

CUMULUS

13 April 2023

by J Malherbe, R Kuschke



WE GET
AGRICULTURE'S *heartbeat*

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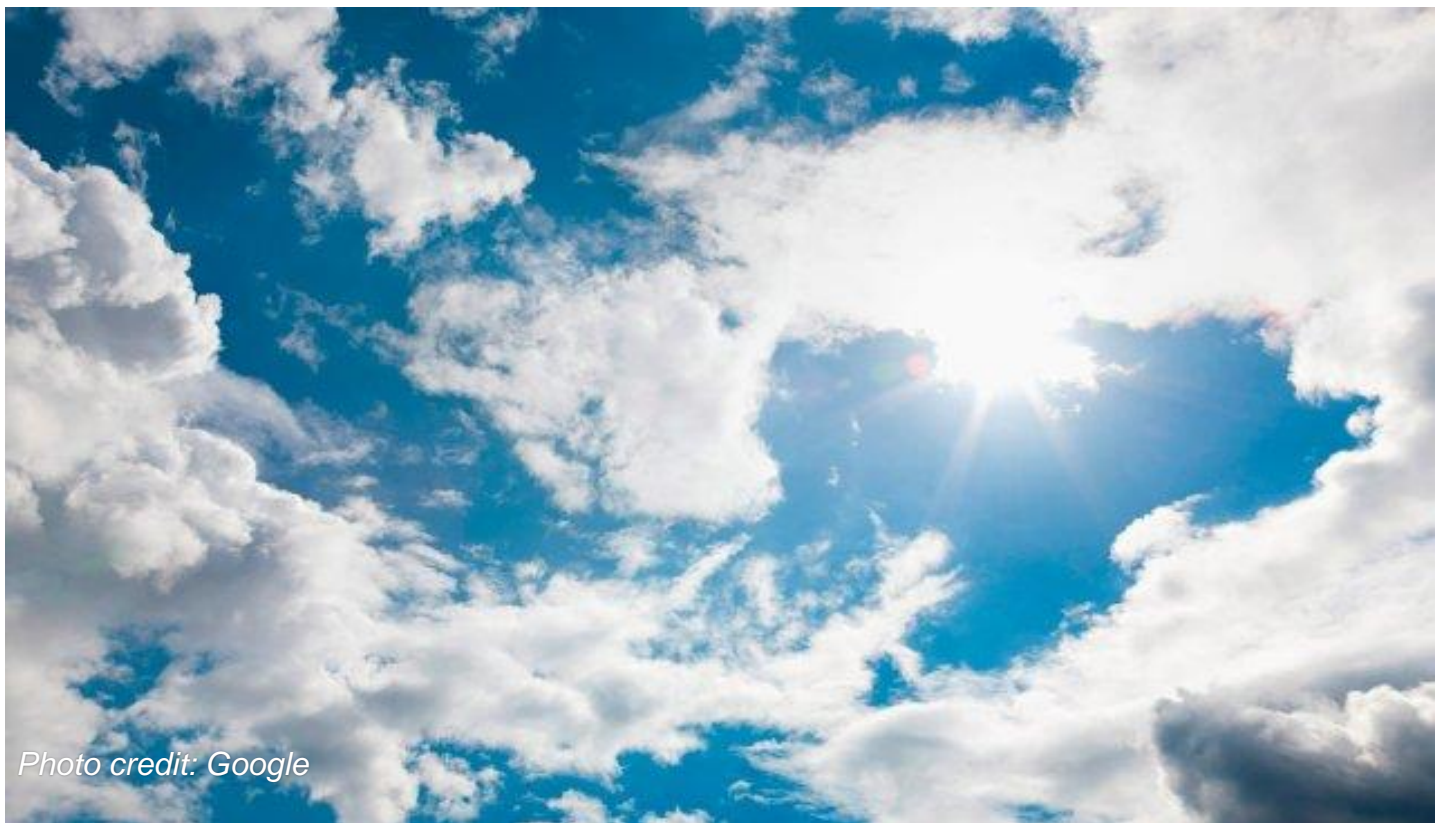


Photo credit: Google

Summary

More light frost and then warmer conditions ahead

Another cold front will move across the southern to central parts and result in cool to cold conditions, especially on Saturday morning when light frost may again occur over parts of the interior, including parts of the summer-grain production region. This will however be followed up by a pattern that will result in warming across the country, with above-normal temperatures for this time of the year following the weekend. Unlike the previous weekend, the interior will remain largely dry.

The below-normal minimum temperatures are associated with the recent atmospheric circulation patterns akin to El Niño conditions.

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, starting out cooler but trending warmer during the period.
- It will be cool over the southern parts initially, spreading into the central interior with light frost possible on Saturday morning.
- It will become warmer from Saturday onwards.
- Rainfall should on average be below normal for this time of the year.
- Cold fronts will result in showers over the western to southern parts of the winter rainfall region as well as along the Garden Route on Thursday and Friday.
- Isolated thundershowers are possible over parts of the northeast on Saturday and Sunday.
- Isolated thundershowers will occur mostly over the western to southeastern parts next week while most of the rest of the country will remain dry.
- The summer-grain production region will be dry for the most part, with some thundershowers possible over the northern to western parts on Sunday and Monday. Except for cool conditions on Friday and relatively low minimum temperatures on Saturday morning with frost in isolated areas, it will be warm for this time of the year:
 - Maximum temperatures over the eastern maize-production areas will be in the order of 22 – 28°C. Minimum temperatures will be in the order of 4 – 12°C, with lowest temperatures on Saturday morning and over the areas near the Drakensberg.
 - Maximum temperatures over the western maize-production region will range between 23 and 31°C, with highest temperatures in the far west. Minimums will be in the order of 6 - 17°C, with lowest values on Saturday morning and towards the south.

Overview of expected conditions over the main agricultural production areas

A cold front moving over the southern to central and eastern parts will result in showers over the winter rainfall region and Garden Route initially, with cold, dry air expected to spread into the interior, possibly resulting in light frost over the central to southern and eastern high lying parts. Moisture levels will increase over the northern parts as the high to the south ridges along the southern parts towards the east. The upper air will not be particularly favorable for widespread rain due to the absence of significant upper-air troughs or lows over the country.

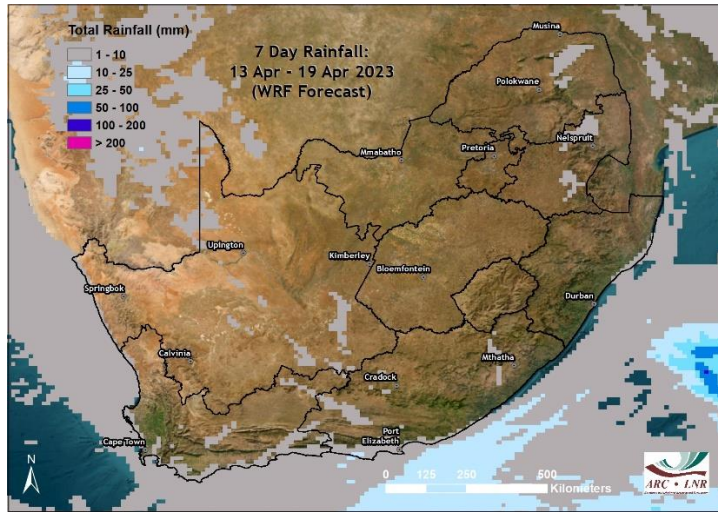
Maize production region: The region is expected to be mostly dry except for the possibility of isolated thundershowers over the northern to western parts on Saturday and Sunday. Temperatures will be above average except for cooler conditions initially with the possibility of light frost especially on Saturday morning:

- Minimum temperatures will be in the order of 4 – 12°C, with lowest temperatures on Saturday morning and over the areas near the Drakensberg.
 - Maximum temperatures over the western maize-production region will range between 23 and 31°C, with highest temperatures in the far west. Minimums will be in the order of 6 - 17°C, with lowest values on Saturday morning and towards the south.
-
- **Thursday (13th):** Sunny and warm with moderate north-westerly winds in the afternoon.
 - **Friday (14th):** Sunny and mild, becoming cooler from the south, with moderate south-westerly winds.
 - **Saturday (15th):** Cool in the morning, but cold over the southern and eastern high-lying areas with light frost in places. It will become warmer during the day and partly cloudy in the north with isolated thundershowers over the northern to north-western parts of the region.
 - **Sunday (16th):** Partly cloudy and warm. Isolated thundershowers are possible in the west and northwest. Moderate northerly winds are possible in the west.
 - **Monday (17th):** Partly cloudy and warm.
 - **Tuesday (18th):** Partly cloudy and warm.
 - **Wednesday (19th):** Partly cloudy and warm.

Cape Wine Lands and Ruens: Frontal activity will result in cool conditions with southwesterly to southerly winds and light showers over the southwestern parts and Garden Route, clearing early on Friday. The remainder of the period will be mild to warm and dry, but hot over the northern to northwestern parts and into the Swartland on Sunday and Monday. Fresh to strong south-easterlies are expected in the southwest until Sunday.

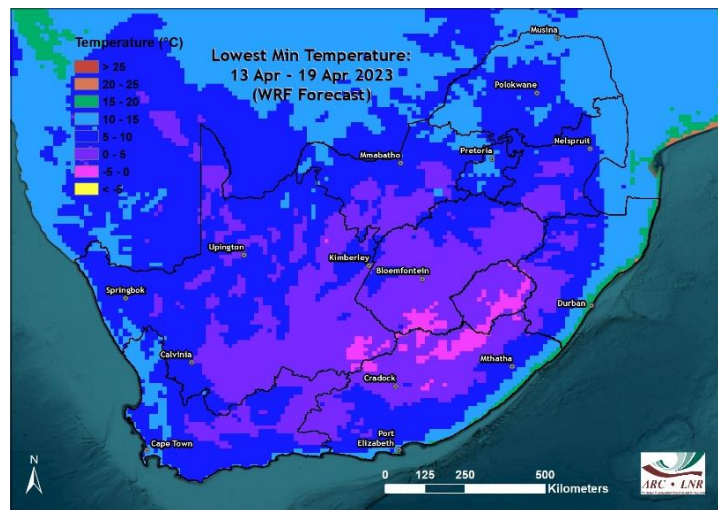
Daily summary of expected conditions

(GFS forecast downscaled using WRF)



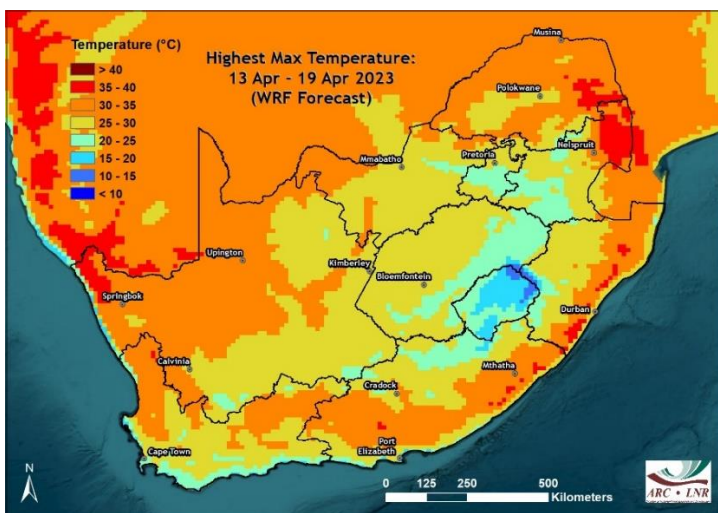
7-Day total rainfall:

- Very little rain is expected during the next few days.
- The winter rainfall region and Garden Route will experience cold-front-related showers until Saturday.
- Light showers are expected along the eastern seaboard and northeastern escarpment on Friday.
- Isolated thundershowers in the northeast on Saturday/Sunday.
- Isolated thundershowers over the western parts from Monday onwards



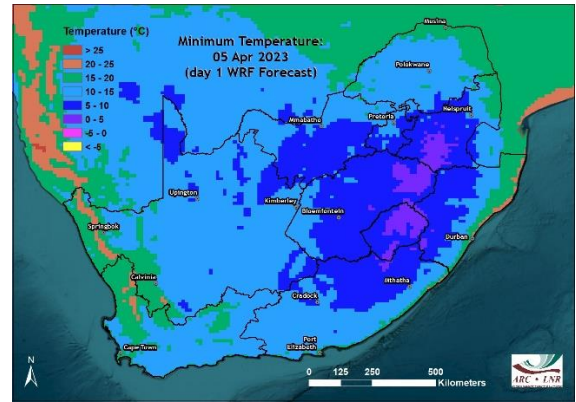
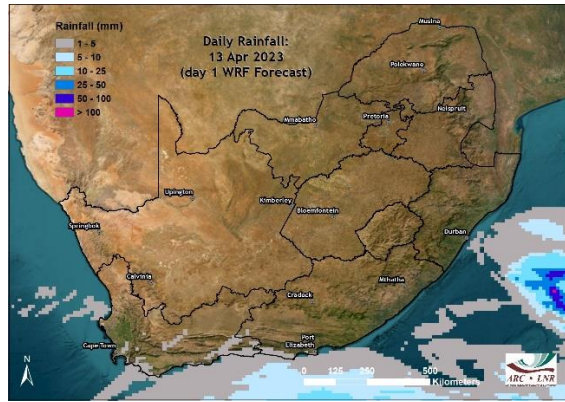
Lowest minimum temperatures

- The lowest minimum temperatures, reaching values below 5°C, will occur over the central to southern interior and eastern high-lying areas and will occur on Saturday morning.
- Parts of the southern escarpment and Drakensberg will experience sub-zero temperatures.
- Minimum temperatures will increase from Sunday onwards.



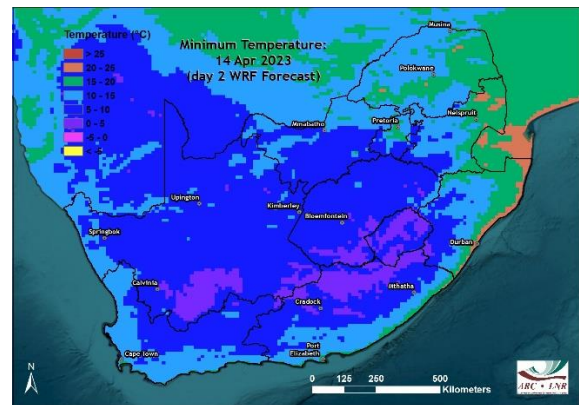
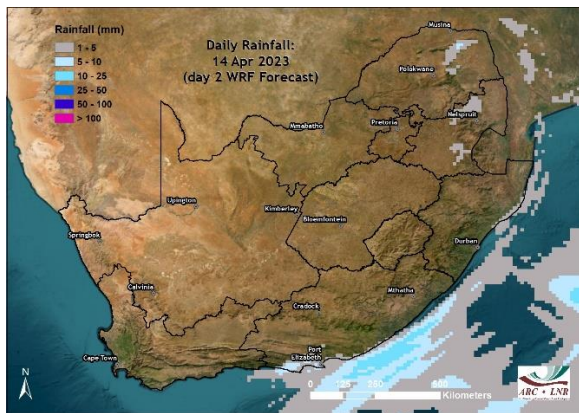
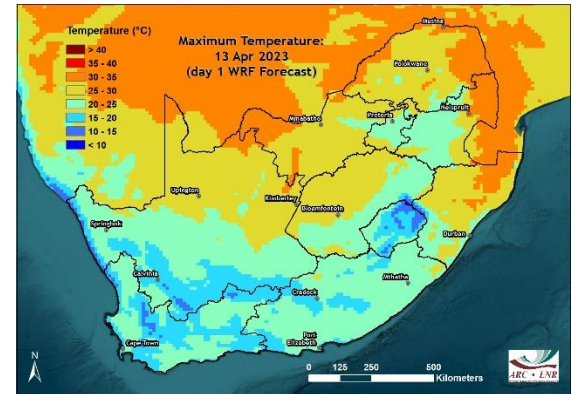
Highest maximum temperatures

- Hot conditions will occur over the Lowveld on Thursday and Friday.
- Parts of the Eastern Cape and the eastern seaboard will be hot by Tuesday next week.
- Parts of the western interior, focusing on the Lower Orange River Valley, will be hot from Monday onwards.



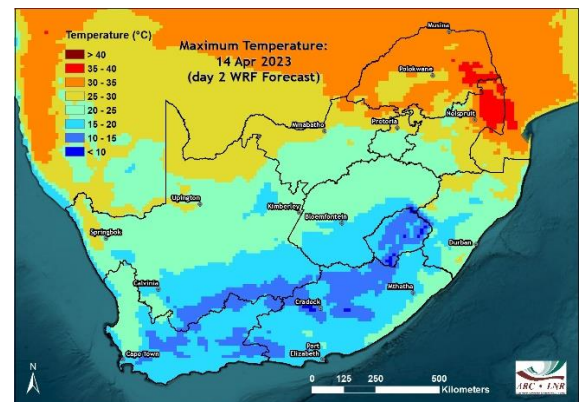
Thursday 13 April

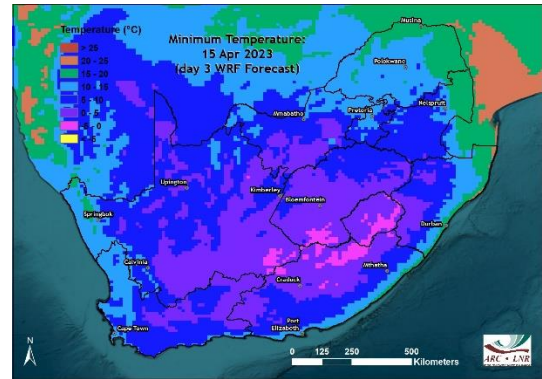
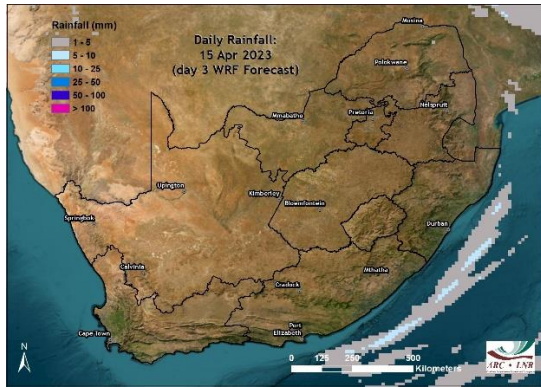
- Dry over most of the country
- Light showers over the winter rainfall region and Garden Route.
- Relatively low minimum temperatures over parts of the eastern Highveld.
- It will be mild to cool in the south during the day.
- It will become warm in the north and northeast.



Friday 14 April

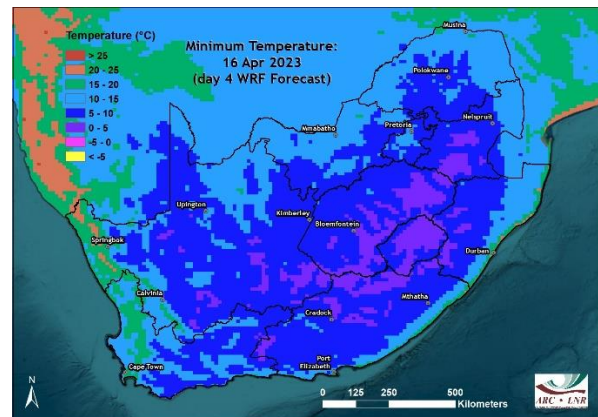
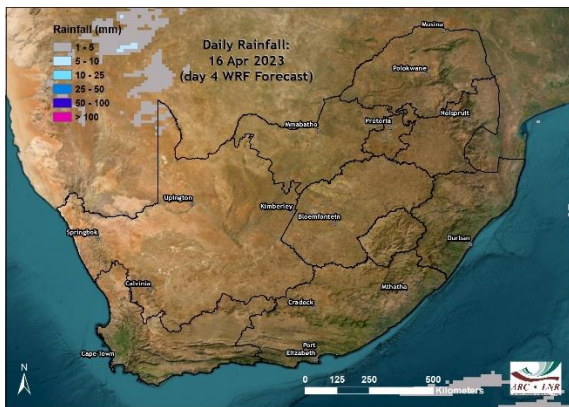
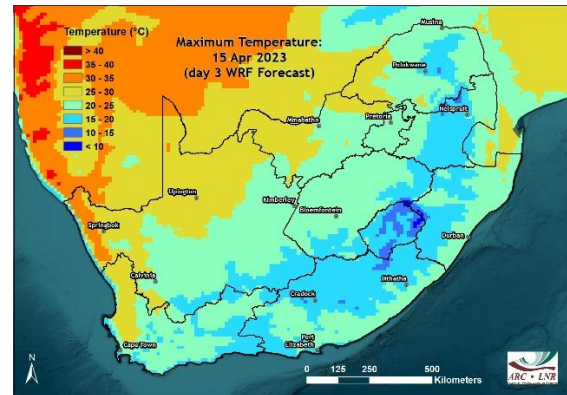
- Still dry over most of the interior.
- Showers over the eastern Garden Route, advancing further up to include the KZN coast later.
- Showers over the Lowveld and northeastern escarpment later.
- Warmer over the northern and northeastern parts, hot in the Lowveld.
- Cooler over the southern parts as a cold front advances into the interior.





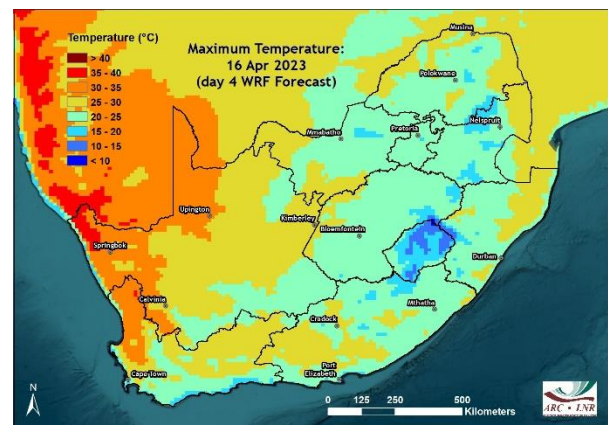
Saturday 15 April

- Chilly over the central to southern and eastern high-lying areas in the morning with frost, especially towards the south.
- Cooler over the eastern to northeastern parts during the day. Cloudy in the northeast.
- Isolated afternoon thundershowers possible over parts of Gauteng, North West.
- Warmer in the west, including along the west coast.
- Moderate to fresh northeasterly winds over Limpopo and over the northwestern interior and west coast.



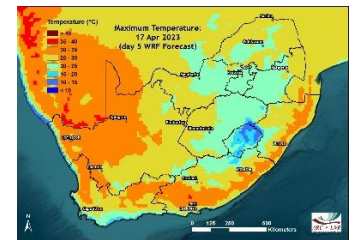
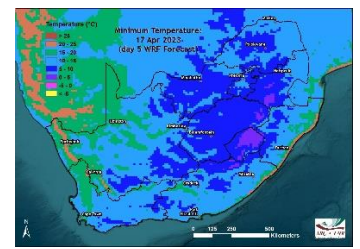
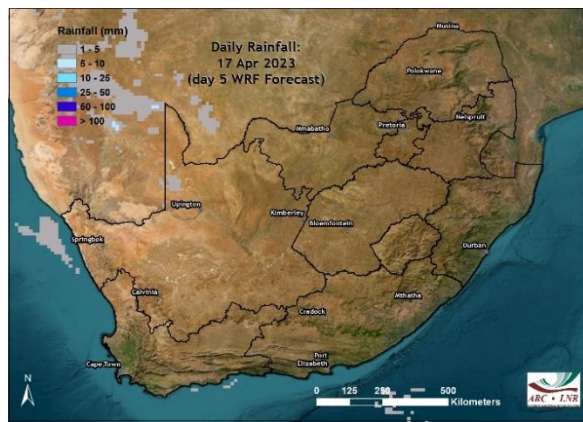
Sunday 16 April

- Mostly dry except for isolated thundershowers over the northern to northwestern interior.
- Somewhat higher minimum temperatures, but still chilly over the eastern to southern high-lying areas.
- Mild in the east during the day.
- Warm in the west, becoming hot in the far west including the west coast.
- Moderate northerly winds over the central parts.



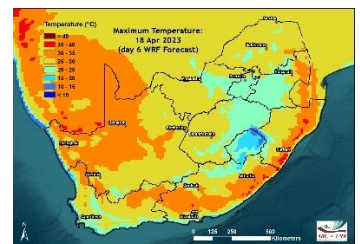
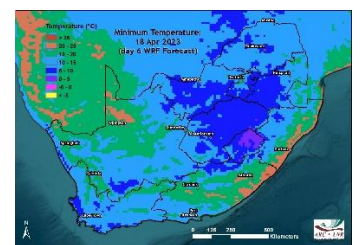
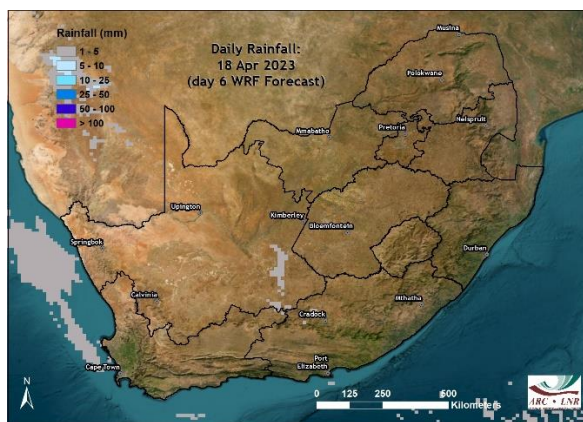
Monday 17 April

- Mostly dry, but isolated thundershowers are still possible over the northwestern parts.
- Warm to hot over the western parts. Also warm over the southern parts and southeastern to eastern coastal belt and adjacent interior.
- Mild over the eastern to northeastern interior.
- Warm with fresh northwesterly winds over the western to southern and southeastern parts.
- Cool over the western to southern parts during the day.



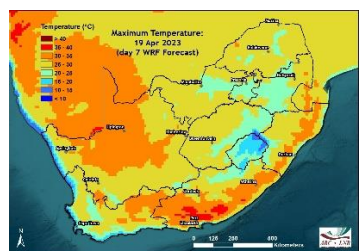
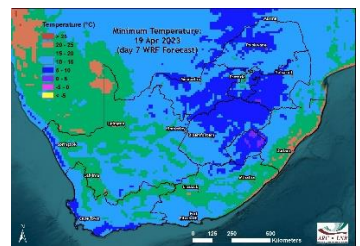
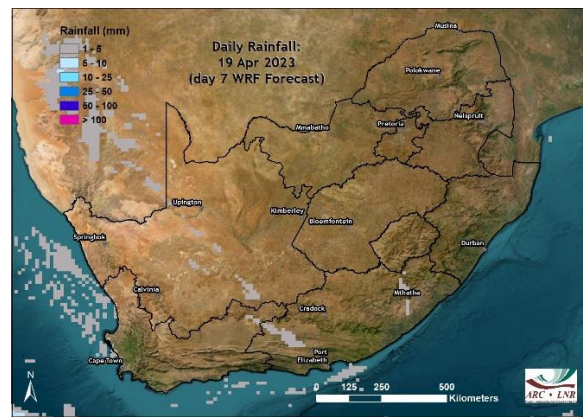
Tuesday 18 April

- Dry over most of the country.
- A band of isolated thundershowers stretching from the western interior into the southeastern parts.
- It remains warm with fresh northwesterly winds over the western to southern and southeastern parts.
- Warm to hot over the western parts. Also warm over the southern parts and southeastern to eastern coastal belt and adjacent interior where it becomes hot.



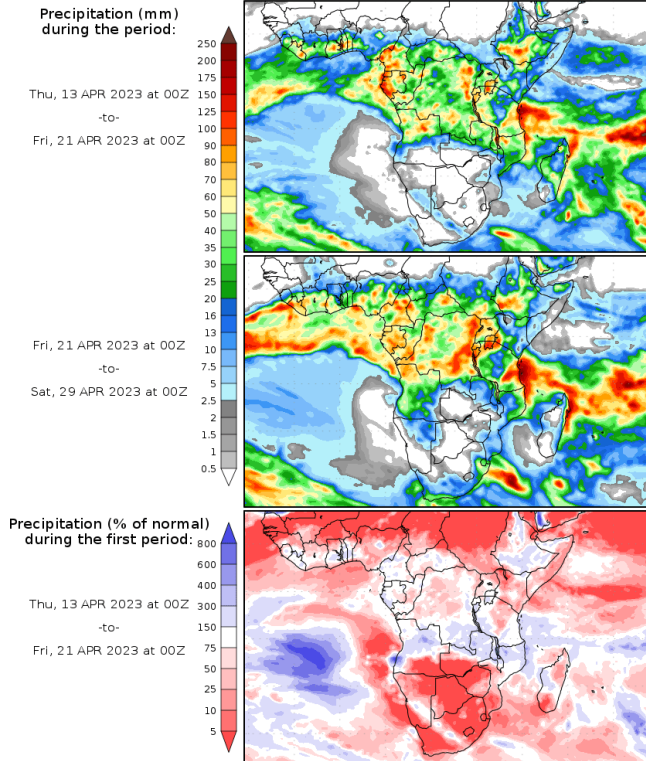
Wednesday 19 April

- Dry over most of the country.
- Band of isolated thundershowers still present over the western to southeastern parts.
- Minimum temperatures still somewhat higher.
- Warm to hot over the western parts. Also warm over the southern parts where it will become hot. Warm also along the southeastern to eastern coastal belt and adjacent interior.
- Warm with moderate northwesterly winds over the western to southern interior.



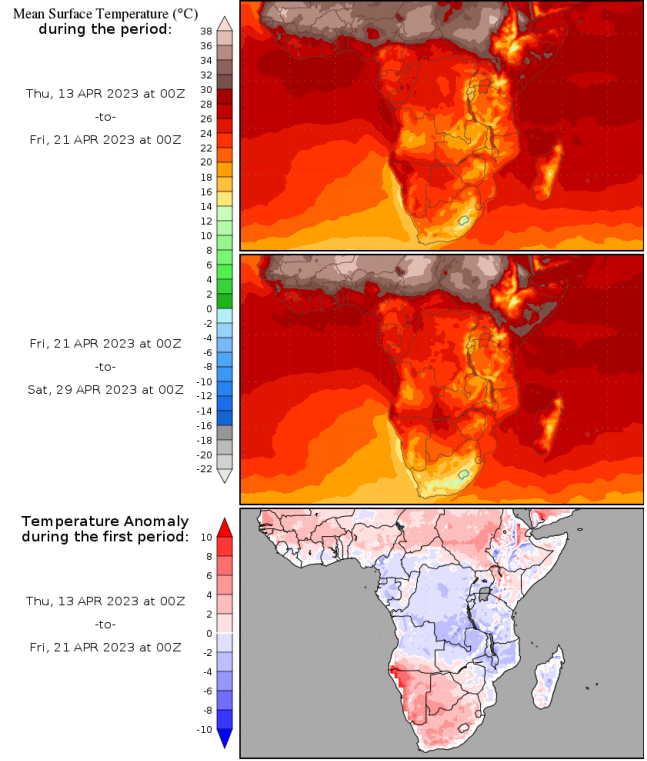
Medium term rainfall and temperature summary

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 13 April) 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 be deduced:

- **It will be hot:**
 - Over the Lowveld: **Friday (14th)**.
 - Orange River Valley and west coast: **Sunday to Tuesday (16th – 18th)**.
 - Karoo: **Monday to Tuesday (17th – 18th)**.
 - Eastern parts of the Eastern Cape and KZN coastal belt and adjacent interior: **Monday to Tuesday (17th – 18th)**.
- **It will be windy, enhancing the fire hazard where vegetation is dry:**
 - Western to southern and central interior (north-westerly to westerly winds): **Thursday (13th)**.
 - Western to southern and central interior (south-westerly to southerly winds): **Friday (14th)**.
 - Western to southern and southeastern interior, where it will also be hot at times (westerly to north-westerly winds): **Monday - Wednesday (17th – 19th)**.
- **Cool to cold conditions may pose a hazard to small stock:**
 - Southern to southeastern parts, especially the southern escarpment and Drakensberg: **Friday to Sunday (14th– 16th)**.
- **Light frost is possible in isolated areas:**
 - High-lying parts of the southern interior: **Saturday and Sunday morning (15th – 16th)**.
 - Drakensberg and isolated parts of the Eastern Highveld: **Saturday and Sunday morning (15th – 16th)**.
 - Isolated areas across the Free State and southern North West: **Saturday morning (15th)**.
- **Moderate to fresh southeasterly winds are expected:**
 - Over the southwestern parts of the Western Cape: **Friday to Sunday (14th – 16th)**.

Seasonal forecast

Seasonal forecasts for autumn over South Africa are less indicative of wet conditions than earlier, reflecting global atmospheric circulation patterns now neutral and out of the La Niña state that has been present for much of the last few years.

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 chances for the development of an El Niño later this year remain elevated

(Updated 11 April): The El Niño–Southern Oscillation (ENSO) is currently neutral (neither La Niña nor El Niño). Oceanic and atmospheric indicators for the tropical Pacific Ocean are at neutral ENSO levels. However, there are some signs El Niño may form later in the year. Therefore, the ENSO Outlook is at El Niño WATCH. This means there is approximately a 50% chance of El Niño in 2023.

International climate models suggest neutral ENSO conditions are most likely to persist through autumn. From July, all but one of the models indicate El Niño thresholds will be met or exceeded, with all models by August. Current ENSO outlooks extending beyond autumn should be viewed with some caution as they typically have lower forecast accuracy than forecasts made during other times of the year.

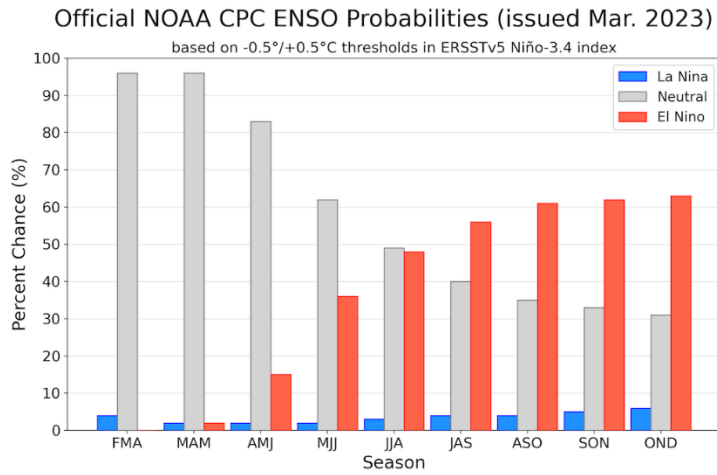
The Madden-Julian Oscillation (MJO) has recently strengthened and moved into the Western Pacific region.....

The Southern Annular Mode (SAM) index is currently neutral and is expected to become briefly negative in the coming week before returning to neutral values... *Australian Bureau of Meteorology* - <http://www.bom.gov.au>

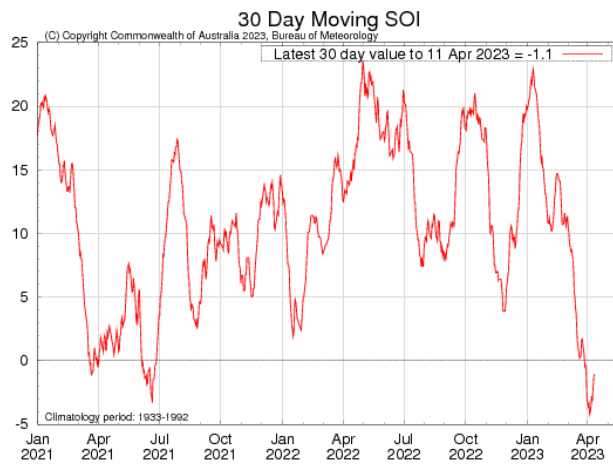
With ENSO neutral conditions present, there is little to no strong indication for either wet or dry conditions over the summer rainfall region, especially given the time of the year. ENSO Neutral conditions are expected to remain in place at least until the winter. The Southern Annular Mode (SAM) is neutral, and its association with rainfall over the summer rainfall region during this time of the year is weak. Current seasonal forecasts lean towards drier conditions during the winter over the winter rainfall region.

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

According to the IRI (Updated 20 March): In mid-March 2023, the previous negative sea surface temperature anomalies in the central-eastern equatorial Pacific weakened further, and the basin is now in an ENSO-neutral state (as of 15 March 2023, the last observed value in the NINO3.4 region was 0.1 °C). Key oceanic and atmospheric variables are now consistent with ENSO-neutral conditions. CPC issued a Final La Niña Advisory in March 2023, signaling the end of the event. Most models in the IRI ENSO prediction plume forecast SSTs in the ENSO-neutral state during Apr-Jun, and May-Jul, 2023. The likelihood of El Niño remains low during Apr-Jun (21%), increasing to 49% in May-Jul, and then becomes the dominant category from Jun-Aug onward with probabilities in the 60-67%. ENSO-neutral is the next most-likely category, with probabilities remaining in the range of 31-35%.....*International Research Institute for Climate and Society*-
<http://iri.columbia.edu/>



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

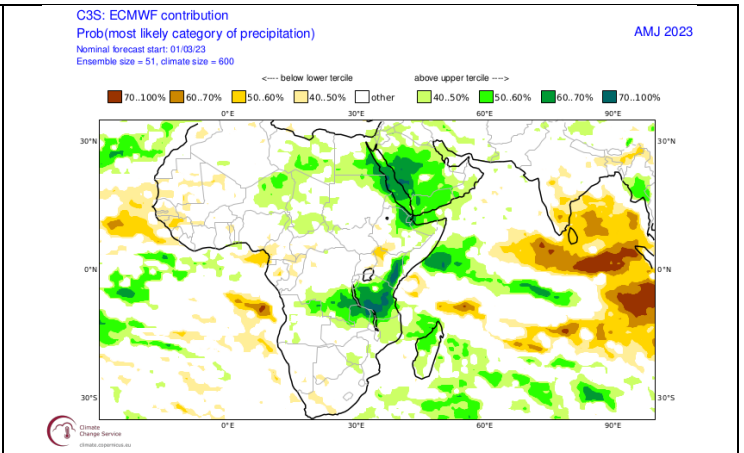
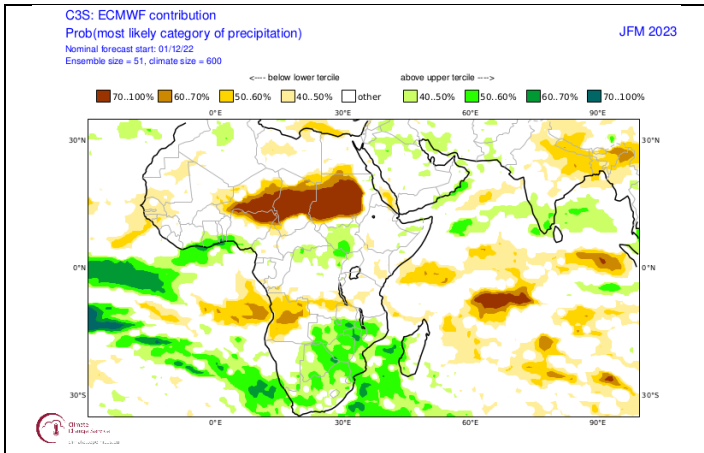


Australian Bureau of Meteorology - <http://www.bom.gov.au>

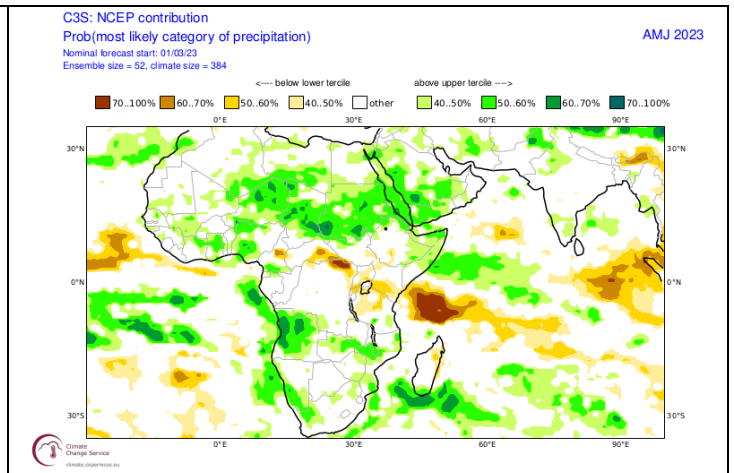
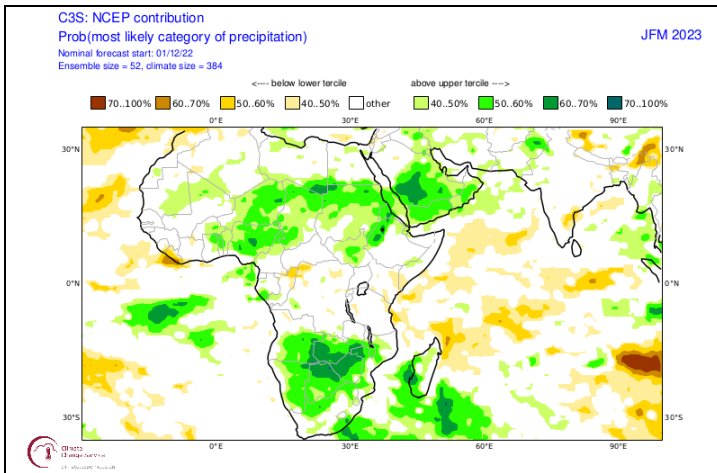
The Southern Oscillation Index is in neutral territory (-1.1). This is indicative of atmospheric circulation patterns not being associated with La Niña conditions anymore.

Seasonal forecasts issued by various international institutions

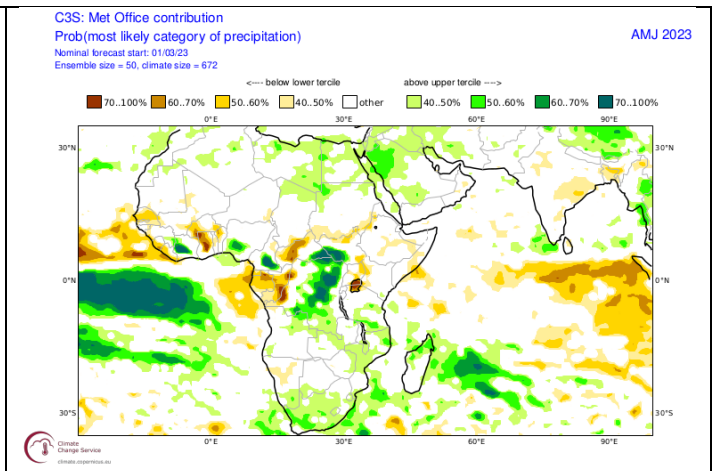
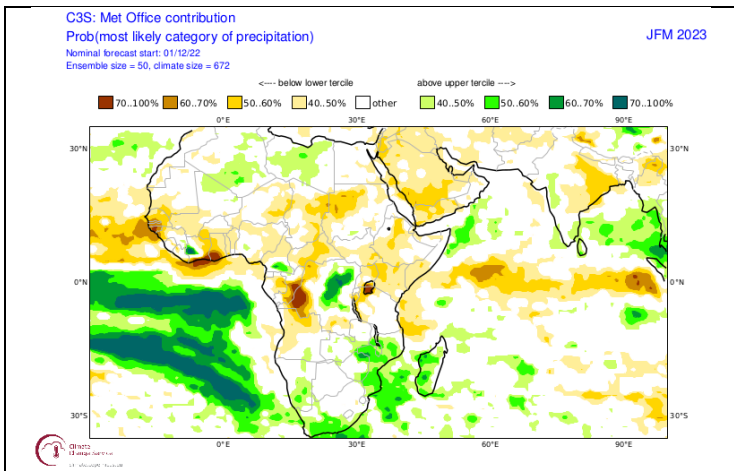
Seasonal forecasts (updated in October 2022) by these institutions, as published by the COPERNICUS Programme (<https://climate.copernicus.eu/seasonal-forecasts>) for autumn to early winter, reflect weak signals with regard to rainfall anomalies over both the interior and the winter rainfall region, as 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 late-summer (January-March 2023; left – Forecast issued 2022-12) and autumn to early winter (April-June 2023; right - Forecast issued in 2023-03).



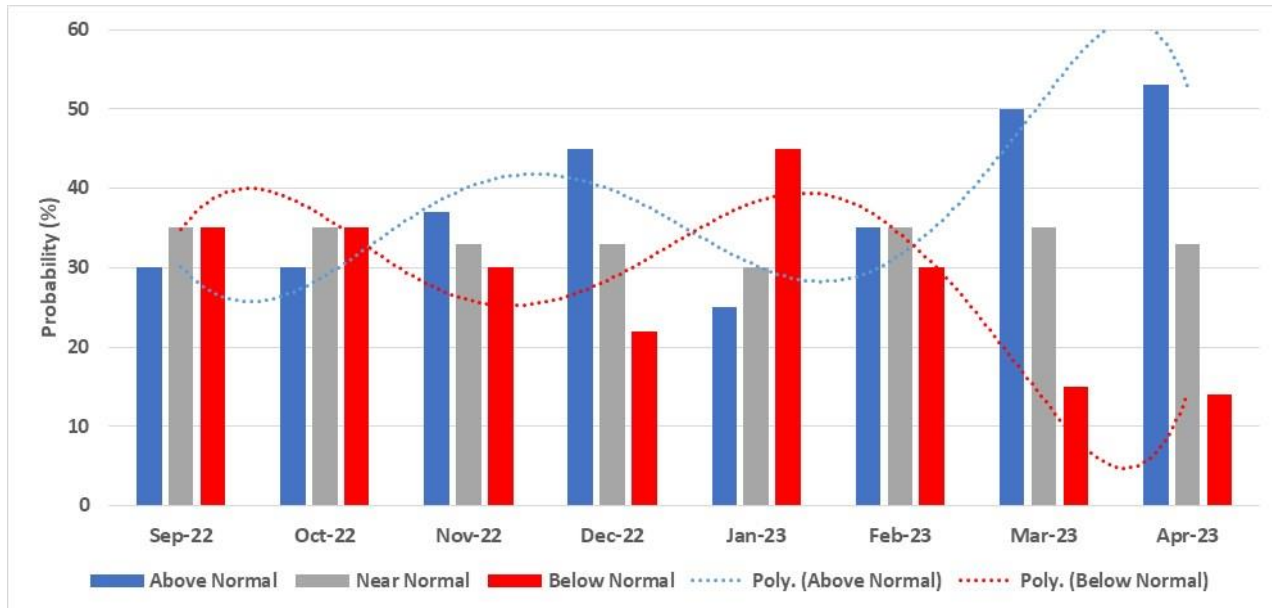
Same as above, but forecasts issued by the National Centres for Environmental Prediction.



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

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 2022/23 more often experience a seasonal rainfall curve that compares to normal conditions as indicated in the bar graph below, with wetter conditions focussing on November to December and again from mid-February to April while drier than normal conditions focus on October and January to mid-February:



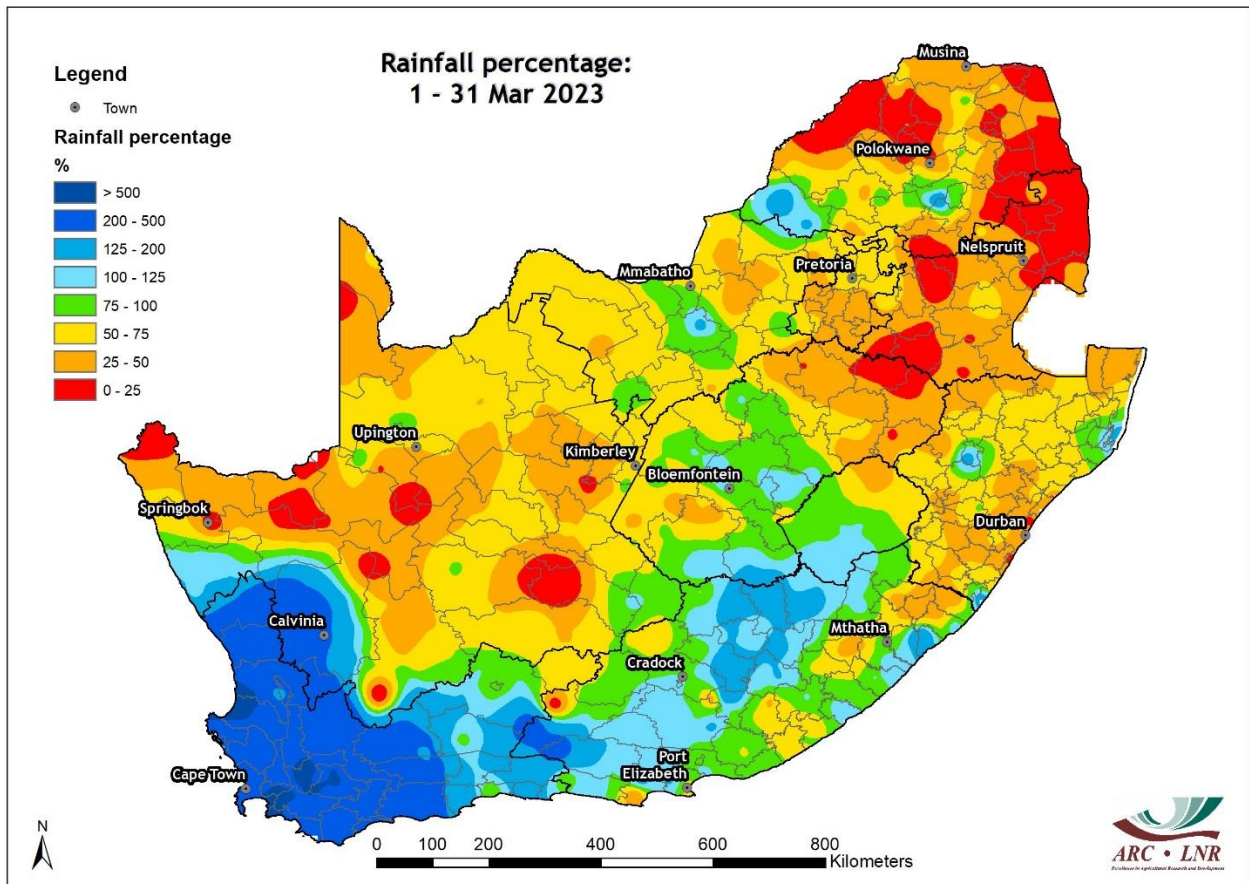
Probabilistic forecast for rainfall over the summer rainfall region, based on the natural cyclic nature of the climate system as seen in decadal variability, per month for the period September 2022 – April 2023 (Forecast issued in 2022-10).

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

- September – 9 October: Relatively dry conditions over the north-eastern half of the summer rainfall region
- 10 October – 10 November: Near-normal rainfall over the north-eastern half of the summer rainfall region
- 10 November – end of December: Near-normal to above-normal rainfall over the north-eastern half of the summer rainfall region
- January – mid-February: Below-normal rainfall over the north-eastern half of the summer rainfall region
- Mid-February - April: Above-normal rainfall over the north-eastern half of the summer rainfall region

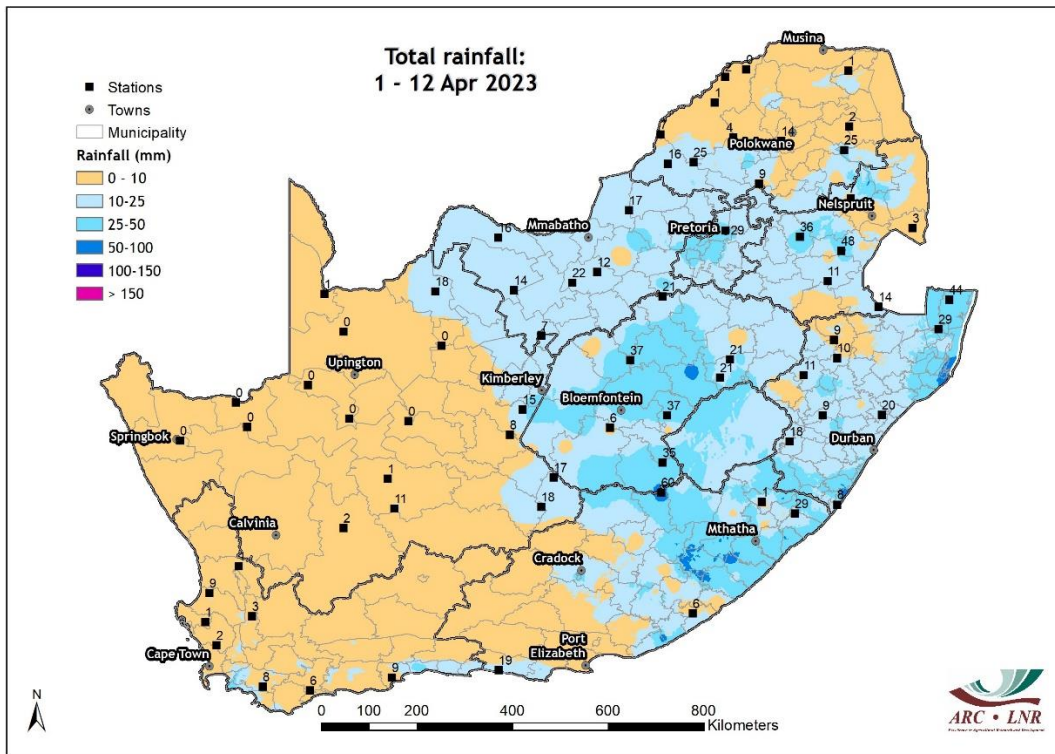
Observed conditions

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



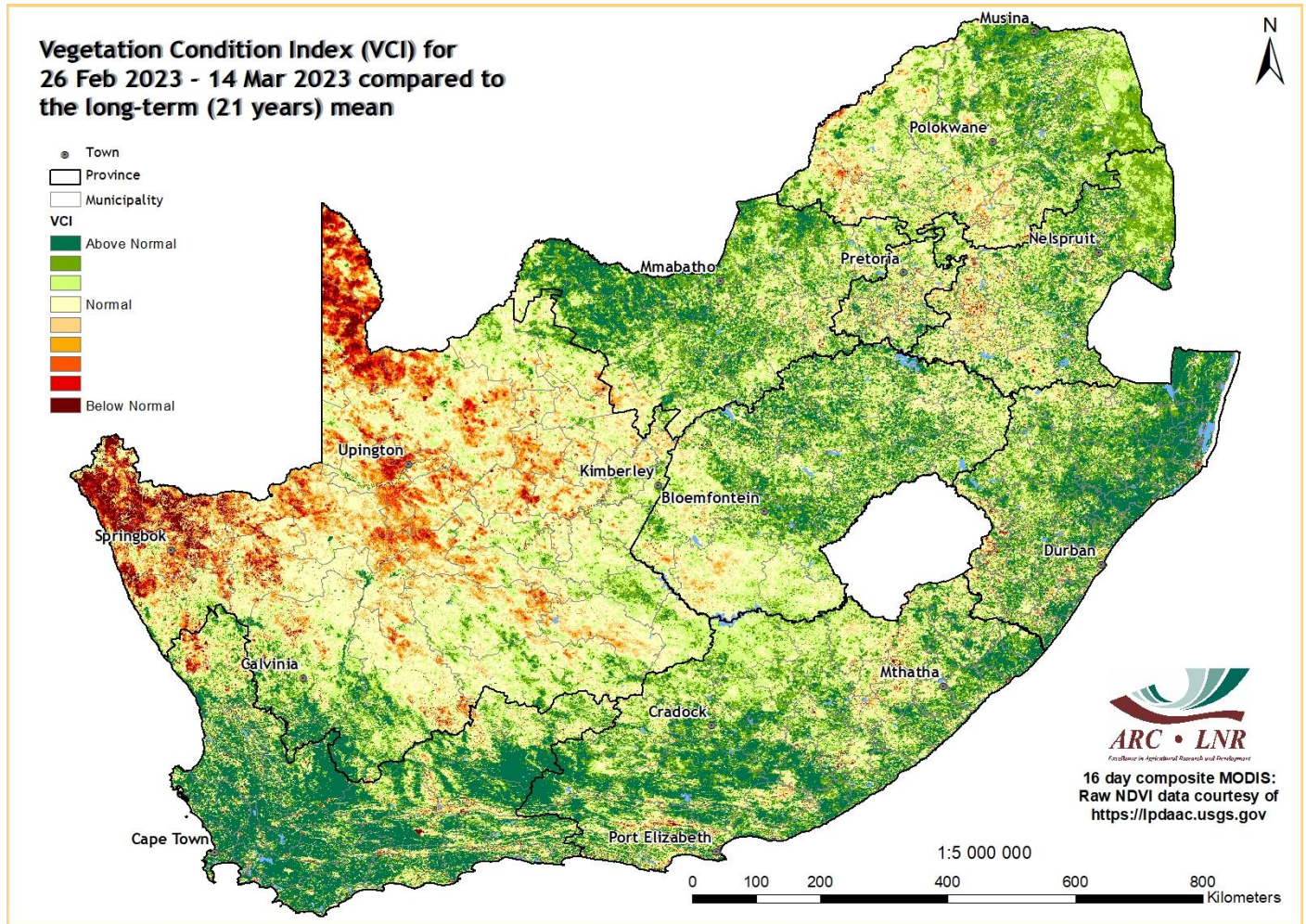
While the northern parts of the country received below-average rainfall during March, rainfall over the southern to southwestern parts, including the winter rainfall region, was above average.

Rainfall (mm): 1 – 12 April 2023



Large parts of the summer rainfall region received at least some rain during the first few days of April, with totals exceeding 25 mm over several areas, including large parts of the Free State and eastern half of the Eastern Cape.

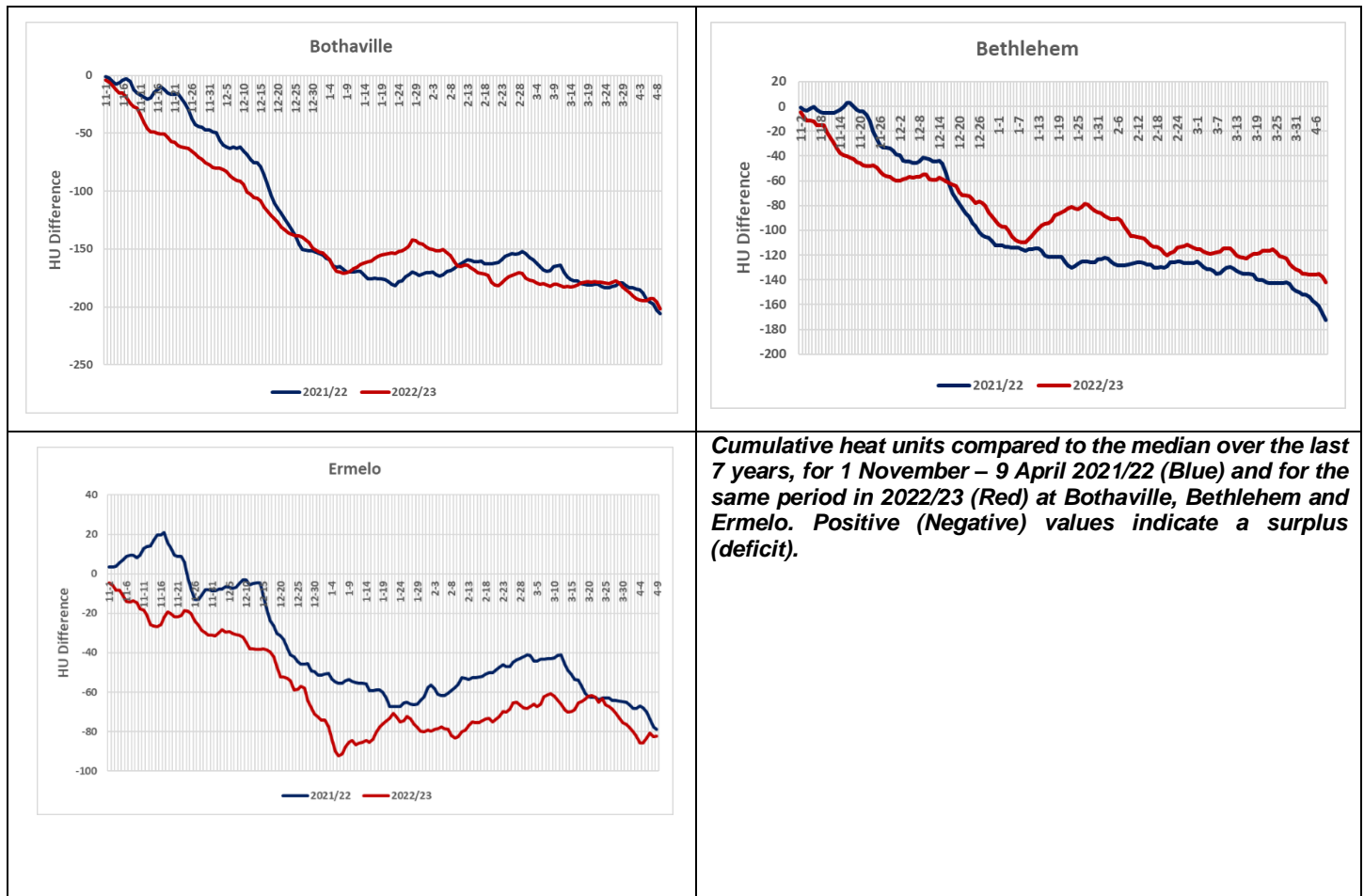
Vegetation Condition Index: February - March 2023



By early to mid-March, vegetation activity still reflected widespread above-normal rainfall since mid-October over most of the 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 was mostly below normal.

Heat units since 1 November 2022

Due to cool, rainy conditions during extended periods in the 2022/23 summer, heat units are behind the median value calculated over the last seven years over the summer-grain production region.



Cumulative heat units since 1 November still lag the 7-year median and are in line with the figure for 2021/22. Deficits have increased somewhat recently. With the growing season coming to an end, heat unit deficits will remain in place.

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>

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