# CUMULUS

05 DECEMBER 2024

**by J Malherbe, R Kuschke**

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# Summary

## Hot and dry in most areas, thundershowers in the north-east

It will remain mostly hot and dry during the next week, but thundershowers over the northeastern interior will become more widespread. An upper-air high will be present over the subcontinent, keeping most of the tropical moisture further to the north than normal and keeping it mostly hot and dry over the interior, including the summer-grain production region. Thundershowers will become more widespread over the northeastern parts during the weekend and early next week, but the distribution of rainfall will not be even as can be expected with isolated to scattered thundershowers. The influence of cold fronts will keep temperatures over the winter rainfall region on average below normal for this time of the year while light showers will occur in association with frontal systems. Westerly winds associated with the cold fronts in the southwest will keep the central to western interior dry until next week.

Looking further ahead, circulation patterns are expected to improve later this month. This will be associated with an expected change in large-scale circulation patterns such as the occurrence of convection along the equator (represented by the Madden Jullian Oscillation - MJO), favoring the development of cloud bands in the southern African region. These changes are expected only by the 14th and onwards, and forecasts will be monitored as the long lead time until this change adds some uncertainty to the forecast.

**The following is a summary of weather conditions during the next few days (until early next week)**:

- Temperatures will on average be above normal for this time of the year over the interior.
- Temperatures will on average be near normal over the winter rainfall region and along the coastal belt.
- It will be hot over the interior on several days.
- Cold fronts will result in cooler conditions over the southern to western parts on some days.
- Increasing cloud cover over the northeastern interior will result in lower maximum temperatures there next week.
- Rainfall will be below normal, but some areas in the north-east will receive near-normal rainfall in total for this time of the year. The central to western interior is expected to remain mostly dry.
- Isolated to scattered thundershowers are expected over the northeastern parts from the weekend onwards.
- Thundershowers in the north-east during the weekend and into next week will have an enhanced tendency to become severe.
- **The winter rainfall region** will be partly cloudy to cloudy at times with light showers initially. It will be partly cloudy to sunny without further rain expected from the weekend onwards. The region will become hot next week, but cooler periods are still expected over the southern parts.
- **The summer-grain production region** will be warm to hot and dry over the central to western parts during most of the period. Isolated thundershowers are expected initially. Isolated to scattered thundershowers are expected over the eastern to northern areas from the weekend, continuing into next week and possibly spreading into the central parts and further west by the middle of next week.

# Overview of expected conditions over the main agricultural production areas

Warm to hot conditions will dominate over large parts as the upper-air flow will be largely anti-cyclonic during this period. Westerly winds will introduce dry air over the western to central and southern parts of the country. Some tropical moisture spilling in from the north-west as well as an influx of moisture from the Indian Ocean together with upper-air perturbations will result in thundershowers from the weekend onwards over the northeastern to northern parts.

***Maize production region:***

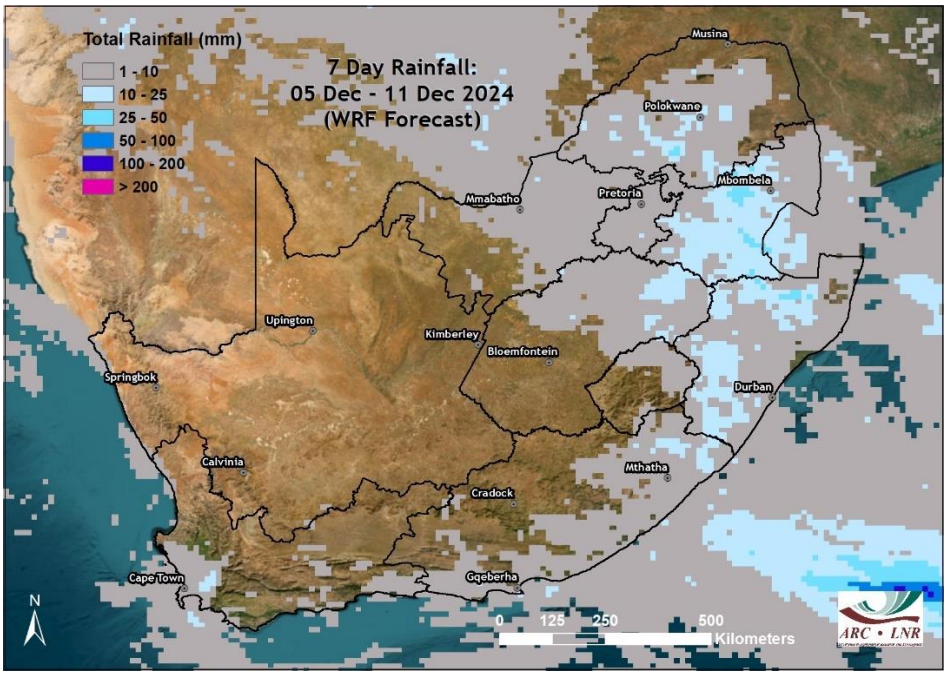
It will be hot over most of the summer-grain production region and dry for the most part during the next few days except for thundershowers over the northern to eastern parts and at times the central parts too. Temperatures over the central to western parts may approach 40°C on certain days. I will be somewhat cooler over the northeastern parts of the region next week when cloud cover and thundershowers will have a moderating effect on maximum temperatures.

- Maximum temperatures over the eastern maize-production areas will range between 25°C and 35°C, with the lower temperatures expected over parts of Mpumalanga next week. Minimum temperatures will be in the order of 14°C to 19°C.
- Maximum temperatures over the western maize-production areas will range between 33°C and 40°C. Minimum temperatures will be in the order of 17°C to 23°C.
- **Thursday (5th):** Partly cloudy and warm, but hot in the west. Isolated thundershowers will occur. Moderate to fresh westerly winds will occur in the west.
- **Friday (6th):** Partly cloudy and warm, but hot over the western to central parts with moderate to fresh westerly winds.
- **Saturday (7th):** Partly cloudy and warm, but hot over the western to central parts with moderate to fresh westerly winds. It will become cooler in the east with easterly winds and isolated to scattered thundershowers in the northeast.
- **Sunday (8th):** Partly cloudy and warm, but hot in the west. Scattered thundershowers are possible over the central to eastern and northern parts.
- **Monday to Wednesday (9th – 11th):** Isolated to scattered thundershowers may remain in place over the northern to eastern parts mostly. At this stage, forecasts indicate hot and dry conditions over the western and possibly central parts to continue, with westerly winds especially in the afternoon. Thundershowers may extend westwards on Wednesday to cover the entire region.

***Cape Wine Lands and Ruens:*** The region will be partly cloudy to cloudy at times in the southwest and south with light showers until Friday (6th). It will become partly cloudy to sunny and warm and dry during the weekend, with hot conditions expected over the interior by next week according to current forecasts.

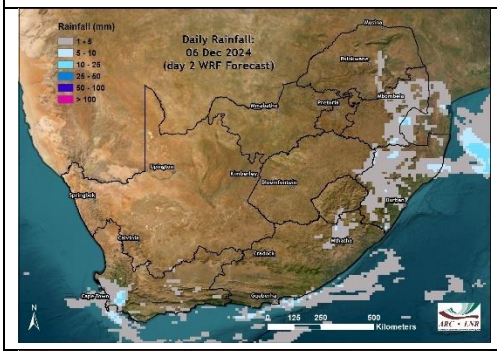
# Daily summary of expected conditions (5 – 11 Dec)

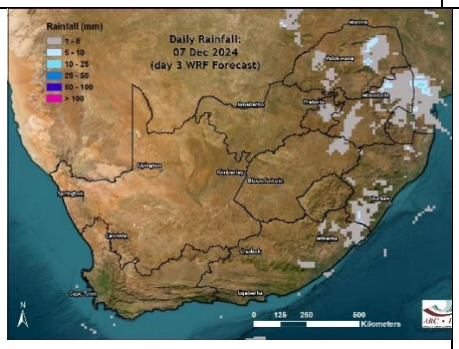
**(GFS forecast downscaled using WRF)**

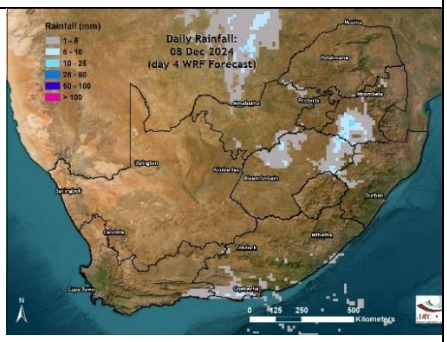


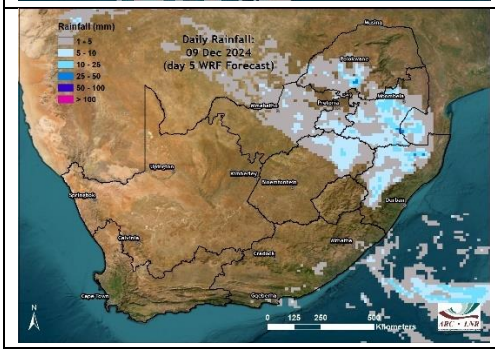

## Rainfall

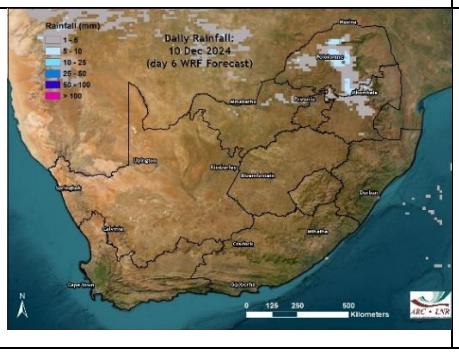
- The central to western interior will be dry until the 11th.
- Totals over the northeastern parts will vary between 0 and 25 mm for the most part, with some parts of Mpumalanga possibly receiving more rain.
- Some rain is also expected over the southern parts of the winter rainfall region and along the Garden Route, but totals are expected to be low.

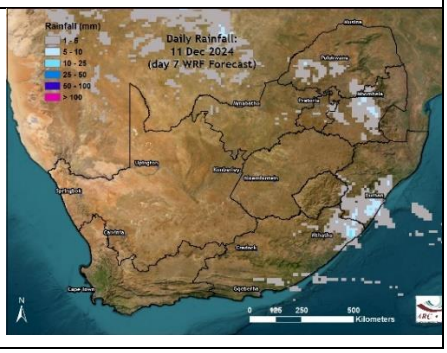


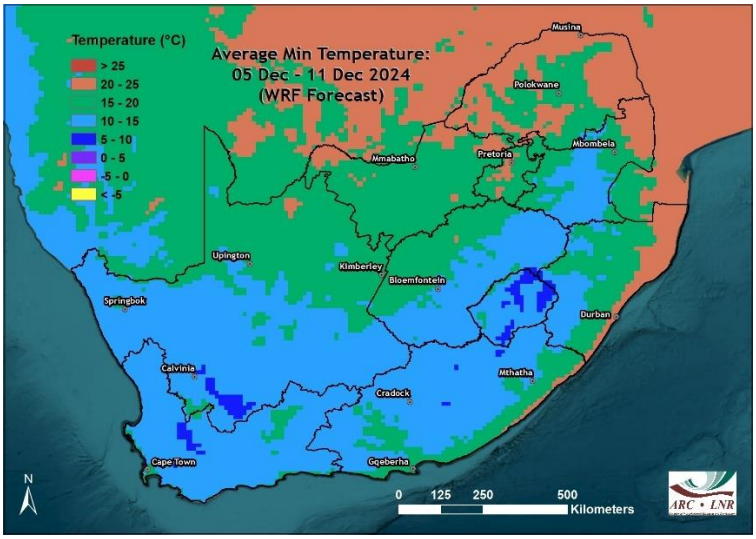



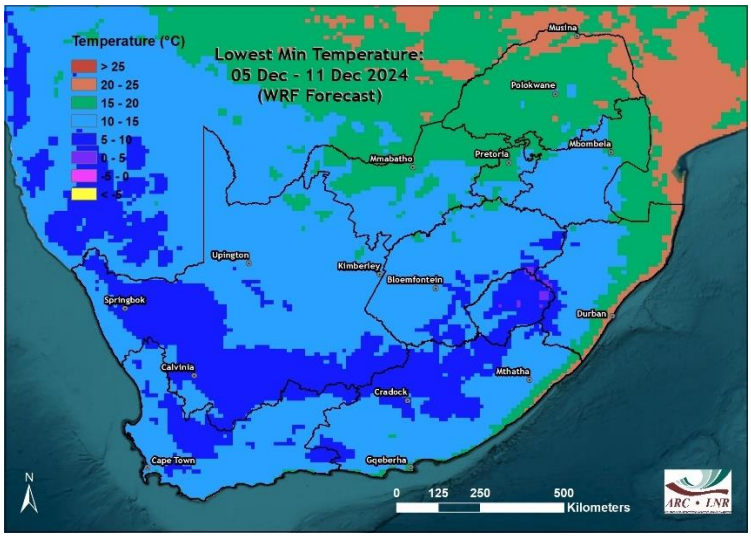




- Light showers will occur over the winter rainfall region on Friday.
- Thundershowers are possible over the northeastern parts from Saturday onwards, reaching a maximum on Sunday and Monday.
- The central to western interior will remain mostly dry.



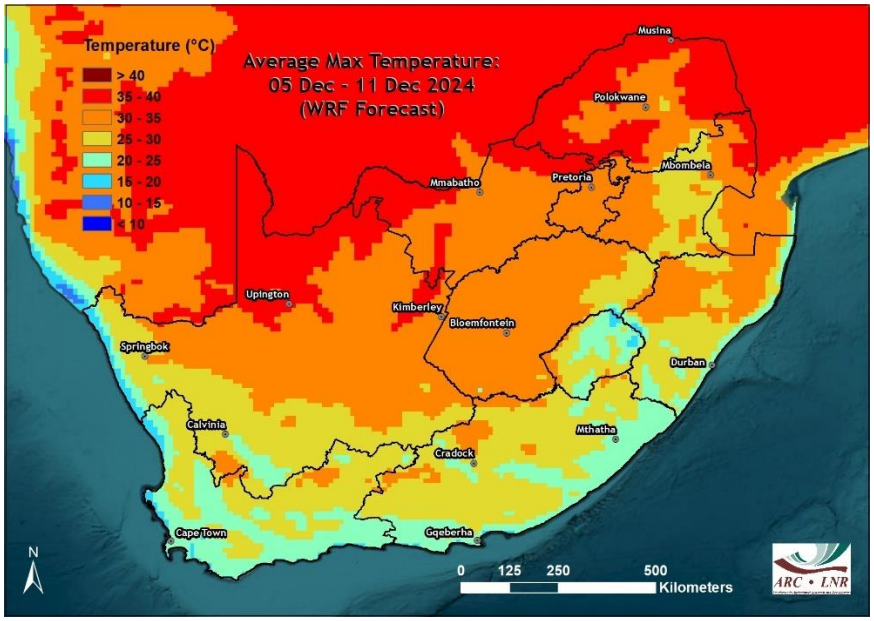

## Average minimum temperatures

- Average minimum temperatures will range between 10 and 20°C over most parts but will exceed 20°C over the lower-lying eastern to north-eastern parts.



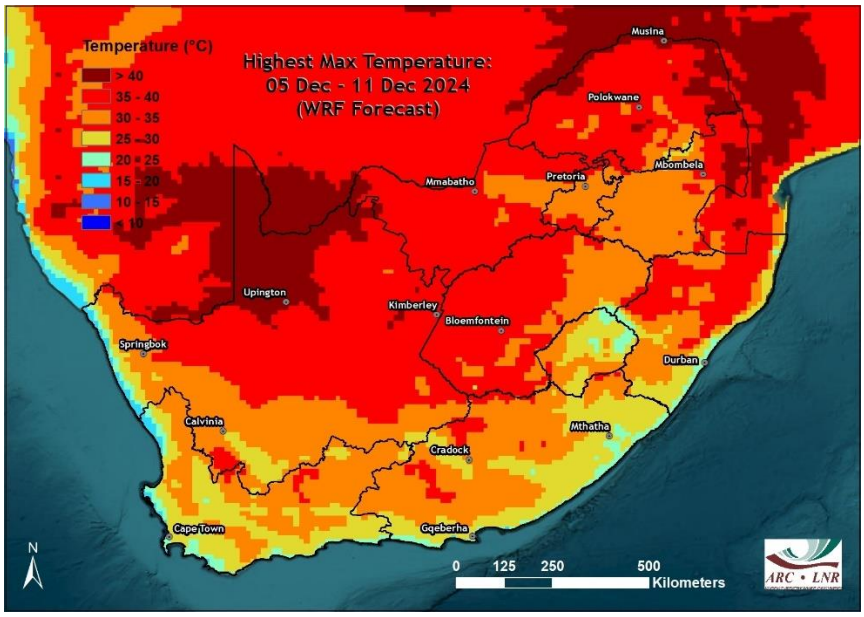

## Lowest minimum temperatures

- Lowest minimum temperatures will remain above 10°C over the summer-grain production region.




## Average maximum temperatures

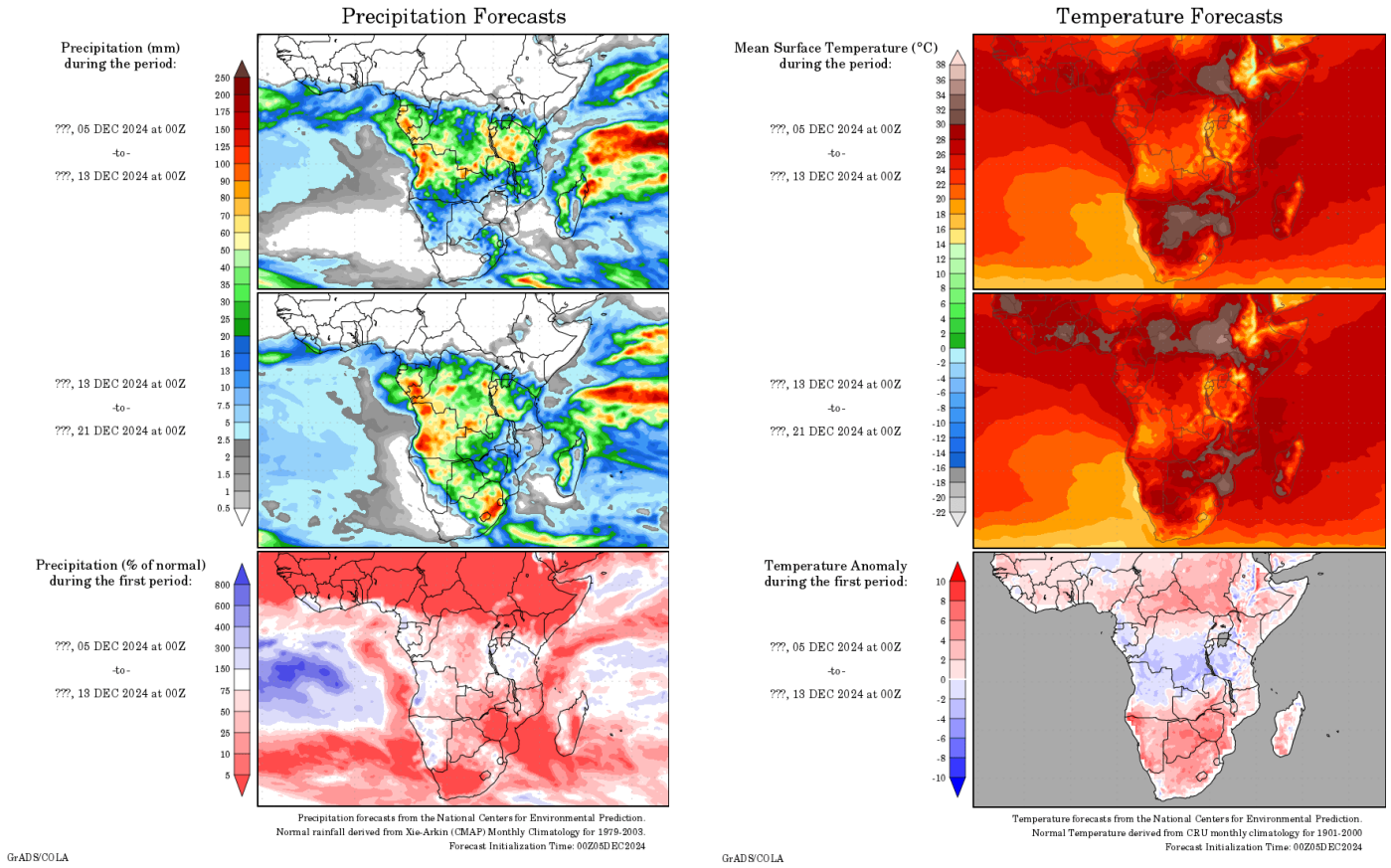
- Average maximum temperatures will range between 20 and 35°C over most of the interior except for the escarpment where it will be lower.

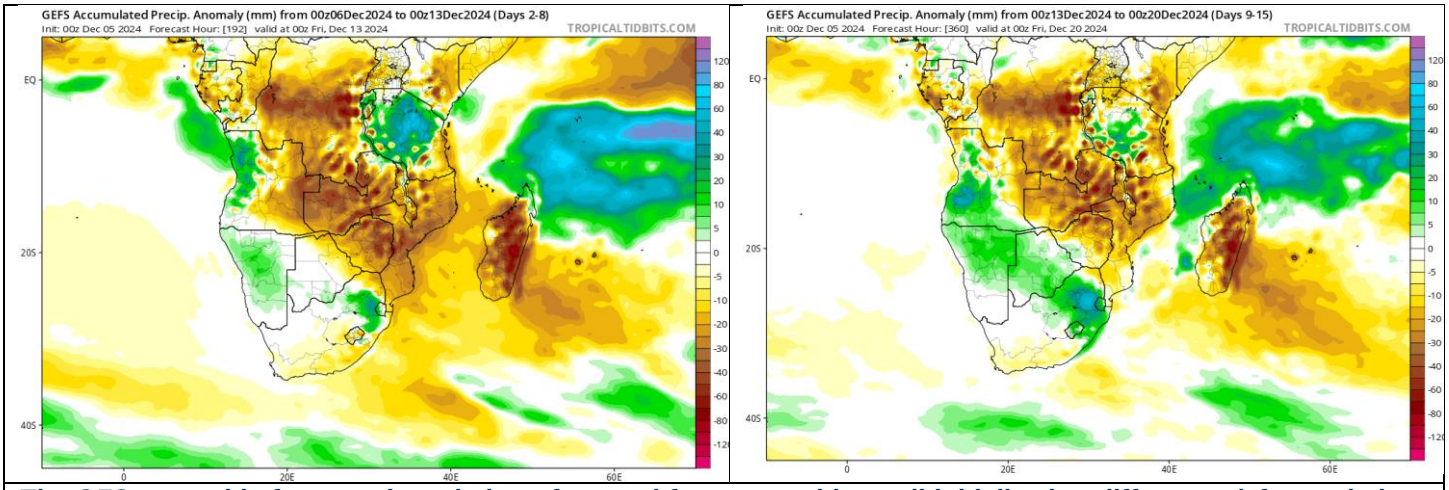



## Highest maximum temperatures

- Highest temperatures during the next few days are expected to exceed 35°C over most of the interior. Highest temperatures will exceed 40°C over the Lowveld, Limpopo River Valley and the northern to north-western parts of the Northern Cape.

# Medium term rainfall and temperature summary




***The GFS ensemble forecast (consisting of several forecasts with small initialization differences) favors below-average rainfall during the second week of December (left), with some areas in the east, especially the Eastern Highveld, that may experience above-average rainfall in places. The pattern is expected to remain broadly similar later into December (right) but thundershowers may become more widespread with the potential for a larger area over the eastern to central interior to receive near-average to above average rainfall.***

# 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 5 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:**

- **Thundershowers may become severe, with hail and strong winds:**
  - Mpumalanga to western Limpopo: **Saturday to Monday (7th – 9th).**
  - Eastern North-West, Gauteng, north-eastern Free State: **Sunday (8th).**

- **Hot and windy conditions at times will increase the fire hazard where vegetation is dry:**
  - Western to central and southern interior: **Thursday to Wednesday (5th – 11th).**

- **It will be hot, with maximum temperatures exceeding 35°C:**
  - Interior of the Northern Cape: **Saturday to Wednesday (7th – 11th).**
  - The Swartland: **Sunday to Wednesday (8th – 11th).**
  - The Karoo: **Sunday to Wednesday (8th – 11th).**
  - Northern KZN: **Thursday to Friday (5th – 6th) and Monday to Wednesday (9th – 11th).**
  - Lowveld: **Thursday to Friday (5th – 6th) and Monday to Wednesday (9th – 11th).**
  - Limpopo River Valley: **Thursday to Wednesday (5th – 11th).**
  - Western to central and northern Free State, North-West, Gauteng: **Thursday to Wednesday (5th – 11th).**
  - Western Mpumalanga: **Thursday to Saturday (5th – 7th) and Tuesday to Wednesday (10th – 11th).**

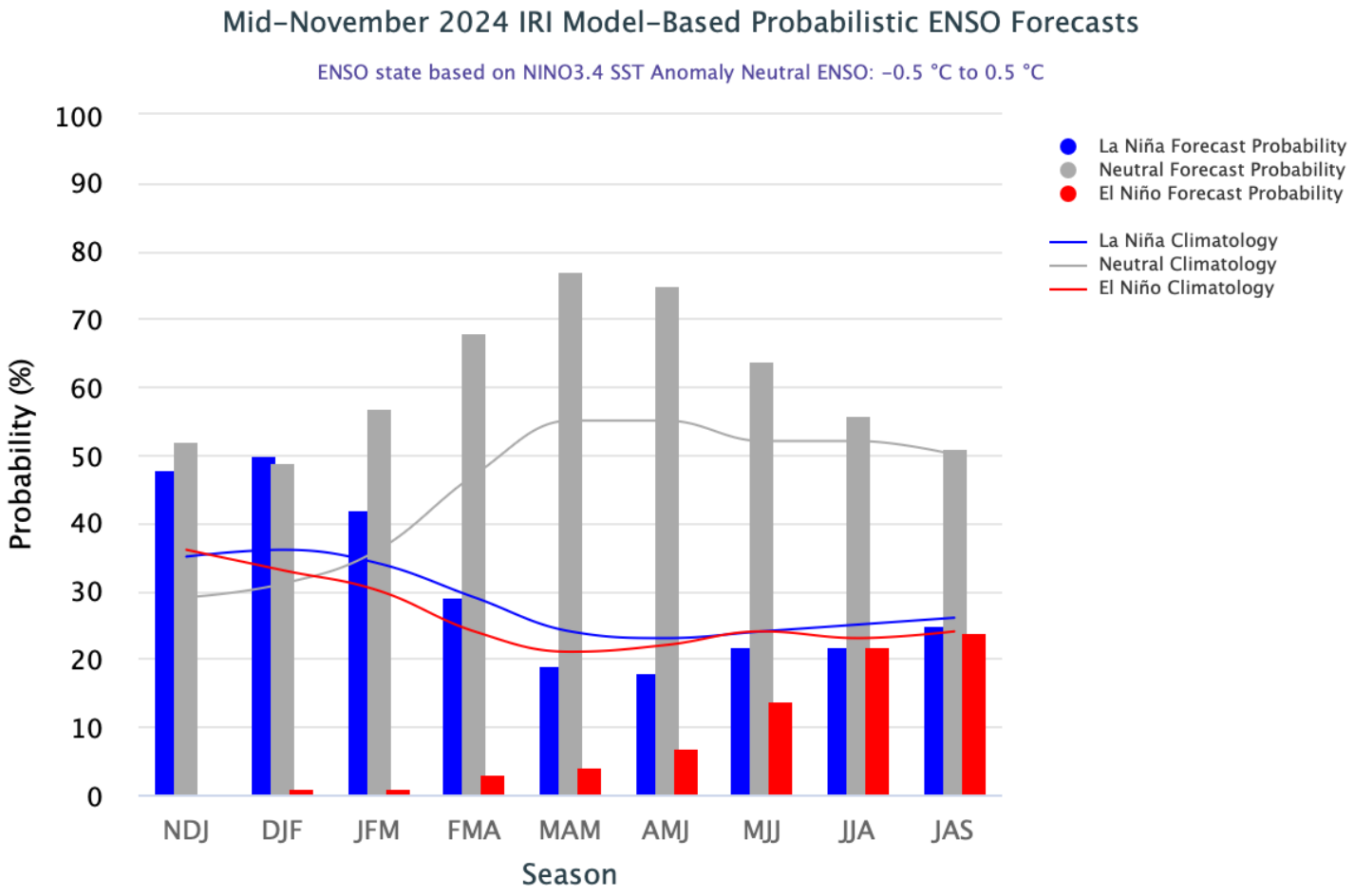
# Seasonal forecast

## Current ENSO conditions:

ENSO is in neutral state. There is still a slight chance that a La Niña will develop during the next few months but the likelihood of SSTs reaching the La Niña threshold during the next few months has diminished. The atmospheric indicators, such as trade winds along the equator and cloud patterns, have at times been indicative of a developing La Niña, but not consistently. Recently, the Southern Oscillation Index (SOI) has trended into weak La Niña territory. This is an indication that the broad-scale atmospheric circulation may favor better rainfall over southern Africa going forward.

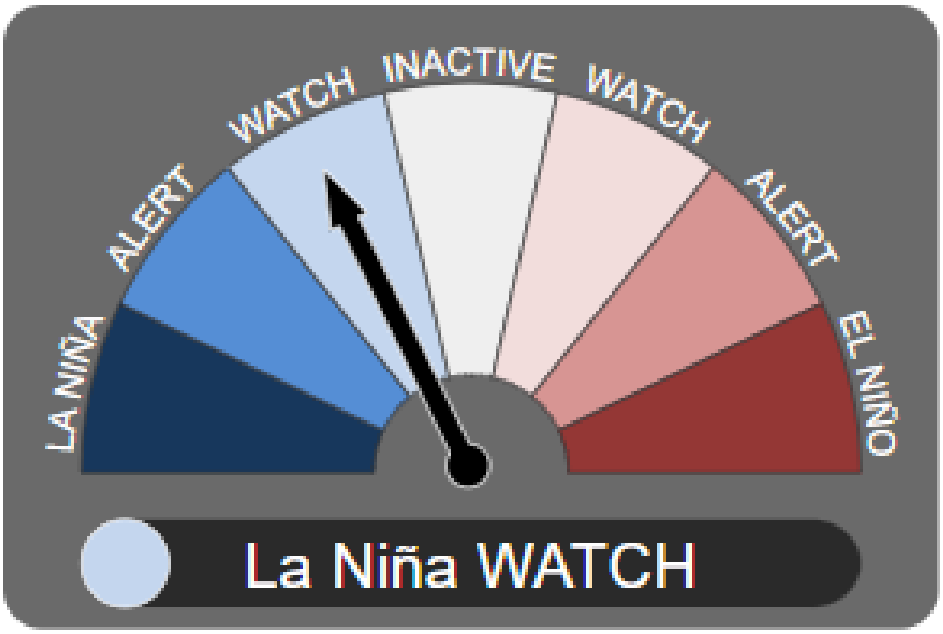
The International Research Institute for Climate and Society (IRI) forecast now is more like the Australian Bureau of Meteorology model data which are more indicative of ENSO neutral conditions this coming summer than a La Niña event.

The graph below shows the IRI's latest ENSO forecast which maintains the expectation of borderline La Niña or neutral conditions by mid-summer:




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

**Likewise, the Australian Bureau of Meteorology keeps their outlook to "La Niña Watch" ……**




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

In their most recent update (issued 19 November), the **IRI** notes that "As of mid-November 2024, ENSO-neutral conditions persist in the equatorial Pacific, and both oceanic and atmospheric indicators remain in an ENSO-neutral state. In September, October, and early November 2024, observations showed a sustained weakening of the trade winds tending to hamper the ongoing development of La Nina conditions. The IRI ENSO prediction plume forecasts slightly higher chances (52%) for ENSO-neutral conditions for Nov-Dec. 2025. Borderline La Niña conditions are forecasted during Dec-Feb (50% chances) just for one three-month season, with a return to ENSO-neutral conditions from Jan-Mar, 2025 to end of the forecasts period in Jul-Sep, 2025. In summary, ENSO-neutral conditions are likely to continue during the boreal winter, spring and summer of the 2025.

According to the most recent official CPC ENSO Outlook (issued on November 14, 2024), the La Nina onset is forecasted in Oct-Dec. 2024, with 57% chance; however, the objective IRI model-based ENSO outlook forecasts indicate the continuation of ENSO-neutral conditions for Nov-Jan. 2025." .... ***https://iri.columbia.edu***

In their most recent update (26 November), the **Australian Bureau of Meteorology** states that "The El Niño–Southern Oscillation (ENSO) remains neutral, with sea surface temperatures (SSTs) in the central equatorial Pacific Ocean at ENSO-neutral levels. Atmospheric indices, such as those related to patterns of surface pressure, cloud and trade winds, are broadly consistent with an ENSO-neutral state. While some have displayed La Niña-like signals over recent months, a consistent and sustained shift in the atmosphere has not been observed. Ocean temperatures in the central equatorial Pacific have started to warm in recent weeks, away from the La Niña threshold, although they are still cooler than the historical average.

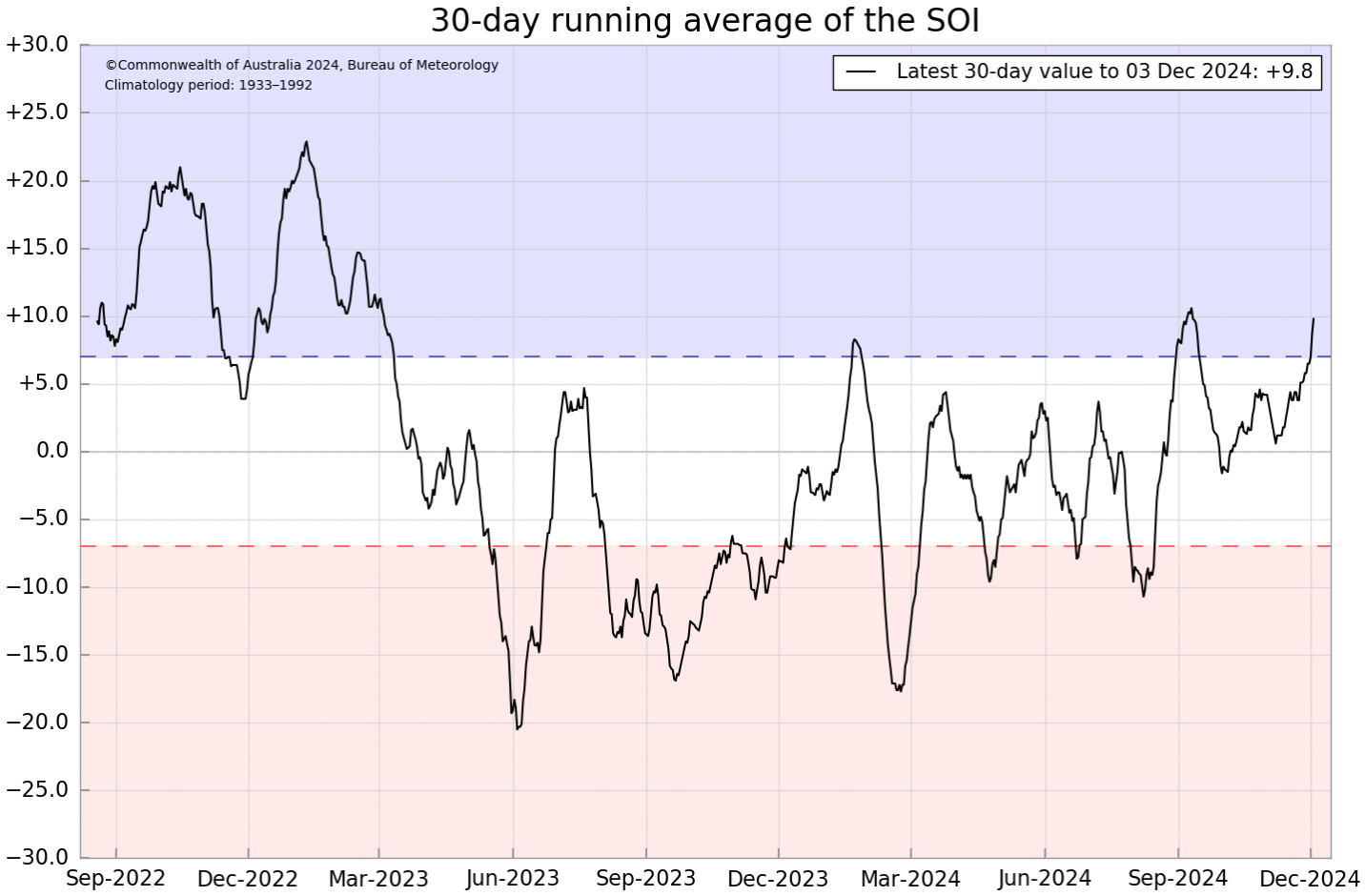
The Bureau's model suggests SSTs are likely to remain within the ENSO-neutral thresholds (−0.8 °C to +0.8 °C) throughout the forecast period to February 2025. Of the 6 other climate models surveyed, 2 models suggest SSTs in the tropical Pacific are likely to exceed the La Niña threshold (below −0.8 °C) throughout December to February, which is sufficient time to be

classified as a La Niña event, though this would be considered a very short-lived event compared to the historical record. All models forecast neutral ENSO values by March.

The Southern Annular Mode (SAM) index is neutral as of 23 November, having been positive for most of November. It is forecast to become positive again in the coming fortnight. SAM is also forecast to have a greater than usual chance of being in the positive phase during December....." ***http://www.bom.gov.au.***

***A positive SAM is associated with above-average rainfall over the summer rainfall region of South Africa.***

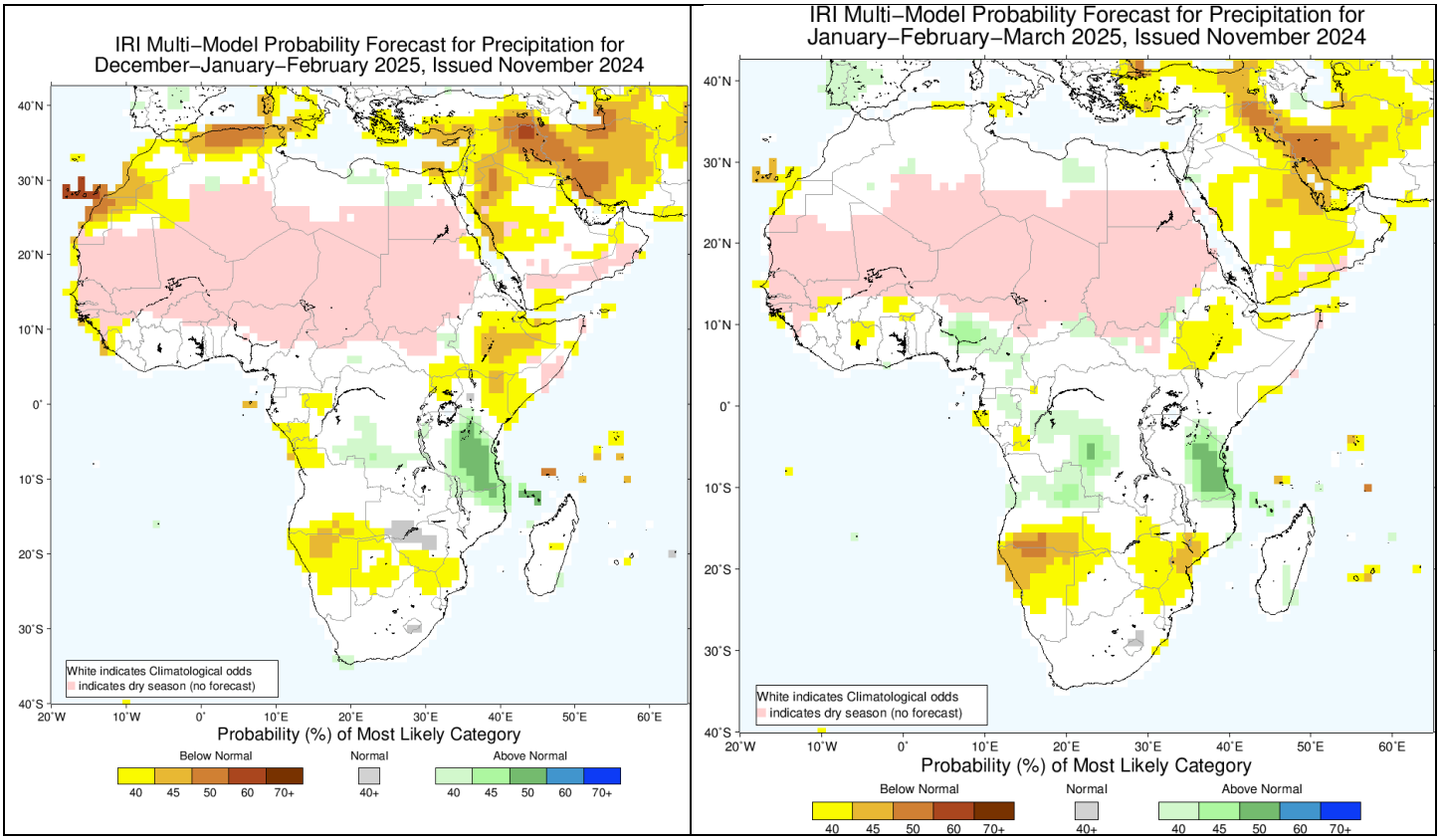
The 30-day Southern Oscillation Index (SOI) is currently +9.8 and therefore representing atmospheric pressure patterns in the Australia – Pacific region indicative of borderline La Niña conditions. The SOI is still slowly trending positive.



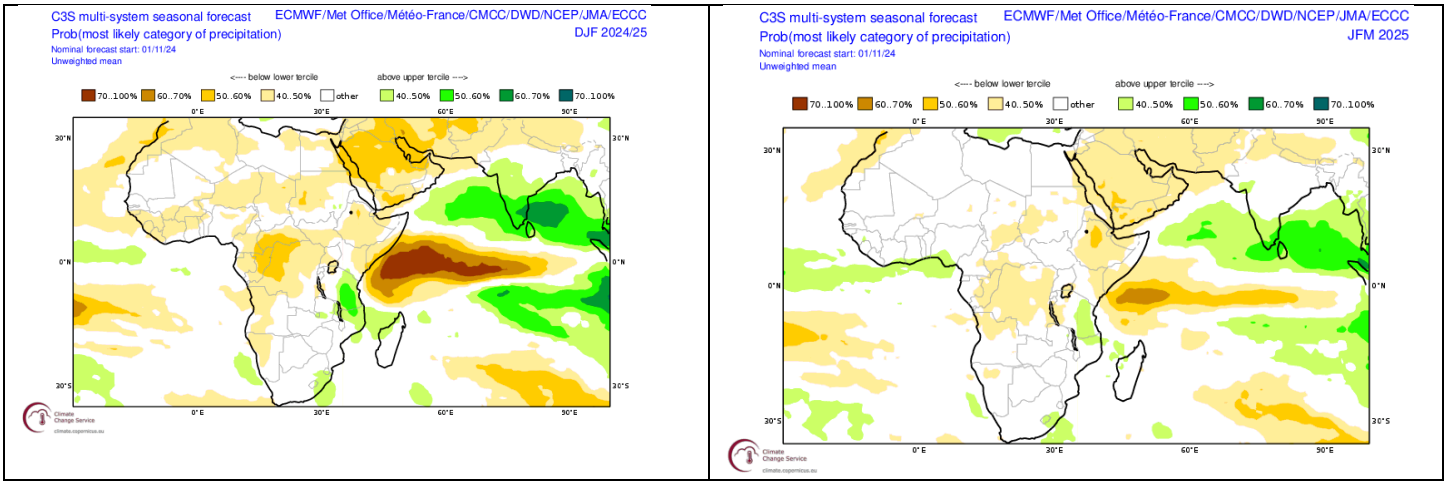

***Australian Bureau of Meteorology - http://www.bom.gov.au***

# Seasonal forecasts issued by various international institutions

Seasonal forecasts (updated in November 2024) remain relatively neutral for summer given the weak signal from the Pacific Ocean. The IRI seasonal forecast for the period November to March (first pair of maps) indicates enhanced probabilities for relatively dry conditions over the northern parts of South Africa and into the neighboring countries to the north, but no clear signal over most of South Affrica. The overall signal over the subcontinent, with a dry bias over northern Botswana and Namibia, is associated with what would be more likely during weak El Niño conditions. With the uncertainty regarding further development of a La Niña, these forecasts will likely be adjusted later. The COPERNICUS multi-model assimilated forecast (second pair of maps) doesn't show any strong wet or dry signal over the summer rainfall region and reflects the uncertainty related to fairly neutral conditions with possible La Niña development in the Pacific.



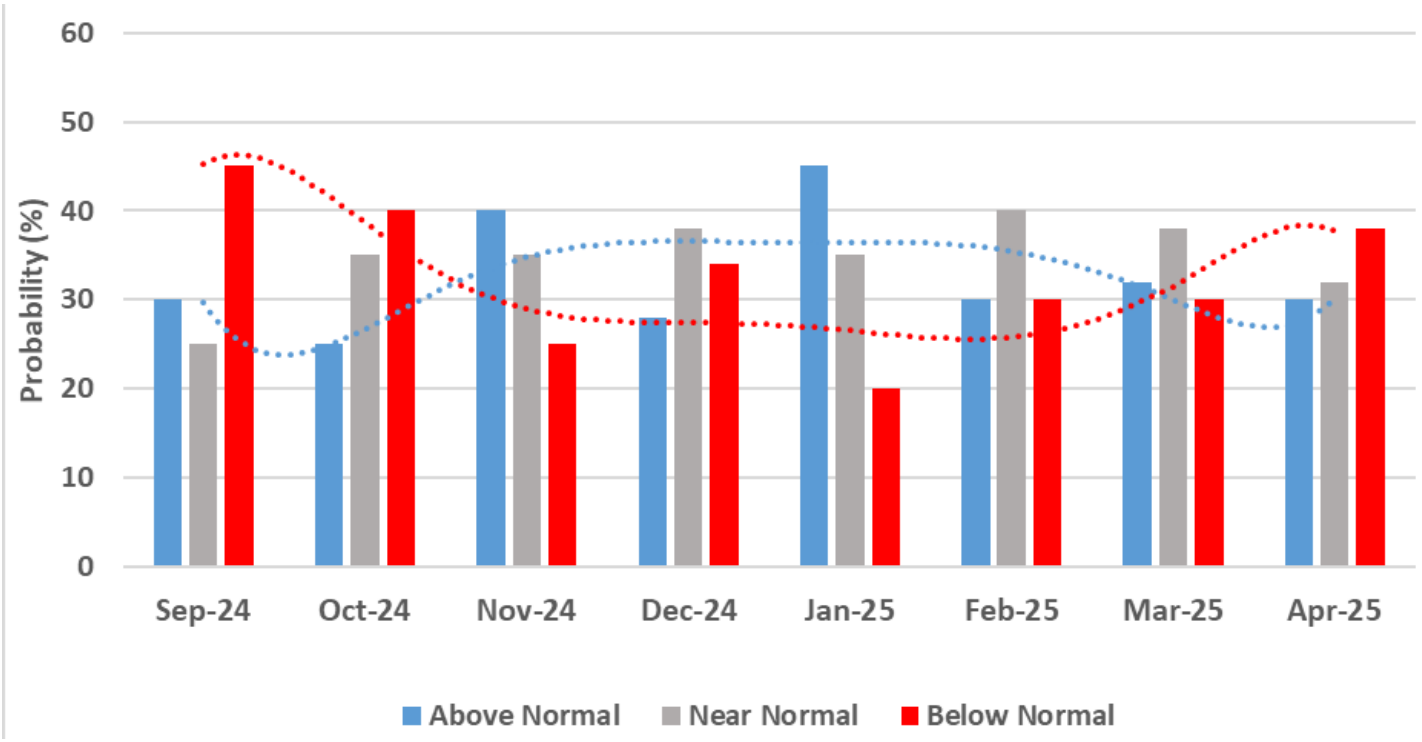

***Probabilistic forecasts by the International Research Institute for Climate and Society (IRI) for rainfall for mid-summer (December-February 2024/25; left - Forecast issued in 2024-11) and late summer (January to March 2025, right – Forecast issued in 2024-11).***




***Probabilistic multi-model forecasts by the ECMWF COPERNICUS Programme for rainfall for mid-summer (December-February 2024/25; left - Forecast issued in 2024-11) and late summer (January to March 2025, right – Forecast issued in 2024-11).***

# 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), associated with the cyclic variability of the global climate system. Summers that are similar to 2024/25 usually experience near normal rainfall in total, with a delayed start and a wetter signal during November and again by January/February.



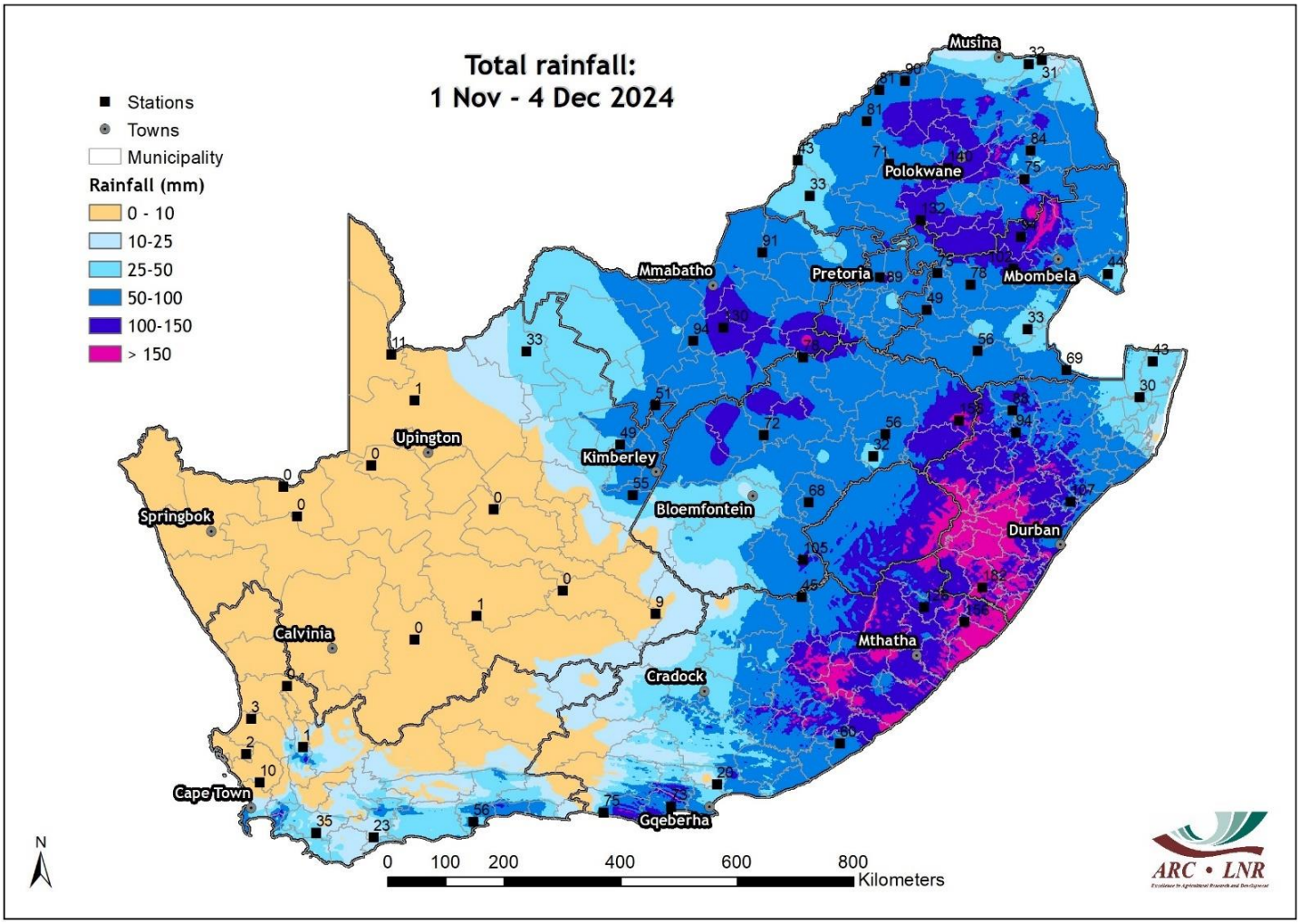

***Probabilistic forecast for rainfall over the summer rainfall region, based on the natural cyclic nature of the climate system as seen in decadal variability, per month for the period September 2024 – April 2025 (Forecast issued in 2024-10).***

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

- **September - October**: Relatively dry conditions over the north-eastern half of the summer rainfall region
- **November**: Near-normal to above-normal rainfall over the north-eastern half of the summer rainfall region
- **December**: Near normal to below-normal rainfall over the north-eastern half of the summer rainfall region
- **January**: Above-normal rainfall over the north-eastern half of the summer rainfall region
- **February - March**: Near-normal rainfall over the north-eastern half of the summer rainfall region
- **April:** Below-normal rainfall over the north-eastern half of the summer rainfall region

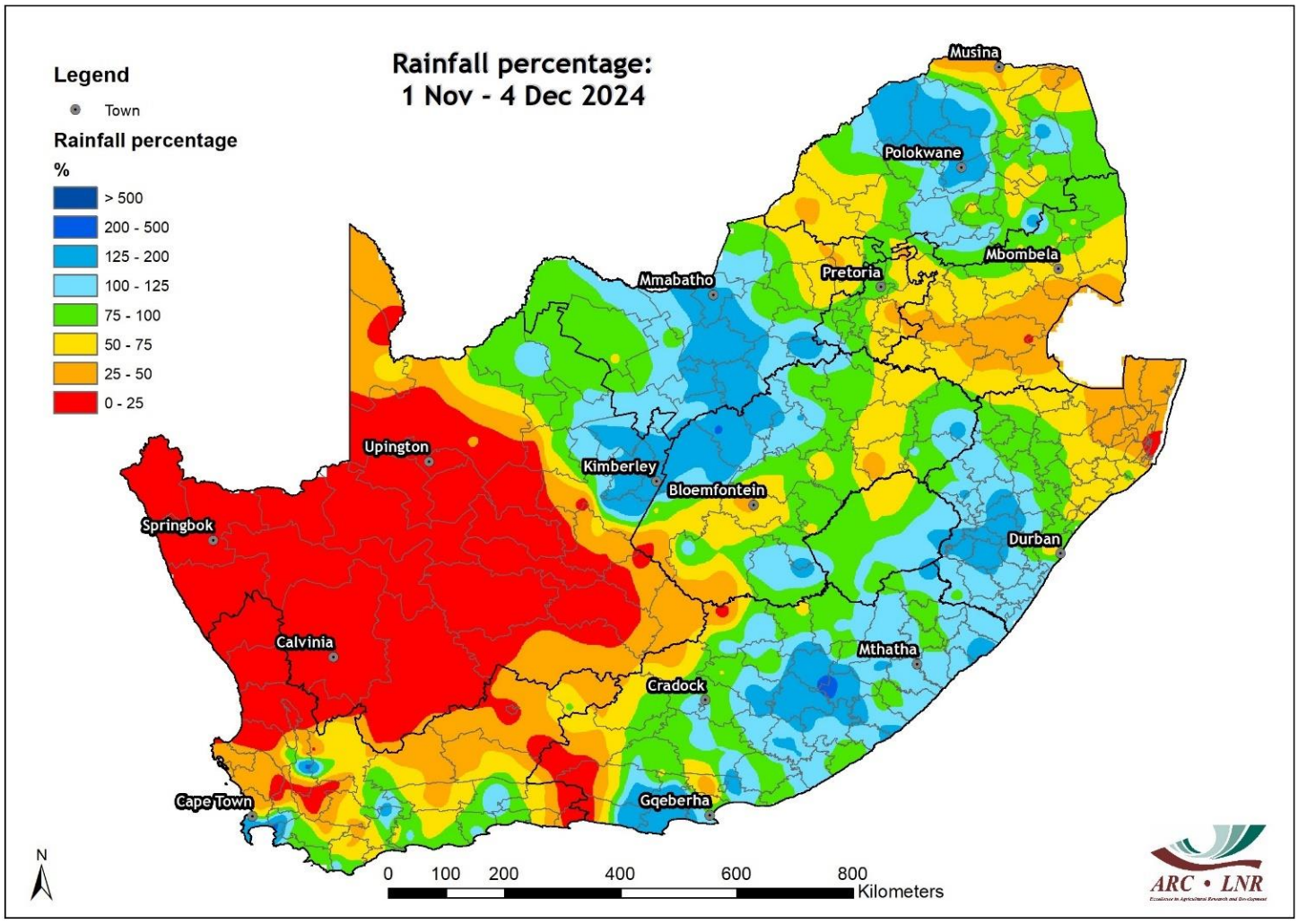
# Observed conditions

## Rainfall (mm): 1 Nov to 4 Dec 2024



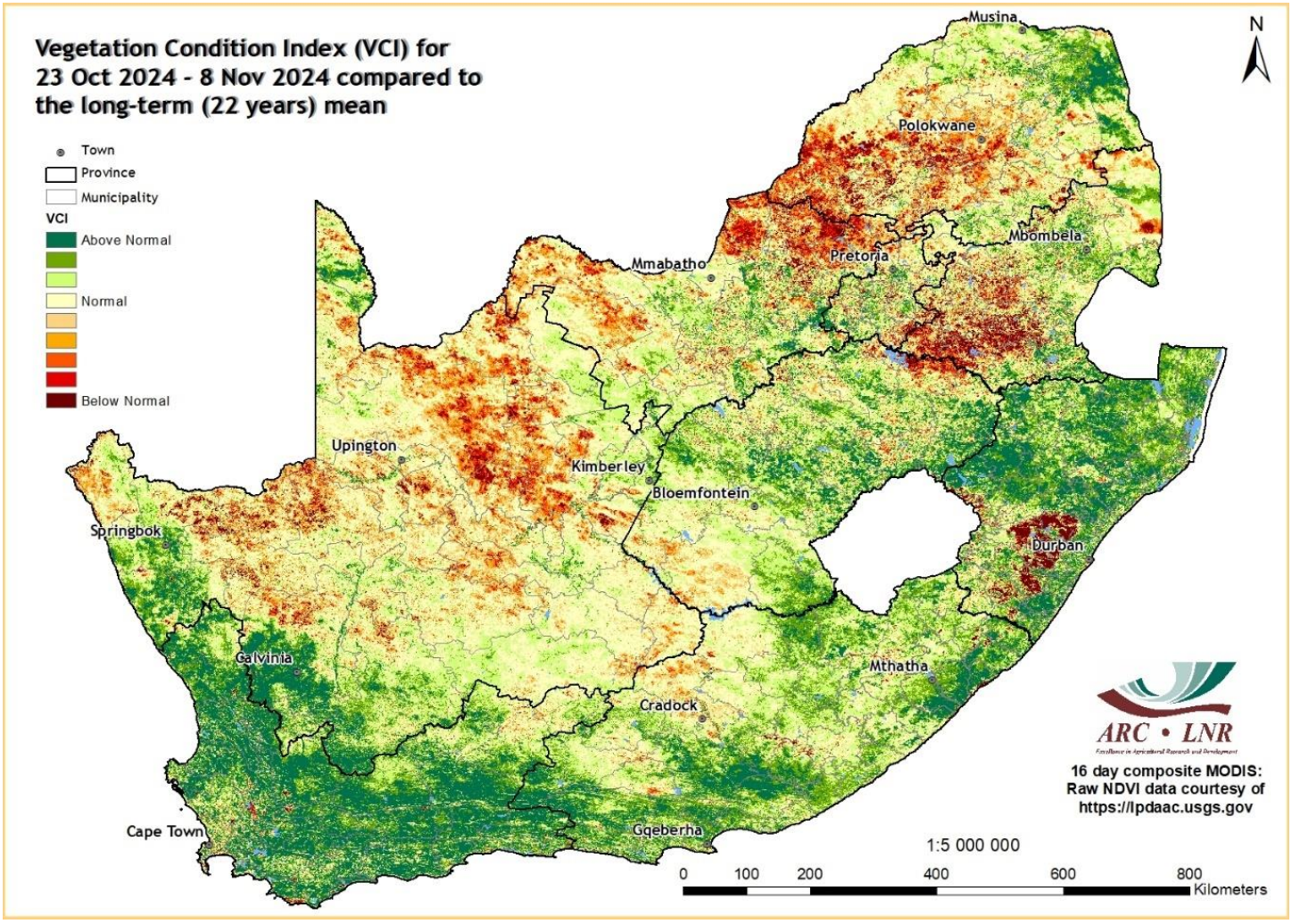

***Large parts of the central to eastern summer rainfall region, including most of the summer-grain production region, received more than 50 mm during November and early December. Parts of Mpumalanga however received less. Parts of the North-West and parts of the western to northern Free State and Limpopo received more than 100 mm of rain in total. The wettest areas were central to southern KZN and the eastern parts of the Eastern Cape where some areas received more than 150 mm. Totals over the winter rainfall region were mostly low but exceeded 20 mm in the south.***

# Rainfall (% of long-term mean): 1 Nov to 4 Dec 2024




***Most of the central to eastern and northeastern summer rainfall region received above-average rainfall during November and early December. An exception is the southern half of Mpumalanga and north-eastern KZN where totals are below average for this time of the year.***

# Vegetation Condition Index: November 2024




***By early November, vegetation activity was clearly below normal over the far-north-eastern parts of the Free State and most of the western to southern maize region in Mpumalanga. These are some of the areas where the planting window is relatively early. Vegetation activity is above normal over the western to southern Free State and KZN, where spring rainfall was more favorable. Vegetation activity is also above normal over the winter rainfall region following above-normal rainfall during winter.***

# 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 downscaling 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***