CUMULUS

30 NOVEMBER 2021

by J Malherbe, R Kuschke

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Contents

Photo credit: E Schütze

Summary

More rain over most areas, including the summer grain production regions

The next few days will on average once again see widespread normal to above-normal rainfall over the country, with temperatures in the normal category for this time of the year. Apart for the possibility of some severe storms at times, conditions should be very supportive of agricultural activities.

Yet another upper-air system will result in fairly widespread rain over the country during the next few days. While starting off relatively warm and with thundershowers mostly confined to the northeastern parts, conditions are set to change towards the weekend when almost the entire country may receive rain in the form of widespread showers and thundershowers. As the rainfall during this period will be associated with upper-air systems in the westerlies, there will be a tendency for some of the expected thundershowers to become severe, as is typical for early to mid-summer. The winter rainfall region will again receive some unseasonal rainfall as the upper-air system responsible for the more widespread rainfall towards the weekend will be situated far west initially.

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

- **General:**
  - Temperatures will be near normal over most of the interior, but the northeastern parts will be warmer than normal.
  - Hot and humid conditions will dominate over most of Limpopo and the Lowveld while little to no rain is expected for most of the period over these areas.
  - The western interior will be mild for this time of the year while the southern to southwestern parts will be cooler than normal.
  - Rainfall will be normal to above normal over most of the summer and winter rainfall regions.
  - Areas that are expected to be relatively dry (or only receive little rainfall) however include: northwestern parts of the Northern Cape, western parts of the Eastern Cape, the northern Limpopo River Valley and northern Lowveld.
  - Scattered thundershowers will occur for most of the week over the central to eastern summer rainfall areas.
  - More widespread thundershowers are expected over the central to eastern and northeastern parts from Friday evening until Sunday.
  - Widespread showers and thundershowers are also possible over the winter rainfall region and southern parts by Saturday and Sunday, clearing by Monday.
  - The low-pressure system in the southwest, responsible for much of the forecasted rainfall during the weekend, may also result in heavy falls over the mountainous areas of the Western Cape such as the Boland. Given the long lead time from this forecast, it is still uncertain, and depends largely on the exact position of the system by Saturday (4th).
  - According to current forecasts (long lead time, large uncertainty), the early part of next week should be mild to warm and dry over the central to western parts while scattered thundershowers may still occur over the northeastern parts.
  - The winter rainfall region will receive rainfall on Saturday and Sunday (4th, 5th).
  - It will be windy over the southern to southwestern interior, with mostly westerly winds, on Wednesday and Thursday (2nd, 3rd) as well as Sunday (5th) according to current forecasts.
  - Strong southerlies to southeasterlies are expected in the southwest from Thursday (2nd) to Saturday (4th).
  - Temperatures over the summer-grain production area will be ideal for crop production:
    - Maximum temperatures over the eastern maize-production areas will be in the order of 27 – 31°C. Minimums will be in the order of 15 – 18°C.
    - Maximum temperatures over the western maize-production region will range between 24 and 34°C, with the lower maxima expected during the weekend when thundershowers and rain will be widespread. Minimums will be in the order of 16 – 20°C.

Overview of expected conditions over the main agricultural production areas

The first few days of this period will see typical summer thundershowers over the central to eastern parts while it will be hot and dry in the extreme northeast. Throughout the period, the southwestern parts of the country will experience winds mostly from the south and west, keeping those areas relatively cool. A cut-off low pressure system will develop to the west of the country during the week, and is expected, according to current forecasts, to move east over the southern half of the country by the weekend. Together with a strong influx of moisture from the east, associated with a surface high-pressure system, the system will result in widespread rain and thundershowers over most parts during the weekend. Towards next week, as the system moves out, the remaining moisture and upper-air instability over the northeastern parts will cause further thundershowers over the northeastern areas while it will be dry over the rest of the country.

Maize production region: Most of this region will receive normal to above-normal rainfall for this time of the year. Temperatures will on average be below normal.

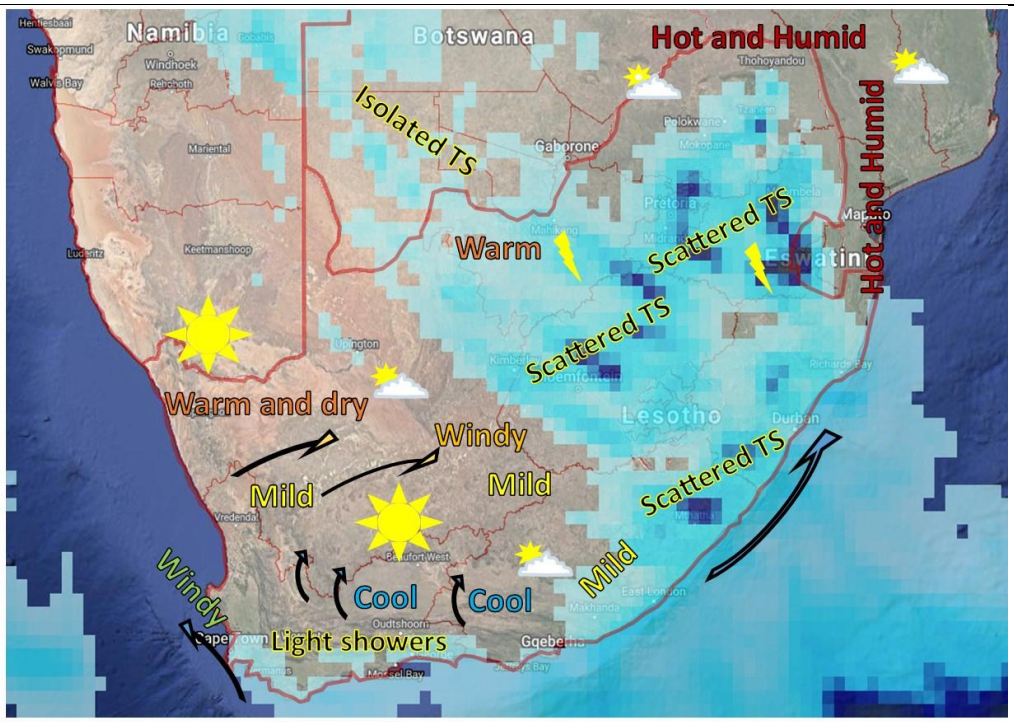
- **Tuesday (30th)**: Partly cloudy and warm with isolated thundershowers, but scattered over the central to eastern areas.
- **Wednesday to Friday (1st to 3rd)**: Partly cloudy and warm with scattered thundershowers.
- **Saturday and Sunday (4th and 5th)**: Partly cloudy with scattered thundershowers, becoming cloudy and mild with widespread rain and thundershowers, clearing from the west later on Sunday. Thundershowers during these 2 days may have an enhanced tendency to become severe.
- **Monday and Tuesday (6th, 7th)**: Cloudy initially over the eastern parts with widespread thundershowers on Monday. It will be partly cloudy with scattered thundershowers over the central to eastern parts during the remainder of the period according to current forecasts, but isolated in the west and dry in the far west.

Cape Wine Lands and Ruens: It will be sunny to partly cloudy and mild over most areas for most of the period. However,

- Strong southerlies to southeasterlies are expected in the southwest from **Thursday (2nd) to Saturday (4th).**
- It will be stormy with showers and thundershowers over the entire areas according to current forecasts on **Saturday and Sunday (4th, 5th).** While very uncertain currently, heavy falls may occur over the southwestern mountainous areas.
- It will become mild and dry again by **Monday (6th)** over the entire area.

Daily summary of expected conditions

Tuesday 30 November to Friday 3 December



Warm with scattered thundershowers over the central to eastern parts.

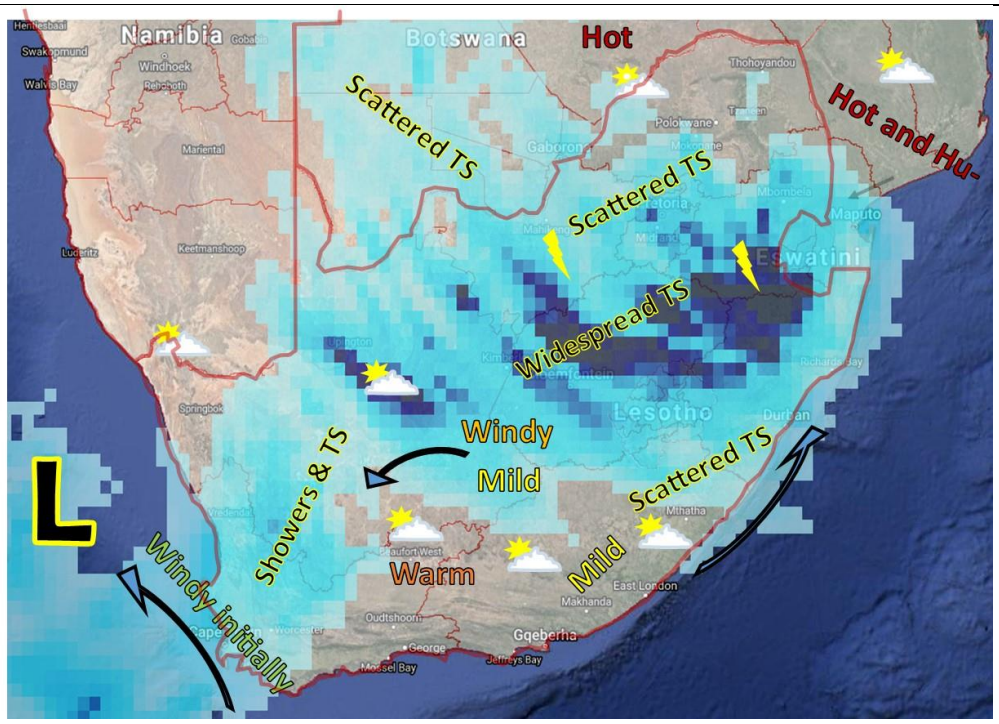
Sunny and mild to warm in the west, but cooler in the southwest.

Strong westerly winds over the western to southern interior at times.

Strong southeasterlies in the southwest.

Light showers along the Garden Route, clearing by Friday

Saturday 4 December

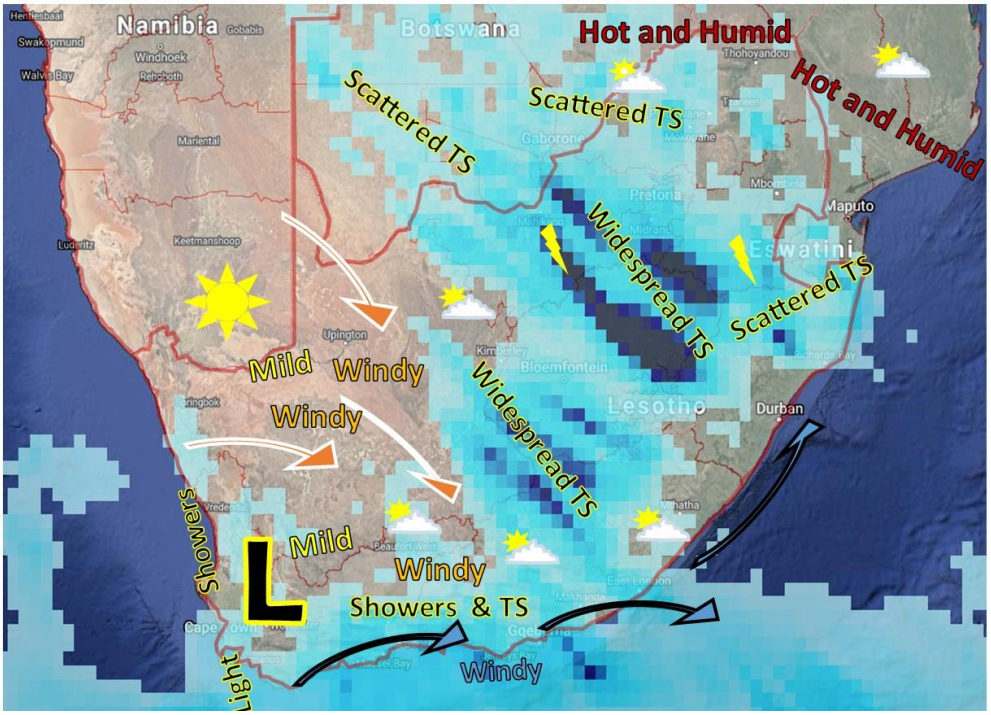


Partly cloudy to cloudy with widespread thundershowers over most parts excluding the northern Limpopo River Valley and northern Lowveld. The southeastern parts of the country will be dry for most of the day, but thundershowers may move in from the north later during the night.

Little to no rain is expected over the far northwestern parts of the Northern Cape.

Strong southeasterlies in the southwest early in the day.

Sunday 5 December



Cloudy and mild over the central to eastern parts with widespread showers and thundershowers.

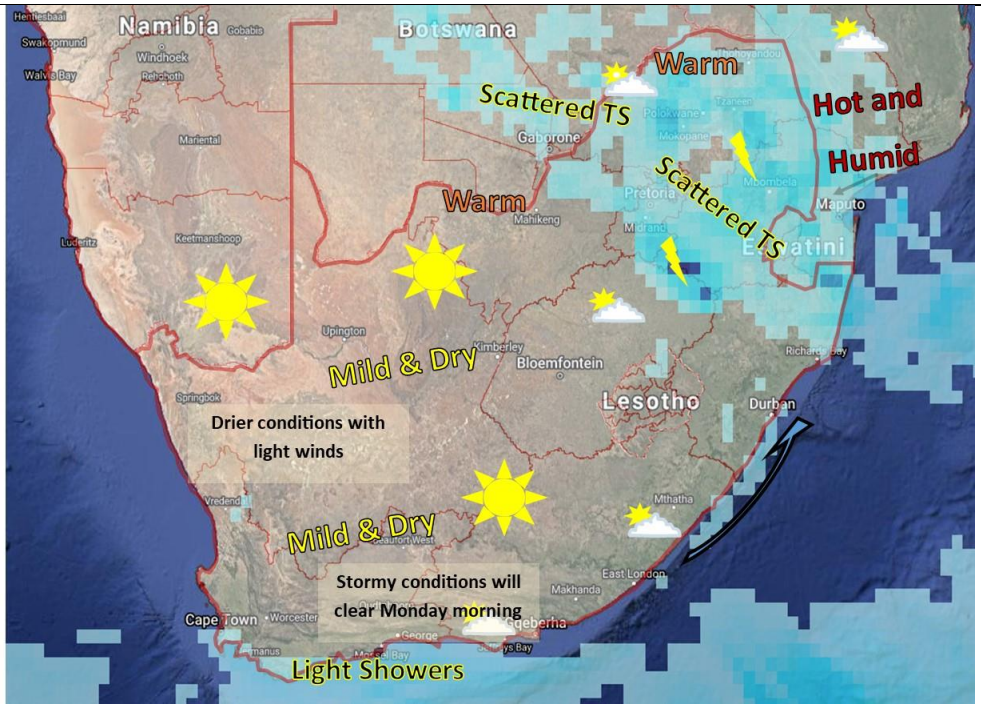
The western interior will become sunny and dry but relatively cool.

Windy over the western interior into the central parts.

Windy along the Garden Route with widespread rain and thundershowers.

Light showers over the winter rainfall region.

Monday – Tuesday, 6 – 7 December

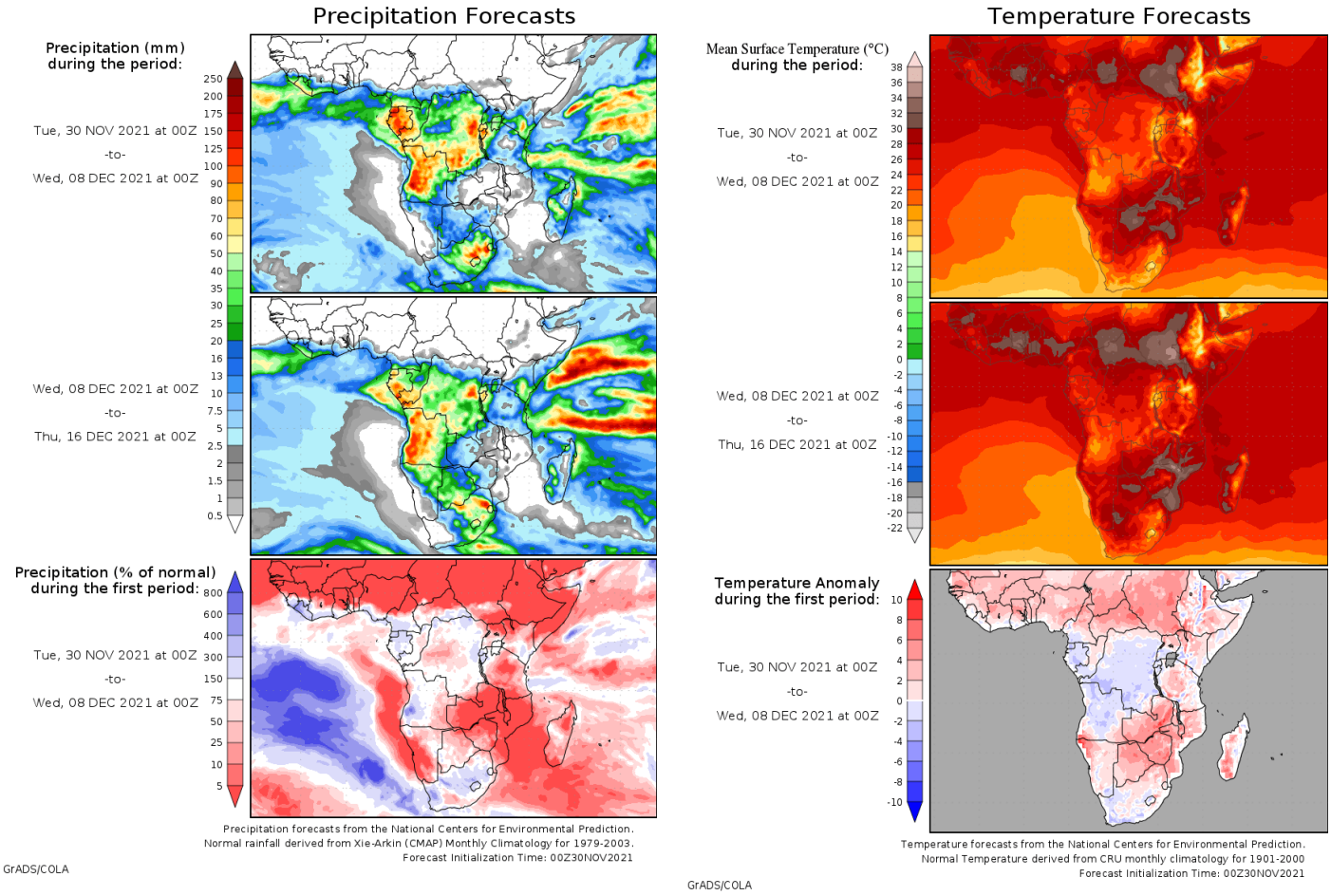


Sunny, mild and dry over the western to central parts and winter rainfall region.

Light showers Monday still over the Garden Route.

Partly cloudy and warm with Scattered thundershowers over the northeastern parts.

Medium term rainfall and temperature summary



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 one single weather model (GFS atmospheric model - *Center for Ocean-Land-Atmosphere Studies (COLA) and Institute of Global Environment and Society (IGES)* – http://Wxmaps.org) considered here in the beginning of a week-long (starting 30 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 model) of weather conditions during the coming week, the following may be deduced:

- Strong winds with a westerly component are possible over the southwestern to central parts on **Wednesday and Thursday (2nd, 3rd)** as well as by **Sunday (5th).** Where vegetation is dry, these may lead to the spread of wild fires.
- Strong southerly to southeasterly winds are possible in the southwest on from **Wednesday (1st)** to **Saturday (4th)**. Where vegetation is dry, these may lead to the spread of wild fires.
- It will be unseasonably stormy with widespread rain and showers / thundershowers along the West Coast (especially central to southern parts) and much of the winter rainfall region into the Garden route on **Saturday and Sunday (4th, 5th)**.
- Heavy falls are possible over the southern mountainous areas of the Western Cape by **Saturday/Sunday (4th, 5th).** There is large uncertainty to this forecast given the long lead time.
- While thundershowers during this time of the year in general have a greater tendency to become severe, conditions may be especially favorable for the development of severe storms over the following broader areas::
    - **Eastern to northern KZN (Tuesday, 30th)**.

- Northern KZN, southern Mpumalanga and Gauteng **(Saturday, 4th)**.
- Eastern to southern Northern Cape and Karoo **(Saturday, 4th)**.
- Central to northern Free State, central to eastern North West, Gauteng and southwestern Mpumalanga **(Sunday, 5th)**.

- It will be hot and humid over the Lowveld and northern Limpopo until **Sunday (5th)**.
- It will be hot and humid over northeastern KZN by **Tuesday (30th)**.

Seasonal forecast

Because seasonal forecast systems consider Sea Surface Temperatures (SSTs) as a major factor to predict coming conditions, it is worthwhile to take note of current SST anomalies. In general, current patterns reflect anomalies usually associated with higher rainfall than the norm over southern Africa – and lower rainfall over Equatorial East Africa. Most importantly, these include:

- Anomalously cool SSTs over the central equatorial parts of the Pacific Ocean. These are at La Niña thresholds and indicative of a weak La Niña in progress.
- The Subtropical Indian Ocean Dipole (SIOD) pattern is positive, (relatively warm water south of Madagascar, cooler than normal water further northeast). This positive phase of the SIOD suggests a further positive effect as there exists a positive association between rainfall over the South African summer rainfall region and the Subtropical Indian Ocean Dipole.

Given the current SST anomaly patterns across the Globe, seasonal forecasts from most international institutions favor La-Niña-like rainfall patterns over sub-Saharan Africa. These include anomalously wet conditions expected over the summer rainfall region of South Africa for most of the coming summer, with the temperature outlook calling for normal to below-normal maximum temperatures, associated with the expected wetter conditions and more extensive cloud cover than normal.

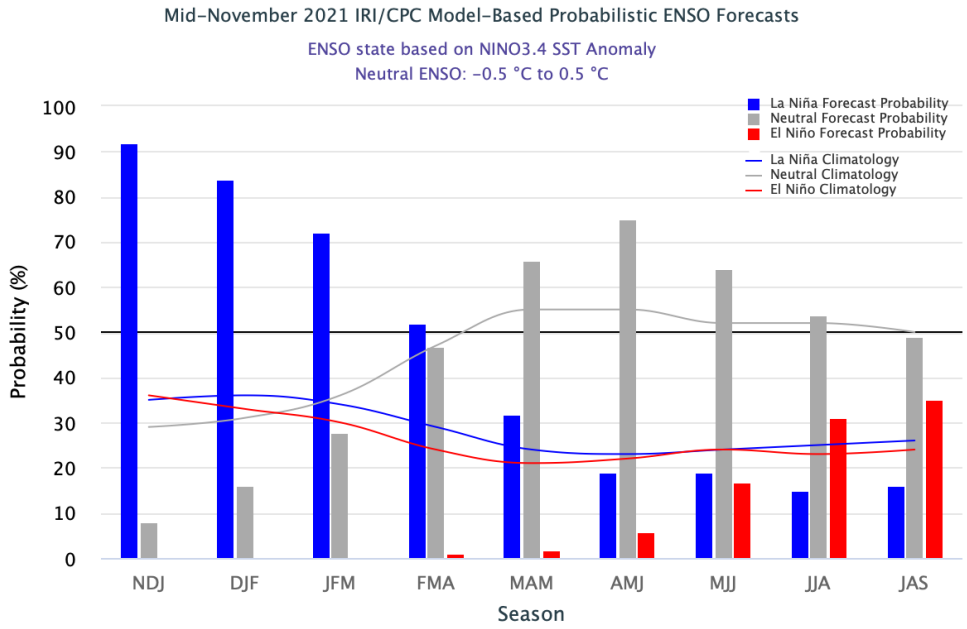
The Australian Bureau of Meteorology points out that La Niña conditions may strengthen.

(Updated 23 November): Key atmospheric and oceanic indicators of the El Niño–Southern Oscillation (ENSO) show an established La Niña. Tropical Pacific sea surface temperatures (SSTs) are close to La Niña thresholds, with models indicating further cooling is likely. Atmospheric indicators including the Southern Oscillation Index (SOI), trade wind strength, and equatorial cloudiness have demonstrated a response to this oceanic cooling and are typical of La Niña conditions. The latest 90-day SOI ending 21 November was +8.6.

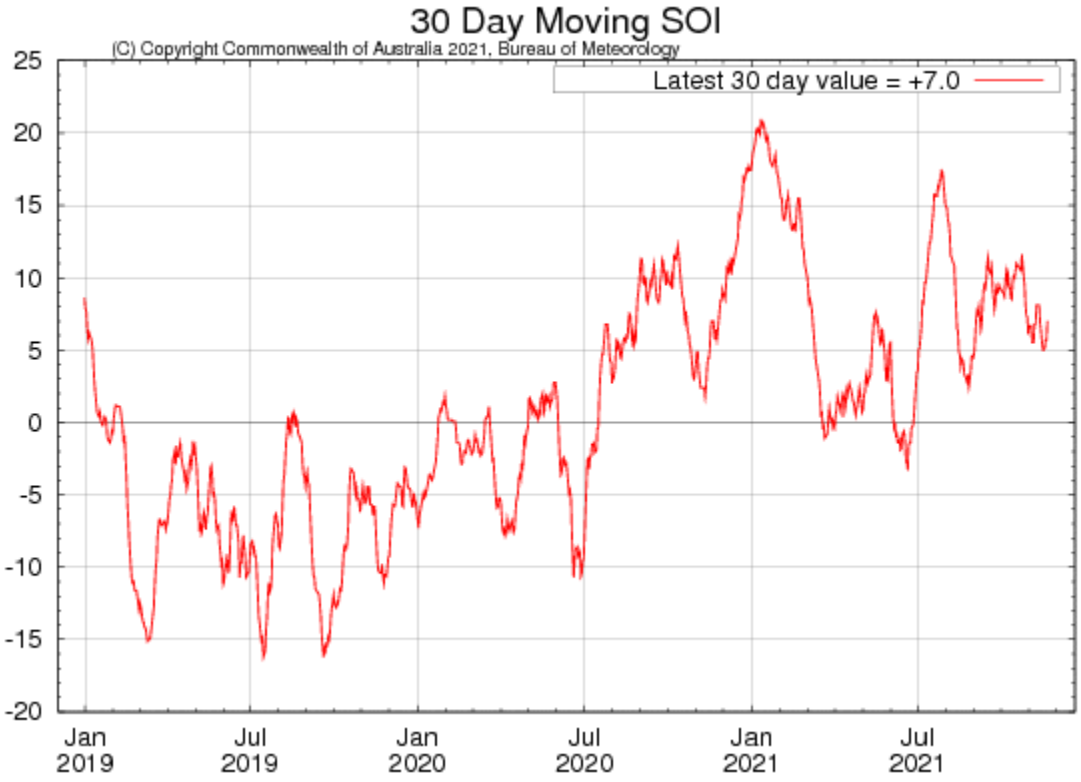
The current model outlooks suggest this La Niña will persist until the late southern hemisphere summer or early autumn 2022. All models surveyed by the Bureau indicate SSTs will meet NINO3.4 La Niña thresholds in December and January with a majority also predicting thresholds will be met in February 2022.....*Australian Bureau of Meteorology* - http://www.bom.gov.au

The International Research Institute for Climate and Society (IRI) also expects La Niña conditions to strengthen.

According to the IRI (Updated 19 November): In mid-November, Sea Surface Temperatures remain well below normal (-0.8C) in the central-eastern equatorial Pacific. The evolution of key oceanic and atmospheric variables is consistent with La Niña conditions, and therefore, a La Niña Advisory remained in place for Nov 2021. A large majority of the models predict SSTs to cool further or stay below-normal during boreal winter, and then return to ENSO-neutral levels during spring. Similar to the most-recent official CPC/IRI ENSO Outlook issued on November 11, this objective model-based ENSO outlook also anticipates a continuation of the La Niña event with high probability during Nov-Jan, persisting until Feb-Apr, with a return to ENSO-neutral conditions with high probabilities for rest of the forecast period (see bar-graph below)…. *International Research Institute for Climate and Society*- http://iri.columbia.edu/



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

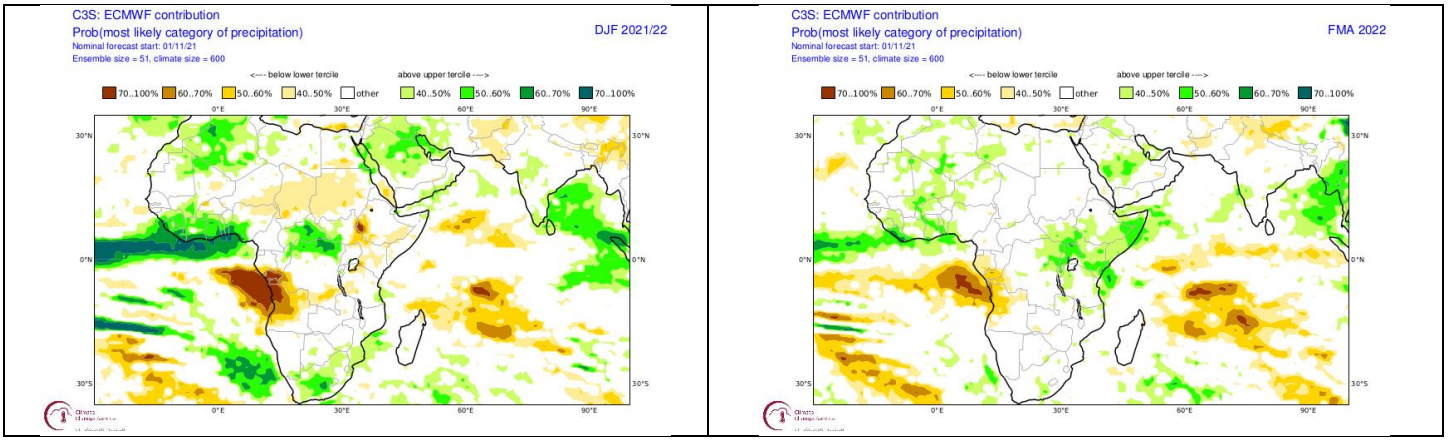


Australian Bureau of Meteorology - http://www.bom.gov.au

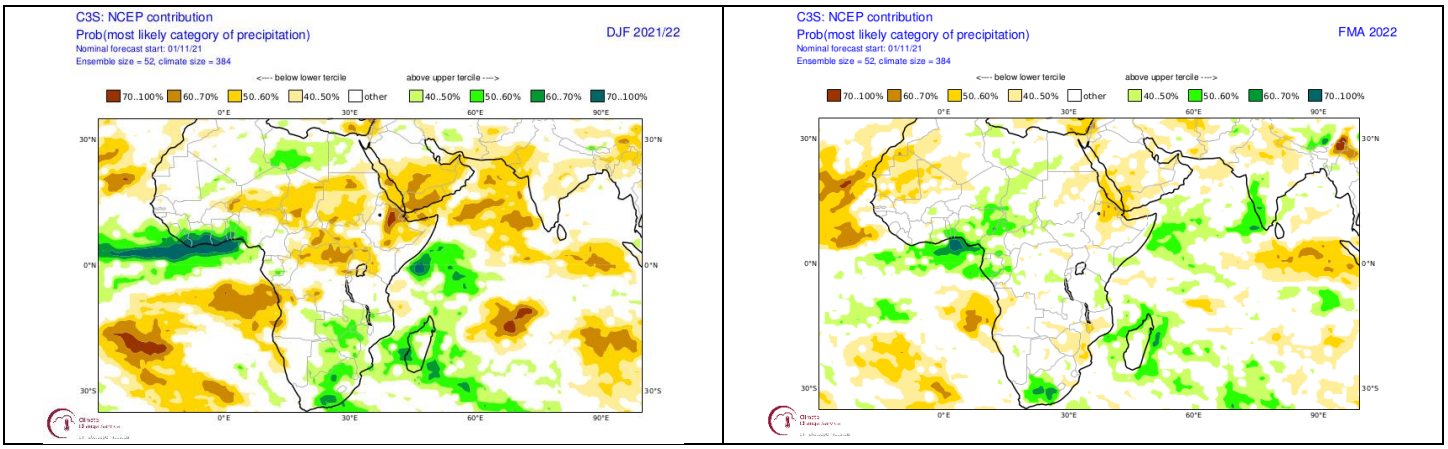
The Southern Oscillation Index remains in neutral territory (+1.0). This is indicative of atmospheric circulation patterns moving towards neutral conditions.

Seasonal forecasts issues by various international institutions

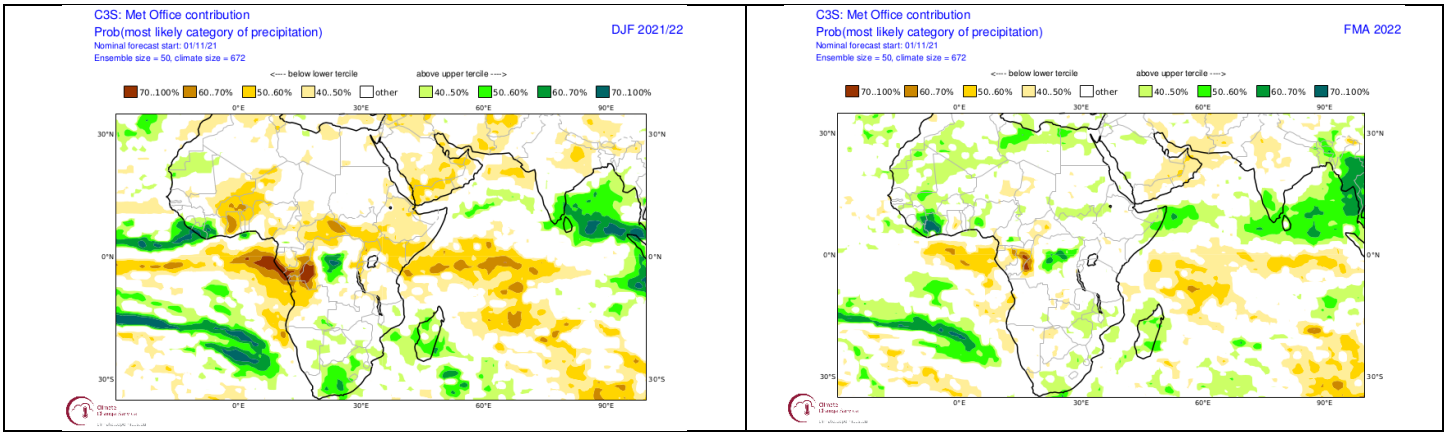
Seasonal forecasts by these institutions, as published by the COPERNICUS Programme (***https://climate.copernicus.eu/seasonal-forecasts***) for both mid-summer and late summer, reflect similar patterns with regards to rainfall for southern Africa as those by the IRI. The signal for relatively wet conditions over the summer rainfall region of South Africa is somewhat stronger for mid-summer than late summer (FMA). This is partly associated with the observed moderate La-Niña.



Probabilistic forecasts by the European Centre for Medium-Range Weather Forecasts for rainfall for mid-to-late-summer (December - February 2021/22; left) and late summer (February-April 2022; right) (Forecasts issued in 2021-11).



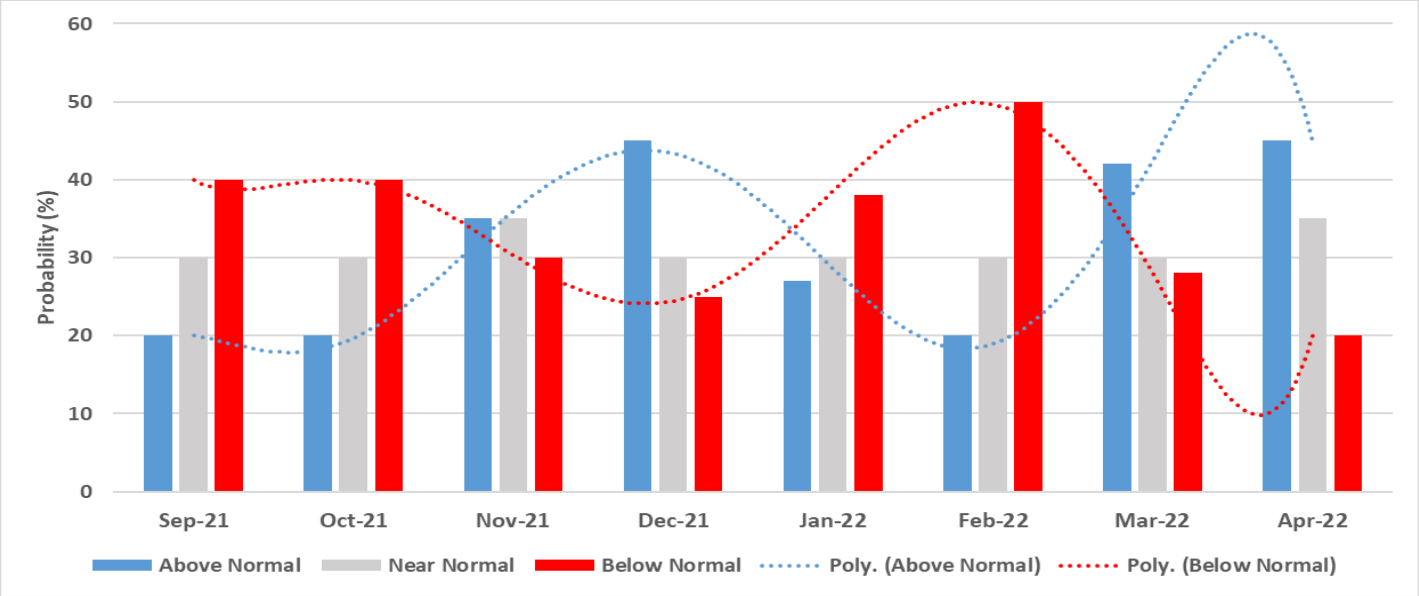
Same as above, but forecasts issued by the National Centres for Environmental Prediction.



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

CUMULUS seasonal outlook, based on decadal variability

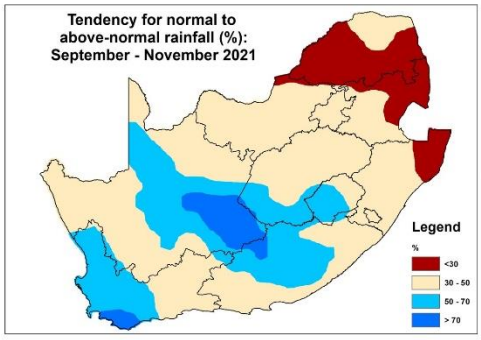
This outlook is based on the typical observed rainfall patterns over the ***north-eastern half*** of the country (including most of the summer grain production region), as associated with the cyclic variability of the global climate system. Summers that are similar to 2021/22 more often experience a seasonal rainfall curve that compares to normal conditions as indicated in the bar graph below, with wetter conditions focussing on December and March while drier than normal conditions focus on October and February:

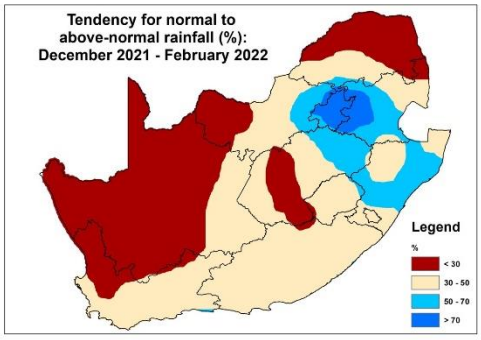


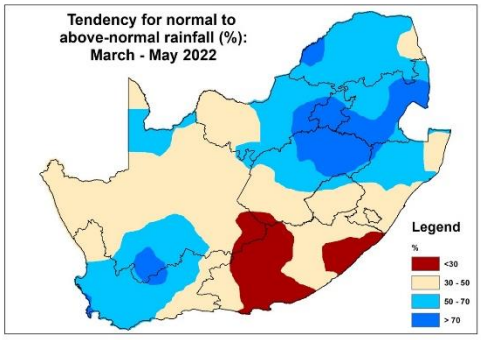
Probabilistic forecast for rainfall over the summer rainfall region, based on the natural cyclic nature of the climate system as seen in decadal variability, per month for the period September 2021 – April 2022 (Forecast issued in 2021-09).

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

- **September – 20 October:** Relatively dry conditions over the north-eastern half of the summer rainfall region
- **20 October – 20 November:** Near-normal rainfall over the north-eastern half of the summer rainfall region
- **20 November – 15 January:** Near-normal to above-normal rainfall over the north-eastern half of the summer rainfall region
- **15 January – late February:** Below-normal rainfall over the north-eastern half of the summer rainfall region
- **March - April:** Above-normal rainfall over the north-eastern half of the summer rainfall region



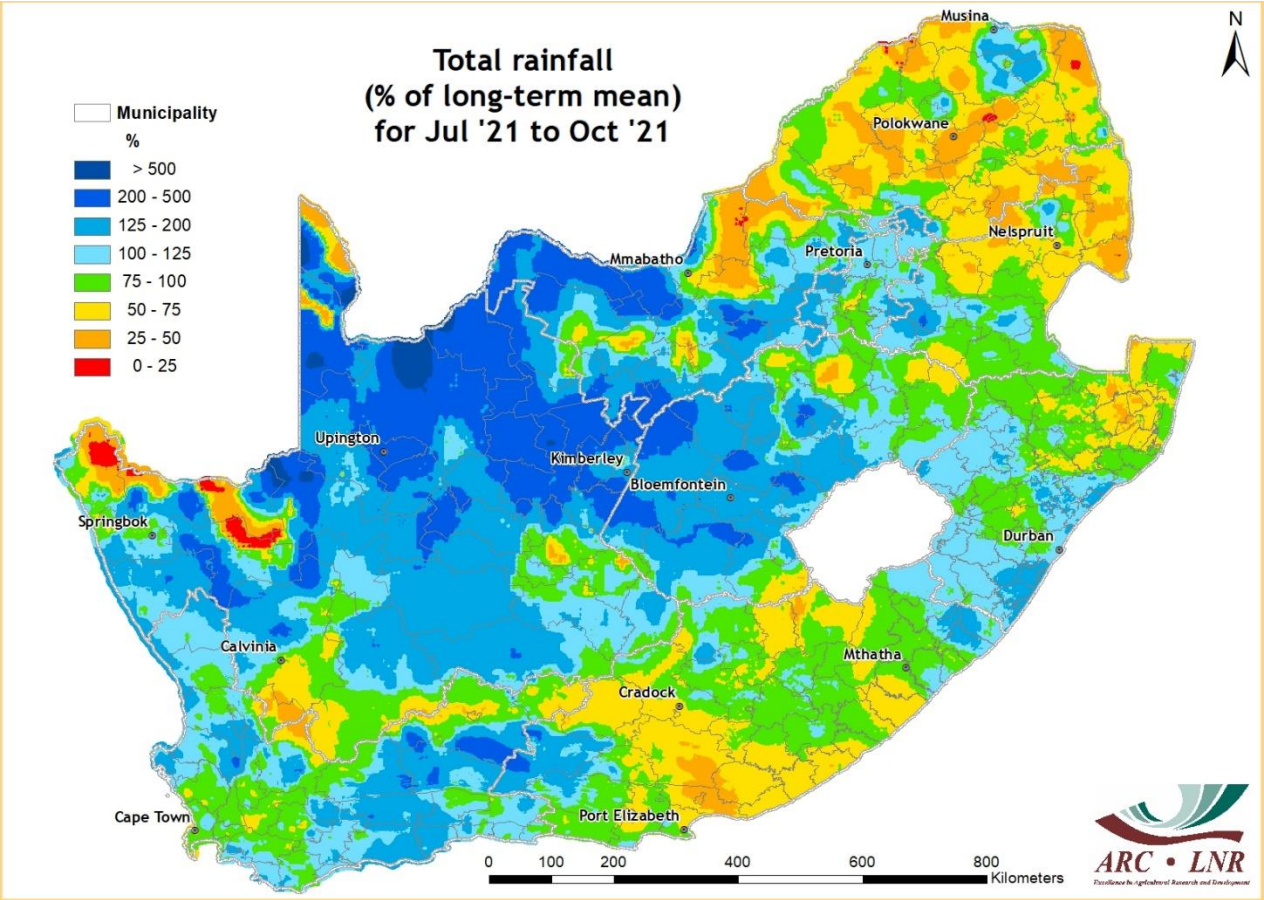




Typical patterns during summers analogous to 2021/22: Early summers during similar years tend to be relatively wet over the western parts of the country while drier than normal over the north-eastern parts of the country (map on the left). During December – February, relatively dry conditions tend to occur over the western and northern parts while rainfall tends to be above normal over parts of the eastern interior and into KZN (map in the centre). By late summer (March – May – map on the right), similar years tend to see above-normal rainfall over large parts of the summer rainfall region.

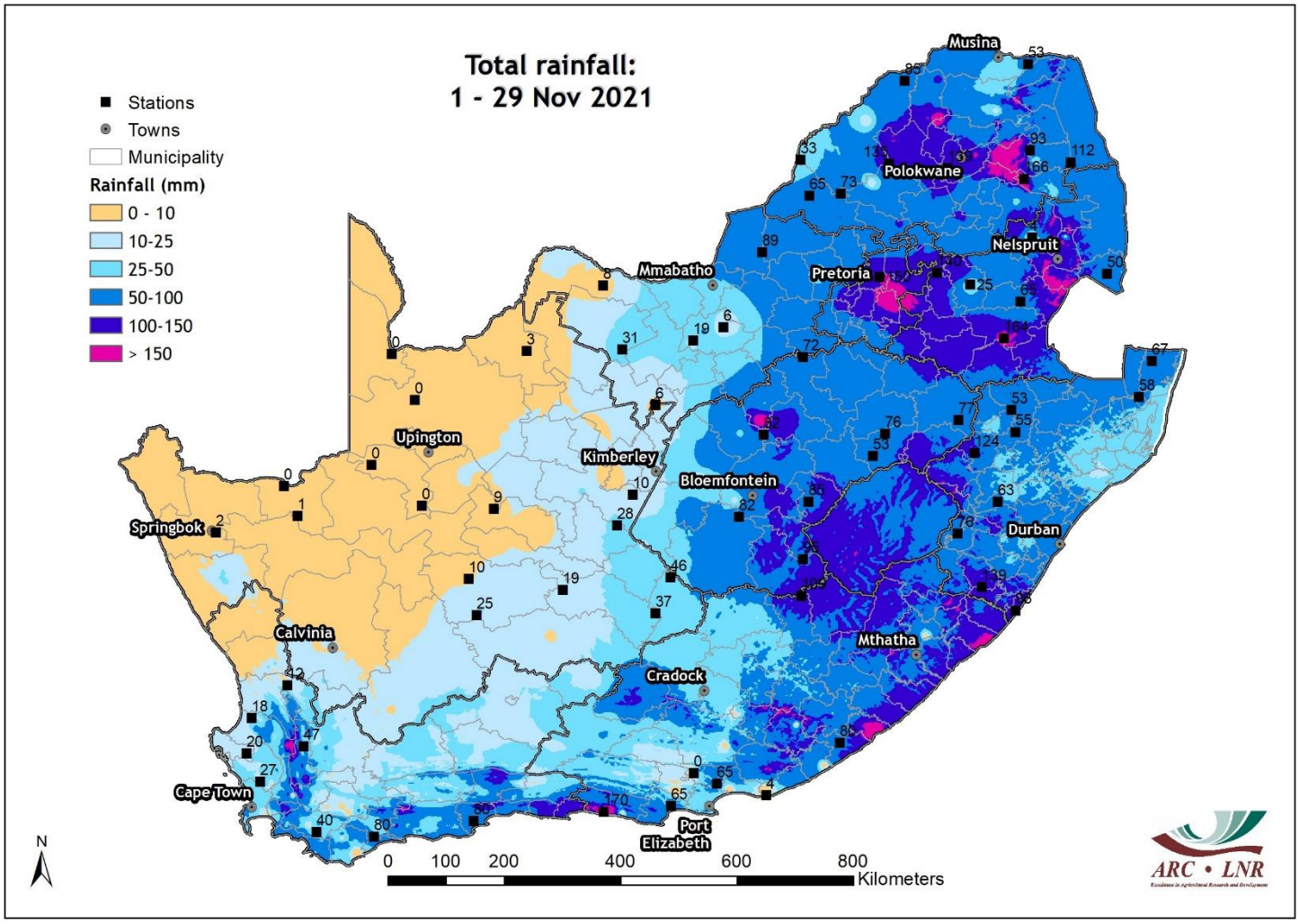
Observed conditions

Rainfall (% of long-term mean): July - October 2021



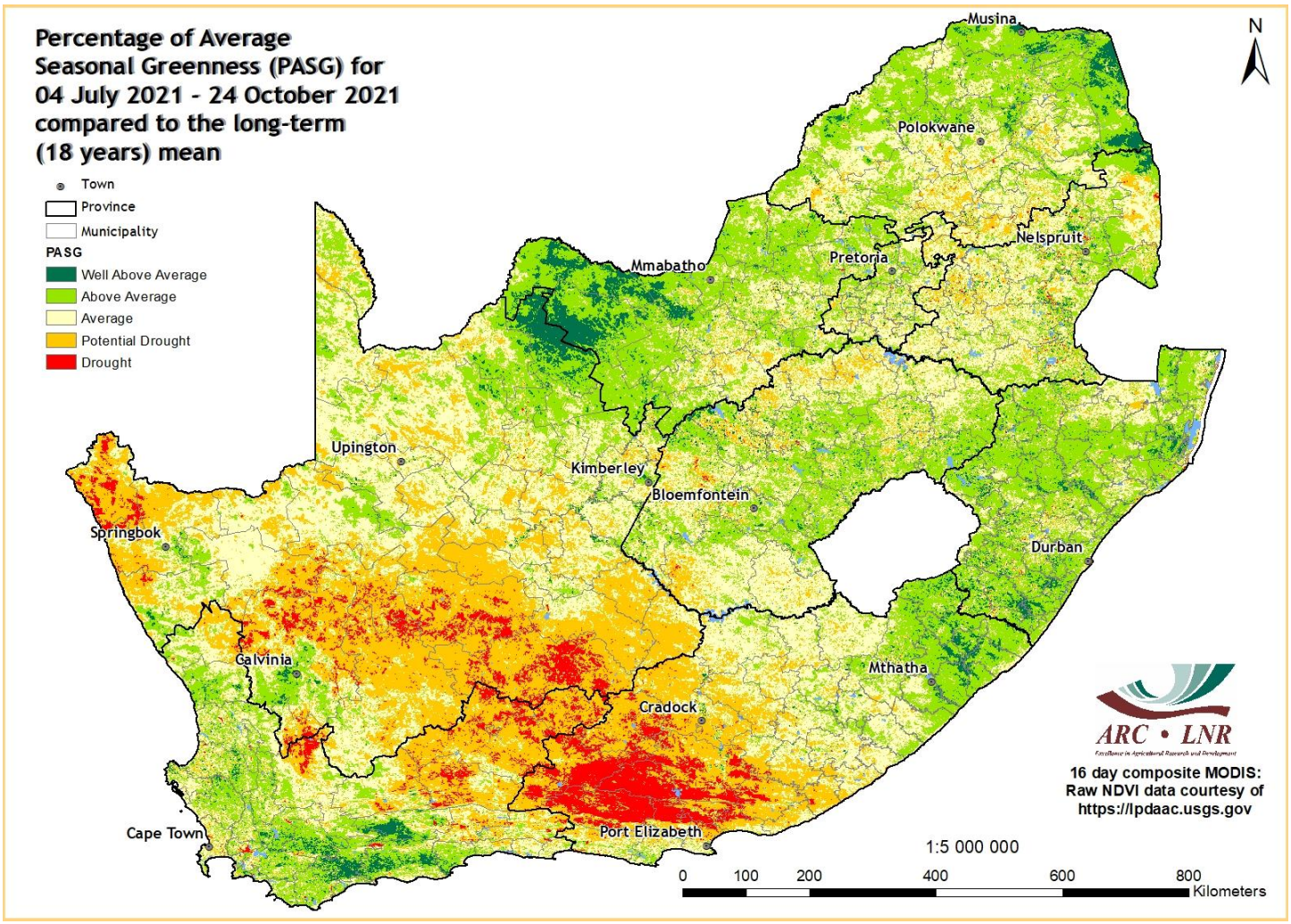
Most of the central to western parts experienced a strong start to the 2021/22 summer rainy season while the northeastern parts were relatively dry, compared to the long-term average.

Rainfall (mm): 1 – 29 November 2021



Scattered thundershowers and rain supported relatively high totals over the northeastern to eastern parts during November until the 29th.

Percentage of Average Seasonal Greenness: July – 24 October 2021



Cumulative vegetation activity since July is above the long-term mean over most of the northeastern and central parts of the country as well as over the winter rainfall region. The drought over parts of the northern Cape and Eastern Cape is clearly visible too.

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:
CSIR NRE (National Resources and the Environment)
"CSIR NRE produces forecasts on an experimental basis, doesn't guarantee the accuracy of the daily forecasts and cannot be held accountable for the results of decisions taken based on the forecasts"

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.