

# CUMULUS

25 May 2023

by J Malherbe, R Kuschke



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AGRICULTURE'S *heartbeat*

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Photo credit: Reinhard Kuschke

# Summary

## Widespread rain over winter and summer rainfall regions

Much of the summer rainfall region, especially the northeastern, eastern and southern parts of the country, experienced significantly above-normal rainfall during the first half of May. Not only total rainfall, but the number of rain days over the central to northeastern parts were also significantly above normal. The winter rainfall region was relatively dry while atmospheric circulation patterns favored the interior and east coast for precipitation.

Atmospheric circulation patterns have however changed recently. During the next few days, the main areas of rainfall will shift to the west and focus on the winter rainfall region. Two significant cold fronts with upper-air lows will influence weather conditions and favor especially the winter rainfall region and the central to southern parts of the country for widespread rainfall and snow in some high-lying areas. The first system is the cause of widespread rain over the southwestern parts of the country today (Thursday 25<sup>th</sup>) with lighter falls expected to spread eastwards over the southern parts, as far north as the southern to eastern Free State and Lesotho. Minimum temperatures are expected to plunge over the central to western and southern parts following the first system, but temperatures will quickly recover from Saturday onwards as a second system builds to the west. The second system will result in more widespread rain over the winter rainfall region as a cut-off low is expected to develop in the region. The system may also result in somewhat more significant rainfall over the interior, with current forecasts indicating widespread showers and thundershowers over the central to southern parts early next week, possibly spreading into the eastern parts.

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

### General:

- Temperatures will on average be above normal for this time of the year over the interior, but below normal over the winter rainfall region and western parts.
- Widespread frost is possible Friday night over most of the central to southern parts as well as areas adjacent to the Drakensberg.
- Rainfall will on average be above normal over the winter rainfall region and most of the interior.
- Widespread rain will occur today (Thursday) over the winter rainfall region.
- More widespread rain is expected over the winter rainfall region again from Sunday until Wednesday next week, with heavy falls possible in places depending on the exact positioning of the upper air low during this time.
- Rain and showers will also spread eastwards along the Garden Route and southern interior during this time.
- While significant rainfall totals are expected over parts of the winter rainfall region according to current forecasts, rainfall totals over the summer rainfall region are expected to be lower, with most areas receiving less than 25 mm according to current forecasts. Most of the Free State may receive in the order of 25 mm in total.
- It will be windy for this time of the year over the interior due to the passage of active weather systems.
- The summer-grain production region will once again be expected to receive late autumn rain, especially from the weekend onwards. While it will be cold on Friday night over most areas, especially the southern areas, cloud cover with expected rain from Saturday and northerly winds will result in relatively mild nights going forward:
  - Maximum temperatures over the eastern maize-production areas will be in the order of 15 – 23°C. Minimum temperatures will be in the order of 4 – 12°C, with lowest values by Friday and Saturday morning.
  - Maximum temperatures over the western maize-production region will range between 14 and 25°C, with lowest temperatures towards Tuesday next week and over the southern to western parts. Minimums will be in the order of 3 - 12°C, with lowest values on Friday morning.

## Overview of expected conditions over the main agricultural production areas

An upper-air trough and cold front will bring widespread rain initially to the winter rainfall region and southern parts. The movement of the front over the interior will also result in cold conditions on Friday and Saturday morning over the interior. A second system will make landfall by Sunday. The upper-air trough with this second system will become a cut-off low over the southwestern parts. Depending on the intensity and positioning of the system, widespread rain may occur over the winter rainfall region, with significant falls in mountainous areas. Over the interior, the system may result in isolated to scattered thundershowers from Sunday onwards, moving towards the eastern and northeastern parts by Tuesday and Wednesday.

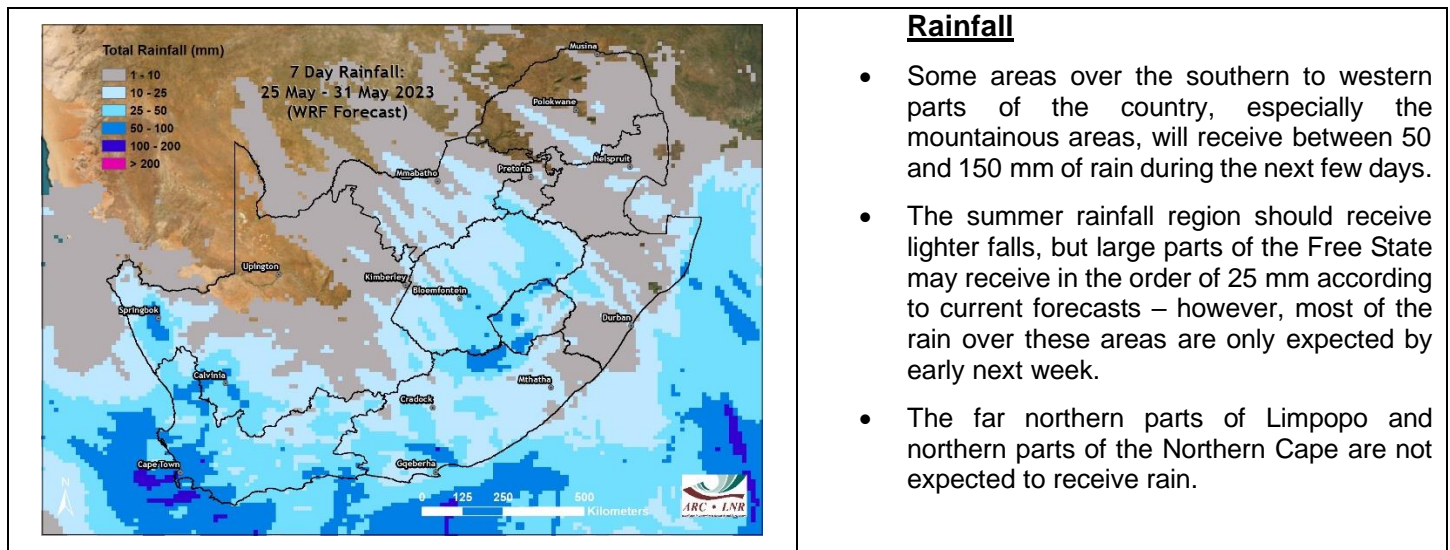
**Maize production region:** It will be windy on most days over the central to western parts. Cold conditions initially will give way to warmer conditions with isolated to scattered thundershowers as the upper-air system in the west intensifies from Saturday to Tuesday next week:

- Maximum temperatures over the eastern maize-production areas will be in the order of 15 – 23°C. Minimum temperatures will be in the order of 4 – 12°C, with lowest values by Friday and Saturday morning.
- Maximum temperatures over the western maize-production region will range between 14 and 25°C, with lowest temperatures towards Tuesday next week and over the southern to western parts. Minimums will be in the order of 3 - 12°C, with lowest values on Friday morning.
- **Thursday (25<sup>th</sup>):** Partly cloudy, warm and windy. It will be sunny in the north. Isolated thundershowers are possible in the southeast and south overnight, with possible snow showers in mountainous areas, especially in Lesotho. Moderate to fresh north-westerly winds are expected over the central to western parts.
- **Friday (26<sup>th</sup>):** Sunny to partly cloudy and cool. Isolated evening thundershowers are possible in the east. It will be cold over the southern to western and high-lying eastern parts in the morning with frost.
- **Saturday (27<sup>th</sup>):** Cold in the south and west initially with frost. It will become partly cloudy and mild, with isolated thundershowers mainly over the Free State and southern Mpumalanga.
- **Sunday (28<sup>th</sup>):** Partly cloudy to and mild to warm, with isolated thundershowers over the central to western parts. Moderate to fresh northerly to north-westerly winds are expected over the central to western parts.
- **Monday (29<sup>th</sup>):** Partly cloudy to and mild to warm, with isolated thundershowers over the central to western parts. Moderate to fresh northerly winds are expected over the central to western parts.
- **Tuesday (30<sup>th</sup>):** Partly cloudy to cloudy and cool with scattered thundershowers over the central to western parts and moderate to fresh northerly winds. Thundershowers will move towards the eastern parts during the day while clearing in the west later.
- **Wednesday (31<sup>st</sup>):** Cool to cold over the southern to central and western parts. Light showers are possible over the far southern parts. It will be mild initially with isolated to scattered thundershowers over the eastern to north-eastern parts.

**Cape Wine Lands and Ruens:** It will be mild to cool over the area on most days. Widespread rain is expected initially. It should clear by Friday, but more rain and showers are possible from Sunday, with possible thundershowers in some areas. Depending on the exact position of the upper air low from Sunday onwards, some areas may experience significant falls.

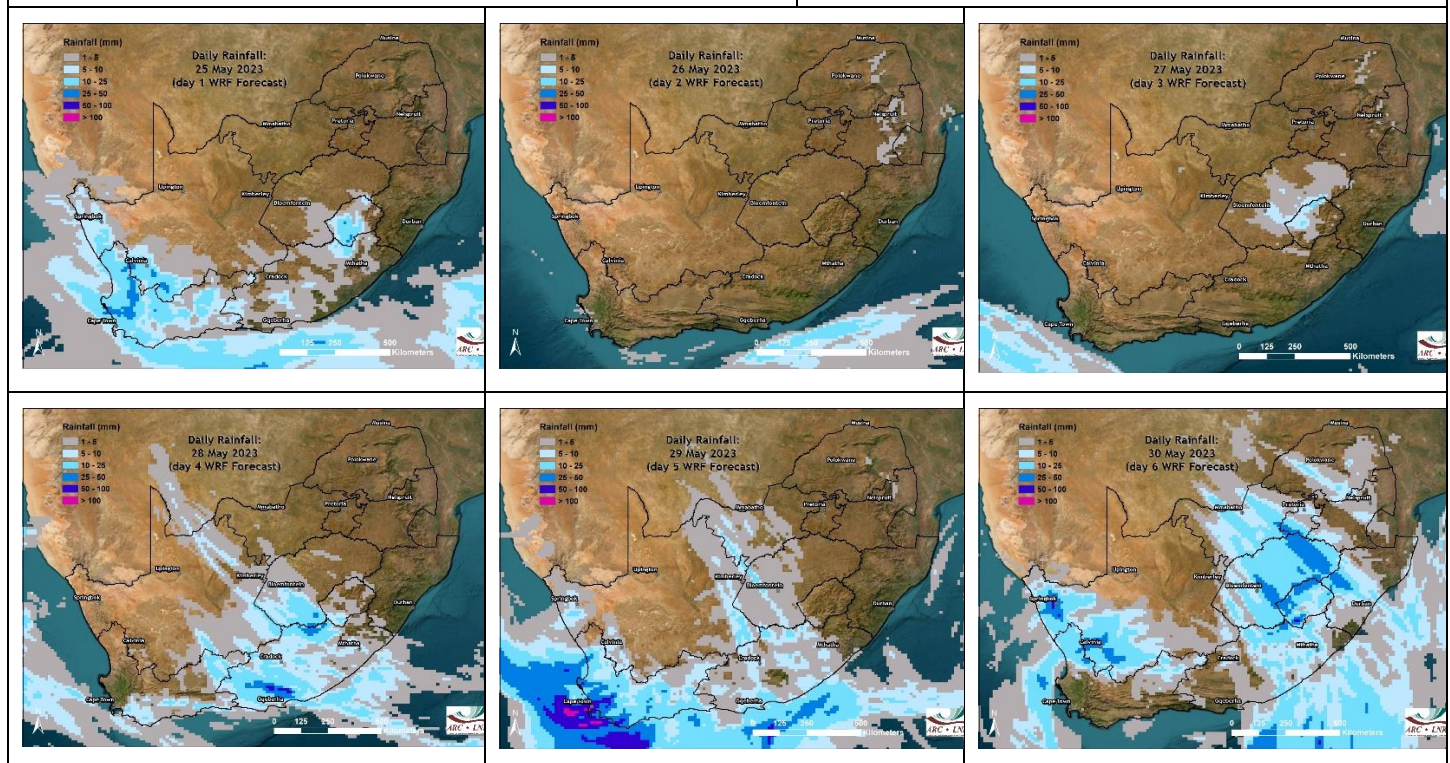
# Daily summary of expected conditions

(GFS forecast downscaled using WRF)



## Rainfall

- Some areas over the southern to western parts of the country, especially the mountainous areas, will receive between 50 and 150 mm of rain during the next few days.
- The summer rainfall region should receive lighter falls, but large parts of the Free State may receive in the order of 25 mm according to current forecasts – however, most of the rain over these areas are only expected by early next week.
- The far northern parts of Limpopo and northern parts of the Northern Cape are not expected to receive rain.



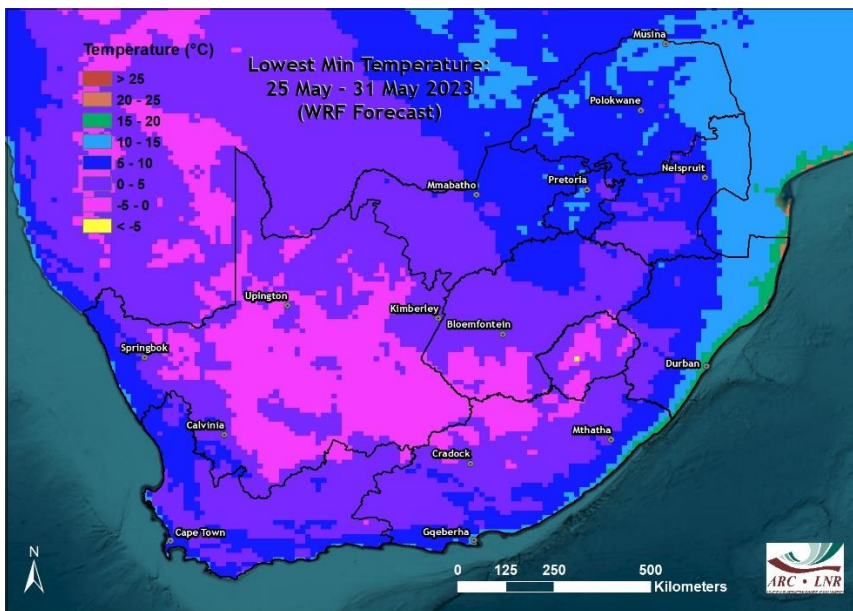
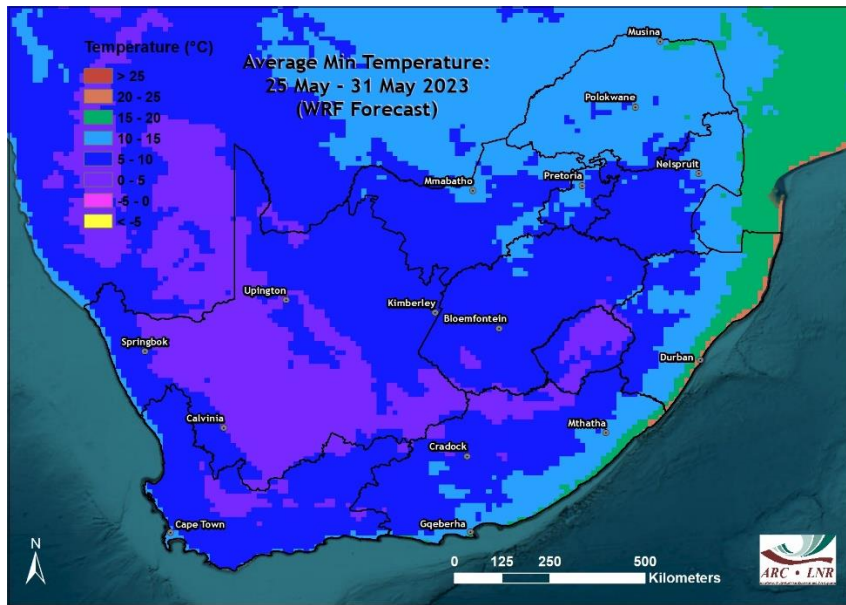
- A cold front will cause rain and showers over the southwestern to southern parts today (Thursday), spreading eastwards over the southern interior and along the Garden Route.
- A band of isolated to scattered showers and thundershowers will develop over the central parts from late Saturday and slowly track eastwards during early next week. Fairly widespread falls are expected by Tuesday according to current forecasts.
- An upper air low and surface cold front will result in widespread rain and showers (possible thundershowers in places) from Sunday until Wednesday over the southern to western parts.

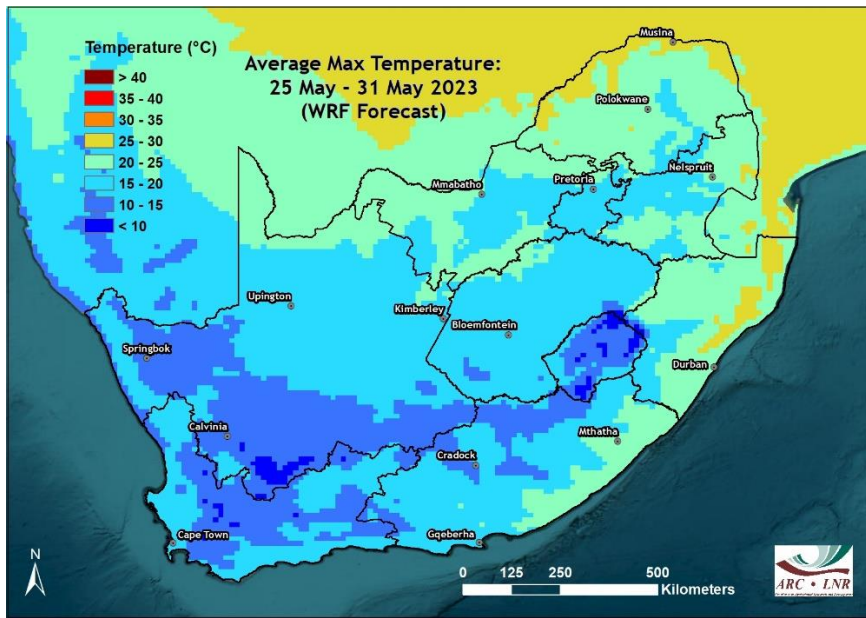
### Average minimum temperatures

- The southern to western interior, especially the higher-lying escarpment, will experience the lowest minimum temperatures with the average over this period below 5°C.
- Average minimum temperatures over the summer-grain production areas are expected to be in the order of 5 – 15 °C, with lower temperatures towards the south.

### Lowest minimum temperatures

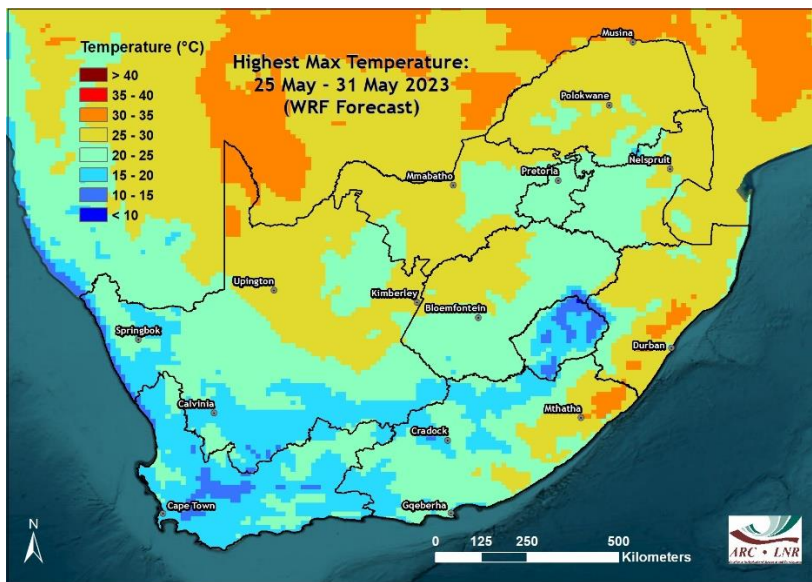
- Lowest minimum temperatures will be below zero over much of the Northern Cape interior, northern parts of the Eastern Cape and southern parts of the Free State.
- The lowest temperatures over the southern to central interior as well as the Eastern Highveld are expected Friday and Saturday morning.
- Lowest minimum temperatures over the far northwestern areas, including Namibia, are expected early next week. Free State are expected on the 4<sup>th</sup>.
- Lowest minimum temperatures over the summer grain production region will range from 10°C over parts of Gauteng to about 0°C over the central to western and southern Free State.





### Average maximum temperatures

- Average maximum temperatures will be as low as 10 – 15°C over the southern to western parts, especially the higher lying areas.
- The northeastern parts will be relatively warm with average maxima exceeding 25°C over the Limpopo River Valley, Lowveld and eastern KZN.
- Average maximum temperatures over the warmer northern and northeastern parts of the country will range between 25 and 30°C.

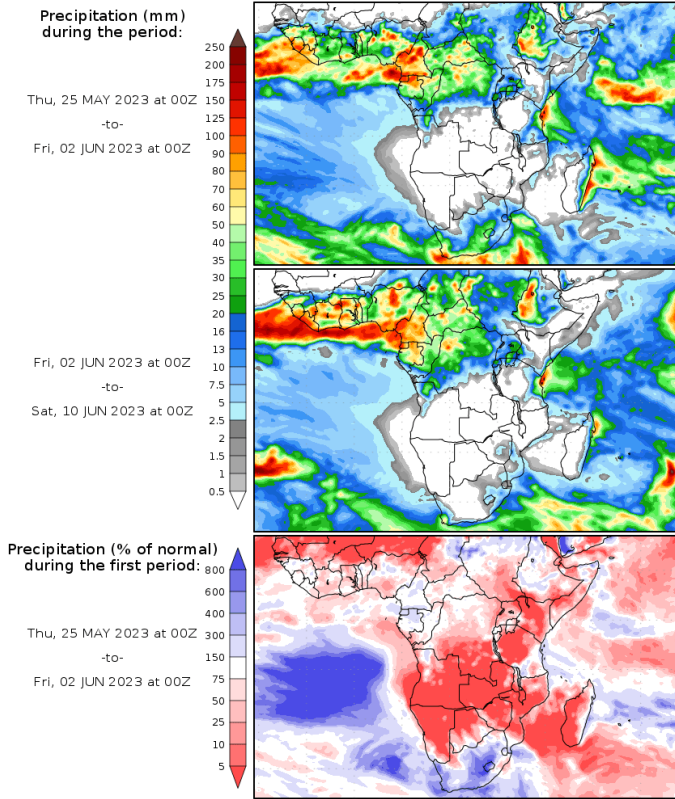


### Highest maximum temperatures

- Highest maximum temperatures will exceed 30°C over parts of KZN and eastern parts of the Eastern Cape and also over the extreme northern parts of the country.
- The warmest conditions over the northern to eastern parts will occur today (Thursday) and again by Sunday and Monday next week, when it will be windy over the northern to central parts.

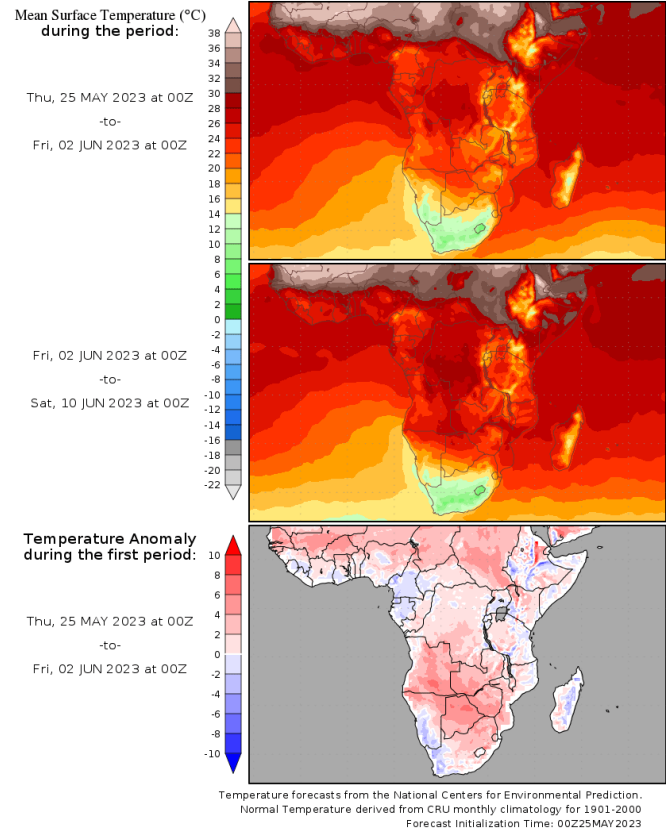
# Medium term rainfall and temperature summary

## Precipitation Forecasts



GRADS/COLA

## Temperature Forecasts



GRADS/COLA



## 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 25 May) period. It is therefore advised to keep track of warnings that may be issued by the SAWS ([www.weathersa.co.za](http://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 be deduced:**

- **Frost is possible:**
  - Over the southern to western interior, especially the high-lying areas, as well as along the Drakensberg in the east: **Friday and Saturday morning (26<sup>th</sup>, 27<sup>th</sup>).**
  - Western interior of the Northern Cape: **Monday and Tuesday morning (29<sup>th</sup>, 30<sup>th</sup>).**
  - Southern interior: **Wednesday morning (31<sup>st</sup>).**
  - Central interior and eastern high-lying areas: **Wednesday morning (31<sup>st</sup>).**
- **It will be windy, enhancing the fire hazard where vegetation is dry:**
  - Northern Cape interior, western to central North West, western to central Free State, northern parts of the Eastern Cape (north-westerly to westerly winds): **Thursday (25<sup>th</sup>).**
  - Central to eastern Northern Cape, western to central North West, western to central Free State, northern parts of the Eastern Cape and northern parts of the Western Cape (northerly to north-westerly winds): **Saturday to Tuesday (27<sup>th</sup> – 30<sup>th</sup>).**
- **Cloudy, wet and cool conditions may disrupt harvest activities:**
  - Central to western maize-production region: **Sunday to Tuesday (28<sup>th</sup> – 30<sup>th</sup>).**
- **Cold, wet and windy conditions will pose a hazard to small stock:**
  - Southern to western interior: **Thursday (25<sup>th</sup>).**
  - Southern to western interior: **Sunday to Wednesday (28<sup>th</sup> – 31<sup>st</sup>).**
- **Significant daily rainfall totals are possible:**
  - Mountainous areas of the winter rainfall region: **Thursday (25<sup>th</sup>).**
  - Southern to western mountainous areas of the Western Cape, depending on the position of the cut-off low early next week: **Monday to Tuesday (29<sup>th</sup>-30<sup>th</sup>)**
- **Light snow is possible:**
  - Southern to southeastern mountainous areas and Lesotho: **Thursday (25<sup>th</sup>).**
  - Southwestern to southern and southeastern mountainous areas and Lesotho: **Tuesday to Wednesday (30<sup>th</sup> – 31<sup>st</sup>).**

## Seasonal forecast

**Seasonal forecasts for autumn over South Africa** are less reliable during winter than during summer.

**ENSO observations and forecasts** indicate that the 2022/23 La Niña has come to an end. ENSO neutral conditions are present. Over the Western Equatorial Pacific Ocean, westerly wind anomalies are present, indicating atmospheric circulation over this region favoring the development of warmer surface water anomalies and El Niño. Moreover, Eastern Equatorial Pacific surface water temperatures have been rising recently, also indicating a potential trend towards El Niño conditions later.

**The Australian Bureau of Meteorology points out that the Equatorial Pacific continues to warm but there is still little atmospheric response**

(Updated 23 May): The Pacific Ocean is currently ENSO-neutral (neither La Niña nor El Niño). Sea surface temperatures are warmer than average in the west and the east of the tropical Pacific. While all international climate models indicate it is very likely that tropical Pacific Ocean temperatures will reach El Niño thresholds during the southern hemisphere winter, an atmospheric response is also required for an El Niño to be declared. Thus far, little shift has been observed in atmospheric ENSO indicators with trade winds and cloudiness patterns in the Pacific remaining indicative of ENSO-neutral conditions. The 30-day SOI has dropped below the El Niño threshold, but sustained values are required for it to be considered a part of an El Niño response.

The ENSO Outlook remains at El Niño WATCH. This indicates there is an increased risk of an El Niño occurring this year, at least double the usual chance. History shows that when the ENSO Outlook has reached El Niño WATCH, El Niño has subsequently developed in about half of those years.

A moderately strong Madden-Julian Oscillation (MJO) pulse is moving over the Western Pacific region and is forecast to move into the central Pacific region in the coming days. There is some variation amongst climate models, with some indicating marginal strengthening and continued eastwards progression across the tropical Pacific until the start of June, while others suggest the MJO pulse will rapidly weaken and become indiscernible. However, if the MJO pulse maintains its strength and continues to track over the western or central Pacific, it would likely weaken trade winds across the equatorial Pacific Ocean. This, in turn, would result in further warming of the equatorial Pacific Ocean and hence drive further development towards El Niño.

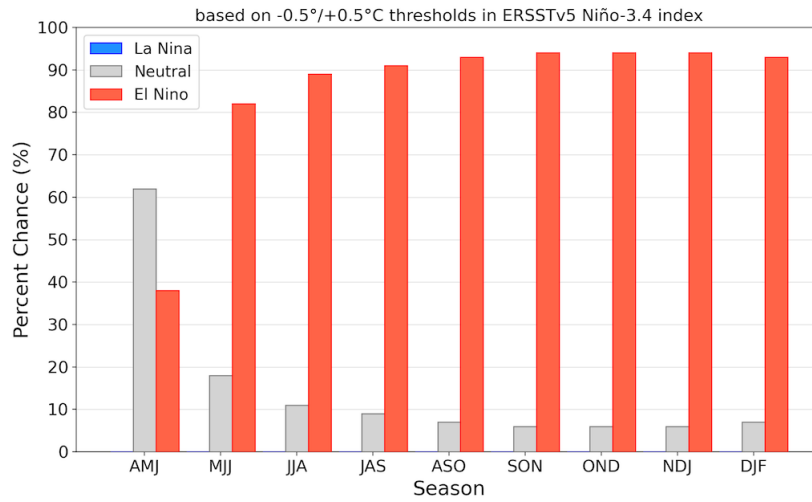
The Southern Annular Mode (SAM) index is currently positive and is expected to return to neutral towards the end of May.....  
*Australian Bureau of Meteorology* - <http://www.bom.gov.au>

**With ENSO neutral conditions present as well as winter approaching, there is little to no strong indication for either wet or dry conditions over the summer rainfall region. The Southern Annular Mode (SAM) is positive, but its association with rainfall over the summer rainfall region during this time of the year is weak. The latest seasonal forecasts are indicative of relatively dry conditions over the winter rainfall region only by the second half of winter.**

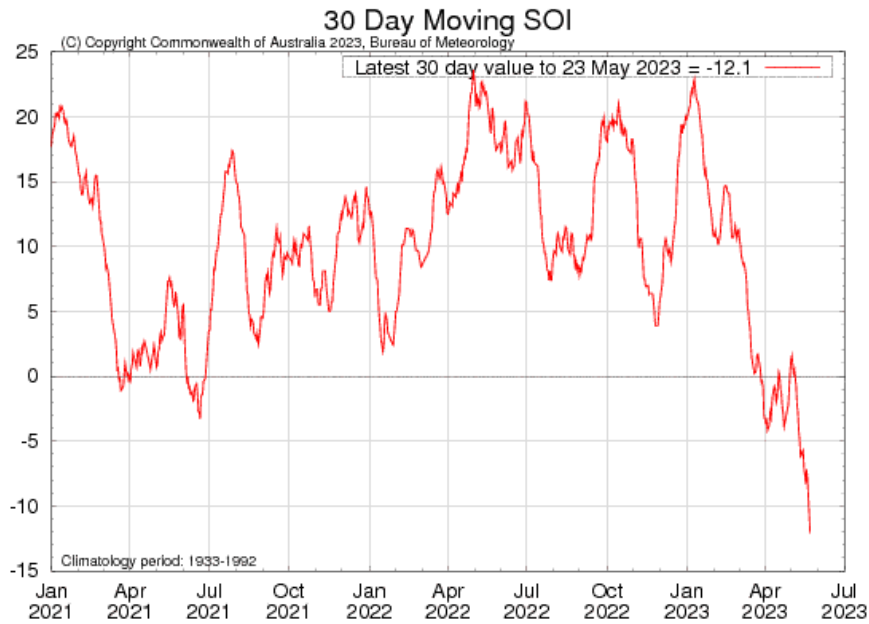
**The International Research Institute for Climate and Society (IRI) also indicates that ENSO is in neutral state**

**According to the IRI** (Updated 19 April): As of mid-May 2023, the previous negative sea surface temperature anomalies in the central-eastern equatorial Pacific have dissipated. Currently, the basin is characterized by warmer sea surface temperature anomalies in the eastern and central Pacific regions, while the values in the western Pacific are currently in the ENSO-neutral range. Key oceanic and atmospheric variables are now consistent with developing El Niño conditions. CPC issued an El Niño watch in April 2023, signaling the start of the warm phase of the ENSO, which remains effective in May 2023. According to the IRI ENSO prediction plume, most of the models forecast an El Niño that persists throughout the entire forecast period.....*International Research Institute for Climate and Society*- <http://iri.columbia.edu/>

Official NOAA CPC ENSO Probabilities (issued May 2023)



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

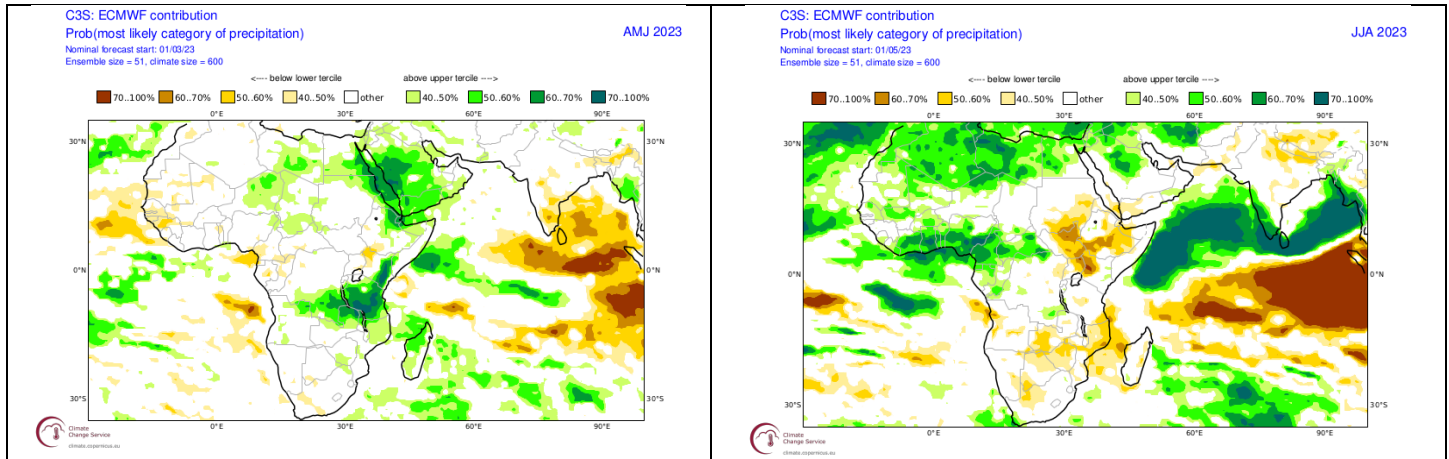


Australian Bureau of Meteorology - <http://www.bom.gov.au>

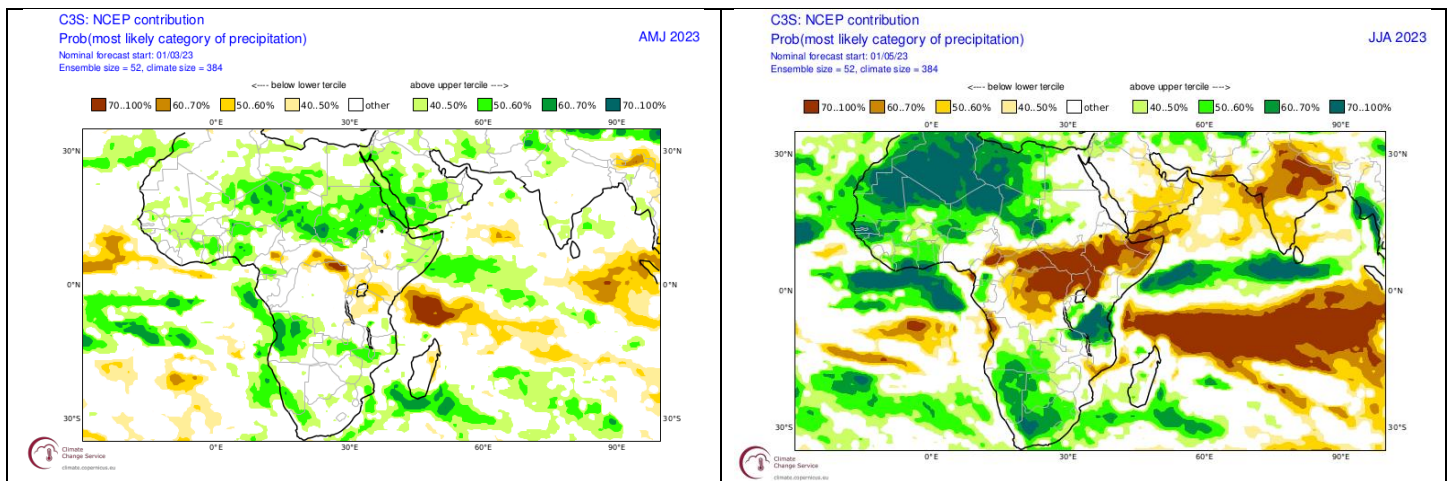
**The Southern Oscillation Index is in neutral territory (-12.1). This is indicative of atmospheric circulation patterns not being associated with La Niña conditions anymore, but more with El Niño conditions.**

# Seasonal forecasts issued by various international institutions

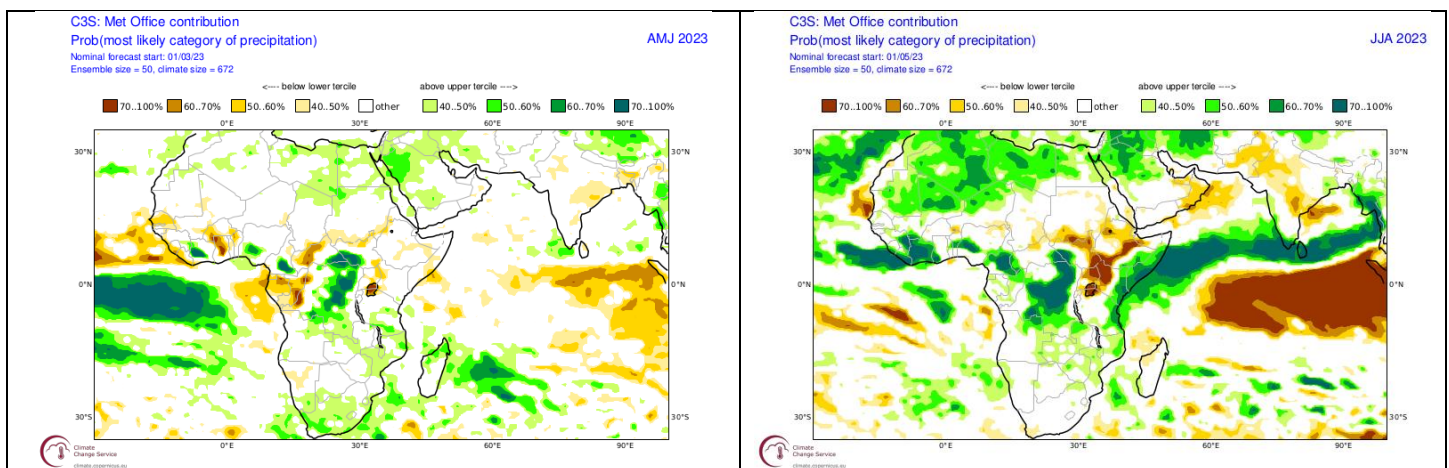
Seasonal forecasts (updated in May 2023) by these institutions, as published by the COPERNICUS Programme (<https://climate.copernicus.eu/seasonal-forecasts>) for autumn to early winter, reflect weak/varying signals with regard to rainfall anomalies over both the interior and the winter rainfall region, as opposed to the late summer forecast that was dominated by the 2022/23 La Niña event that has come to an end.



**Probabilistic forecasts by the European Centre for Medium-Range Weather Forecasts for rainfall for autumn to early winter (April-June 2023; left - Forecast issued in 2023-03) and winter (June to August 2023; right – forecast issued 2023-05.**



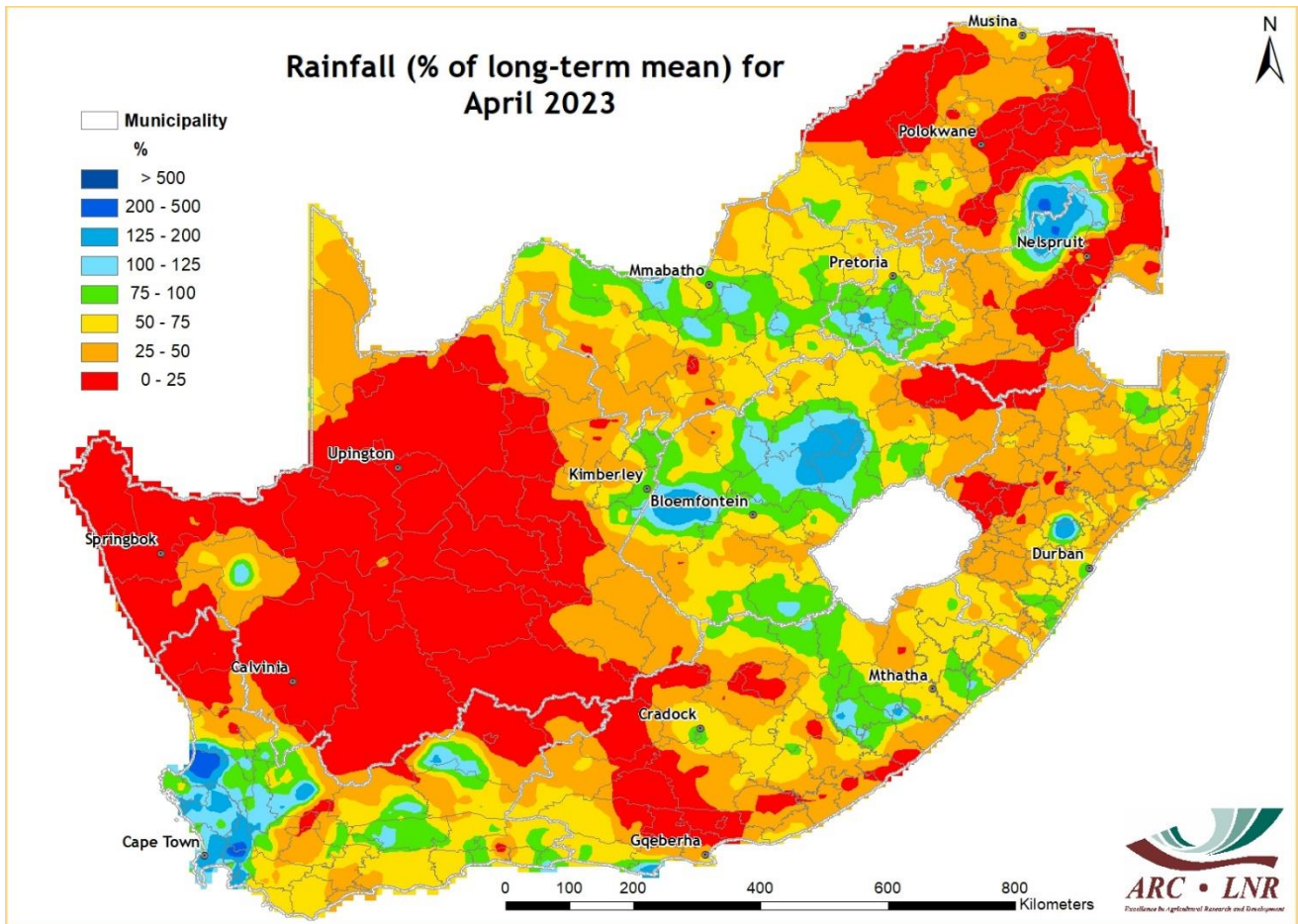
**Same as above, but forecasts issued by the National Centres for Environmental Prediction.**



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

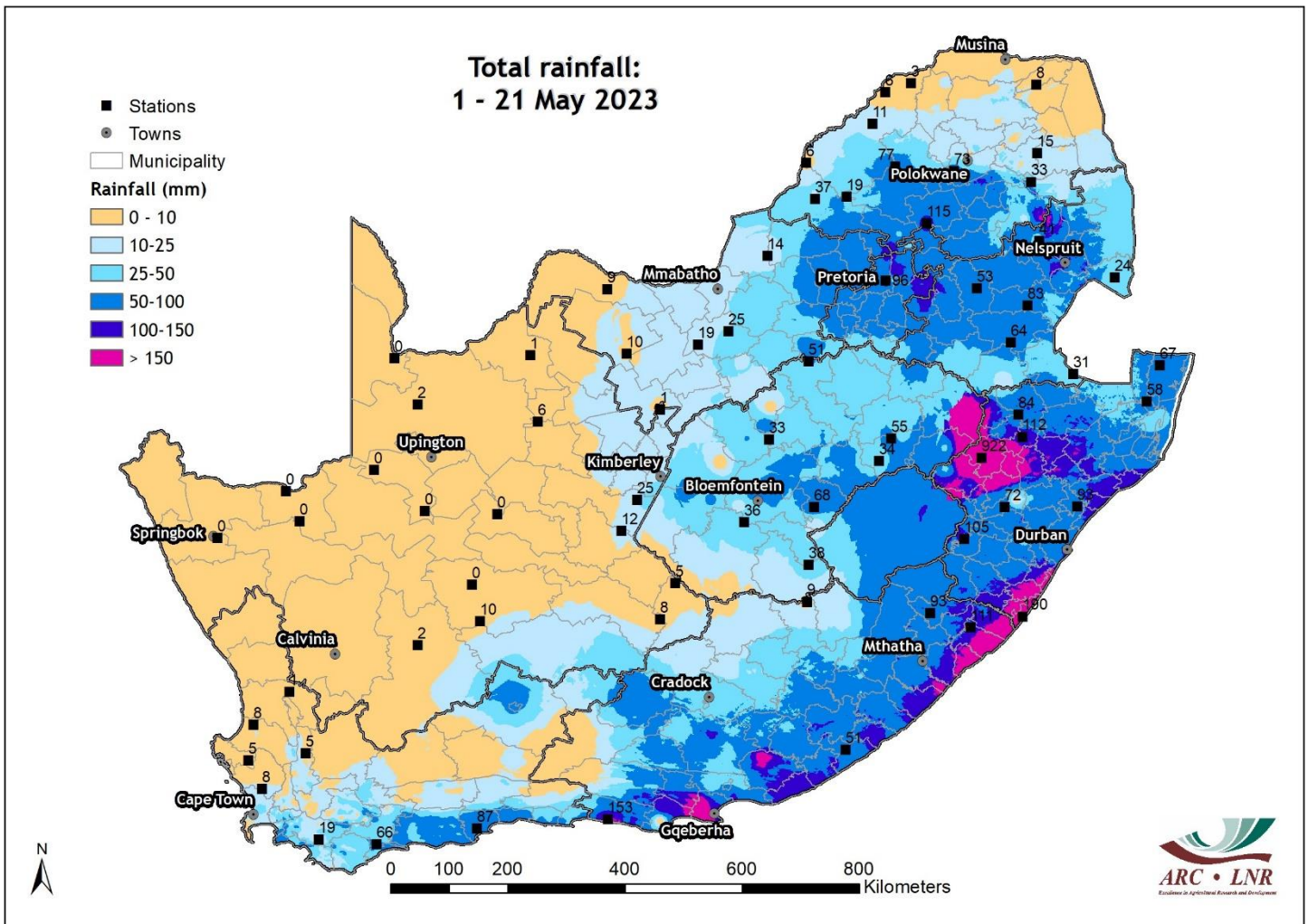
# Observed conditions

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



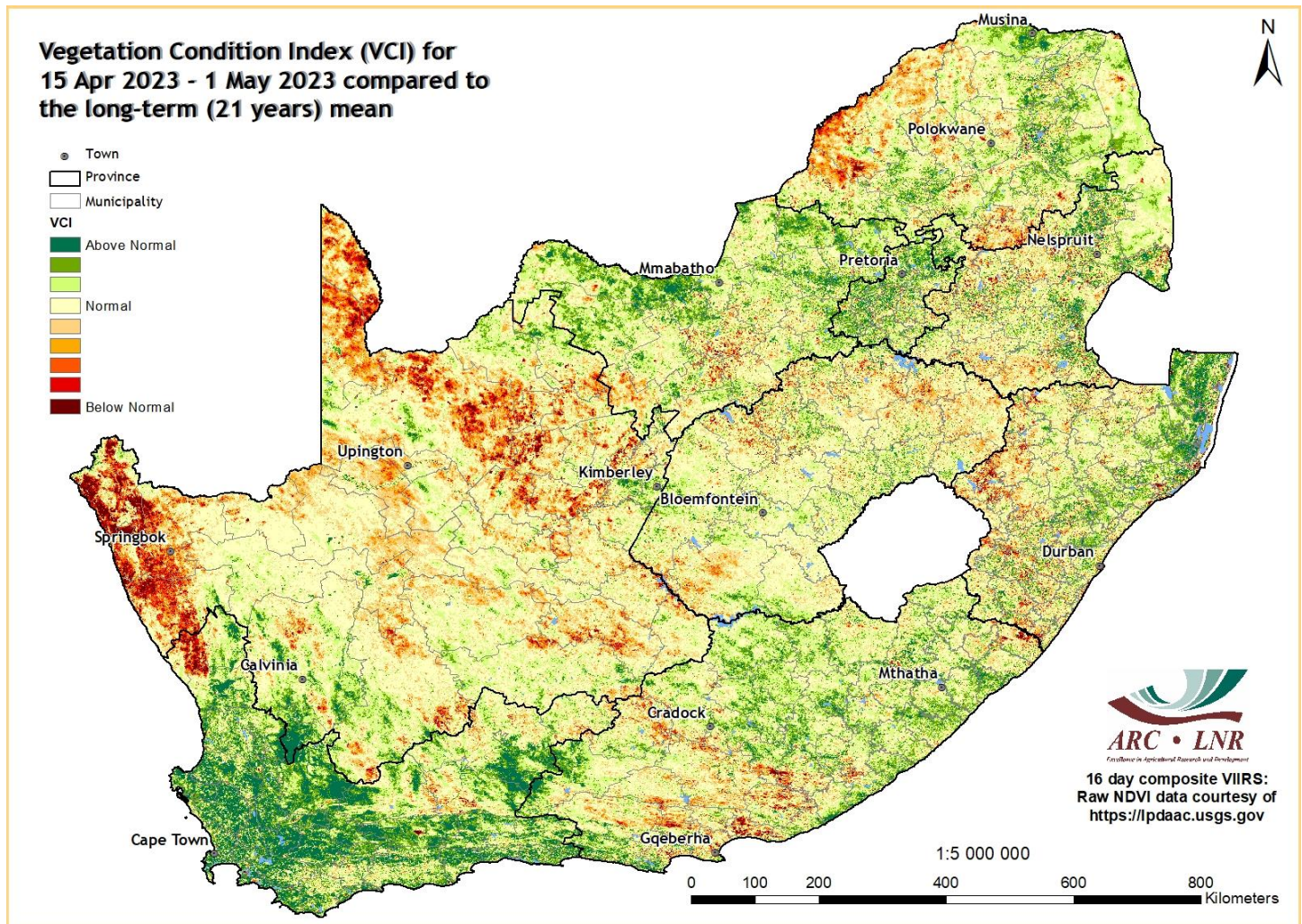
*Most of the country received below average rainfall during April, except for the western parts of the winter rainfall region as well as the central parts of the Free State where rainfall was normal to above normal.*

## Rainfall (mm): 1 – 21 May 2023



*The central to eastern and southern parts received above average rainfall during the first half of May, with totals ranging between 50 and 150 mm over large parts of Gauteng, eastern North West, eastern Free State, Mpumalanga, KZN, Eastern Cape and more generally along the Garden Route in the south. The winter rainfall region was relatively dry during the period.*

## Vegetation Condition Index: April 2023



**By mid- to late-April, vegetation activity still reflected widespread above-normal rainfall since mid-October over the central to eastern interior. The winter rainfall region and large areas in the south benefitted from above-normal rain since December. Due to drier conditions setting in, vegetation activity over the Northern Cape western parts of Limpopo was below normal.**

## 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](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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