

CUMULUS

SEASON 2023/2024

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16 November 2023



YOUNG PEOPLE

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



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Summary

Mostly warm and dry conditions expected to continue

The summer rainfall region, including the grain-production region, will again be relatively dry for this time of the year while it will also be hot at times. It has already been dry for this time of the year the past week except for parts of Gauteng and Mpumalanga where some thundershowers became severe, as expected with the type of atmospheric circulation patterns present.

While rainfall will be below normal over the interior, isolated to scattered thundershowers will occur over the central to southeastern parts daily, shifting somewhat east by later this weekend and early next week. Distribution of rainfall will however be uneven and most areas will receive below-normal rainfall in total for this time of the year. Thundershowers that occur may at times be accompanied by strong winds as is usually the case when the atmosphere is relatively dry. At times, some storms may also produce hail, as is typical for this time of the year especially with dry air over much of the interior.

A cold front is expected to cause rain by Monday over the winter rainfall region, with current forecasts indicating the possibility of totals up to 25 mm in the mountainous areas of the southwestern Cape. While the frontal system results in rainy conditions over the southwestern parts by Monday, the interior is expected to become hot and dry, with thundershowers expected to shift to the northeastern parts.

Large-scale circulation patterns are unfavorable for widespread rainfall over southern Africa currently. Tropical moisture is still mostly confined to the far northern parts of the subcontinent and cloud bands are sourced from very far north, with the intertropical convergence zone not yet active close to South Africa. Large amounts of tropical moisture in our own region are still absent, keeping rainfall totals relatively low. While low-pressure areas tend to develop towards the southwest of the country over the Atlantic Ocean, anti-cyclonic circulation dominates the subcontinent and rainfall events consist mostly of heat-driven thundershowers. Large-scale atmospheric circulation patterns therefore represent conditions associated with El Niño events.

Looking further ahead, there is still no indication of a large-scale shift in the patterns, with models favoring the development of low-pressure areas towards the southwest and anti-cyclonic conditions present across the subcontinent. While thundershowers will be more widespread at times, there isn't an indication of significant widespread rain yet. On a global scale, more intense convection along the equator is moving from a region that is generally associated with better rainfall over South Africa into a region that is more typical for less rain over SA, until the end of the month.

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

General:

- It will be relatively warm and dry for this time of the year over the interior.
- Temperatures will on average be above normal over the interior.
- Rainfall is expected to be below normal over most areas.
- Isolated to scattered thundershowers will occur over the central to southeastern and eastern parts initially. The band of thundershowers will shift somewhat further east during the weekend to include also much of the northeastern interior.
- Scattered showers with moderate to strong northwesterly winds are expected over the winter rainfall region on Monday and early Tuesday as a cold front is expected to move across the region early next week.
- **The summer-grain production region** should be warm in the east to hot in the west on most days. It will also be windy at times, especially in the west. Temperatures across the region should gradually increase during the period and it may become very hot over the western parts according to current forecasts next week. Isolated to scattered thundershowers are expected over the region on most days, but rainfall will not be spread evenly and most areas should receive below-normal rainfall for the time of the year while temperatures will be above normal, especially over the western parts.
- As is typical in early summer, where thundershowers do develop during the next few days, they will have an enhanced tendency to become severe.

Overview of expected conditions over the main agricultural production areas

With low-pressure troughs towards the southwest most of the time, large-scale circulation patterns will not be conducive to widespread rainfall over South Africa. Thundershowers will be present over the interior due to a surface trough, moisture from the north and heat-driven convection. A cold front is expected in the southwest on Monday. Dry, westerly winds are expected to occur over the western to central parts in association with the frontal system to the south and is expected to push the low over the interior and band of thundershowers somewhat further northeast by early next week.

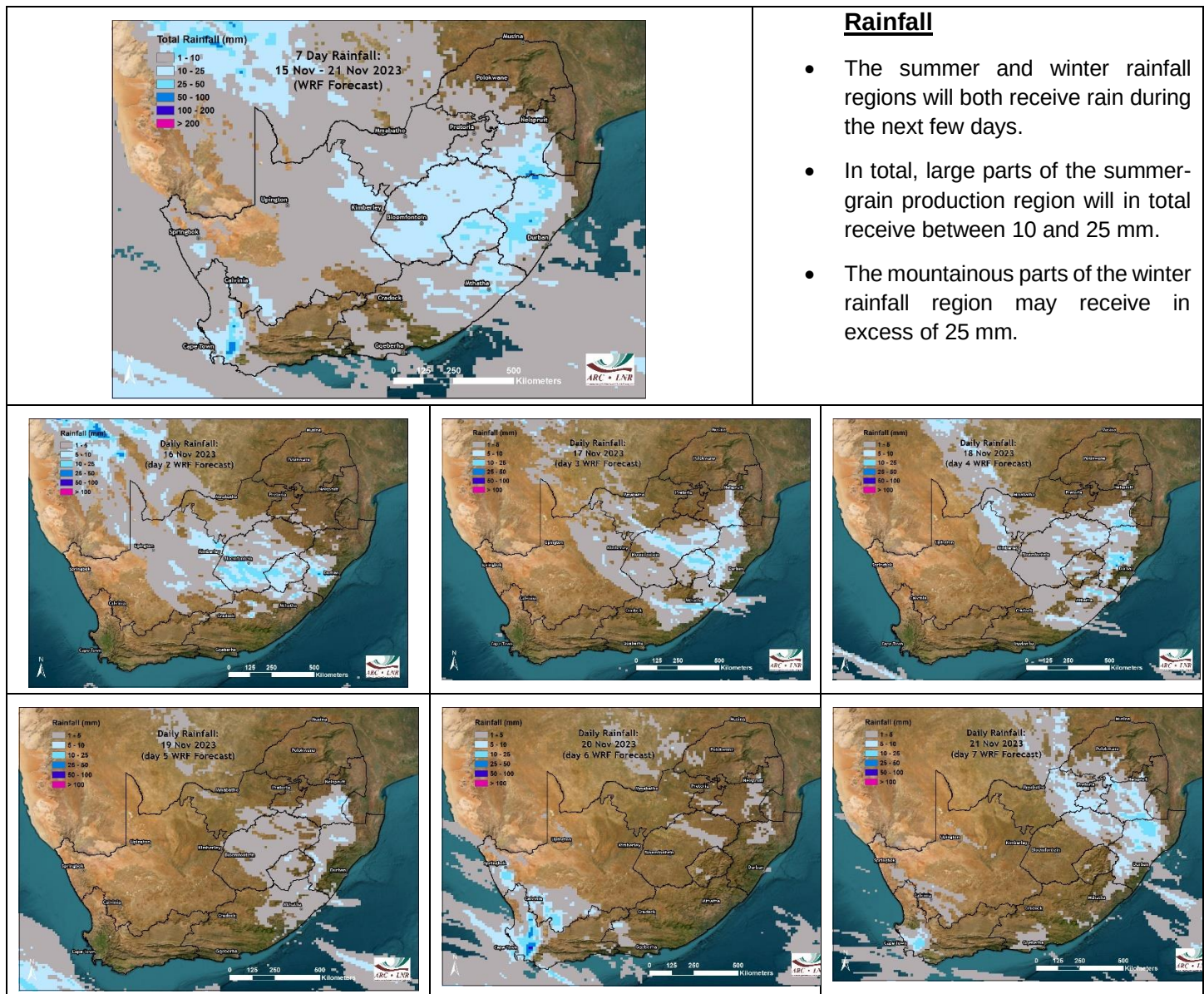
Maize production region: While thundershowers are expected at times over the region, these will be isolated for the most parts and rainfall will be distributed unevenly. It will gradually become warmer during the period according to current forecasts, with hot conditions from Sunday especially over the western parts:

- Maximum temperatures over the western maize-production areas will be in the order of 30 – 36°C. Minimum temperatures will be in the order of 18 – 22°C.
- Maximum temperatures over the eastern maize-production region will range between 27 and 33°C. Minimum temperatures will be in the order of 14 - 21°C.
- **Thursday (16th):** Partly cloudy and warm with isolated thundershowers except in the northeast.
- **Friday (17th):** Partly cloudy and warm with scattered thundershowers, but isolated in the northeast.
- **Saturday (18th):** Partly cloudy and warm, becoming hot and windy in the west. Isolated thundershowers are possible over the central to eastern and northern parts.
- **Sunday (19th):** Partly cloudy and warm, but hot and windy in the west. Isolated thundershowers are possible.
- **Monday (20th) to Wednesday (22nd):** It will remain hot over especially the western parts, becoming very hot as temperatures are expected to increase over the region while the cold front moves over the southern parts of the country. Dry westerly to north-westerly winds are expected to continue over the western parts and will, according to current forecasts, limit the chances for rainfall over these areas. Further east, over the central to eastern and northern parts, thundershowers of isolated to scattered nature are currently expected to remain in place. Given the dry air to the west, some of the thundershowers over the region may become severe, as is typical for this time of the year when dry air dominates the central to western interior.

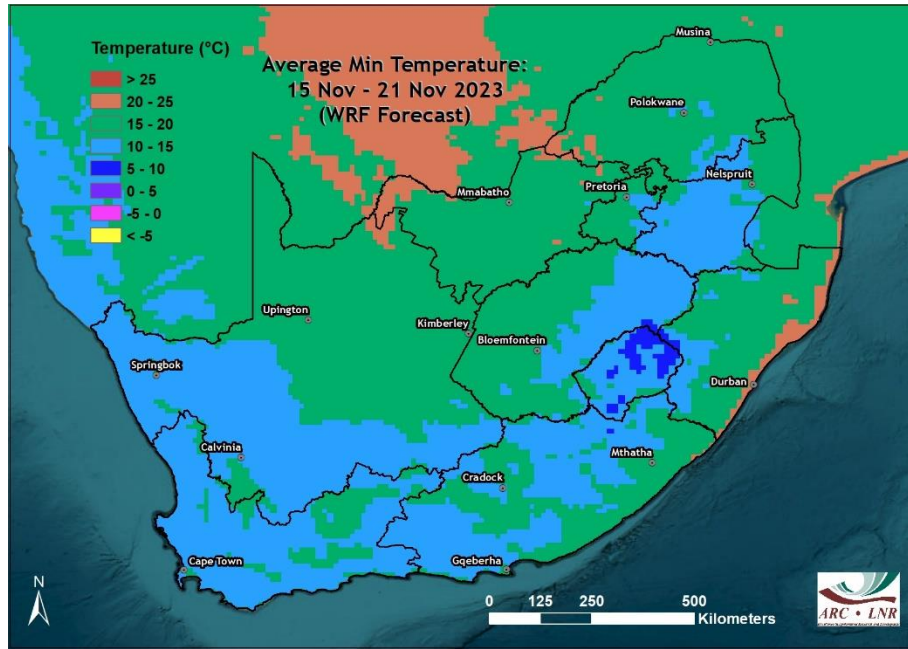
Cape Wine Lands and Ruens: Westerly winds are expected to dominate, keeping most of the region mild to cool while the southeastern parts will become warm at times. Showers are expected on Monday and early Tuesday as a cold front will move over the area from the west, associated with strong north-westerlies especially over the western parts. Except for Monday and Tuesday, little to no rain is expected apart from a very small chance for thundershowers initially on Thursday and Friday (16th /17th) over the interior.

Daily summary of expected conditions

(GFS forecast downscaled using WRF)

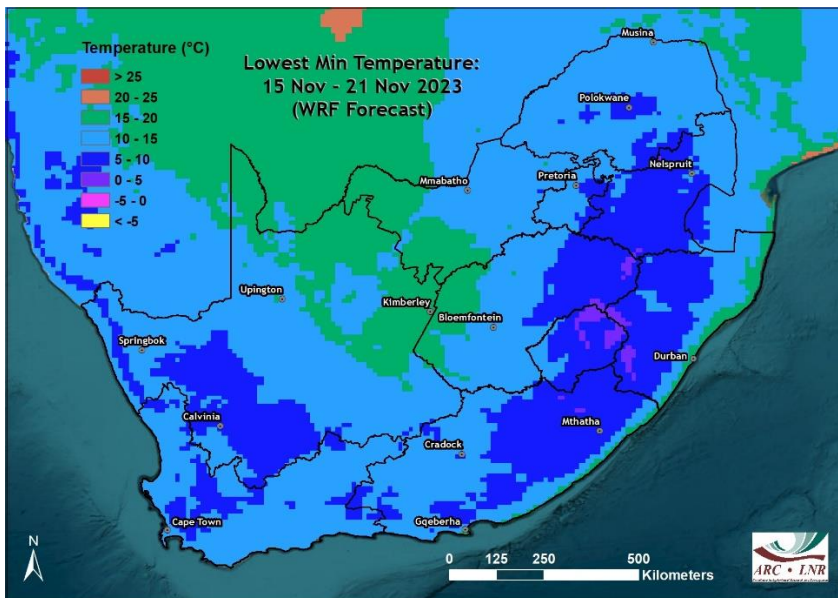


- Isolated thundershowers are expected over the central parts in a diagonal band until Sunday.
- By Monday, a cold front will result in widespread showers over the winter rainfall region, including the west coast as far as possibly the extreme southwestern coastal areas of Namibia.
- With the cold front moving into the southwestern parts, the band of thundershowers over the central parts will shift further east and northeast, focusing on the northeastern provinces.



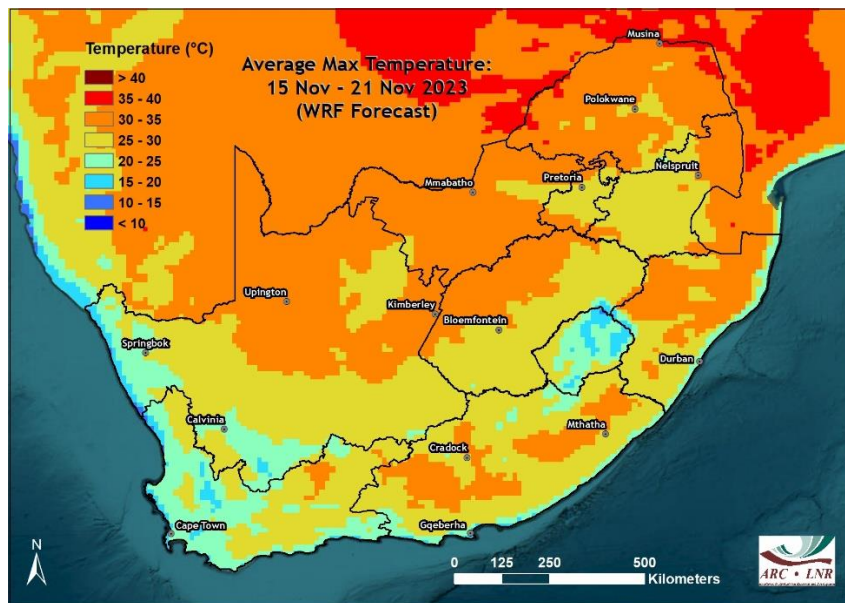
Average minimum temperatures

- Average minimum temperatures over the interior will range between 10 and 20°C, with highest temperatures in the north and lowest over Lesotho.



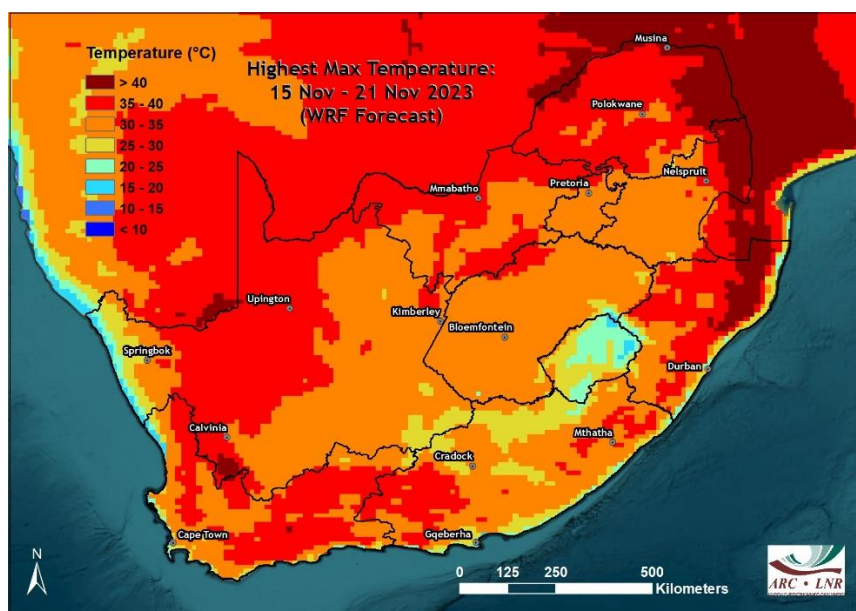
Lowest minimum temperatures

- Lowest minimum temperatures should exceed 5°C over the entire summer-grain production region.
- Lowest temperatures over the southwestern parts will occur early next week in the wake of the expected cold front.
- Lowest temperatures in the east will occur early in the period (morning of the 16th).



Average maximum temperatures

- Average maximum temperatures will be relatively high, exceeding 35°C over the lower-lying north-eastern parts.
- The winter rainfall region in the southwest will on average be relatively cool.
- Average maximum temperatures will be close to 30°C, with lower temperatures over the high-lying eastern parts.

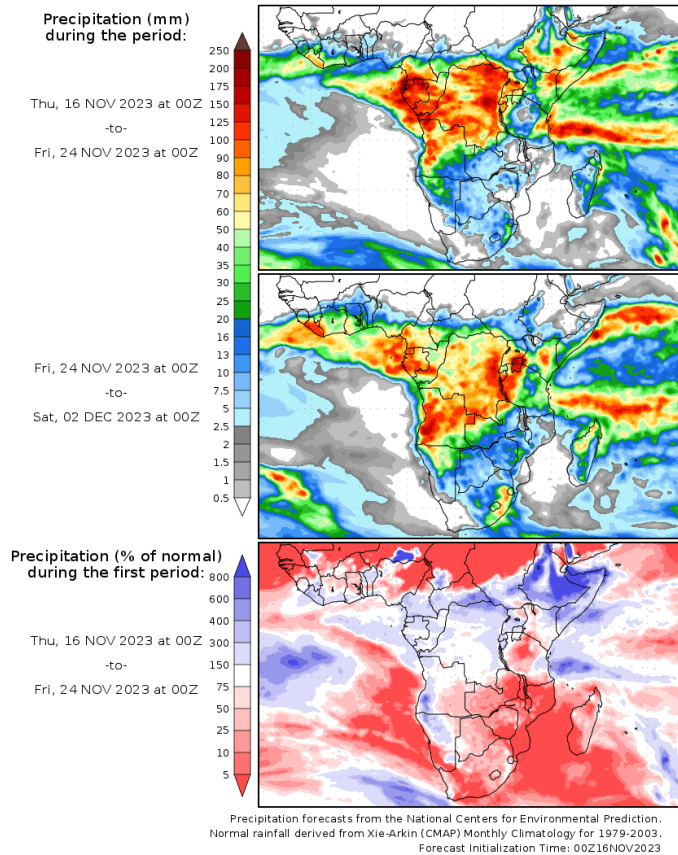


Highest maximum temperatures

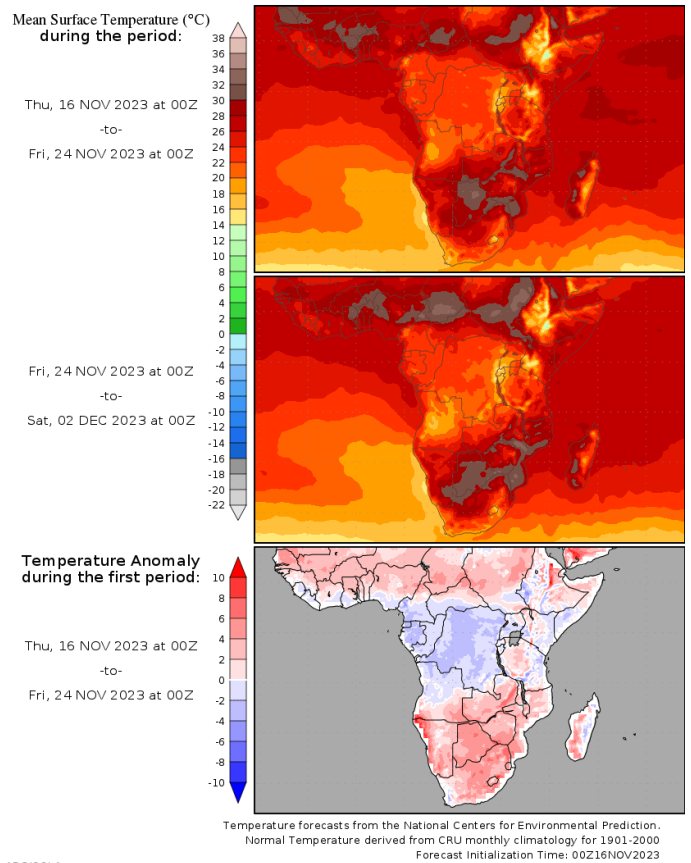
- Hot conditions (>35°C) will occur from Sunday to Tuesday over the northeastern parts, with maximum temperatures expected to exceed 40°C over the Limpopo River Valley, Lowveld and north-eastern KZN.

Medium term rainfall and temperature summary

Precipitation Forecasts

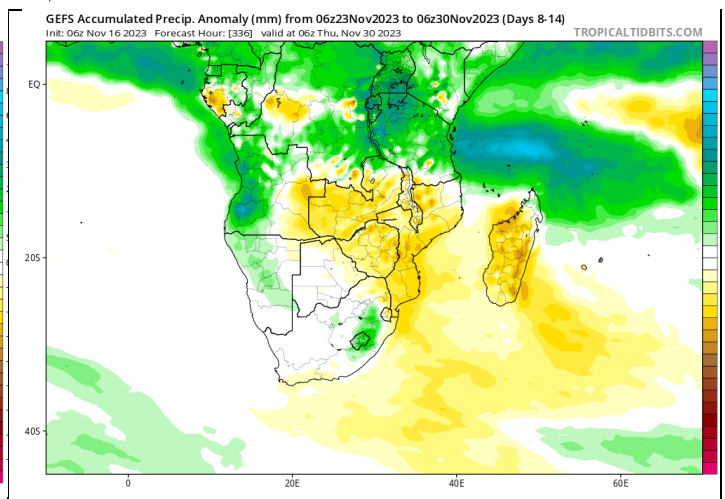
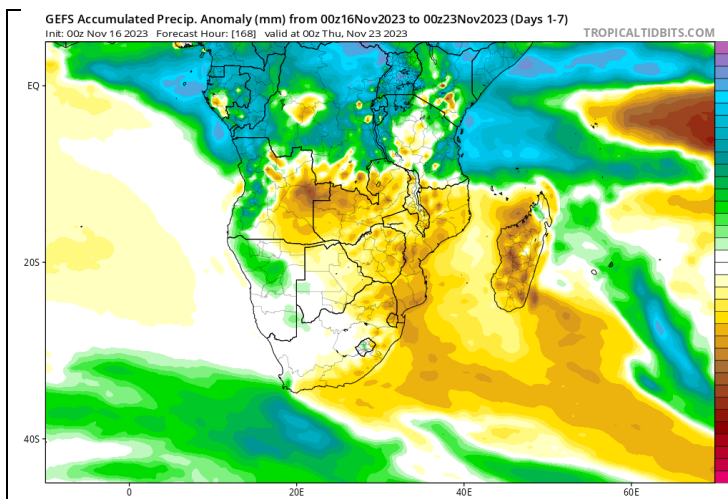


Temperature Forecasts



GrADS/COLA

GrADS/COLA



The GFS ensemble forecast (consisting of several forecasts with small initialization differences) favors relatively dry conditions for the next few days dominating much of southern Africa, with an upper-air high in place across the subcontinent most of the time. Towards the end of the month, the situation remains largely similar, but thundershowers over the central parts of South Africa and Namibia are expected to become more frequent as moisture flows around the upper-air high (right).

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 16 November) 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.

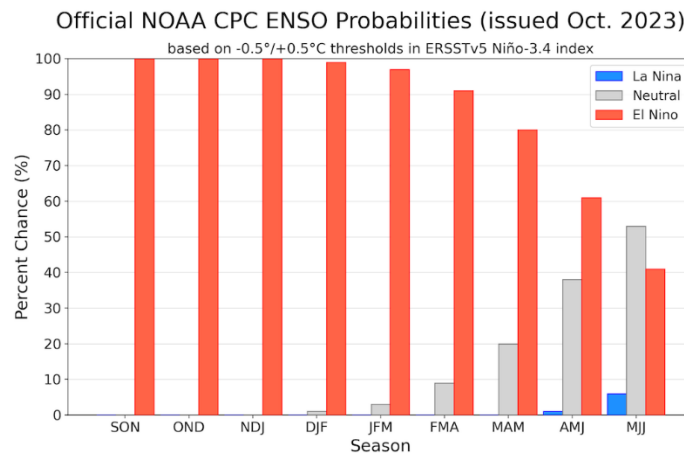
According to current model projections (GFS / ECMWF models) of weather conditions during the coming week, the following may negatively affect agricultural activities and production:

- **It will be hot and humid:**
 - Limpopo River Valley and Lowveld: **Saturday to Wednesday (18th to 22nd).**
 - Central to northeastern KZN: **Sunday to Wednesday (19th to 22nd).**
- **It will be hot:**
 - North West, northern Gauteng, Western to northwestern Free State, interior of the Northern Cape: **Sunday to Wednesday (19th to 22nd).**
- **It will be hot and windy, enhancing the fire hazard where vegetation is dry:**
 - Eastern parts of the Northern Cape and western to southwestern parts of the Free State: **Friday (17th).**
 - Eastern parts of the Northern Cape and western to southwestern parts of the Free State: **Sunday and Monday (19th, 20th).**
- **It will be dry and windy, enhancing the fire hazard where vegetation is dry:**
 - Central to southern parts of the Northern Cape, interior of the Western and Eastern Cape: **Friday (17th).**
 - Central to southern parts of the Northern Cape, interior of the Western and Eastern Cape: **Monday and Tuesday (20th, 21st).**
- **Cool, wet and windy conditions may be disruptive to agricultural activities, especially harvest-related activities:**
 - Winter rainfall region: **Monday (20th).**
- **Even though not widespread, some thundershowers may become severe given instability associated with the vertical temperature profile of the atmosphere and dry air to the west:**
 - Northern to northeastern parts of the Northern Cape: **Thursday (16th).**
 - Central to southeastern Free State and north-eastern parts of the Eastern Cape: **Friday (17th).**
 - Location of thundershowers, currently indicated for Northern KZN and Mpumalanga: **Tuesday (22nd).**

Seasonal forecast

Current ENSO conditions:

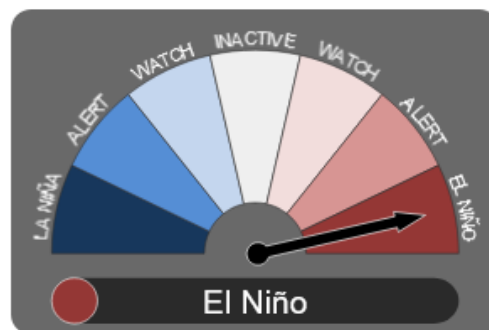
The current El Niño event is expected to last through our summer at least into early 2024 and it is unlikely that this outlook will change much during the next few months. The Australian Bureau of Meteorology (BOM) has again noted that atmospheric indicators are now also consistent an event where coupling between the ocean and atmosphere is present, showing a mature state of the event. Observed trade winds in the Equatorial Pacific have now been weaker than average for more than a month, showing atmospheric anomalies consistent with a full-fledged El Niño with ocean-atmosphere coupling. The International Research Institute for Climate and Society (IRI)'s latest ENSO forecast also maintains the expectation of a continuation into autumn:



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

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

El Niño under way in the tropical Pacific



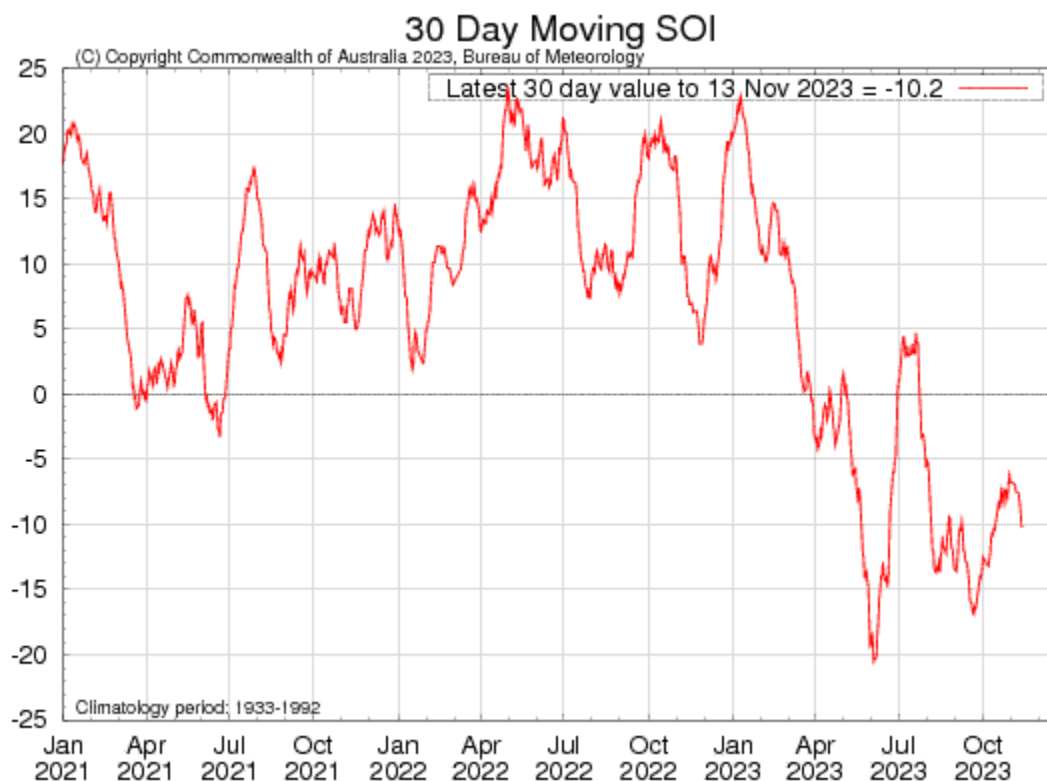
Australian Bureau of Meteorology - <http://www.bom.gov.au>

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. It is weaker currently, and if this will persist, the 4th criterion will be met later.

In their most recent update (8 November), the BOM notes regarding Sea Surface Temperatures: “El Niño continues in the tropical Pacific. Warmer than average sea surface temperatures (SSTs) in the tropical Pacific persist above El Niño thresholds, with warmer water beneath the surface to support that at the surface..... Climate model forecasts indicate some further warming of the central to eastern Pacific is likely, with SSTs remaining above El Niño thresholds into the early southern hemisphere autumn 2024.” Australian Bureau of Meteorology - <http://www.bom.gov.au>.

Regarding the atmospheric component, they also note that “.....cloud, wind and pressure patterns are consistent with El Niño conditions.” - Australian Bureau of Meteorology - <http://www.bom.gov.au>.

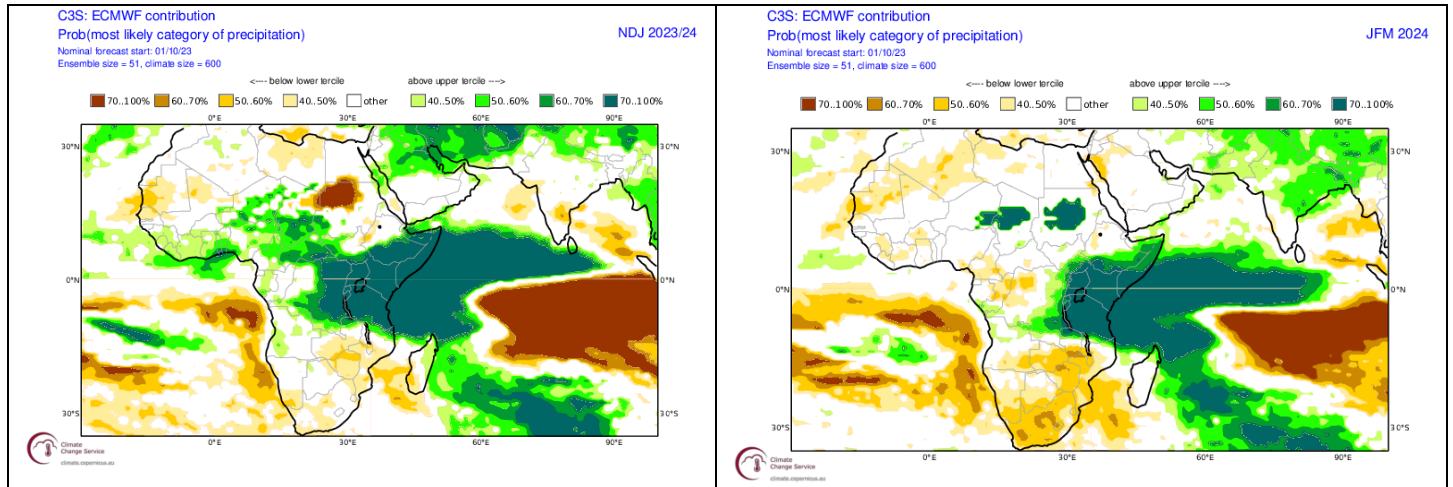
The 30-day Southern Oscillation Index (SOI) is currently -10.2 and therefor indicative of atmospheric pressure patterns in the Australia – Pacific region being in El Niño mode. In general, a negative SOI is associated with drier conditions over southern Africa.



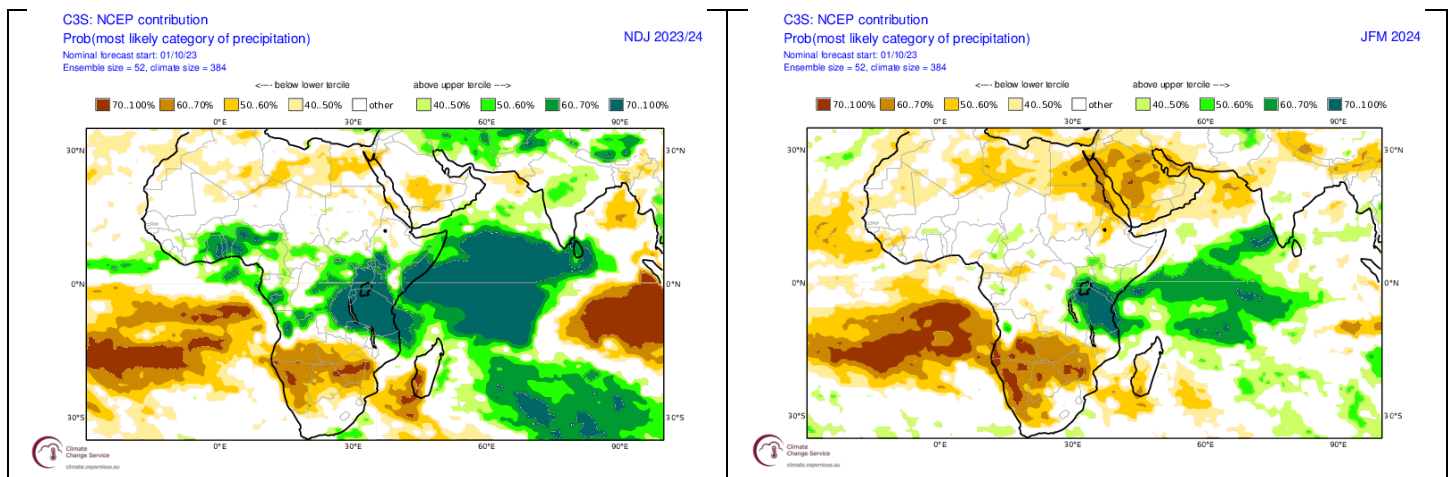
Australian Bureau of Meteorology - <http://www.bom.gov.au>

Seasonal forecasts issued by various international institutions

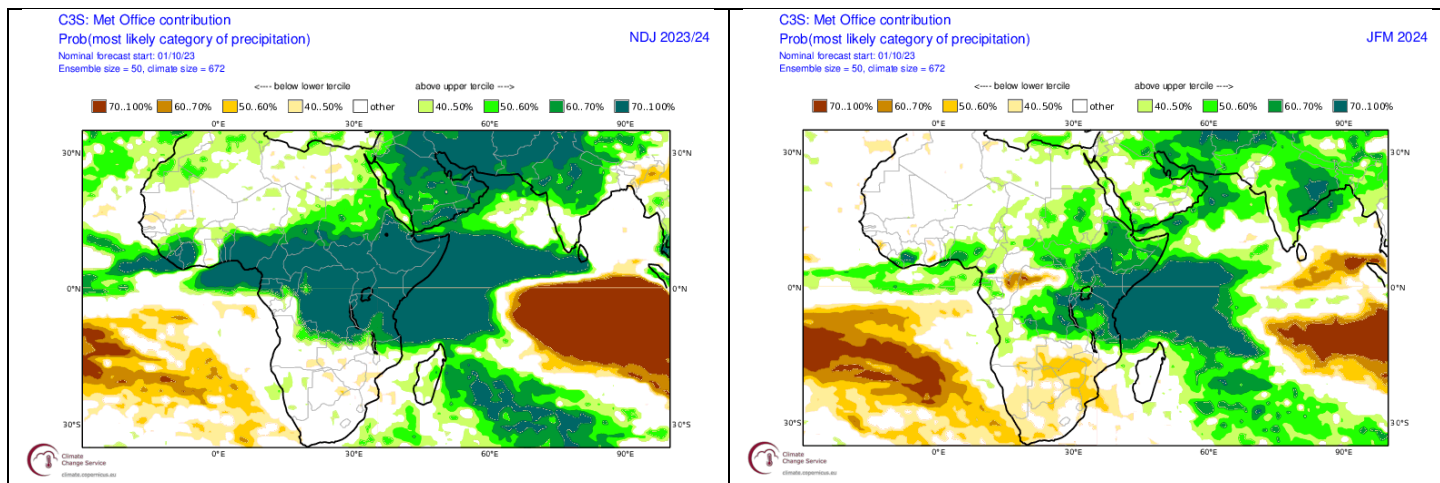
Seasonal forecasts (updated in October 2023) by various institutions, as published by the COPERNICUS Programme (<https://climate.copernicus.eu/seasonal-forecasts>) and by the IRI, still expect drier conditions towards late summer compared to during early and mid-summer. Moreover, the forecasts for late summer have drifted drier with the most recent (October-issued) forecasts. The drier pattern over southern Africa is to be expected with regard to seasonal forecasts given the current El Niño event. During the December – February and January – March period, forecasts still lean more strongly towards drier than normal conditions over the central to western parts of the country while the somewhat wetter signal over the eastern parts have weakened and mostly leans towards drier conditions.



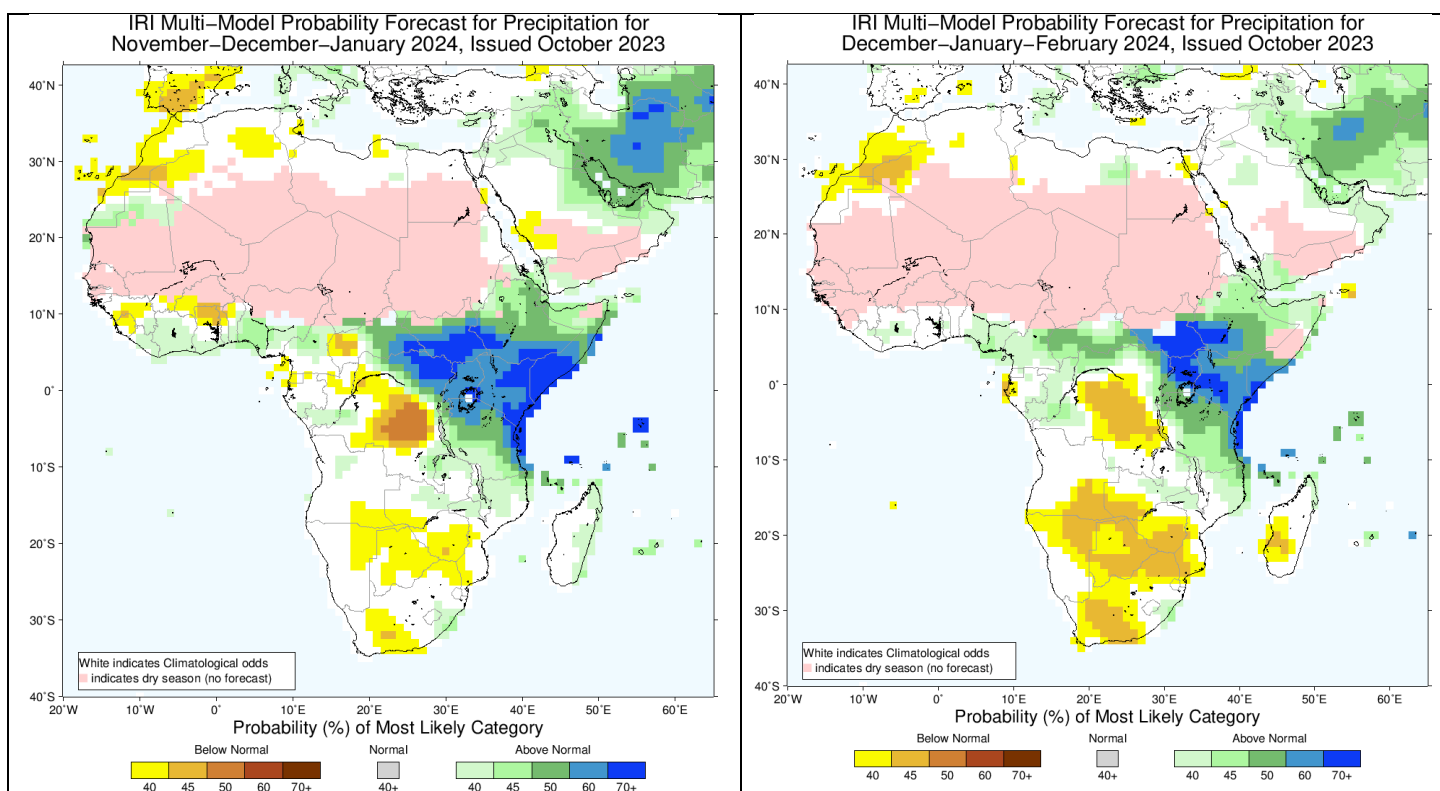
Probabilistic forecasts by the European Centre for Medium-Range Weather Forecasts for rainfall for mid-summer (November-January 2023/24; left - Forecast issued in 2023-10) and mid-to-late summer (January to March 2024; right).



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



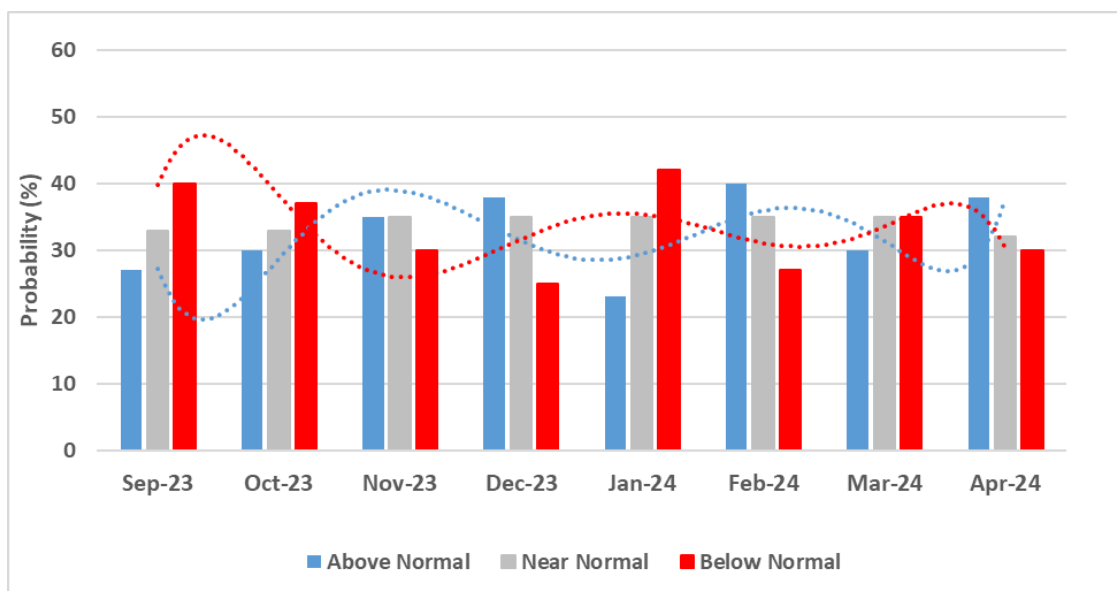
Same as above, but forecasts issued by the UK Met Office.



Probabilistic forecasts by the International Research Institute for Climate and Society (IRI) for rainfall for mid-summer (November-January 2023/24; left - Forecast issued in 2023-10) and mid-to-late summer (December to February 2023/24; right).

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.



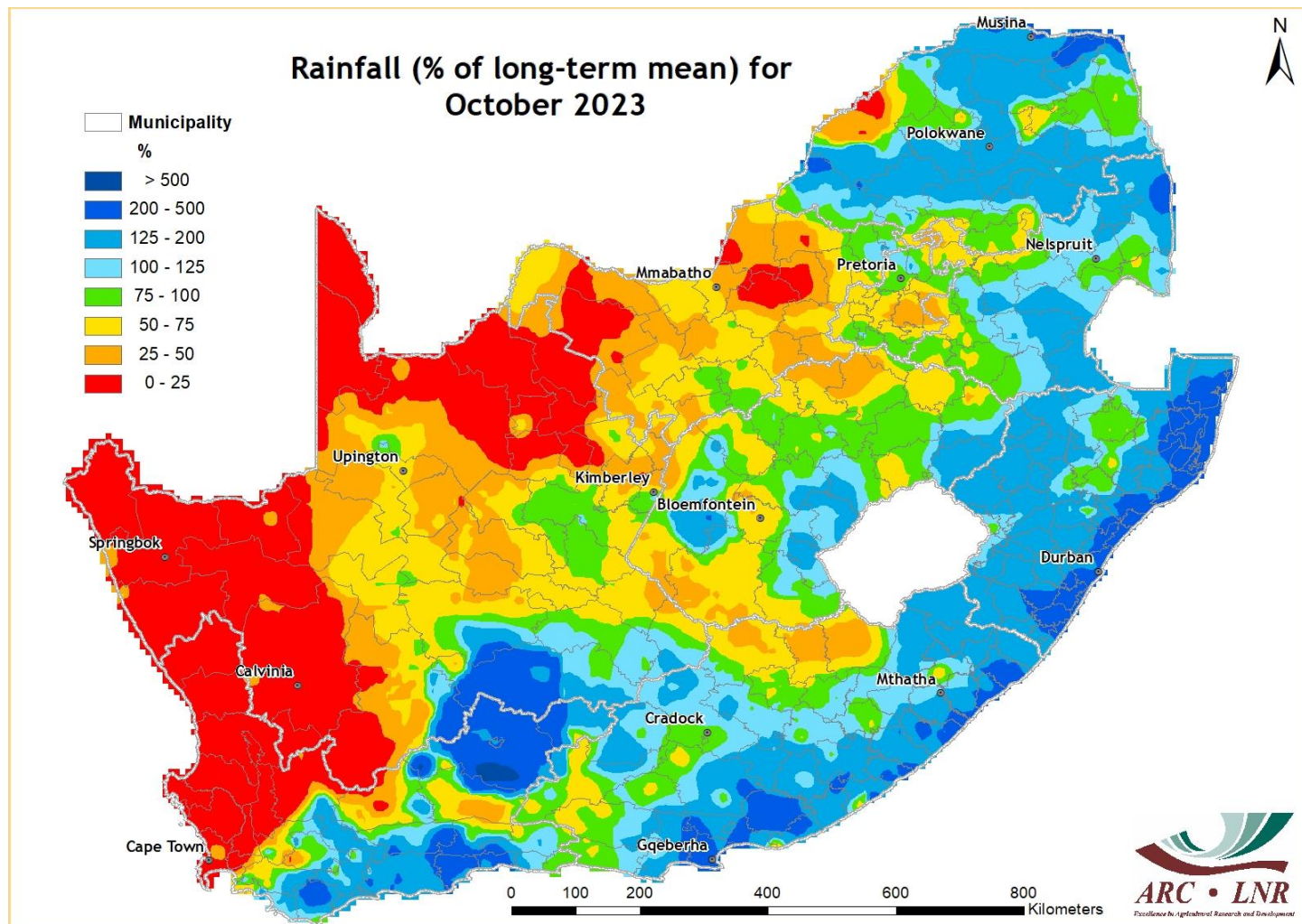
Probabilistic forecast for rainfall over the summer rainfall region, based on the natural cyclic nature of the climate system as seen in decadal variability, per month for the period September 2023 – April 2024 (Forecast issued in 2023-09).

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

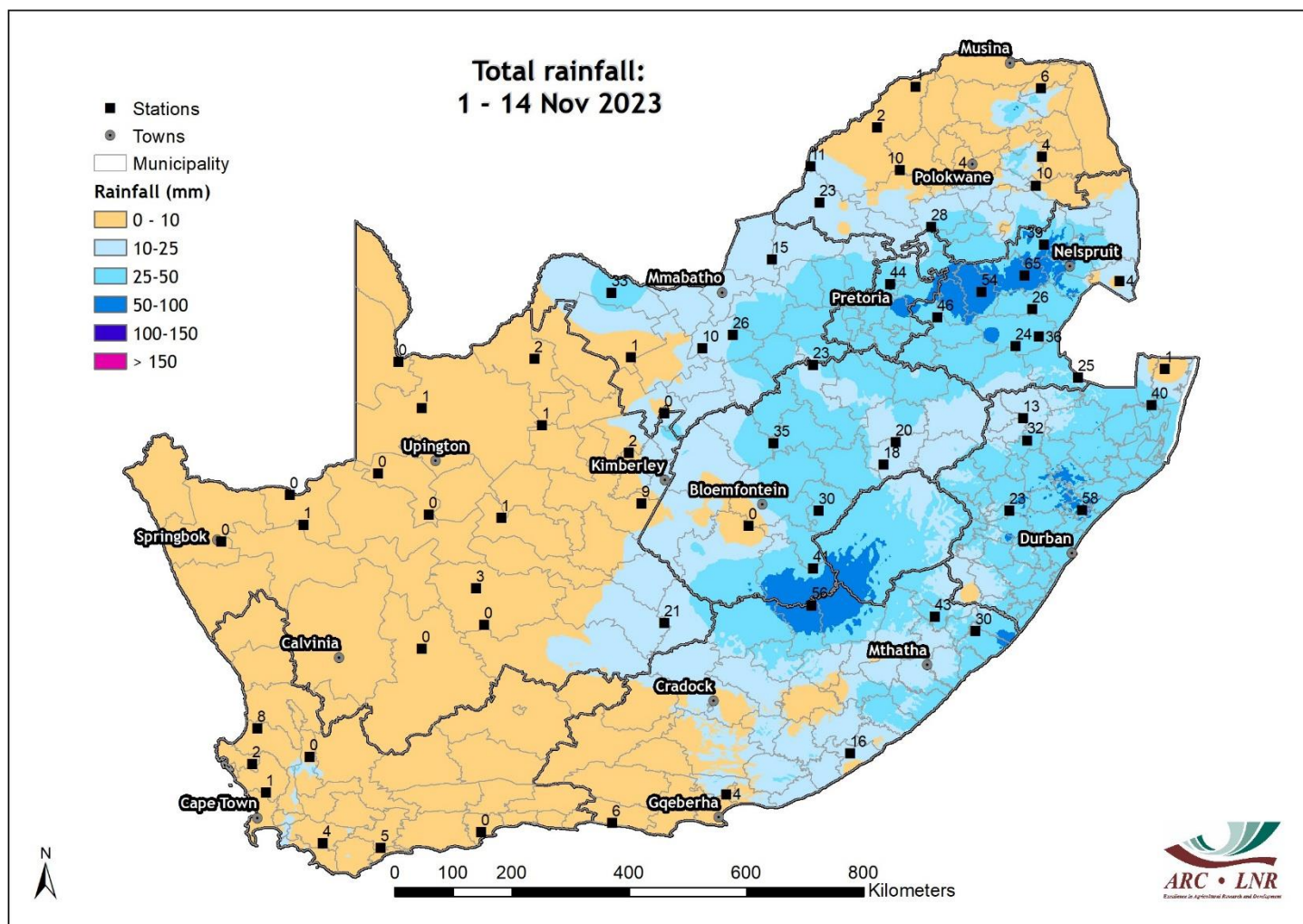
Observed conditions

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



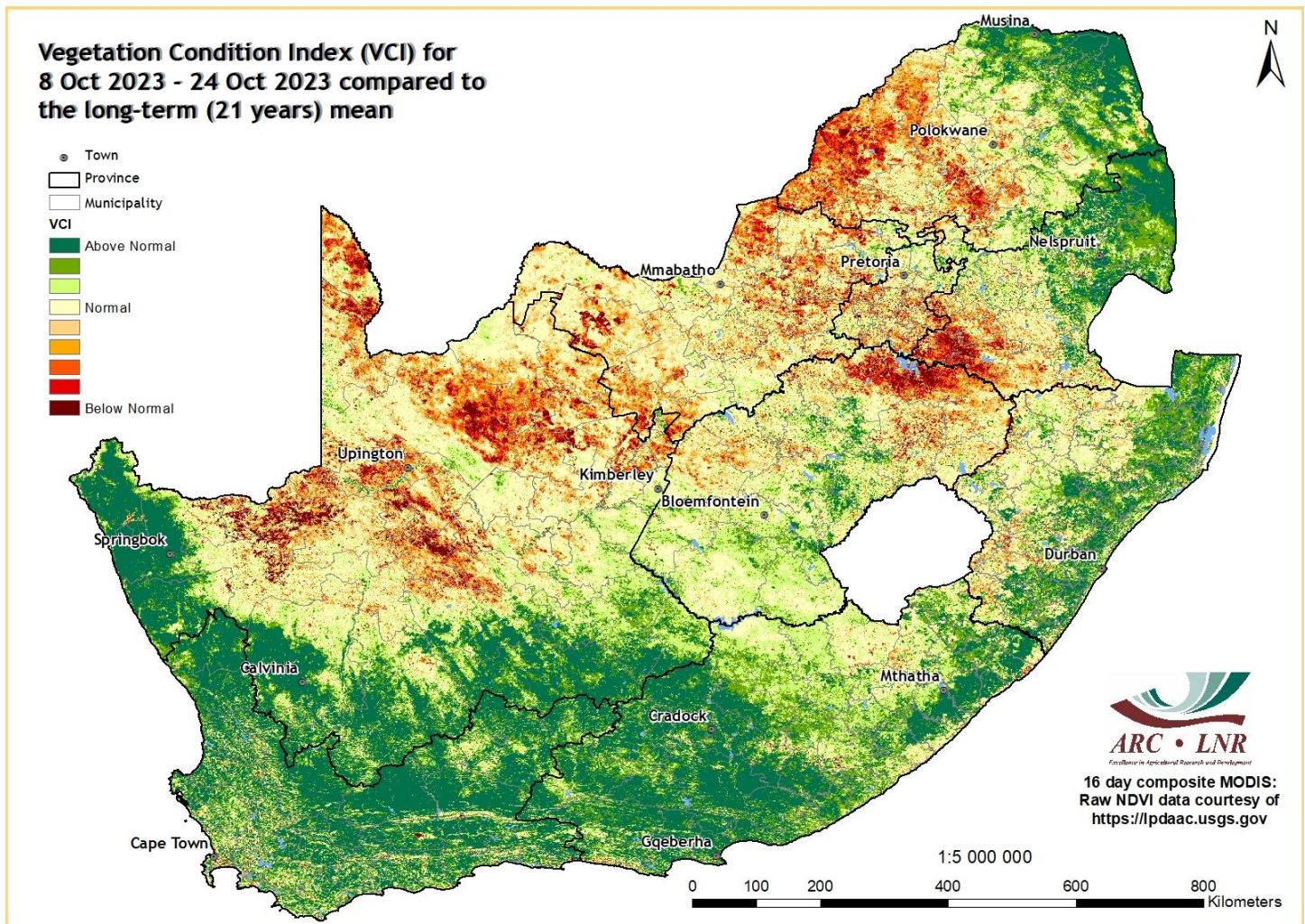
The pattern of a relatively dry northern to northwestern interior with anomalously high rainfall over the southern to southeastern and far eastern to far northeastern parts continued during October. This pattern is in contrast to the rainfall pattern observed during the 2021-2023 La Niña, when the interior was wet and the southern parts dry.

Rainfall (mm): 1 – 14 November 2023



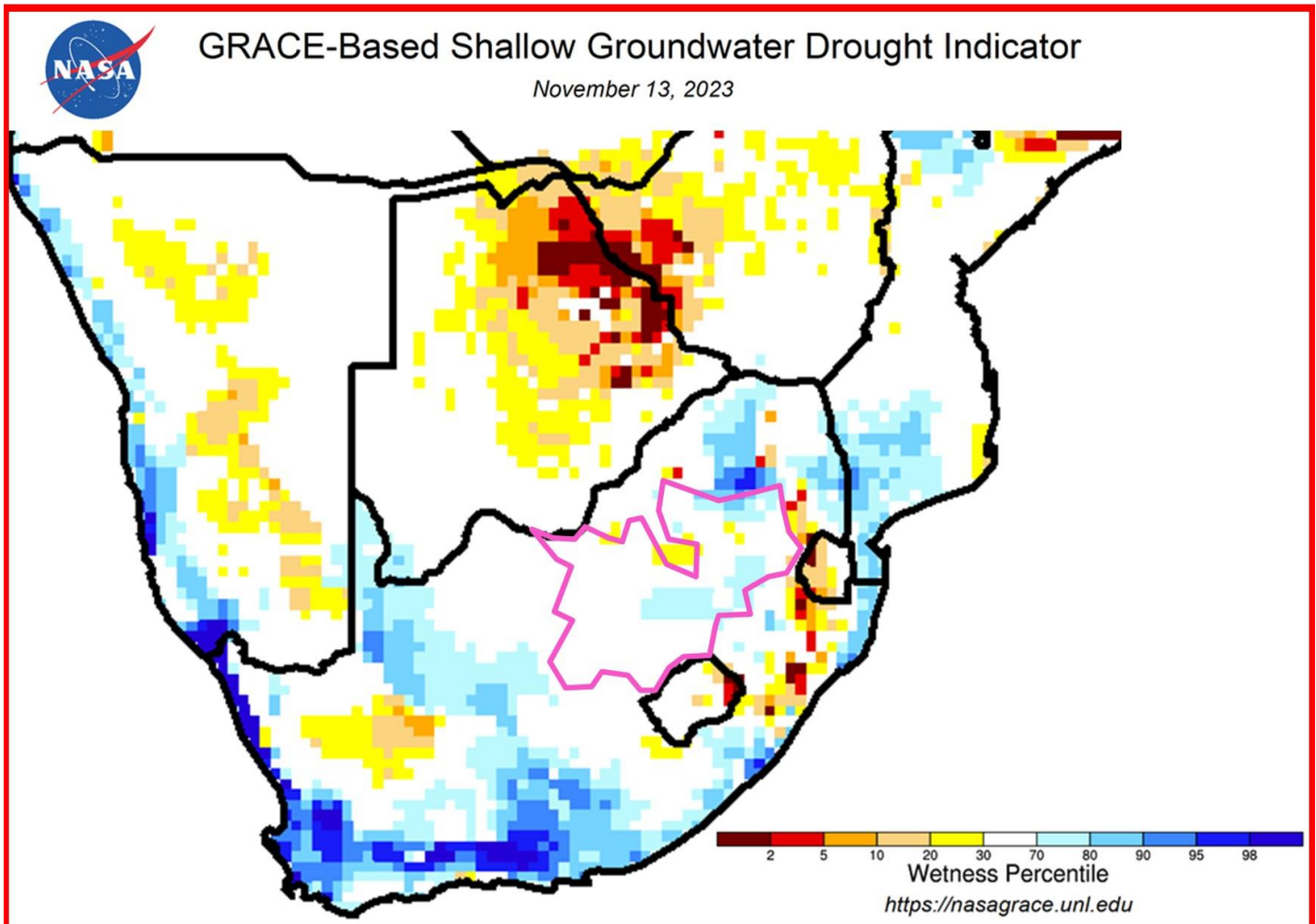
While widespread rain occurred over the country during the first half of November, only small areas received more than 50 mm of rain. Large parts of the central to eastern summer-grain production region received between 25 and 50 mm of rain, with totals exceeding 50 mm over the northern half of Mpumalanga into central Gauteng. The far-western parts of the summer-grain-production area received less than 25 mm. Some rain was recorded over the winter rainfall region, but totals remained below 10 mm.

Vegetation Condition Index: October 2023



By late October, drier conditions over the central to northern interior resulted in below-normal vegetation activity over these areas. 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 south and southwest together with the southern interior. Over the summer-grain-production region, the northern half of Mpumalanga and parts of the central Free State experienced above-normal vegetation activity while the rest of the region experienced below-normal activity.

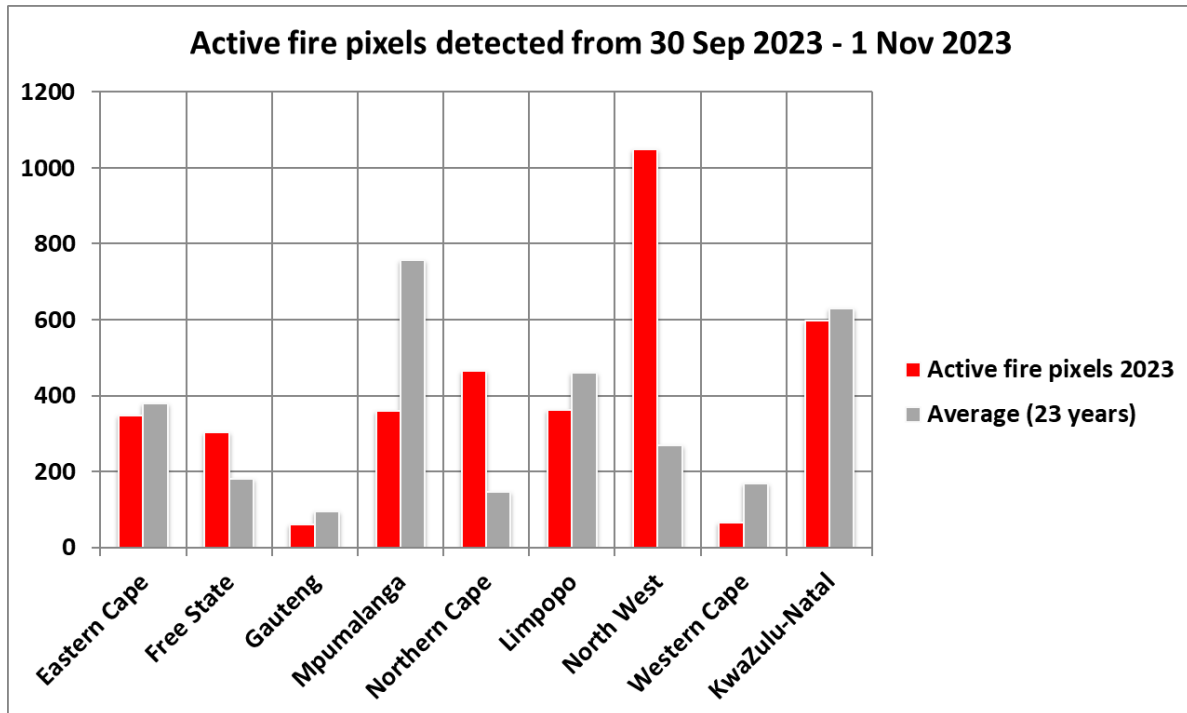
Soil moisture conditions



The Shallow Groundwater Drought Indicator shows that soil moisture within the top few centimeters of the soil profile is within the normal range (mostly between the 30th and 70th percentile) for this time of the year (by 13 November) over most of the summer-grain production region (indicated on the map). Soil moisture is still very much above normal over the winter-grain production region in the southwest

Data / maps available at nasagrace.unl.edu through a partnership with the National Drought Mitigation Center.

Observed Fires



The area where fires were observed, as represented by the number of pixels indicating active fires, during October 2023, is shown for each province as indicated. The red bars show the number of active fire pixels observed during October 2023 while the gray bars represent the long-term average.

The number of active fire pixels was near to below average over the far eastern parts such as KZN, Mpumalanga and Limpopo. Further west, where hot and dry conditions occurred more often and where rainfall so far during the current summer has been below normal, the number is well above average, such as over the Free State, North West and the Northern Cape.

Based on MODIS data, distributed by the Land Processes Distributed Active Data Center (LP DAAC), located at the US Geological Survey's EROS Data Center.

Sources of information

Seasonal forecasts: Published by the COPERNICUS Programme (<https://climate.copernicus.eu/seasonal-forecasts>)

Rainfall, temperature and wind maps over South Africa for the past week:

Agricultural Research Council - Institute for Soil, Climate and Water (ISCW) – Climate Data Bank. Data recorded by the automatic weather station network of the ARC-ISCW.

Vegetation condition maps: Copernicus Global Land service, distributed by VITO.

Information related to: ENSO, IOD and SOI:

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

Climate Prediction Center - <http://www.cpc.ncep.noaa.gov>

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

Information related to the SAM:

The Annular Mode Website - <http://www.atmos.colostate.edu/ao/index.html>

SST map:

NOAA Climate Prediction Center - <http://www.cpc.ncep.noaa.gov>

Daily conditions over South Africa:

WRF model downscalings of GFS forecasts.

Fires:

MODIS data, distributed by the Land Processes Distributed Active Data Center (LP DAAC), located at the US Geological Survey's EROS Data Center

Soil moisture:

<https://nasagrace.unl.edu/>

Precipitation and temperature outlooks for the coming week:

Center for Ocean-Land-Atmosphere Studies (COLA) and Institute of Global Environment and Society (IGES) – <http://Wxmaps.org>

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