

CUMULUS

SEASON 2023/2024

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YOUNG PEOPLE

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"THE FUTURE OF AGRICULTURE... A CERTAIN FUTURE"



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Summary

Rain over large parts of the interior

After a rather dry early part of the month, rainfall is expected over large parts of the interior during the next few days. Large-scale circulation patterns are becoming more favorable for rainfall over the medium time scale, with several upper-air systems that may move into the interior and promote early-summer rainfall events. Widespread rainfall will occur initially over the southern half of the interior, but the low-pressure system responsible for the rainfall will move out to the east rather quickly. The system will then remain to the east of the country, resulting in drier but cooler conditions over the country and cooler over the eastern parts during the weekend. With yet another upper-air low expected to develop in the southwest and then move northeastwards over the country, widespread thundershowers are expected again by early next week, focusing more strongly on the northeastern parts of the country and realizing the expectation of somewhat more favorable conditions by mid-month.

Mild to cool conditions over the eastern parts of the country, with southeasterly to easterly winds and rain along the southeastern to eastern seaboard from Friday to Tuesday, will occur due to the presence of a low-pressure system to the east (the system that will initially cause rain over the interior). This type of pattern usually isn't associated with widespread above-normal rainfall over the country and few areas should expect to see significant daily totals during the period. However, scattered thundershowers are still possible by Sunday and Monday in the northeast as an upper-air low will contribute to instability over the region while some moisture is available with the easterly winds at the surface.

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

General:

- Temperatures will on average be near normal over the interior, but above normal in the west.
- Hot conditions are expected over the Lowveld and Limpopo River Valley initially, shifting to the western parts next week.
- Rainfall will on average be near normal over the interior, but below normal over the far northeastern parts and far west.
- Scattered to widespread showers and thundershowers are expected over the central to southern and southeastern parts initially, clearing.
- Scattered to widespread thundershowers, with cooler conditions, may occur over the eastern to northeastern parts on Sunday and Monday.
- There is no indication of frost over the summer grain production areas, but temperatures may fall to the low single digits in some of the eastern high-lying areas of the region at times due to the influx of cool air from the east/southeast.

Overview of expected conditions over the main agricultural production areas

Upper-air instability due to west-wind troughs and lows will contribute to some much-needed rain over the interior. The low-pressure system that will remain to the east of the country for some time will however limit the availability of moisture and rainfall totals over the country are expected to be relatively low over most areas.

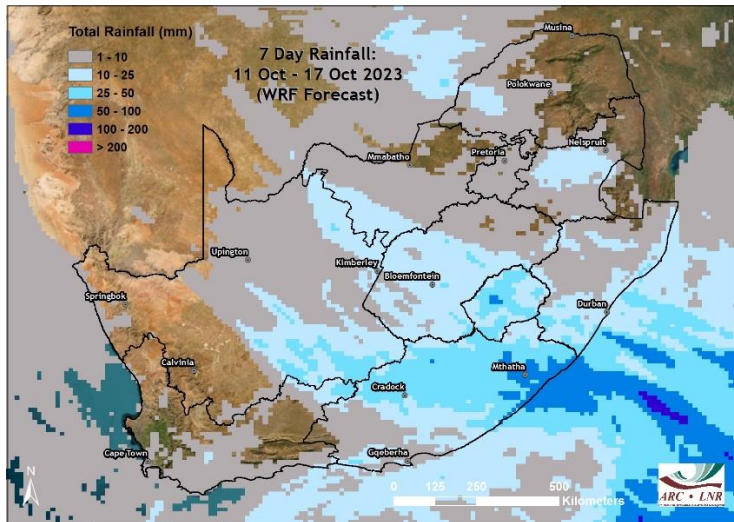
Maize production region: Rainfall is expected over most areas during the period. Initial showers and thundershowers will concentrate over the central to western and southern parts, clearing by Thursday evening. This will be followed by drier conditions. By Sunday and Monday, more showers and thundershowers are expected, but these should focus more on the central to northern and eastern parts:

- Maximum temperatures over the western maize-production areas will be in the order of 22 – 32°C, with the lower temperatures expected in the beginning of the period. Minimum temperatures will be in the order of 11 – 17°C, becoming progressively higher during the period.
- Maximum temperatures over the eastern maize-production region will range between 17 and 30°C, with lowest temperatures around Sunday. Minimum temperatures will be in the order of 6 - 12°C, with lowest temperatures on Saturday and Tuesday mornings.
- **Thursday (12th):** Cloudy and mild with widespread showers and thundershowers over the western to central and southern parts, but only isolated in the north and east. Some thundershowers moving across the Free State may become severe by the evening.
- **Friday (13th):** Sunny and mild with moderate westerly winds by the afternoon.
- **Saturday (14th):** Sunny and mild, becoming partly cloudy over the northern to eastern parts. It will be cool in the morning.
- **Sunday (15th):** Partly cloudy and warm, with fresh easterly winds over the eastern to central parts by the evening. Isolated to scattered thundershowers are expected over the northern to eastern parts by late afternoon/evening.
- **Monday (16th):** Partly cloudy and mild. Scattered thundershowers are possible except in the west.
- **Tuesday (17th):** Cloudy to partly cloudy and cool. Depending on the position of the upper-air low, some thundershowers may still occur, but current forecasts indicate dry conditions with a cool morning.
- **Wednesday (18th):** Partly cloudy and warm.

Cape Wine Lands and Ruens: It will be cool with southwesterly winds and isolated light showers over the region initially. This will be followed by drier conditions over the northern to western parts while showers are expected to continue along the Garden Route. The remainder of the period should be sunny and mild, but warm to hot in the northwest and with strong south-easterlies in the southwest.

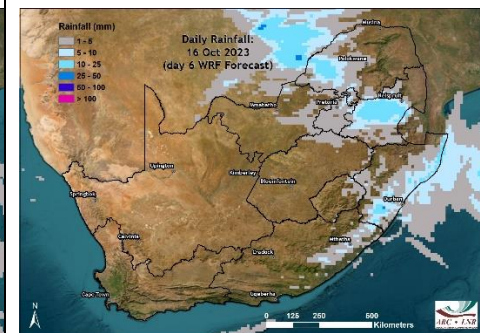
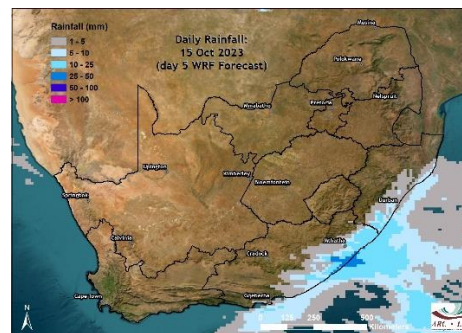
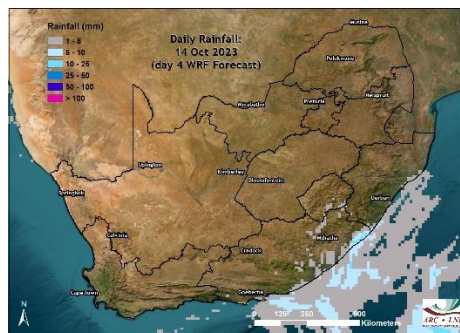
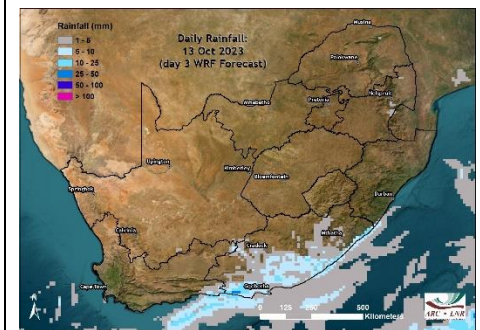
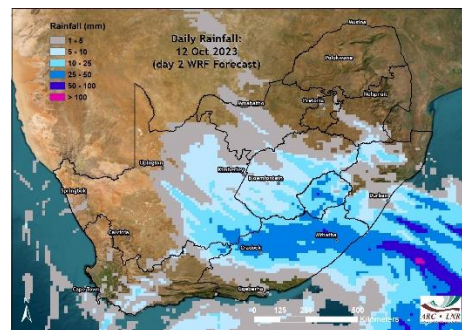
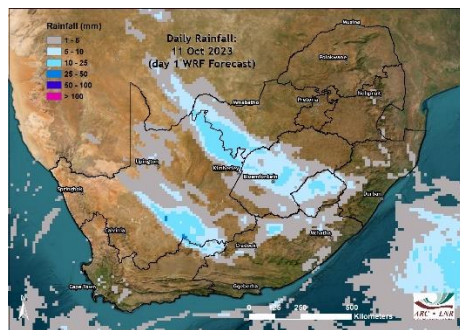
Daily summary of expected conditions

(GFS forecast downscaled using WRF)

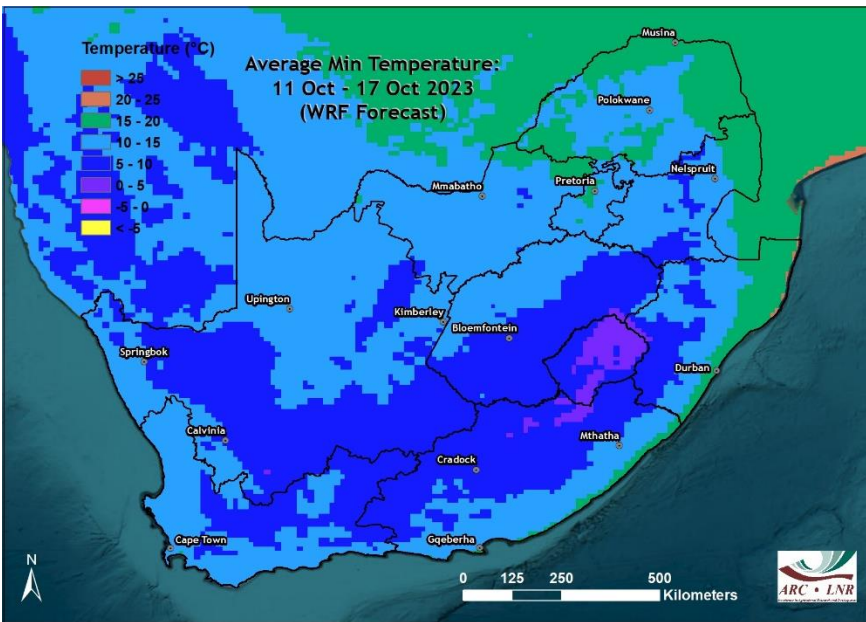


Rainfall

- Rainfall will focus on the central to southern and southeastern parts early in the period
- Through the weekend, the southeastern to eastern seaboard will remain wet.
- Scattered thundershowers may occur in the northeast from Sunday to Monday.

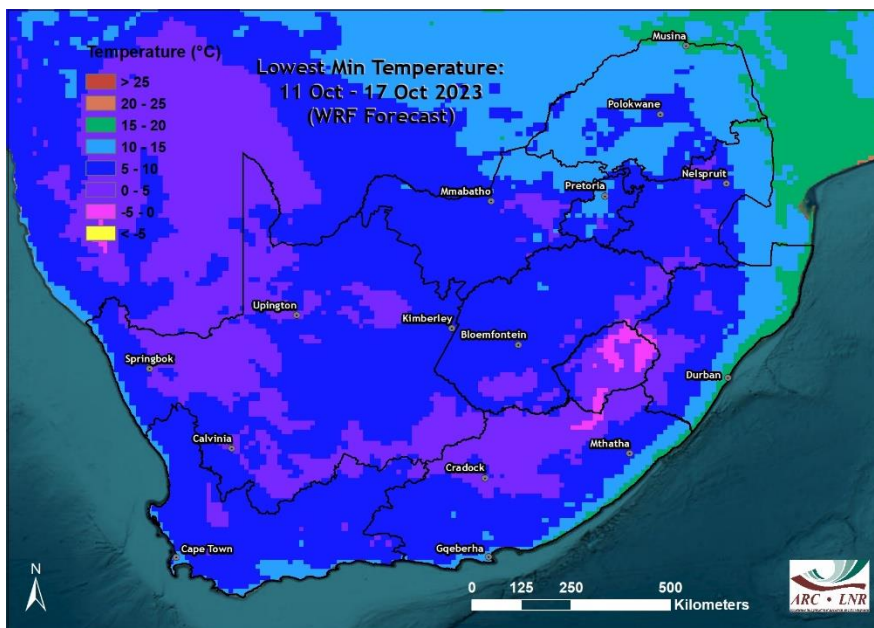


- Scattered to widespread showers and thundershowers will occur over the central to southeastern parts as indicated on Thursday (12th), clearing from the west in the evening. Showers should also occur along the Garden Route.
- The interior should then be dry until Saturday while showers will occur along the Garden Route and coast as well as adjacent interior of the Eastern Cape.
- Showers will remain in place over the coast and adjacent interior of the Eastern Cape until Monday, moving up the coast into KZN on Monday and Tuesday. .
- Scattered thundershowers may occur over the northeastern parts on Sunday to Monday and possibly Tuesday.



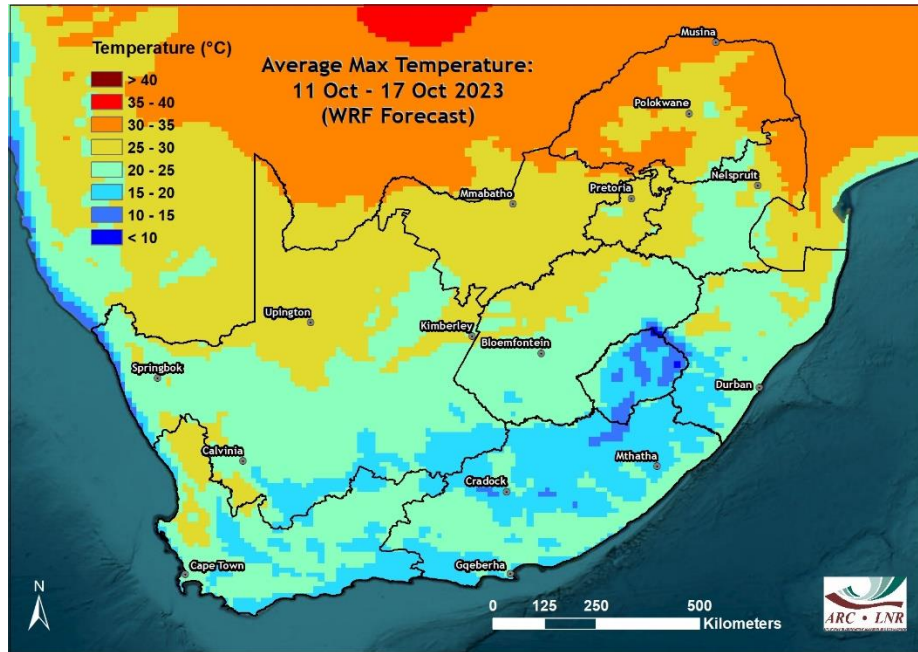
Average minimum temperatures

- Average minimum temperatures over the interior will be close to 10°C.
- Average minimum temperatures will be lowest along the Lesotho Drakensberg (0 to 5°C).
- Average minimum temperatures in the Lowveld and eastern seaboard will exceed 15°C.



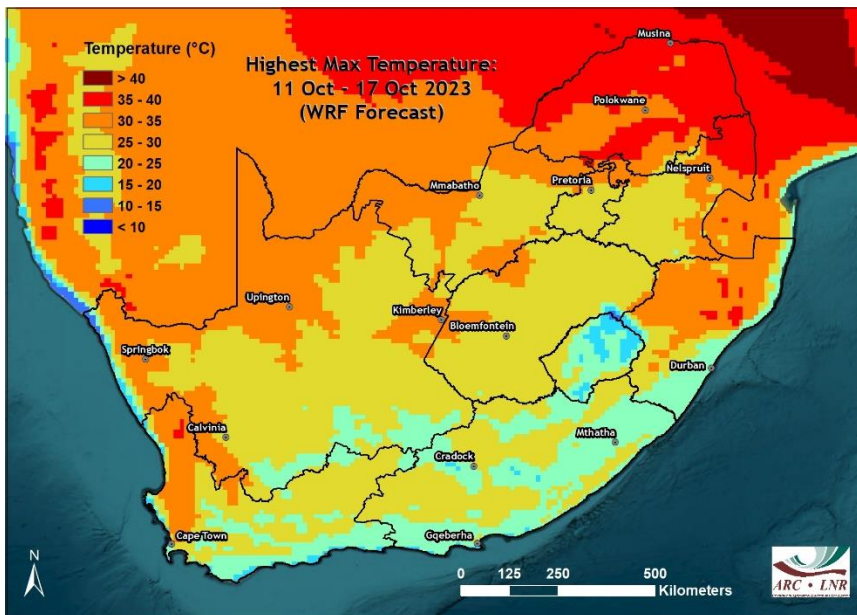
Lowest minimum temperatures

- Lowest minimum temperatures over almost the entire grain production area will remain above 5°C.
- Lowest minimum temperatures are expected on Saturday morning and Tuesday morning according to current forecasts when the temperature can fall to around 5°C and lower in isolated areas over the Eastern Highveld and Drakensberg.



Average maximum temperatures

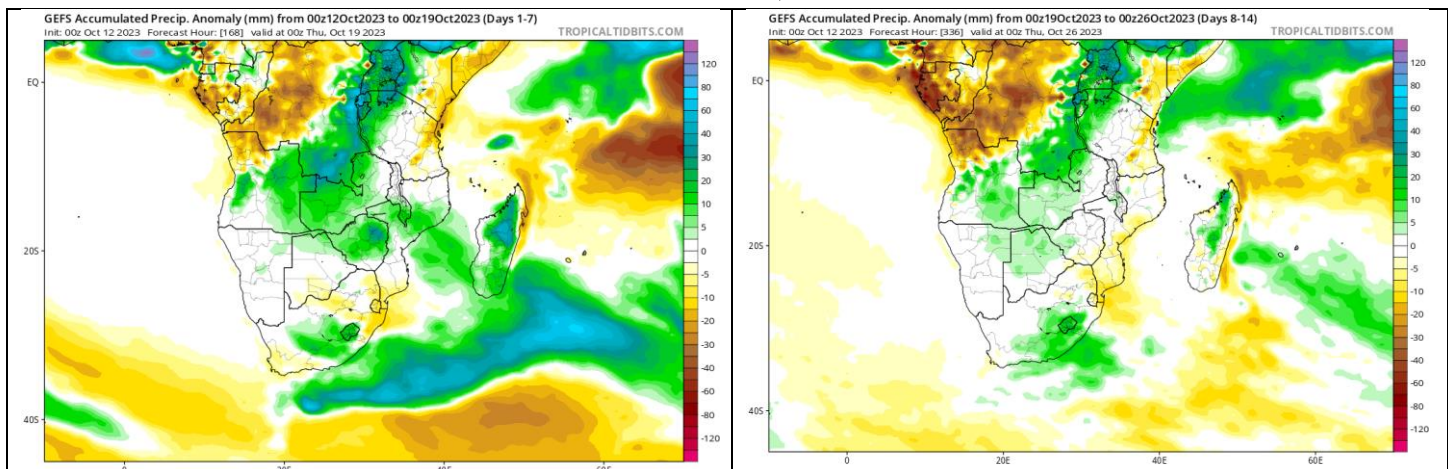
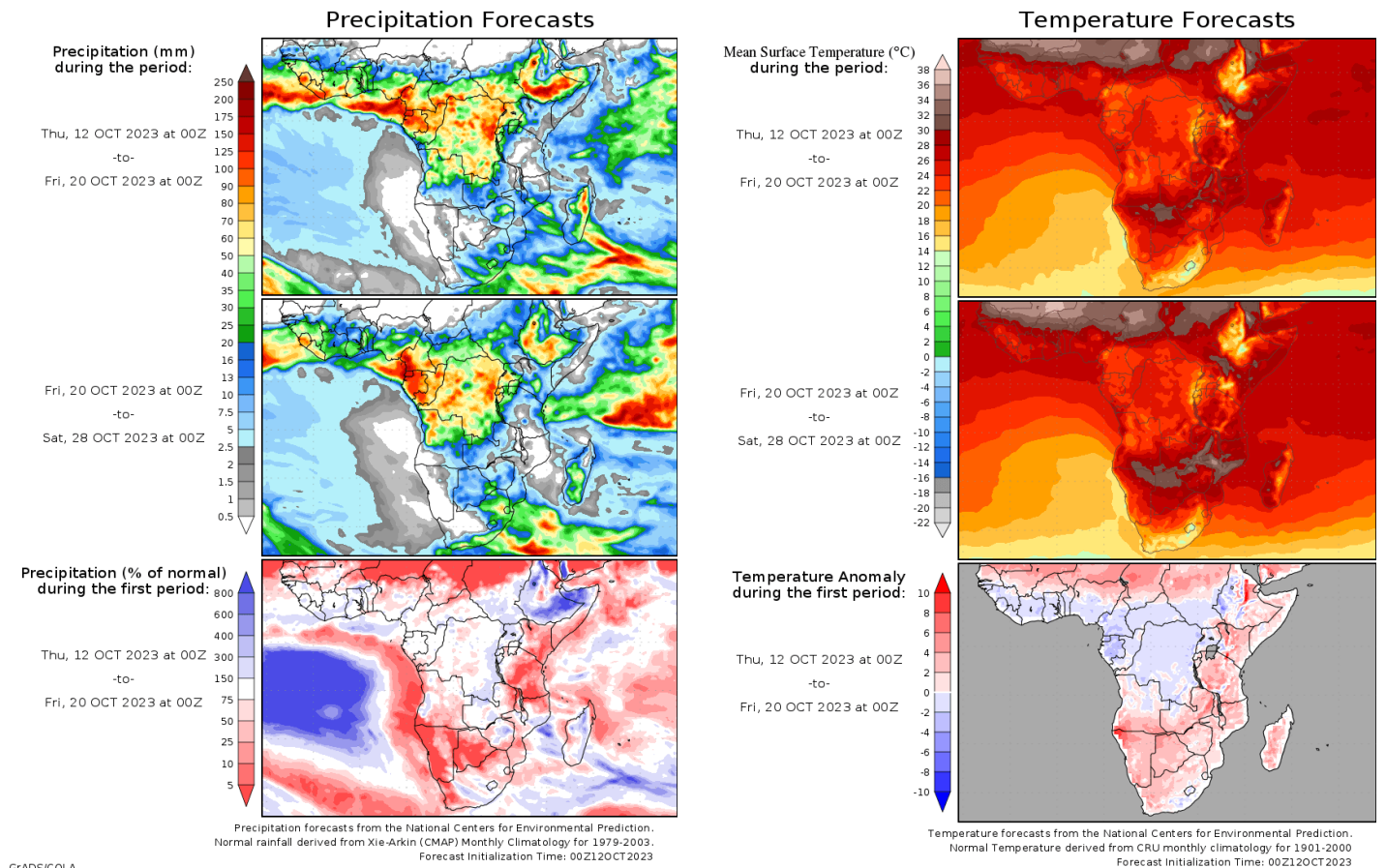
- Average maximum temperatures over most of the interior will range between 15 over the Garden Route and southern escarpment and 35°C in the north over the Limpopo River Valley.



Highest maximum temperatures

- Hot conditions (>35°C) will occur over the northeastern parts early in the period, on Thursday and Friday.
- Hot conditions (>35°C) will shift to the far western interior by the middle of next week.

Medium term rainfall and temperature summary



The GFS ensemble forecast (consisting of several forecasts with small initialization differences) favors near-normal rainfall in the northeast, but relatively wet over the central to southeastern parts until 19 October (left). The patterns is forecast to remain fairly similar later in the month (right). There's no signal for very wet conditions over the winter rainfall region.

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 12 October) 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.

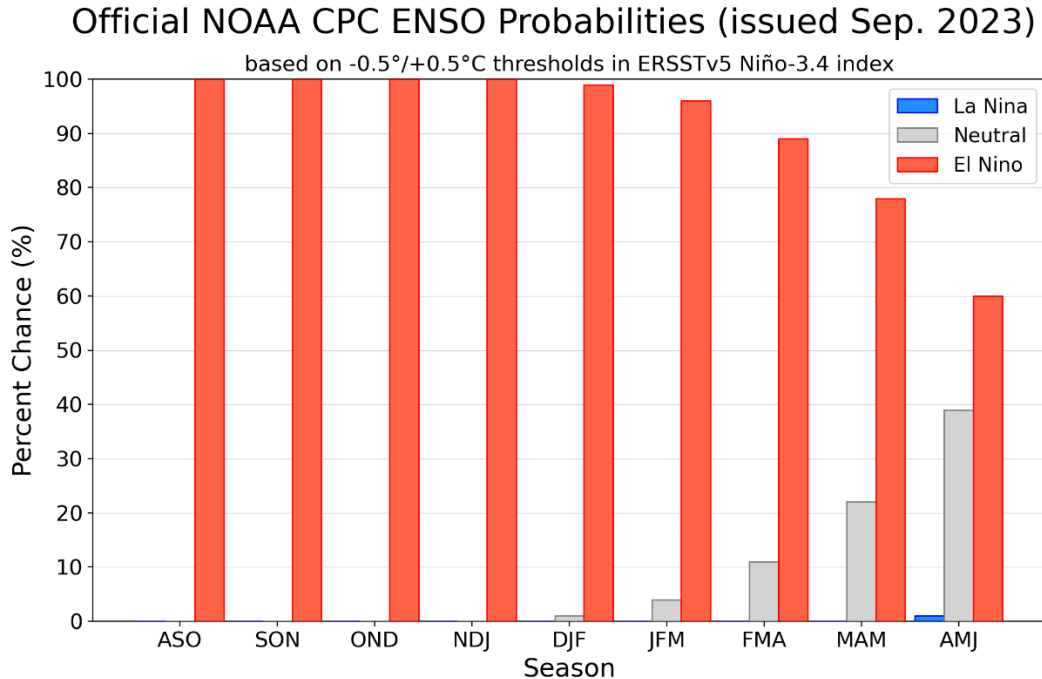
According to current model projections (GFS / ECMWF models) of weather conditions during the coming week, the following may negatively affect agricultural activities and production:

- **Some thundershowers may become severe with gusty winds and small hail:**
 - Free State (except northeast), eastern and northern Eastern Cape and southern to western KZN: **Thursday evening (12th).**
- **It will be hot:**
 - The Limpopo River Valley and Lowveld: **Thursday and Friday (12th – 13th).**
 - Far western interior and west coast: **Tuesday and Wednesday (17th – 18th).**
- **It will be windy, enhancing the fire hazard where vegetation is dry:**
 - Interior of the Northern Cape: **Friday to Monday (13th – 16th).**
 - Limpopo: **Saturday and Sunday (14th – 15th).**
- **Strong south-easterly winds are expected:**
 - Southwestern Cape coast: **Saturday to Wednesday (14th - 18th).**

Seasonal forecast

Current ENSO conditions:

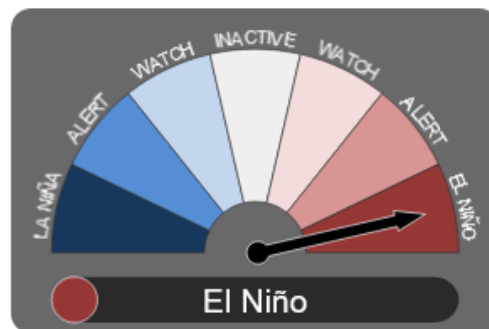
The El Niño is expected to last through our summer at least into early 2024. Various international institutions indicate the expectation of further intensification, albeit not to such strong levels as expected during earlier forecasts. One example of current El Niño forecasts is the IRI's latest ENSO forecast:



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

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

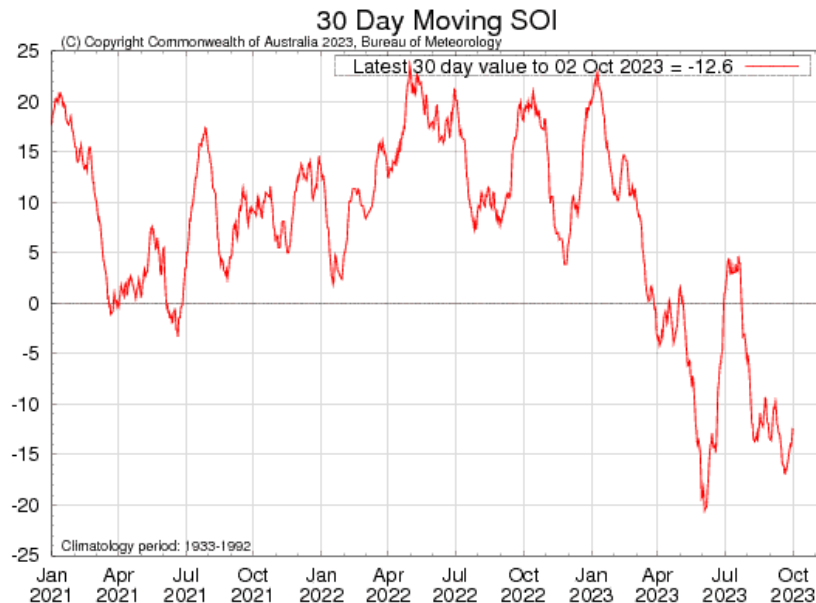
El Niño under way in the tropical Pacific



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

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

- Sea surface temperature: Temperatures in the NINO3 or NINO3.4 regions of the Pacific Ocean are 0.8 °C warmer than average.
- Models: A majority of surveyed climate models show sustained warming to at least 0.8 °C above average in the NINO3 or NINO3.4 regions of the Pacific until the end of the year.
- SOI: The three-month average Southern Oscillation Index is –7 or lower.



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

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

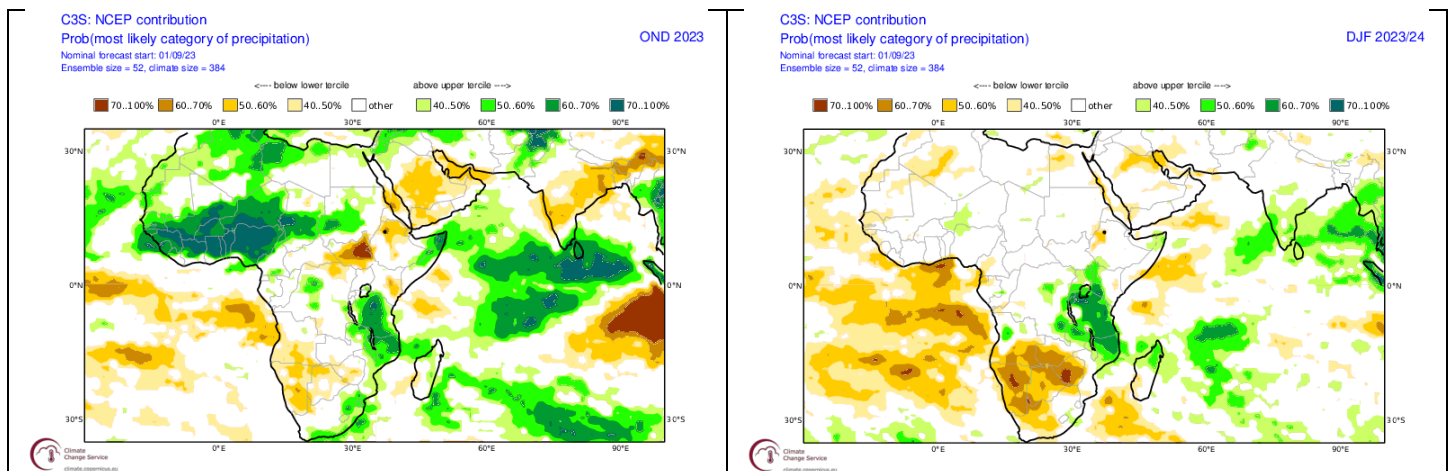
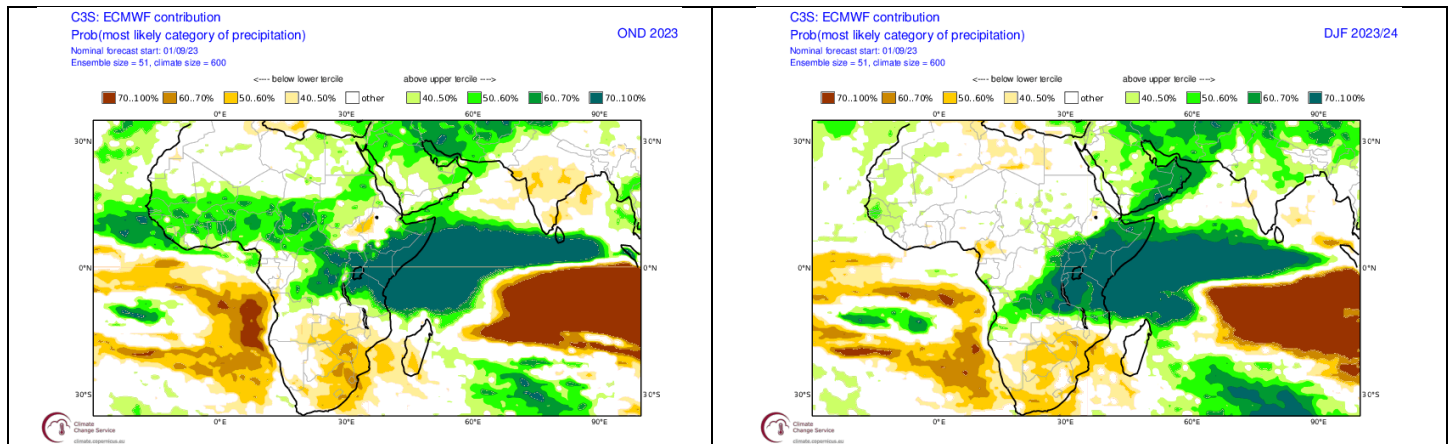
In their most recent update (10 October), the BOM further notes that while Sea Surface Temperatures indicate the presence of an El Niño, coupling between the ocean and atmosphere, regarding El Niño, also seems to be happening, and is potentially indicative of a strengthening of the event:

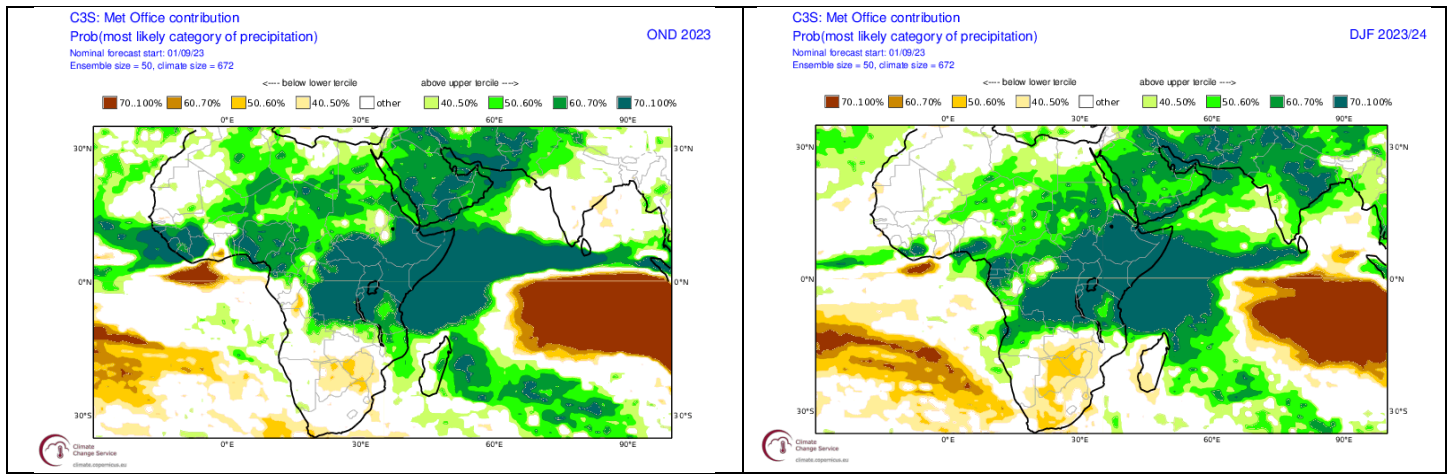
“Oceanic indicators firmly exhibit an El Niño state. Central and eastern Pacific sea surface temperatures (SSTs) continue to exceed El Niño thresholds. Models indicate further warming of the central to eastern Pacific is likely.

Broadscale pressure and cloud patterns over the Pacific reflect El Niño. Trade wind strength over the past fortnight has been weaker than average in the western Pacific but is close to normal elsewhere. Overall, there are signs that the atmosphere is responding to the warm SSTs over the Pacific and coupling of ocean and atmosphere is occurring. This coupling is a characteristic of an El Niño event and is what strengthens and sustains an event for an extended period....” - Australian Bureau of Meteorology - <http://www.bom.gov.au>

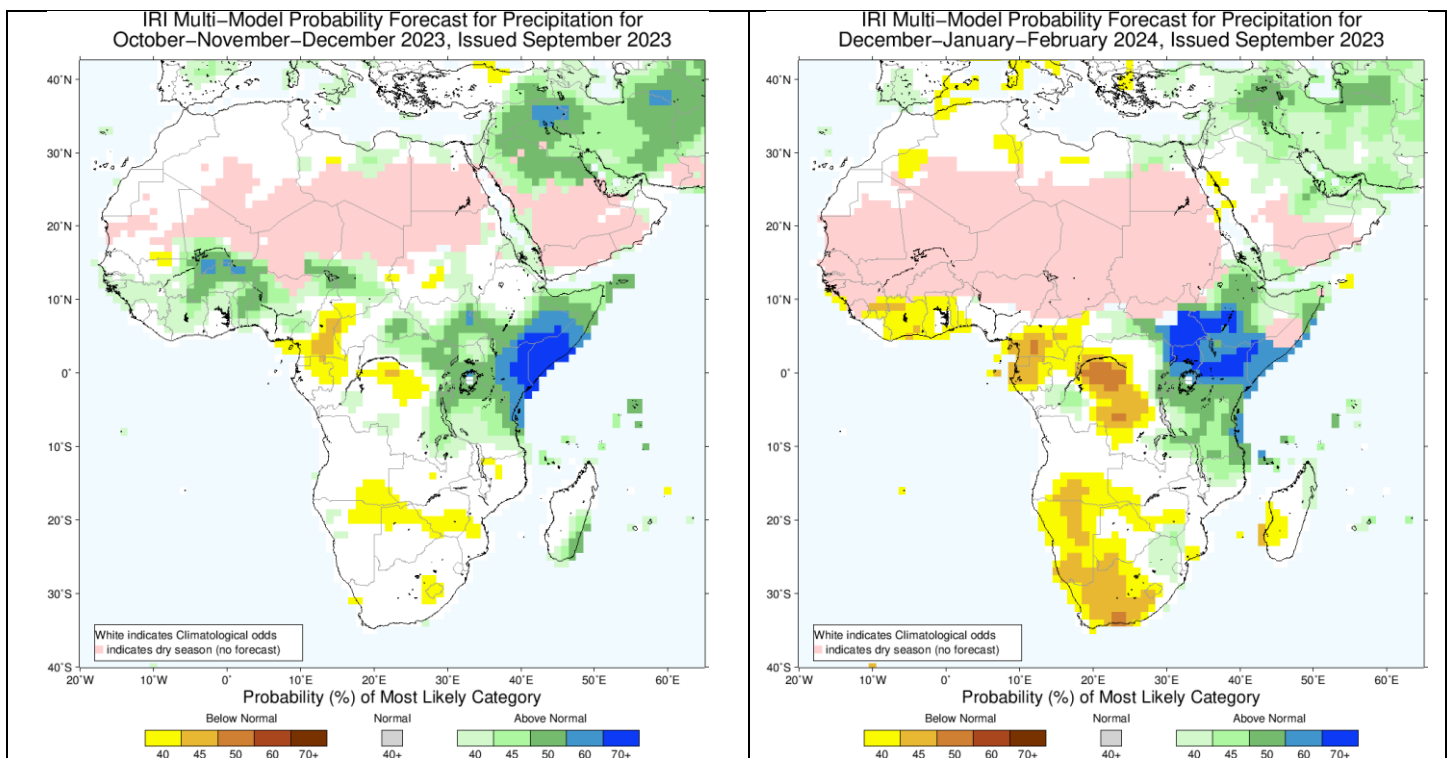
Seasonal forecasts issued by various international institutions

Seasonal forecasts (updated in September 2023) by these institutions, as published by the COPERNICUS Programme (<https://climate.copernicus.eu/seasonal-forecasts>) and by the IRI, reflect near-normal to below-normal rainfall expected over most of southern Africa, as can be expected during an El Niño summer. In general, the dry signal, according to the forecasts, is somewhat stronger during the December – February period than during the October – December period. During the December – February period, forecasts lean towards drier than normal conditions especially over the central to western parts of the country, but the eastern parts are forecasted to receive near normal rainfall and even above normal according to some of these forecasts. The wetter mid-to-late summer signal in the east by some of the models is not typical of forecasts issued during El Niño events.





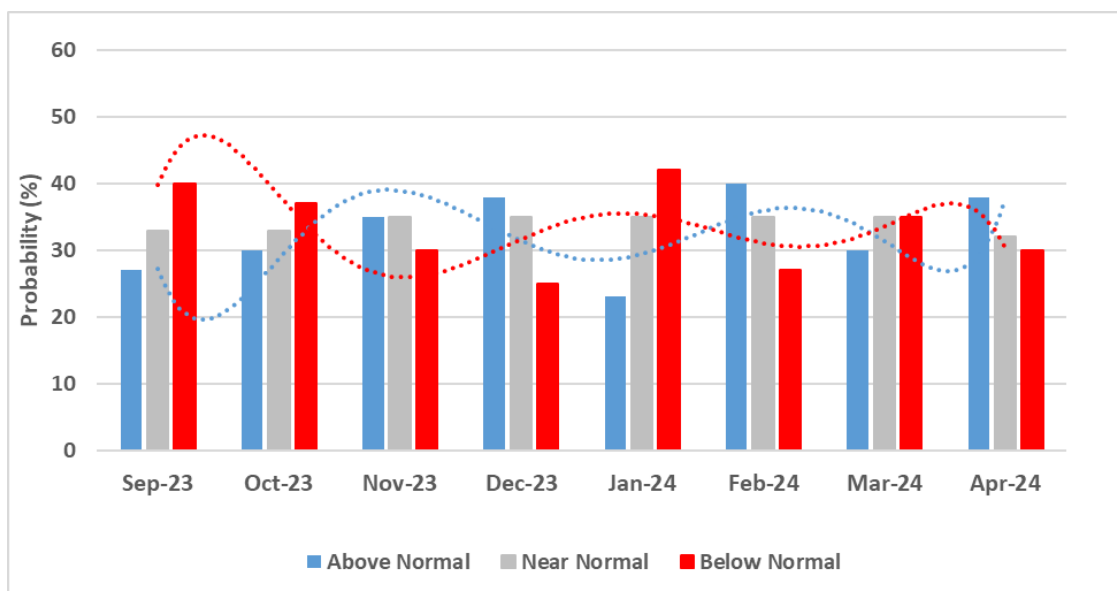
Same as above, but forecasts issued by the UK Met Office.



Same as above, but forecasts issued by the IRI.

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.



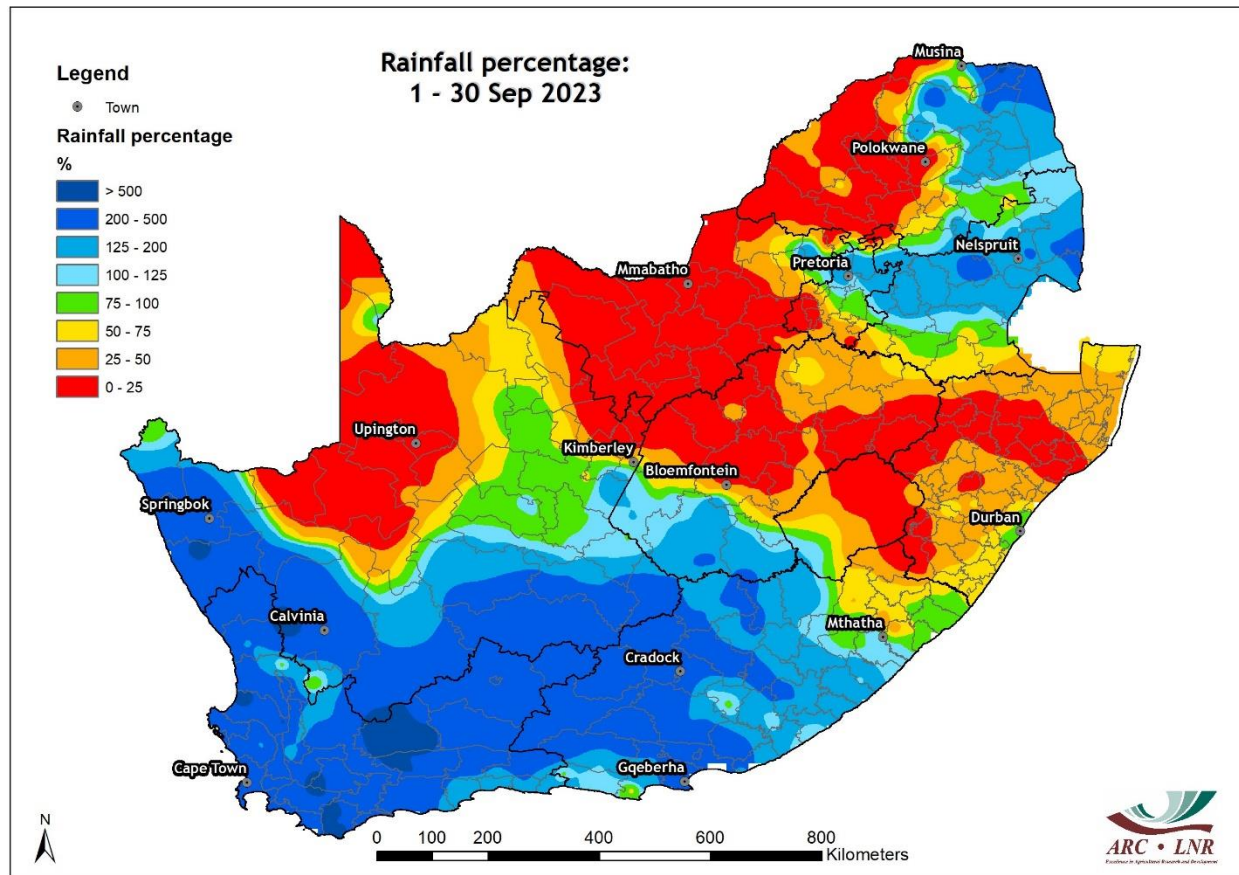
Probabilistic forecast for rainfall over the summer rainfall region, based on the natural cyclic nature of the climate system as seen in decadal variability, per month for the period September 2023 – April 2024 (Forecast issued in 2023-09).

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

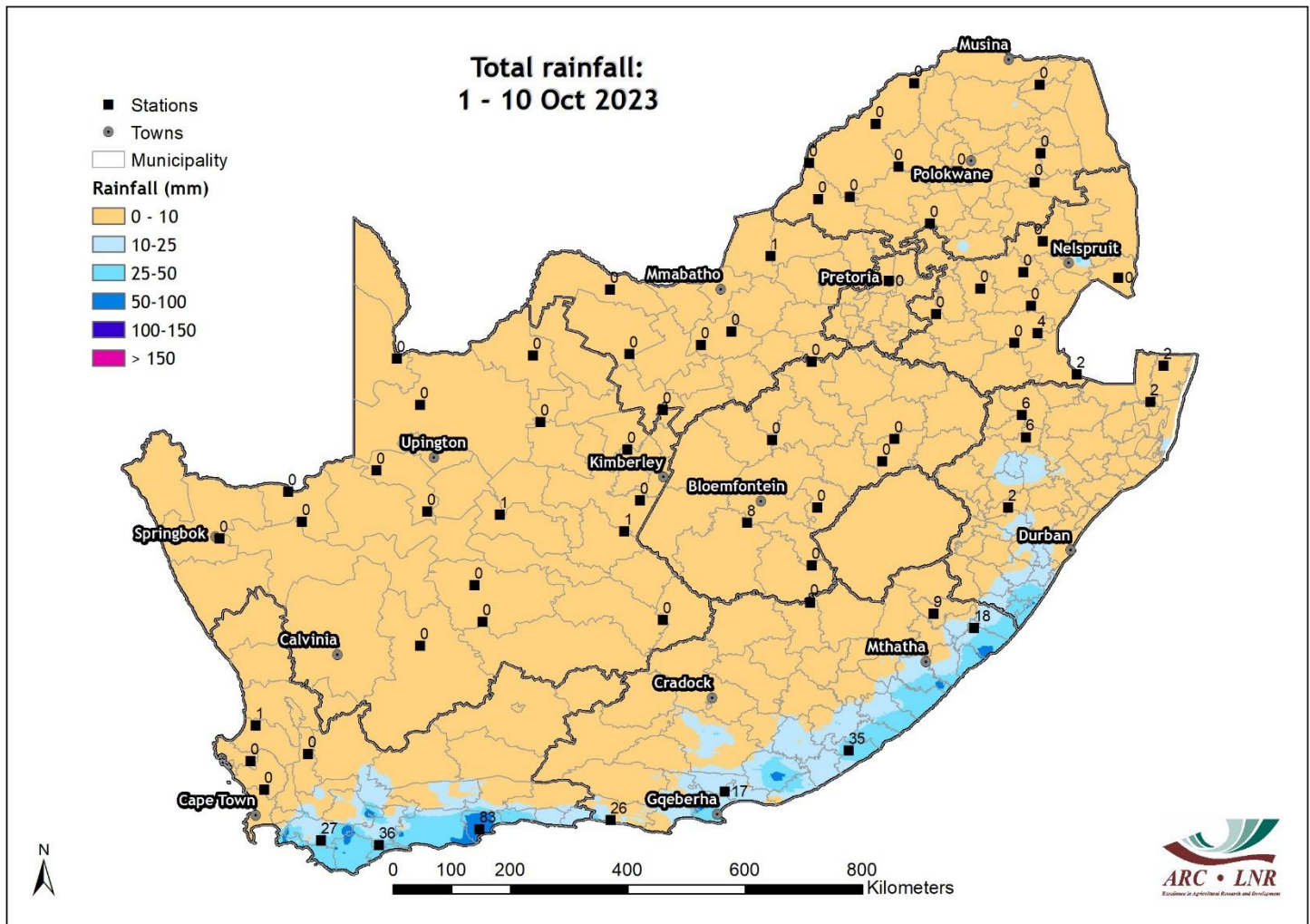
Observed conditions

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



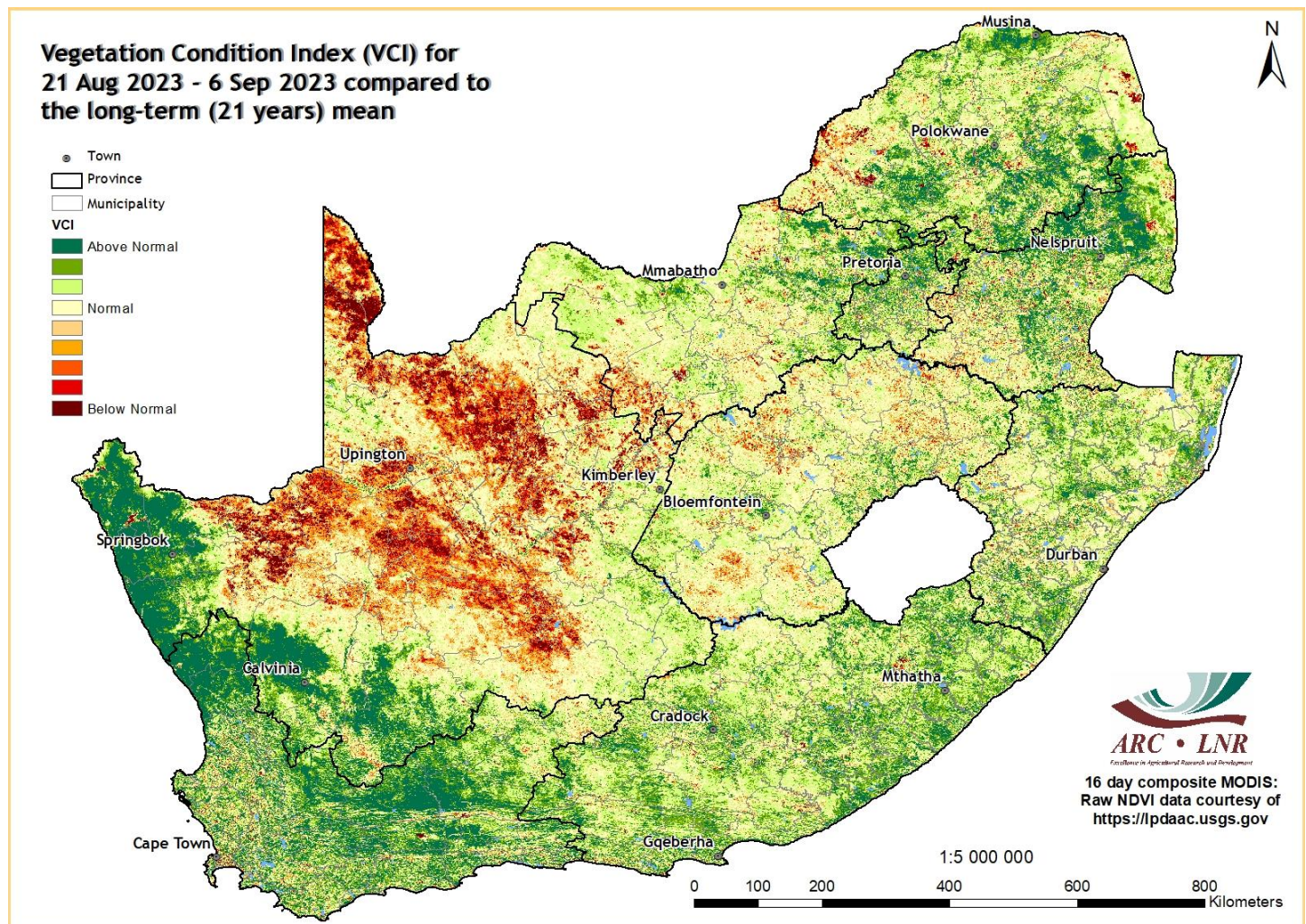
Above-average rainfall occurred over the southern-to-far-western parts of the country, including the winter rainfall region. Above-average rainfall also occurred over the northern parts of Gauteng, most of Mpumalanga and eastern Limpopo. The rest of the interior was relatively dry.

Rainfall (mm): 1 – 10 October 2023



The interior was dry during the first 10 days of October. Rainfall was confined to the southern to southeastern coastal belt and adjacent interior, with totals exceeding 25 mm in some areas.

Vegetation Condition Index: August to September 2023



By late September, drier conditions earlier over the Northern Cape interior and western Limpopo resulted in below-normal vegetation activity over the Northern Cape. 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 southwest.

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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