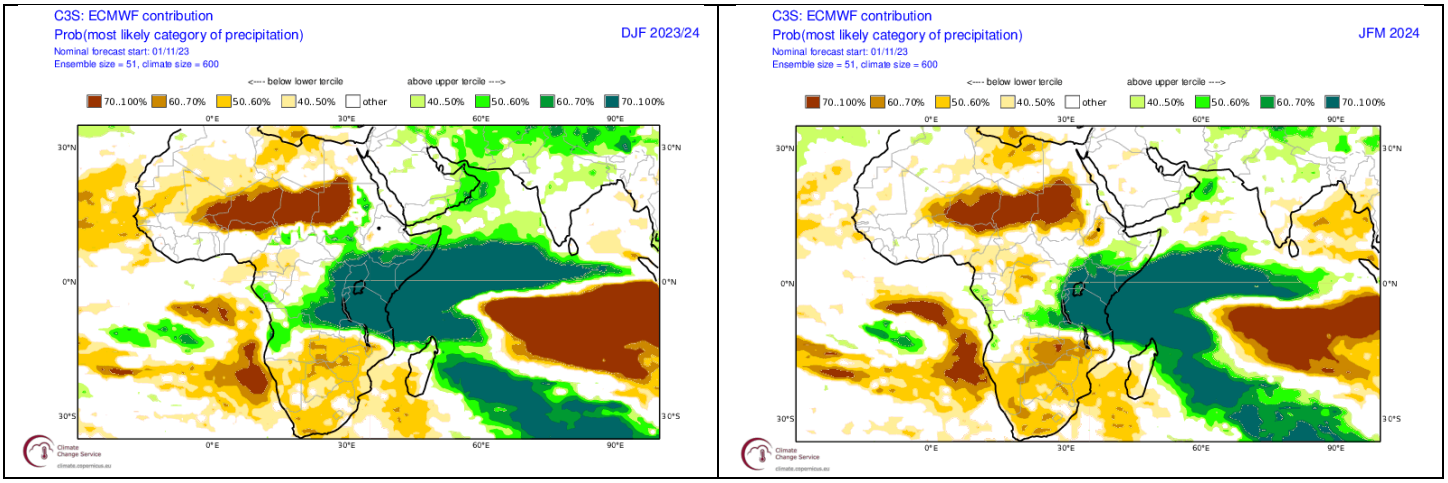
**The 30-day Southern Oscillation Index (SOI) is currently -8.2 and therefor indicative of atmospheric pressure patterns in the Australia – Pacific region being in El Niño mode. In general, a negative SOI is associated with drier conditions over southern Africa.**



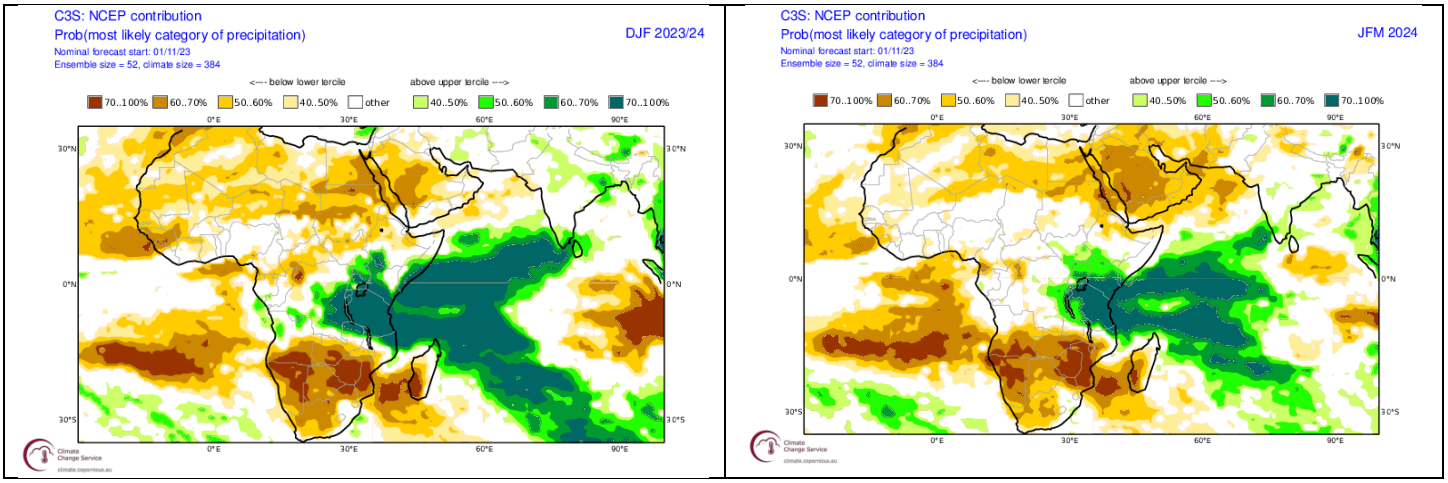

***Australian Bureau of Meteorology* - http://www.bom.gov.au**

# Seasonal forecasts issued by various international institutions

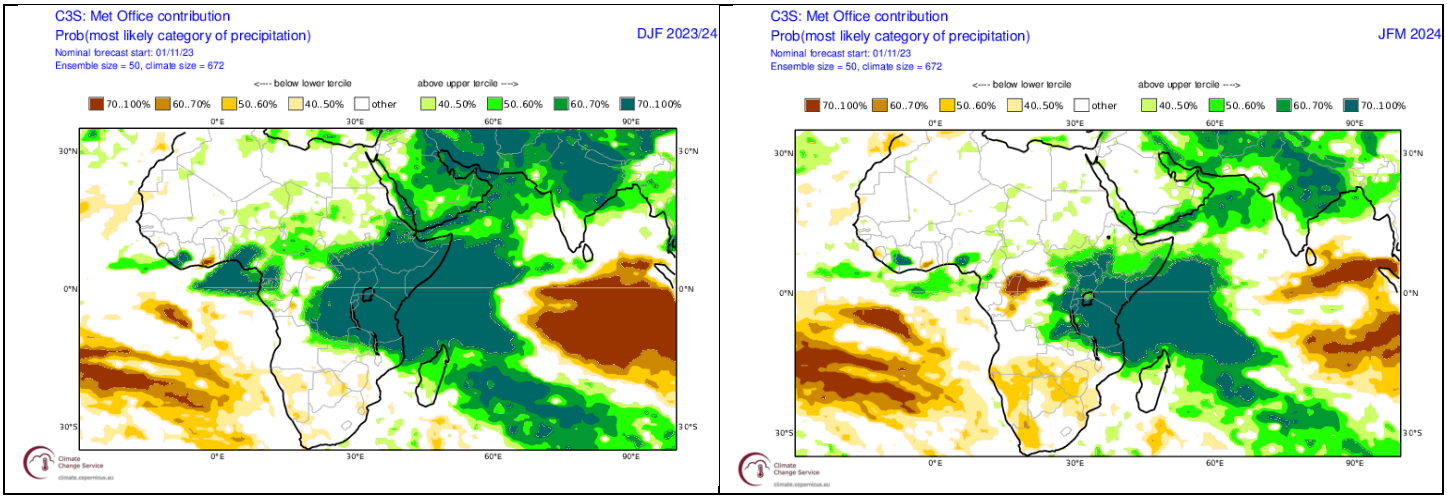
Seasonal forecasts (updated in November 2023) by various institutions, as published by the COPERNICUS Programme (***https://climate.copernicus.eu/seasonal-forecasts***) and by the IRI, still expect drier conditions towards late summer compared to during early and mid-summer. Moreover, the forecasts for late summer have trended drier with the most recent (November-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 near-normal and drier-than-normal conditions.



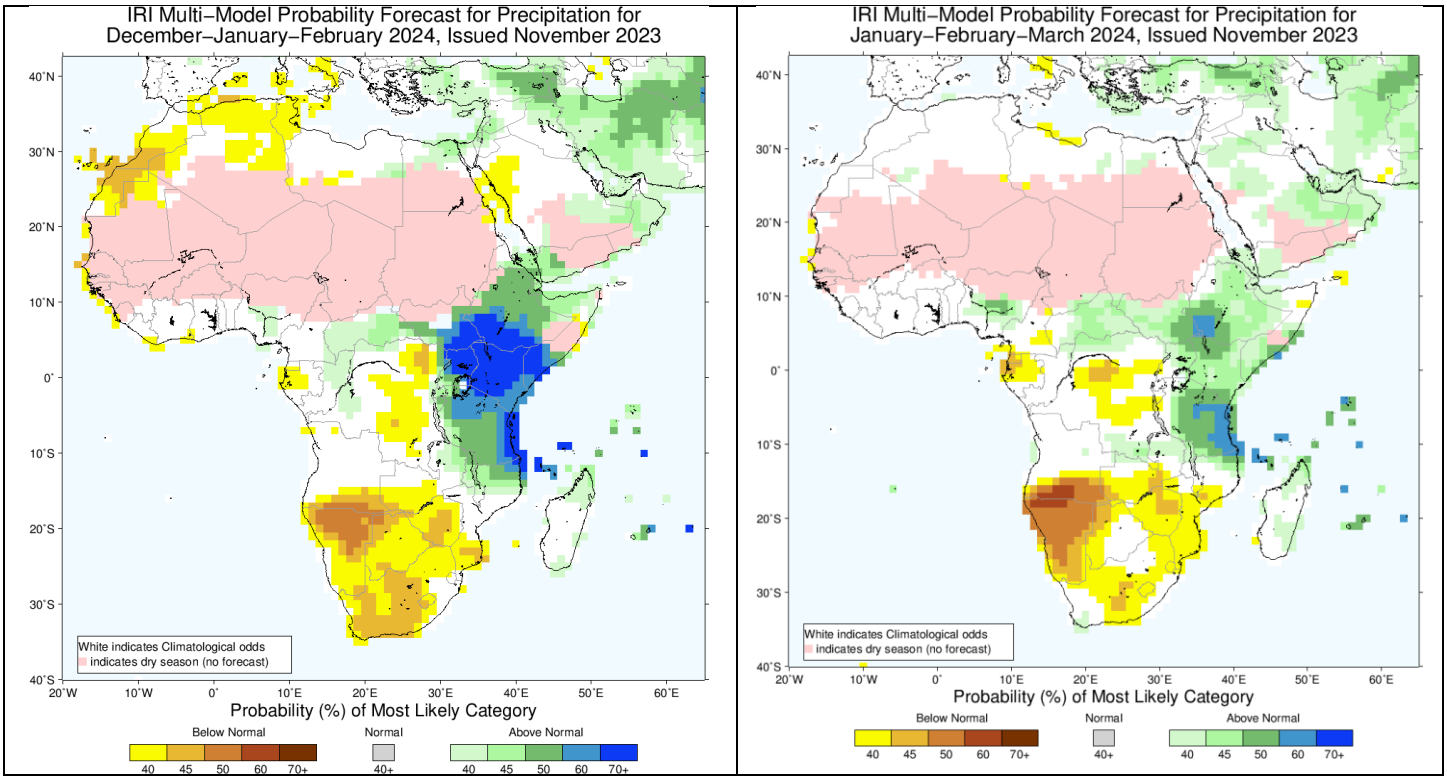

***Probabilistic forecasts by the European Centre for Medium-Range Weather Forecasts for rainfall for mid-summer (December-February 2023/24; left - Forecast issued in 2023-11) and mid-to-late summer (January to March 2024; right).***




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



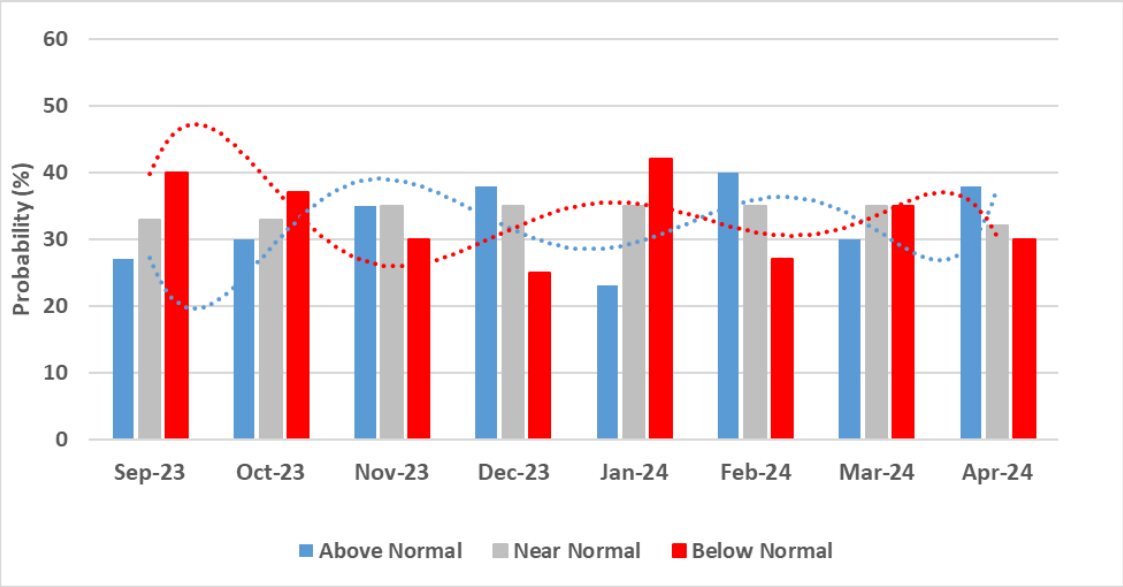

***Same as above, but forecasts issued by the UK Met Office.***




***Probabilistic forecasts by the International Research Institute for Climate and Society (IRI) for rainfall for mid-summer (December-February 2023/24; left - Forecast issued in 2023-11) 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.



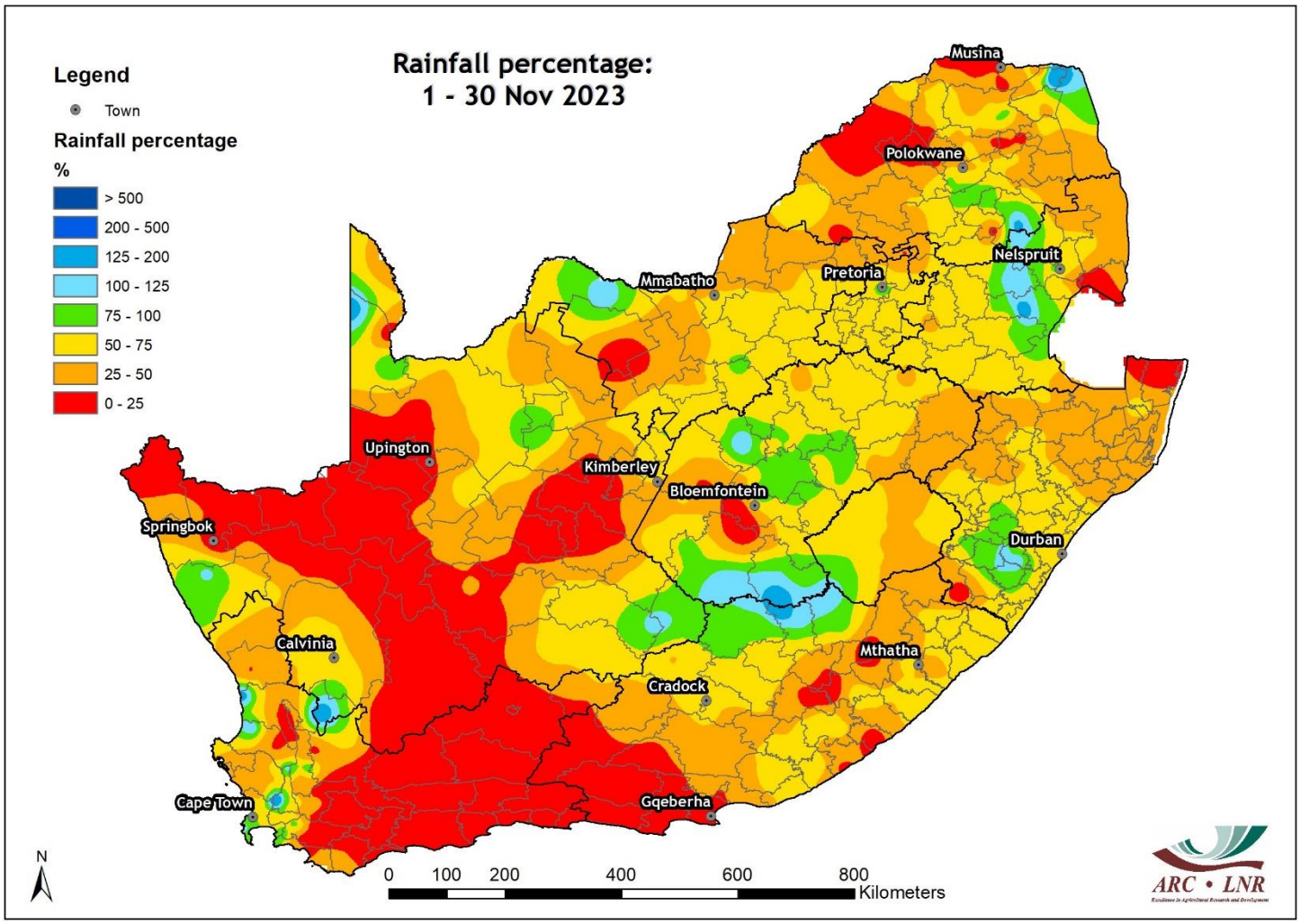

***Probabilistic forecast for rainfall over the summer rainfall region, based on the natural cyclic nature of the climate system as seen in decadal variability, per month for the period September 2023 – April 2024 (Forecast issued in 2023-09).***

**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

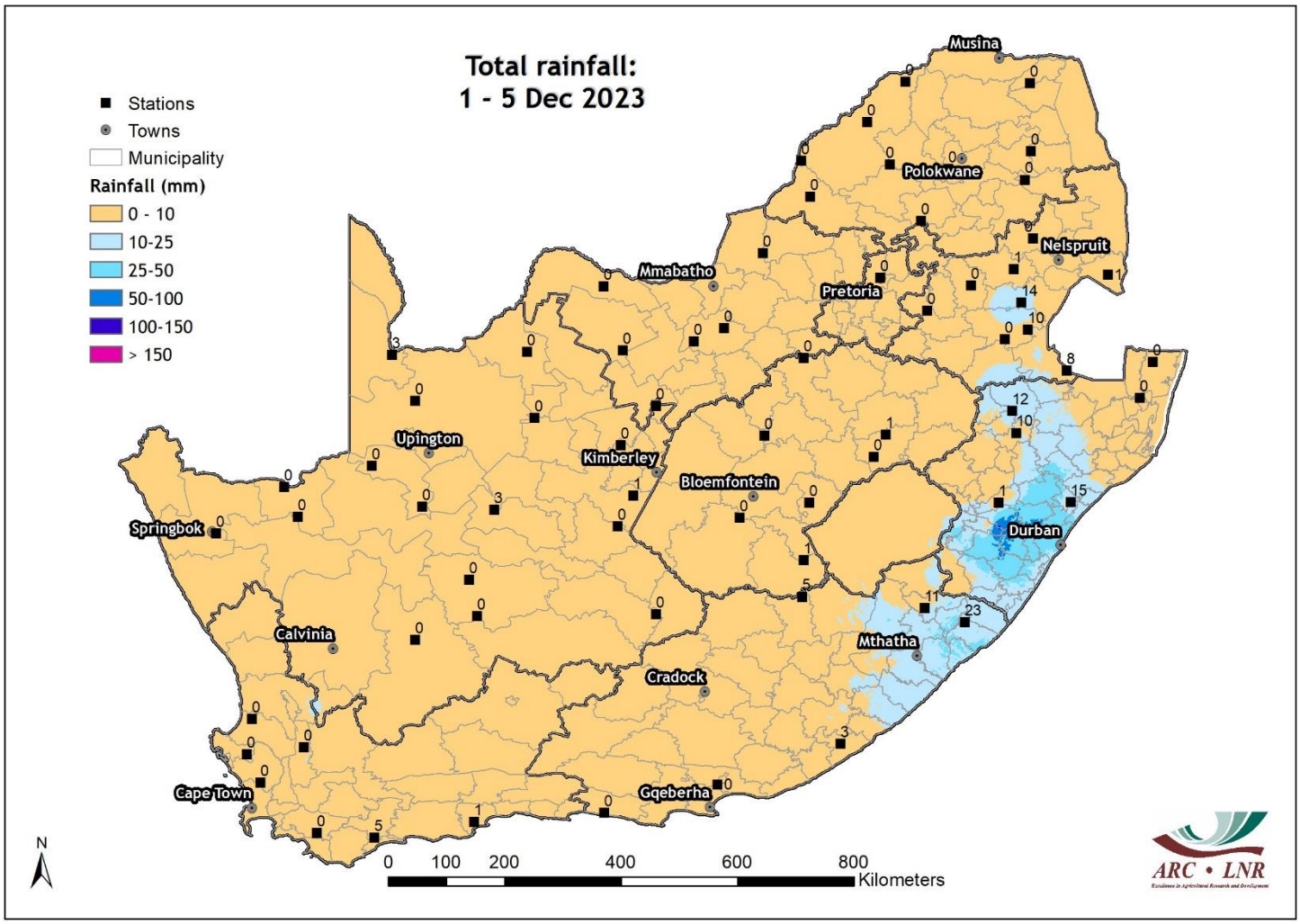
# Observed conditions

## Rainfall (% of long-term mean): November 2023



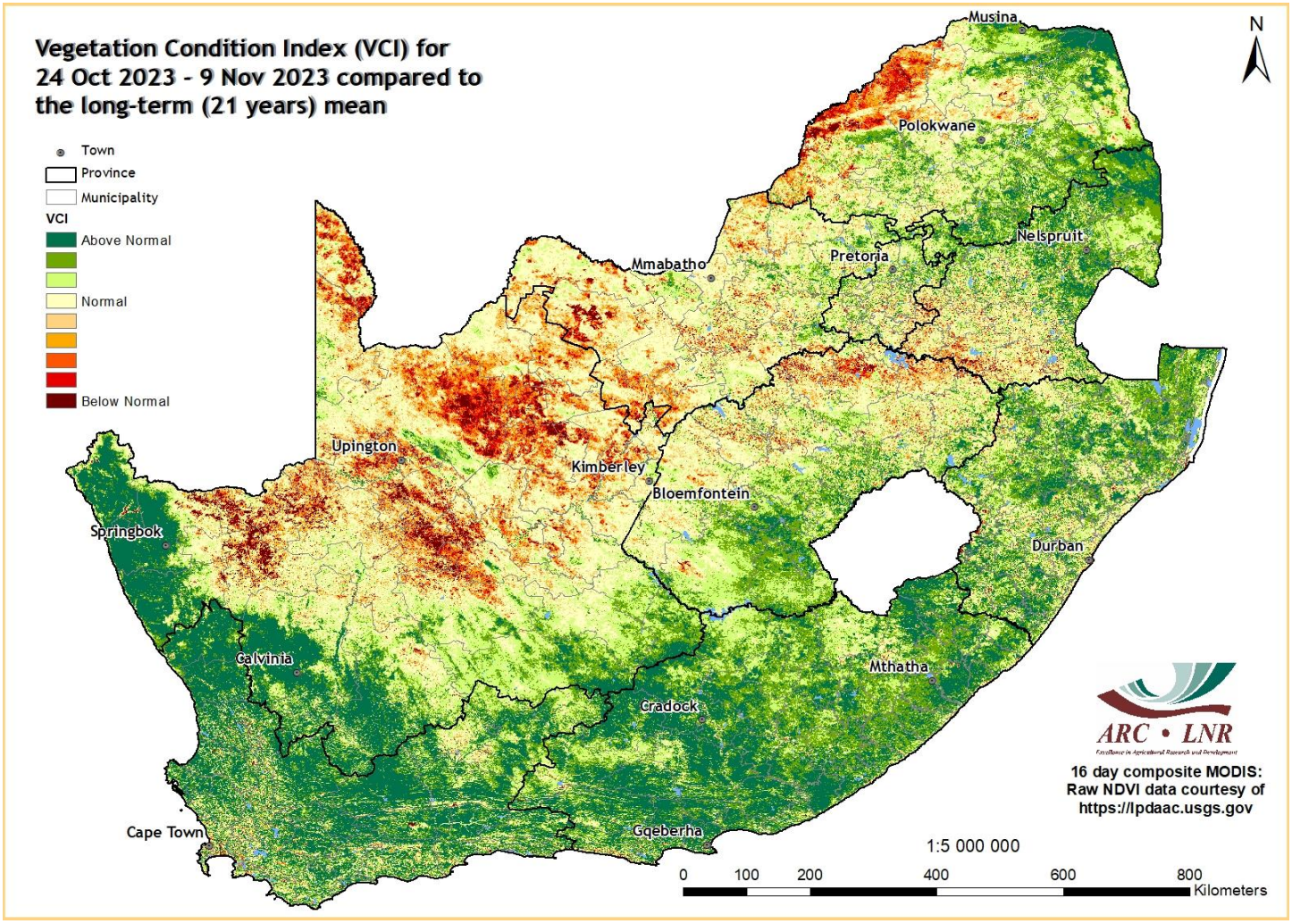

***Total rainfall during November 2023 was below the long-term average over most of the country, with only relatively small areas, such as parts of the southern Free State and parts of the Highveld and escarpment of Mpumalanga where total rainfall exceeded the long-term average. Most of the summer-grain production region received between 50 and 75% of the long-term average.***

# Rainfall (mm): November 2023



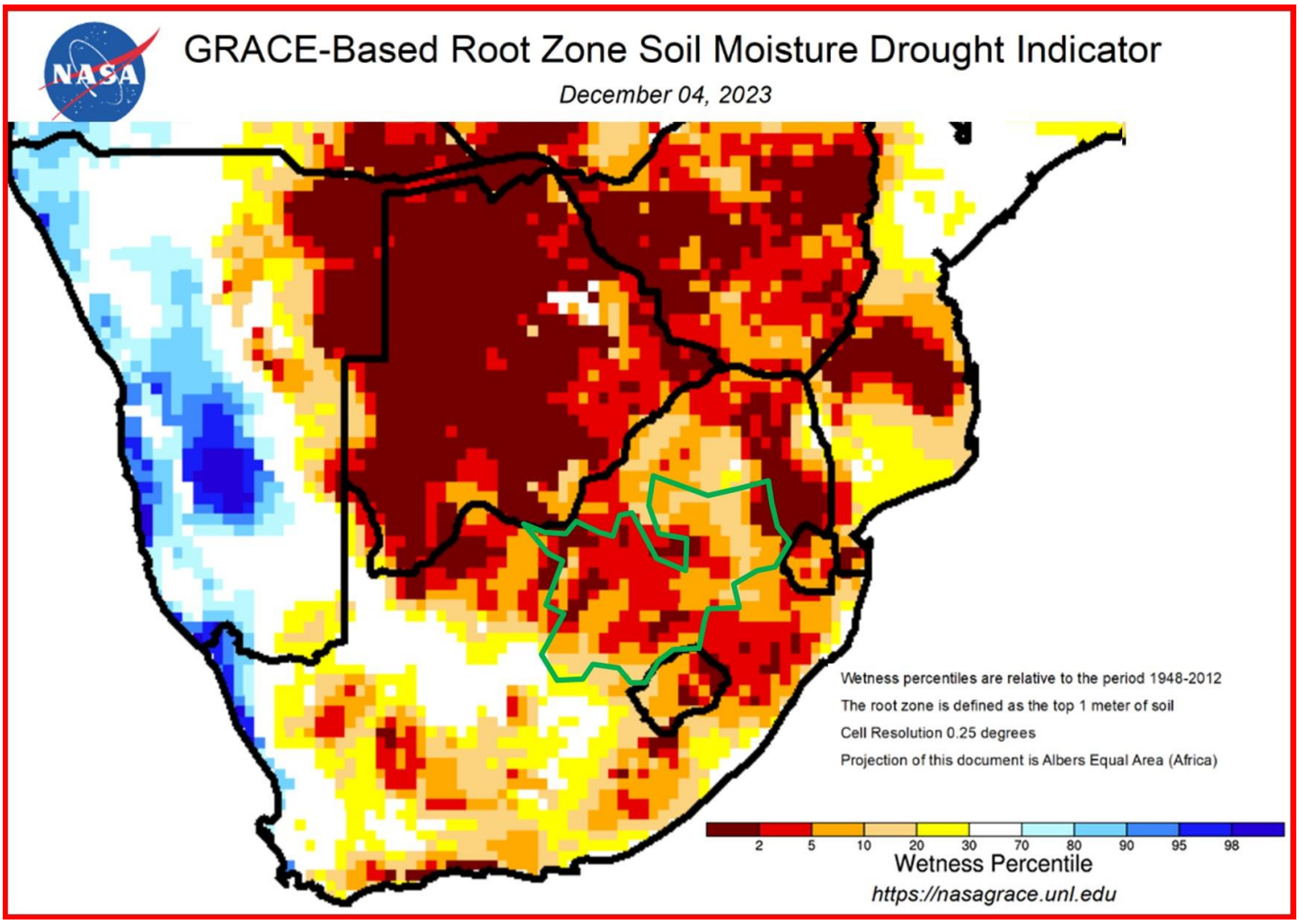

***Little to no rain occurred over the country during the first five days of December. Thundershowers were confined to the far eastern parts, with totals exceeding 10 mm over the eastern parts of the Eastern Cape, southern to central and north-western KZN and southern to central Mpumalanga.***

# Vegetation Condition Index: November 2023




***By early November, drier conditions over the central to northern interior 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. Over the summer-grain-production region, the northern half of Mpumalanga and parts of the central to eastern Free State experienced above-normal vegetation activity while the rest of the region experienced below-normal activity.***

# Soil moisture conditions




***The Root Zone (top 1 meter) Drought Indicator shows that soil moisture is below the normal range (mostly below the 20th percentile) for this time of the year (by 4 December) over most of the summer-grain production region (indicated on the map). This follows a few weeks of mostly warm and dry conditions. Some improvement may be expected given the expected rainfall over the northeastern parts.***

***Data / maps available at nasagrace.unl.edu through a partnership with the National Drought Mitigation Center.***

# 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:**
WRF model downscalings of GFS forecasts.

**Fires:**
MODIS data, distributed by the Land Processes Distributed Active Data Center (LP DAAC), located at the US Geological Survey's EROS Data Center

**Soil moisture:**
https://nasagrace.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

# YOUNG PEOPLE SEE THE FUTURE *Differently*

AgriSeker

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The way in which **young people see the future** speaks of a positive attitude – and of the choice to be relevant in a new era. AgriSeker shares this excitement about the future of agriculture in South Africa. Our motto is '**A certain future**', after all.

AgriSeker is motivated to make a contribution to the future of our country with a dedicated focus on agriculture through knowledge, understanding and participation in this sector. Our focus is on producers and young people, because for agriculture to survive, we need you.

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