

CUMULUS

SEASON 2023/2024

by J Malherbe, R Kuschke

21 September 2023



YOUNG PEOPLE SEE THE FUTURE *Differently*

“THE FUTURE OF AGRICULTURE... A CERTAIN FUTURE”



Contents

Summary.....	3
Dry in the north, but possible extreme conditions in the south	3
Overview of expected conditions over the main agricultural production areas	4
Medium term rainfall and temperature summary	5
Possible extreme conditions - relevant to agriculture.....	6
Seasonal forecast	7
Current ENSO conditions:.....	7
Typical rainfall impacts over South Africa associated with El Niño	9
Seasonal forecasts issued by various international institutions	11
CUMULUS seasonal outlook	13
Observed conditions	14
Rainfall (% of long-term mean): April - August 2023	14
Vegetation Condition Index: August 2023.....	15
Sources of information.....	16

Summary

Dry in the north, but possible extreme conditions in the south

While the northern parts of the country are expected to be warm with little to no rain during the next few days, an intense upper-air cut-off low is expected to develop over the southwestern parts of the country by Sunday. Ahead of the developing system, isolated thundershowers may already develop in a band over the western to central parts during the weekend already. The exact positioning of the low is still uncertain, but forecasts are consistent with the development of the system on Sunday and early next week and favor the southern parts of the country for its location. As is often the case with such a deep low, windy, cold conditions with significant rainfall, especially over the mountainous parts in the south, are expected according to current forecasts. This will also likely make a positive contribution to the levels of dams in the southern parts of the Eastern Cape. Current forecasts favor a southeastward track of the system resulting in widespread rainfall over the winter rainfall region and southern parts of the country while totals should remain on the lower side over the northern parts of the country, except possibly the far eastern/northeastern areas. At the surface, dry westerly to southerly winds are expected to invade the central to northern parts as the system traverse the southern interior and move out to the east over the Eastern Cape by Monday. The influx of cooler air from the west and south will bring lower temperatures from Monday to much of the interior according to current forecasts. The colder air may result in light frost over the high-lying southern escarpment early to middle next week according to current forecasts, spreading also to Lesotho and the surrounding areas as well as frost-prone parts of the Highveld. The occurrence of these events will be closely associated with the movement of the low and a surface high-pressure system to the west, which may be somewhat different from the current forecast as is often the case this far ahead.

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 northern to eastern parts, but below normal over the western to southern parts, associated with the low on Sunday and early next week.
- Rainfall will on average be above normal over the winter rainfall region and southern to southeastern and far-eastern parts, but normal to below normal over the northern parts.
- Cold fronts and the cut-off low pressure will result in regular showers over the winter rainfall region, especially towards the south and southwest.
- Significant rainfall totals are expected over parts of the winter rainfall region and southern to southeastern interior according to current forecasts on Sunday and Monday. Rainfall totals to the north, over most of the summer rainfall region, are expected to be lower, with most areas receiving less than 10 mm and large areas in the north expected to be relatively dry according to current forecasts.
- Thundershowers over the interior on Sunday (central to southern parts) and Monday (east) may have a tendency to become severe given the time of year, upper-air dynamics and wet/dry air interaction.
- It will be windy over large parts of the interior due to the passage of active weather systems.
- **The summer-grain production region** may benefit from the cut-off low early next week in terms of rainfall, but current forecasts indicate totals not exceeding 10 mm for the most part over the region and negligible totals in the north/northwest. Forecasts however indicate higher totals over the southwestern parts of the region by Sunday/Monday and far-east by Monday. It will be windy on most days, especially over the central to western parts of the grain-production region. It is expected to be cooler and dry following the system by Tuesday, with relatively low minimum temperatures that could result in light frost in frost-prone areas.

Overview of expected conditions over the main agricultural production areas

The main feature during the next few days will be the cut-off low moving over the southern parts, resulting in widespread rain over especially the southern parts of the country where heavy falls may be expected in especially mountainous areas and along the coast. The low-pressure system at the surface will result in strong winds over the interior at times, apart from the very windy conditions expected in the south. Thundershowers are also expected over the interior, but totals should be lower. Given the time of year and intensity of the upper-air system together with dry air invading from the west, some thundershowers over the interior will become severe.

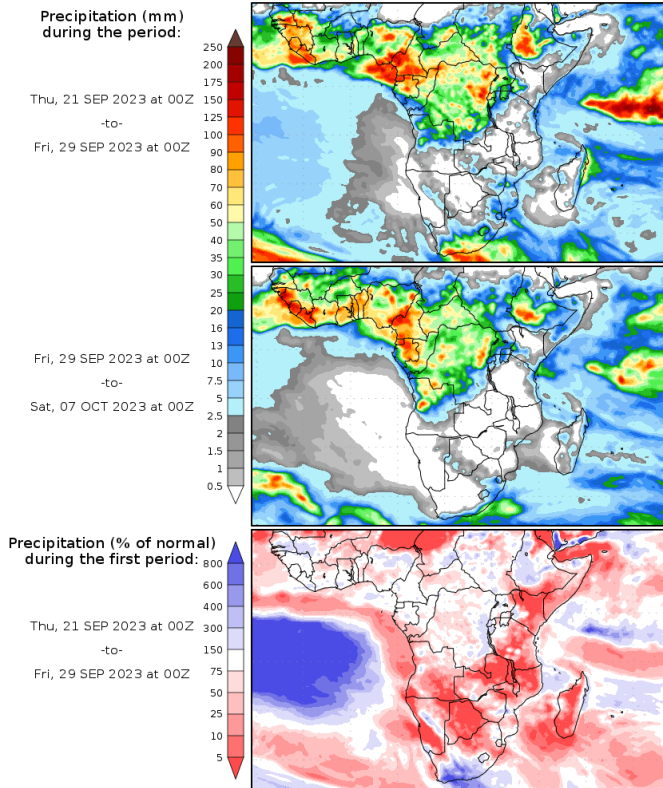
Maize production region: It will be windy on most days, with strong winds at times especially over the western to central parts. Some thundershowers are expected during the Sunday – Tuesday period, clearing from the west. Current forecasts indicate cool to cold, southerly winds following the rainfall event by Tuesday/Wednesday:

- Maximum temperatures over the eastern maize-production areas will be in the order of 18 – 30°C, with the lower temperatures expected on Monday and Tuesday. Minimum temperatures will be in the order of 4 – 12°C, with lowest values by Tuesday morning and over the high-lying eastern parts.
 - Maximum temperatures over the western maize-production region will range between 20 and 33°C, with lowest temperatures towards Tuesday next week and over the southern parts. Minimums will be in the order of 3 - 12°C, with lowest values on Tuesday/Wednesday morning.
-
- **Thursday (21st):** Sunny, warm and windy.
 - **Friday (22nd):** Sunny, warm and windy.
 - **Saturday (23rd):** Sunny, warm and windy. It will become partly cloudy over the western and central parts. Afternoon winds will be strong in the west where isolated thundershowers are possible later.
 - **Sunday (24th):** Partly cloudy, warm and windy with isolated thundershowers over the western to central parts, spreading to the east and becoming scattered over the southern parts and along the Drakensberg. The wind will be strong in the west.
 - **Monday (25th):** Sunny, cool and windy over the western to central parts with possible showers or thundershowers early, clearing. Scattered thundershowers are possible in the northeast. .
 - **Tuesday (26th):** Cool and windy. Residual showers/thundershowers may still occur in the northeast.
 - **Wednesday (27th):** Sunny to partly cloudy and mild, but cool to cold in the morning according to current forecasts with possible frost in frost-prone areas.

Cape Wine Lands and Ruens: It will be partly cloudy and mild initially and until Saturday with light showers in the southwest and south at times. It will become cloudy and windy with widespread showers or thundershowers on Sunday, with heavy falls over the mountainous areas. Gale-force winds may occur over the southern to southwestern parts on Sunday and Monday. Heavy falls are also possible along the Garden route. Thundershowers over the interior may become severe. It should clear from the west on Monday and become sunny and mild.

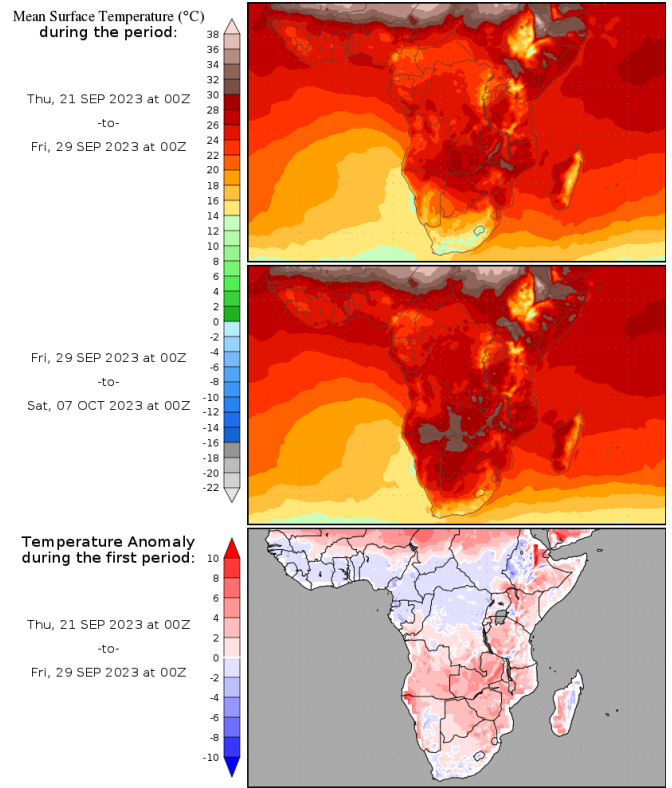
Medium term rainfall and temperature summary

Precipitation Forecasts

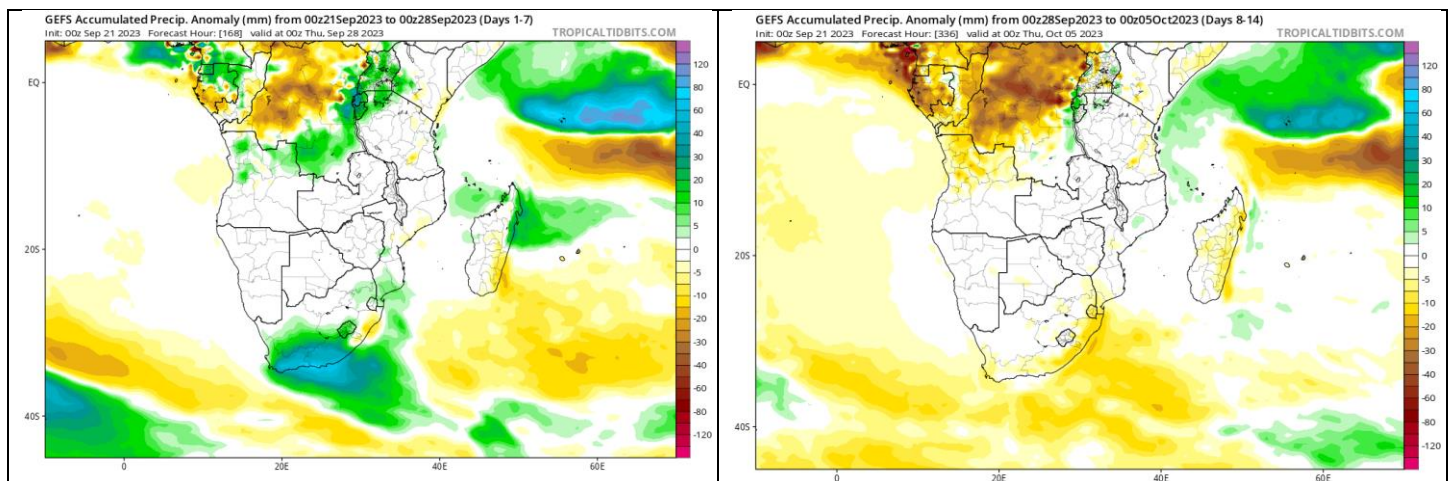


GRADS/COLA

Temperature Forecasts



GRADS/COLA



The GFS ensemble forecast (consisting of several forecasts with small initialization differences) favors relatively wet conditions over the southeastern and southern parts during the first few days (until 28 September – left), associated with the expected cut-off low in the south. However, there is little indication currently of more rain over the country with relatively dry conditions expected according to the ensemble from 28 September to 5 October (right). The outlook for the second period however is much more uncertain given the longer lead time.

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 21 September) 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:

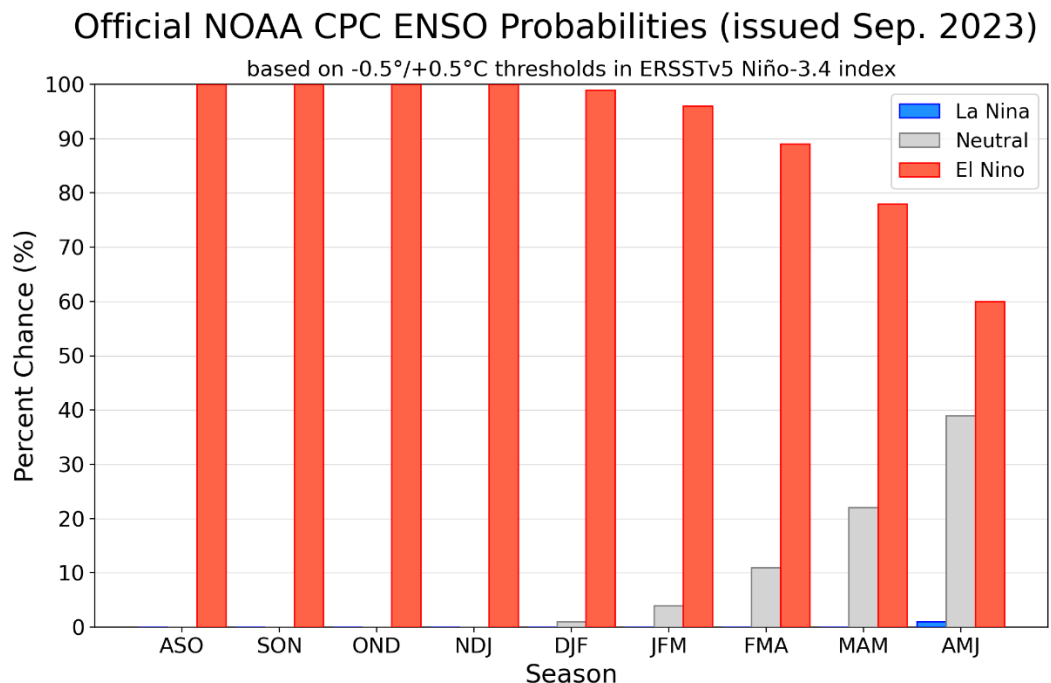
- **It will be hot:**
 - Over the Limpopo River Valley, Lowveld and northern KZN: **Wednesday (20th) to Monday (25th).**
- **It will be windy, enhancing the fire hazard where vegetation is dry:**
 - Southern interior: **Thursday (21st) to Monday (25th).**
 - Central to eastern Northern Cape, North West, western to central Free State, Gauteng: **Thursday to Tuesday (21st – 26th).**
- **Gale-force winds are expected:**
 - Southwestern Cape coast: **Saturday to Sunday (23rd - 24th).**
 - **Along the Garden Route: Sunday to Monday (24th - 25th).**
- **Cold, wet and windy conditions will pose a hazard to small stock:**
 - Southern interior: **Saturday (23rd) to Tuesday (26th).**
- **Significant daily rainfall totals are possible:**
 - Mountainous areas of the winter rainfall region: **Sunday (24th).**
 - Southern mountainous areas of the Western and Eastern Cape and Garden Route, depending on the position of the cut-off low: **Sunday to Monday (24th-25th).**
- **Severe thunderstorms may develop:**
 - Western Cape, Eastern Cape, southern to eastern parts of the Northern Cape, Free State and Lesotho: **Sunday (24th).**
 - Central to eastern Limpopo, Mpumalanga and KZN: **Monday (25th).**
- **Light frost may occur:**
 - Southern escarpment, frost-prone areas of the central to eastern interior (mostly isolated high-lying areas): **Tuesday and Wednesday (26th, 27th).**

Seasonal forecast

It is the beginning of the 2023/24 summer, and here we will look at the potential implications given the El Niño present currently.

Current ENSO conditions:

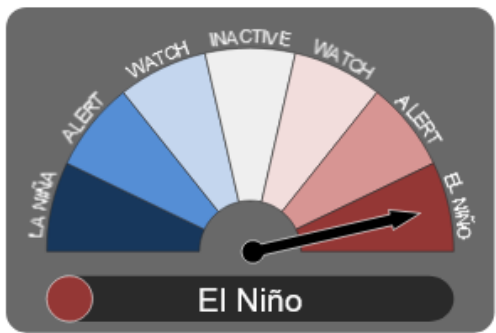
The El Niño is expected to last through our summer at least into early 2024. Various international institutions indicate the expectation of further intensification, albeit not to such strong levels as expected during earlier forecasts. One example of current El Niño forecasts is the IRI's latest ENSO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

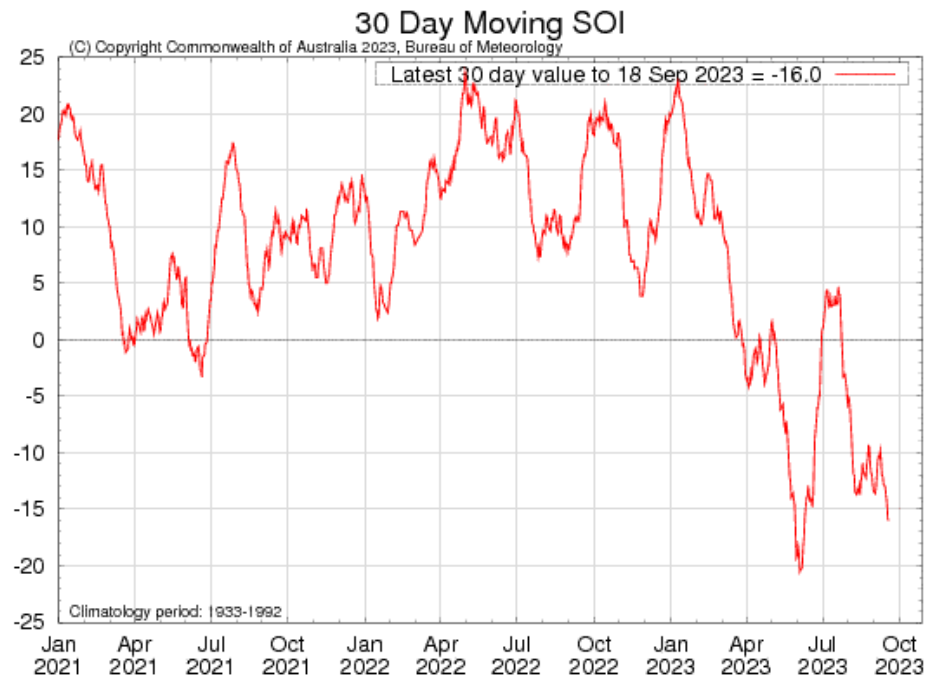
El Niño under way in the tropical Pacific



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>

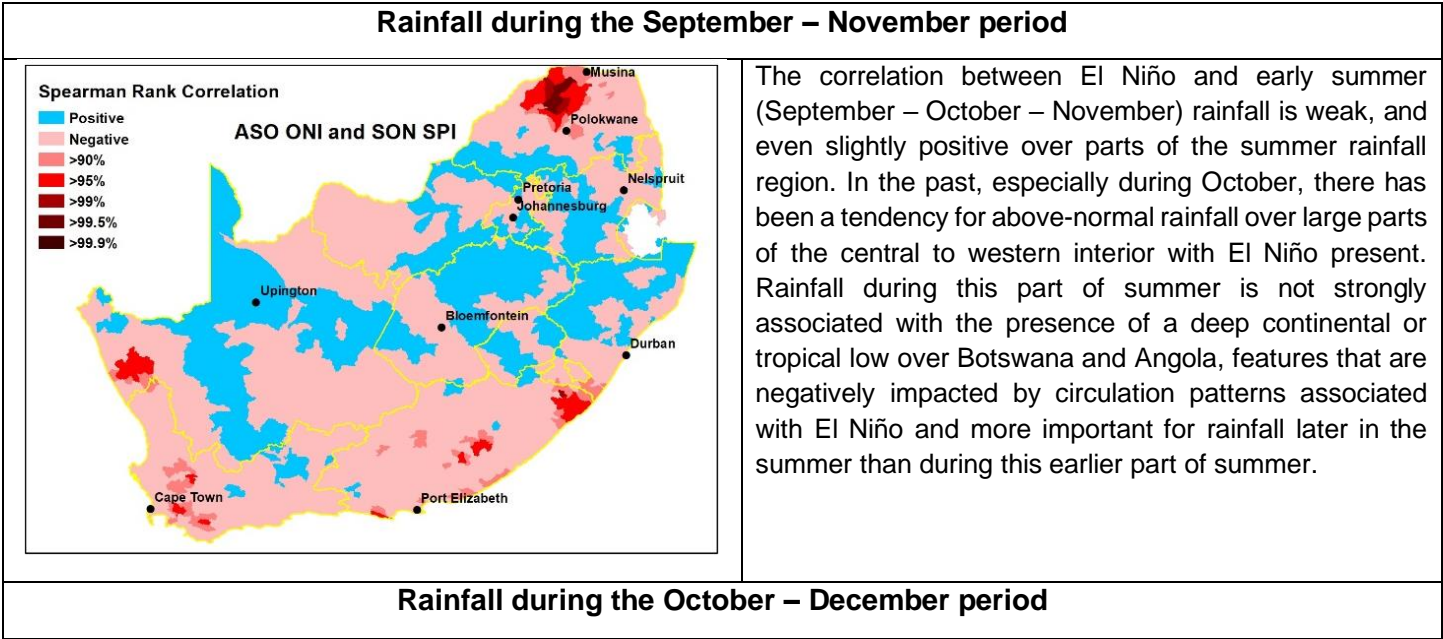
However, they (the Australian Bureau of Meteorology) do note that the trade winds have not yet been weaker than average in the western or central equatorial Pacific Ocean during any three of the last four months, which is the 4th criterion used.

Typical rainfall impacts over South Africa associated with El Niño

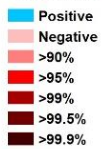
Over South Africa, based on data since 1950, the negative association between rainfall and El Niño is the strongest during mid-summer and focusses especially over the central to western and northern interior, including the western parts of the summer-grain production region. However, during early to mid-summer, the negative impact is the strongest towards the Eastern Highveld, including the eastern summer grain production areas. By late summer (after February), the impact is weaker especially over the northeastern parts, including the eastern summer grain production areas.

The maps below show the correlation between rainfall over South Africa and the Oceanic Niño Index (ONI). The ONI is NOAA's primary index for tracking the ocean part of ENSO, the El Niño-Southern Oscillation climate pattern. The ONI is the rolling 3-month average temperature anomaly in the surface waters of the east-central tropical Pacific, near the International Dateline. Index values of +0.5 or higher indicate El Niño. Values of -0.5 or lower indicate La Niña.

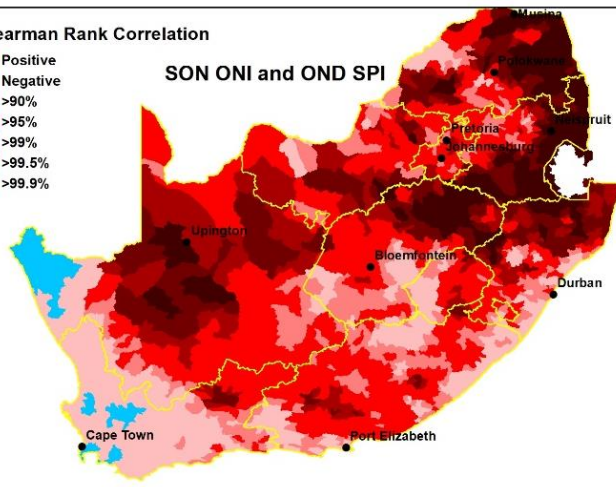
The latest ONI value is +1.1, showing the presence of a weak El Niño according to Sea Surface Temperature anomalies. In the maps below, a negative correlation with the ONI is shown in red (meaning that when the ONI is positive, such as is currently the case, rainfall tends to be lower). The darker red areas experience a more significant negative correlation between the ONI and rainfall. The maps represent the different parts of summer as indicated.



Spearman Rank Correlation



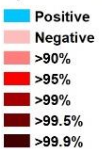
SON ONI and OND SPI



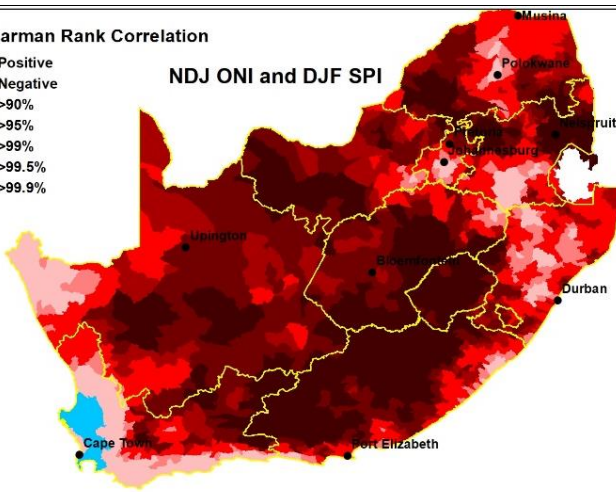
The correlation between El Niño and rainfall over the interior becomes much more strongly negative during early/mid-summer (October – November – December), showing a stronger impact especially during November and December compared to the earlier months. During these earlier parts of the summer, the correlation is more strongly negative over the northeastern parts (Eastern Highveld and Limpopo River Valley), meaning these areas are more often drier than average than further west and south. Weaker to positive correlations in the far west indicate a greater tendency for some late cold fronts impacting the winter rainfall as the westerly winds are somewhat more north for this time of the year during typical El Niño summers and upper-air troughs more often develop far west instead of over the country.

Rainfall during the December – February period

Spearman Rank Correlation



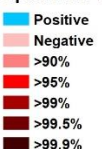
NDJ ONI and DJF SPI



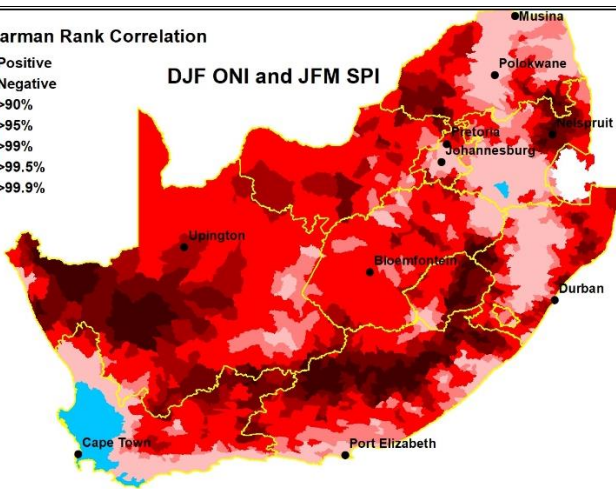
During El Niño summers, the strongest negative impact is seen during mid-to-late summer (December – January – February). During this period, the central to western and northern interior most often experience drier than average conditions, with a very significant negative correlation between the rainfall and Oceanic Niño Index. The correlation is somewhat weaker over the Eastern Highveld, where convective afternoon and evening thundershowers can still contribute meaningful rainfall even though the large-scale atmospheric circulation patterns don't favor widespread rain. Rainfall over the winter rainfall region still is not strongly associated with ENSO, and correlations are even slightly positive in the southwest, meaning that during El Niño DJF periods these areas may on average receive somewhat more frequent rainfall, due to occasional frontal activity and sometimes upper-air troughs displaced far to the west while the interior is dry.

Rainfall during the January – March period

Spearman Rank Correlation



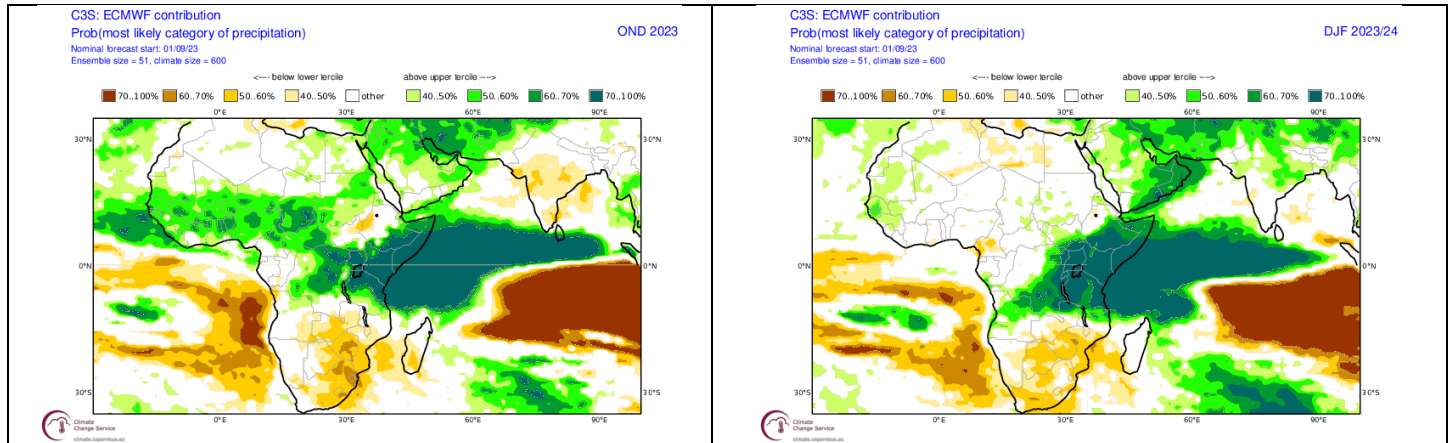
DJF ONI and JFM SPI



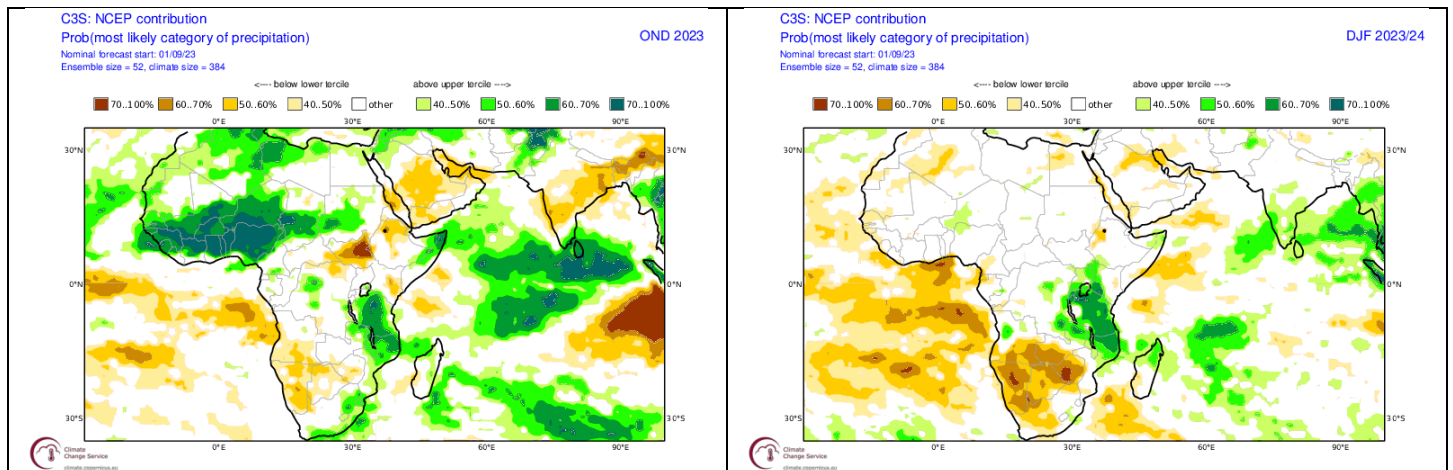
While still negative over the interior, the correlation between rainfall during late summer (January – February – March) becomes somewhat weaker, showing especially weaker correlations by March. Especially the central to western interior is usually negatively affected during El Niño summers this late in summer. Towards the east, especially over the Eastern Highveld and eastern half of Limpopo, average to above-average rainfall occur more often than over the central parts this late in the summer during El Niño events, especially during March. The winter rainfall areas still experience above-average rainfall more often during El Niño summers also this late in summer.

Seasonal forecasts issued by various international institutions

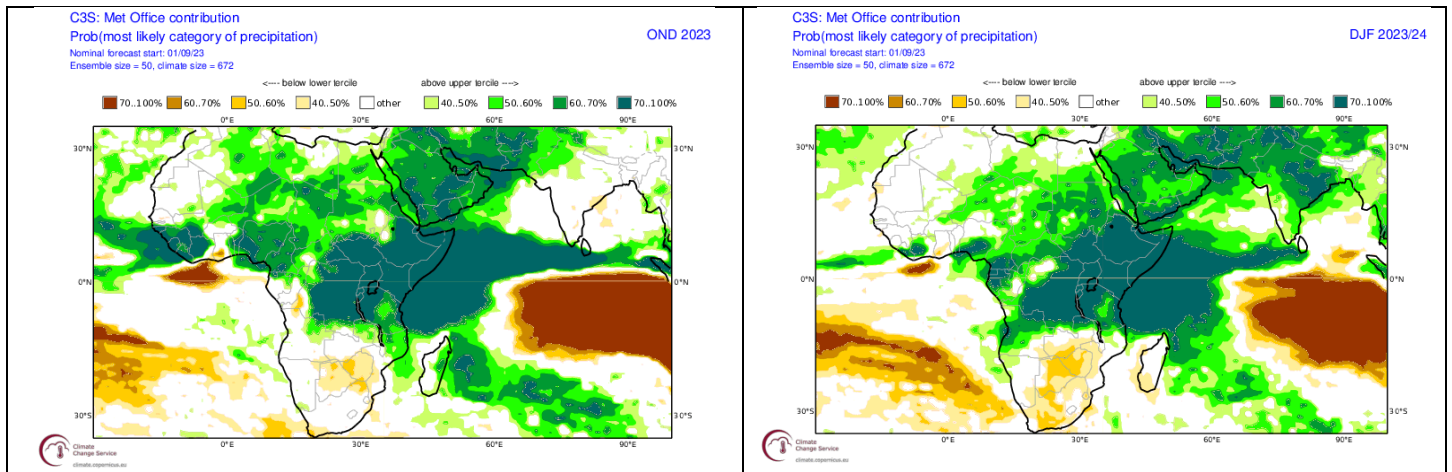
Seasonal forecasts (updated in September 2023) by these institutions, as published by the COPERNICUS Programme (<https://climate.copernicus.eu/seasonal-forecasts>) and by the IRI, reflect near-normal to below-normal rainfall expected over most of southern Africa, as can be expected during an El Niño 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.



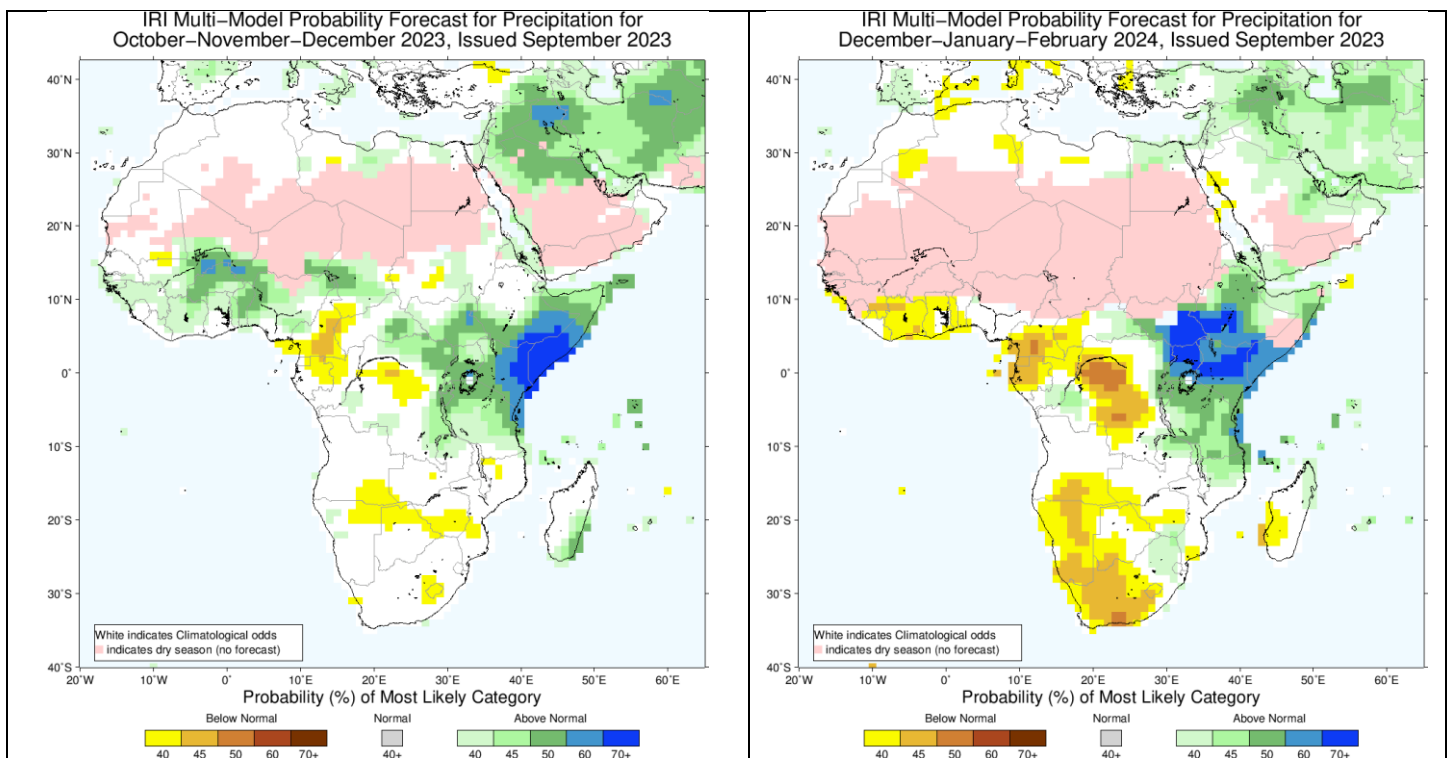
Probabilistic forecasts by the European Centre for Medium-Range Weather Forecasts for rainfall for spring to early summer (October-December 2023; left - Forecast issued in 2023-09) and summer (December to February 2024; right).



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



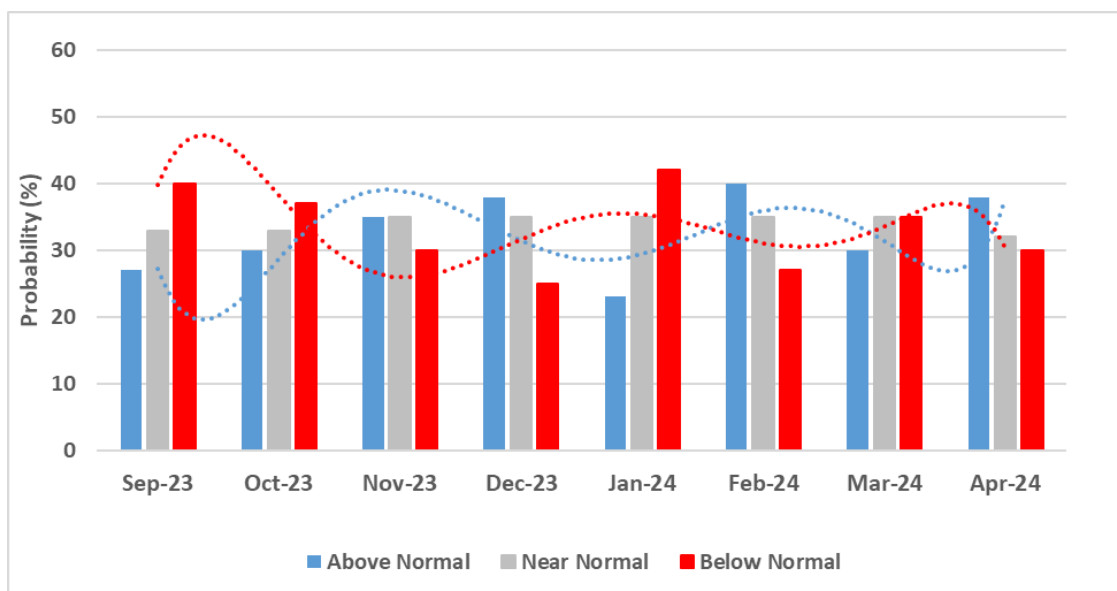
Same as above, but forecasts issued by the UK Met Office.



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.



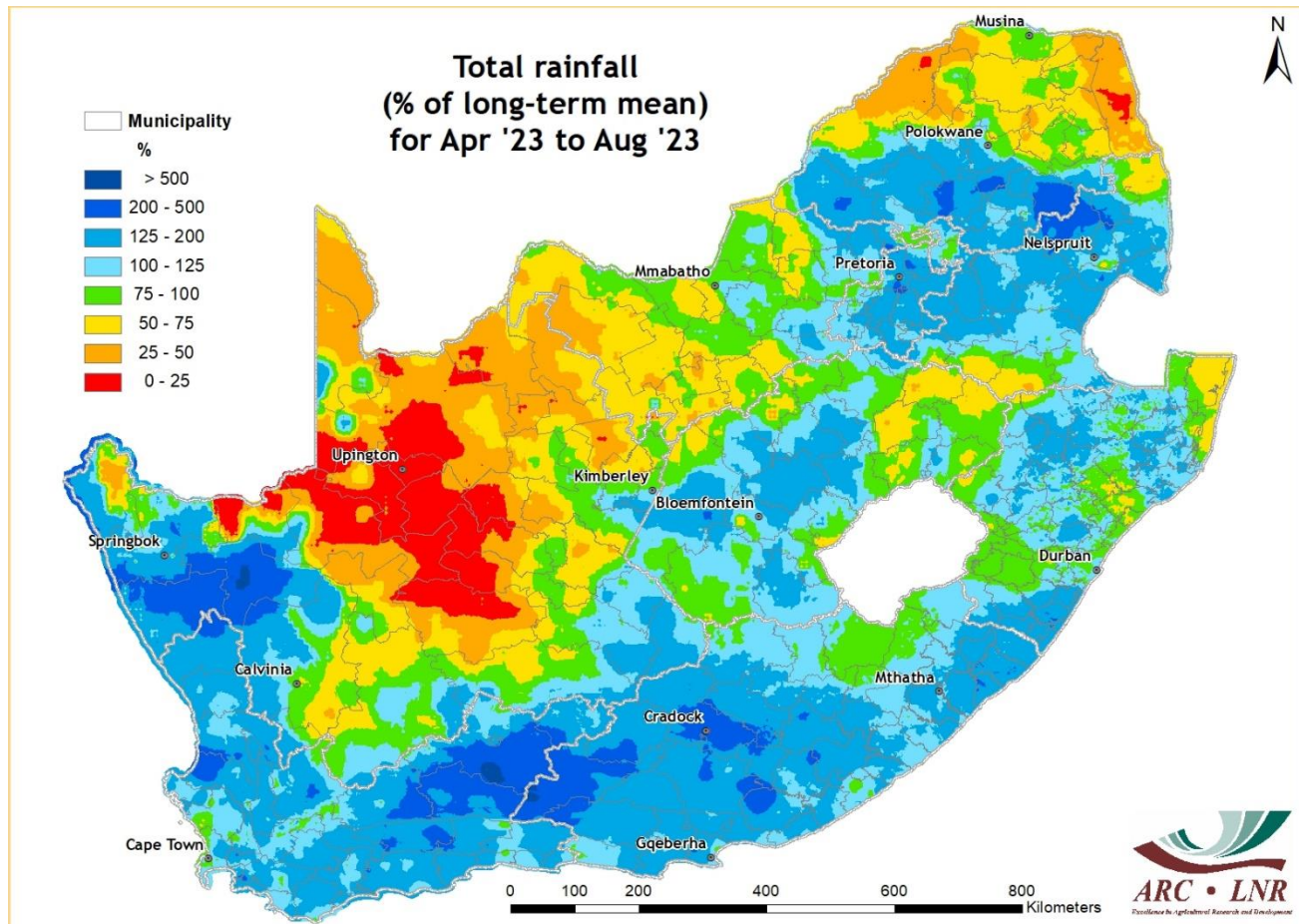
Probabilistic forecast for rainfall over the summer rainfall region, based on the natural cyclic nature of the climate system as seen in decadal variability, per month for the period September 2023 – April 2024 (Forecast issued in 2023-09).

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

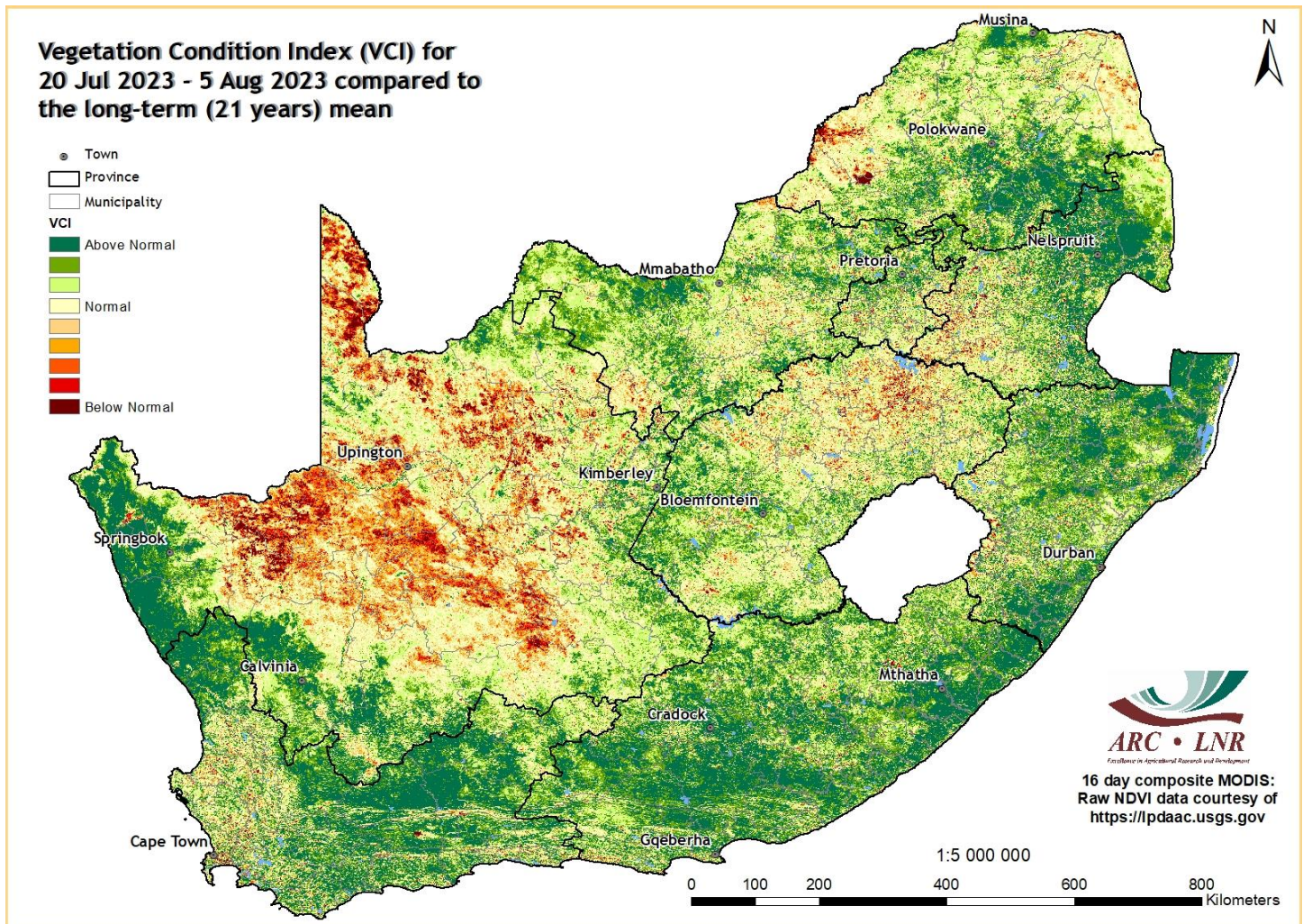
Observed conditions

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



Most of the country, including the winter rainfall region, received above-average rainfall during the winter. The interior of the Northern Cape was drier than average.

Vegetation Condition Index: August 2023



By August, 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 Northern Cape.

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>

“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.

YOUNG PEOPLE

SEE THE FUTURE

Differently



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

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

Ask your insurance broker or find us online at agriseker.co.za