CUMULUS

7 April 2022

by J Malherbe, R Kuschke

Contents

Agri Seker
'n Seker Toekoms

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Summary

Cool, wet conditions remain in place

More cool, cloudy conditions with rain over the summer rainfall region are expected during the next few days. As is typical with rainy conditions during autumn over the interior, temperatures will on average be well below normal, signaling a repeat of the heat unit deficits which characterized the mid-summer period. Furthermore, where thundershowers occur, these may again have a tendency to produce hail due to the lower atmospheric temperatures and expected instability responsible for the rainfall during the next few days. However, at this stage, it seems that a large proportion of the expected rain over the summer rainfall region will be in the form of general rain or showers.

Widespread rain and showers or thundershowers are expected over the central to eastern parts from Friday to Monday, associated with an upper-air cut-off low. Certain areas may receive cumulative totals in excess of 50 mm of rain during the next few days, especially over the central to eastern and southern North West, Gauteng, southern and western Mpumalanga and northern to western Free State, central to eastern parts of the Northern Cape as well as the KZN coast. Following earlier wet weather, these may lead to water-logged conditions and possibly flash floods should heavy downpours be associated with thundershowers.

Given the large amount of moisture and cloud cover, the chances for frost will be negligible. This follows a few days with relatively low minimum temperatures over the southern half of the country, associated with a cold front that moved though and reached much of the central to western and southern parts. Frost occurrence was limited however to the southern high-lying areas in the south of the Northern Cape and northern parts of the Eastern Cape, with only very isolated, light instances further north.

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

- **General:**
  - Temperatures will on average be below normal over the central and eastern parts, but above normal in the west and Limpopo River Valley.
  - Most of the country should receive normal to above-normal rainfall except for the western to northwestern interior and the Limpopo River Valley where rainfall should be below normal.
  - The western to northern parts of the winter rainfall region is expected to be dry.
  - Showers are expected at times along the Garden Route.
  - Widespread rain and thundershowers will occur over the central to eastern parts from Friday until Monday.
  - Much of the interior will be cool during the cloudy, rainy conditions from Friday afternoon to Monday.
  - There are no indications of another cold front to invade the southern to western parts during the next few days.
  - Strong southeasterlies are expected in the southwest until Monday.
  - Temperatures over the summer-grain production area are expected to be in the below-normal category for this time of the year, related initially to the cold front over the interior and later with cool, cloudy and rainy conditions:
    - Maximum temperatures over the eastern maize-production areas will be in the order of 11 – 24°C, with lowest temperatures expected during the weekend when it will be overcast for the most part. Minimums will be in the order of 6 – 11°C.
    - Maximum temperatures over the western maize-production region will range between 14 and 25°C, with the higher temperatures earlier in the period. Minimums will be in the order of 9 – 14°C.

Overview of expected conditions over the main agricultural production areas

The major, dominating feature during the next few days will be a cut-off low pressure system that should develop over the western parts of the country by Friday, slowly moving eastwards to exit to the east early next week. The surface low associated with the system will be responsible for strong winds over large parts of the interior, especially the central parts including westwards into the central parts of the Northern Cape. A strong high-pressure system to the south will feed moisture into the interior as it moves eastwards during the weekend. The combination of the low over the interior and high to the south and east will result in cloudy to overcast conditions with widespread thundershowers or rain over most of the interior. As the low exits to the east, it will clear by next week, with drier and sunny conditions by Wednesday next week over most areas.

Maize production region: The cloudy, wet and cool conditions from Friday to Monday will dominate weather events during the next few days. It will clear from the west by Tuesday or Wednesday. Given the cloudy to overcast and rainy conditions, temperatures will on average be below normal for this time of the year:

- Maximum temperatures over the eastern maize-production areas will be in the order of 11 – 24°C, with lowest temperatures expected during the weekend when it will be overcast for the most part. Minimums will be in the order of 6 – 11°C.
- Maximum temperatures over the western maize-production region will range between 14 and 25°C, with the higher temperatures earlier in the period. Minimums will be in the order of 9 – 14°C.

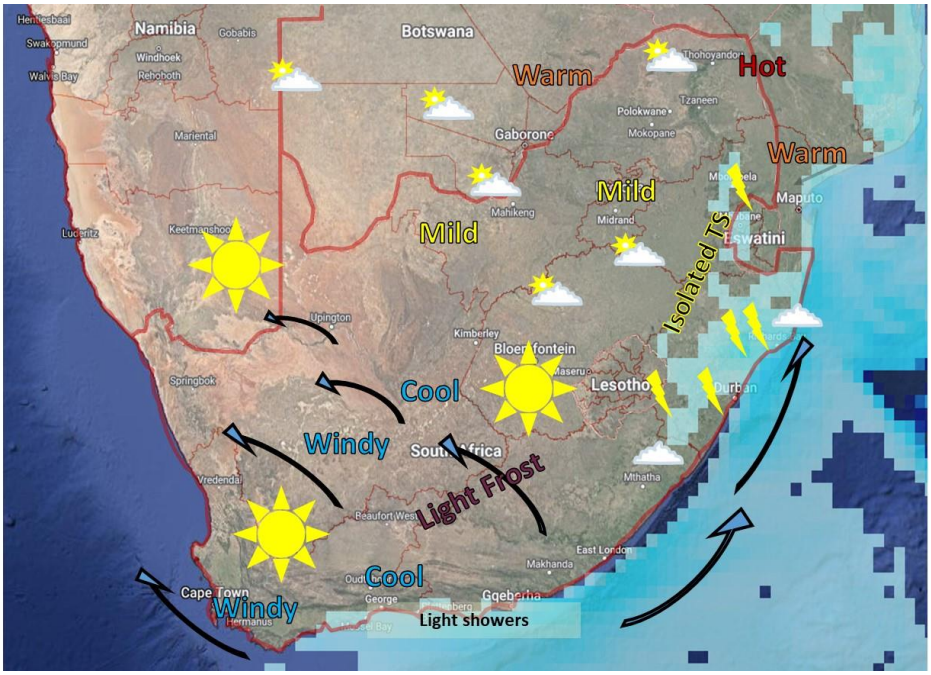
- **Thursday (7th)**: Cool in the morning and evening, otherwise sunny and mild.
- **Friday (8th)**: Partly cloudy and mild, becoming cloudy and windy with widespread thundershowers over the central to northern and eastern areas.
- **Saturday to Monday (9th to 11th)**: Cloudy to overcast and mild to cool with rain and thundershowers. It will be windy over the central to western parts.
- **Tuesday (12th)**: Partly cloudy and mild with isolated to scattered thundershowers.
- **Wednesday (13th)**: Partly cloudy and mild with isolated showers or thundershowers, clearing from the west.

Cape Wine Lands and Ruens: The West Coast, Swartland and western parts of the Karoo should be sunny and warm for the entire period. Strong southeasterly to easterly winds will occur in the south and southwest from Thursday to Monday. Cooler, cloudy conditions with light showers are possible initially until Friday over the Garden Route, associated with the southeasterly to easterly winds. There is also a possibility of a re-occurrence of light showers over the Garden Route by Wednesday next week, when stronger south-easterlies may again commence in the southwest. The warmer weather over the western to northern parts of the region is expected to expand to the rest of the region by next week.

Daily summary of expected conditions

(GFS forecasted rainfall for indicated periods shown in shades of blue, with darkest shading > 50mm)

Thursday, 7 April



Sunny to partly cloudy and mostly dry over the interior.

Light showers along the Garden Route.

Isolated showers or thundershowers over the central to northern parts of KZN into eastern Mpumalanga.

It will be mild to warm over the northern parts of the country.

It will be mild over the central parts of the country.

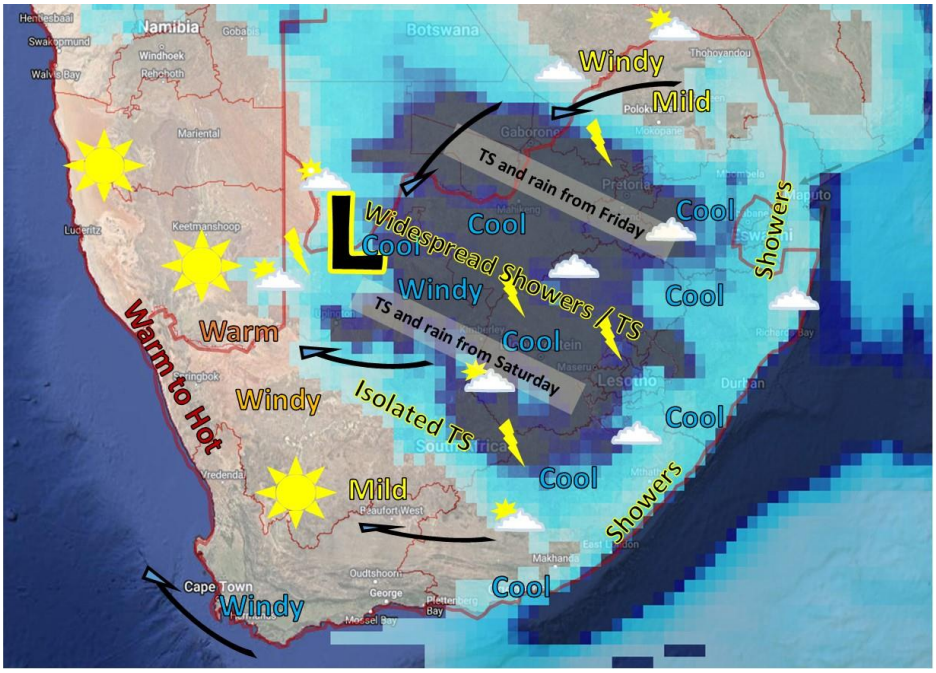
It will be cool over the southern and southwestern parts, with light frost possible over the southern high-lying areas.

It will be hot over the northern Lowveld.

It will be windy over the southern half of the country.

Strong southeasterlies in the southwest.

Friday to Monday, 8 - 11 April



Cloudy to overcast and cool over the central to eastern parts, with widespread rain and thundershowers.

It will be cloudy to overcast and cool with rain and showers along the eastern seaboard.

It will be partly cloudy with isolated showers or thundershowers in the far northeast.

It should be dry over the western to southern parts.

It will be warm to hot over the far western parts into the northern parts of the winter rainfall region.

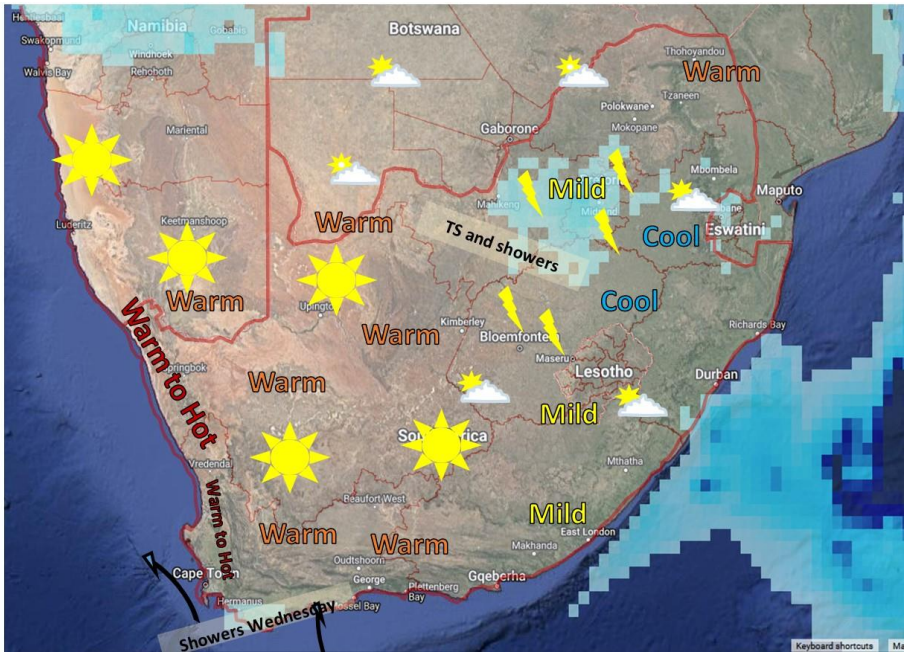
It will be mild to warm over the western interior.

It will be cool over the central to eastern and southeastern parts.

It will be windy over most of the interior, especially the central to southern parts as well as Limpopo.

Strong south-easterlies in the southwest.

Tuesday to Wednesday 12 – 13 April



Partly cloudy to cloudy and mild over the central parts with isolated to scattered showers and thundershowers, clearing from the west.

Light showers possible along the Garden Route by Wednesday.

Little to no rain expected over the rest of the country.

It will be warm in the Lowveld.

It will be warm over the western to central parts.

It will become warm over the southern parts.

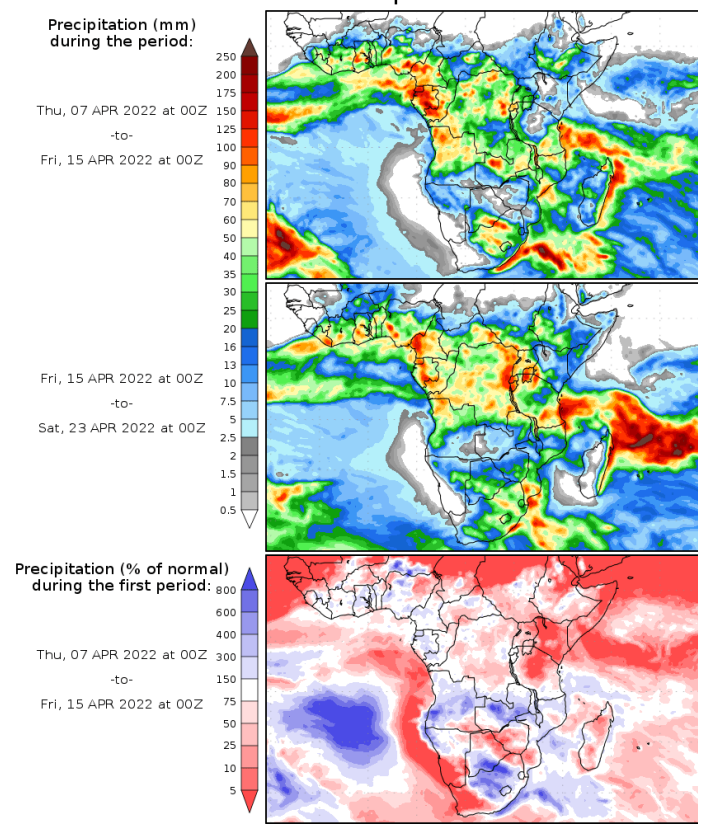
It will be warm to hot along the West Coast and Swartland.

It will be cool over the Eastern Highveld.

Strong south-earlies returning to the southwest by Wednesday.

Medium term rainfall and temperature summary

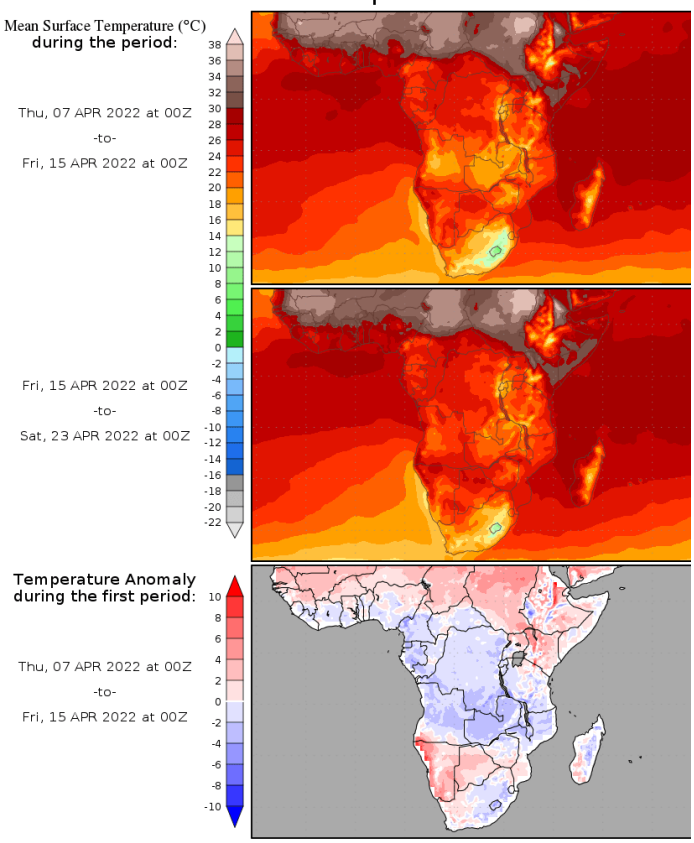
Precipitation Forecasts



Precipitation forecasts from the National Centers for Environmental Prediction.
Normal rainfall derived from Xie-Arkin (CMAP) Monthly Climatology for 1979-2003.
Forecast Initialization Time: 00Z07APR2022

GrADS/COLA

Temperature Forecasts



Temperature forecasts from the National Centers for Environmental Prediction.
Normal Temperature derived from CRU monthly climatology for 1901-2000
Forecast Initialization Time: 00Z07APR2022

GrADS/COLA

Possible extreme conditions - relevant to agriculture

The South African Weather Service issues warnings for any severe weather that may develop, based on much more information (and in near-real time) than the output of 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 7 April) period. It is therefore advised to keep track of warnings that may be issued by the SAWS (www.weathersa.co.za) as the week progresses.

According to current model projections (GFS model) of weather conditions during the coming week, the following may be deduced:

- Cool to cold, windy conditions over the high-lying southern parts **Thursday (7th)** may adversely affect small stock.
- It will be hot:
  - Over the northern Lowveld on **Thursday (7th)**.
  - Over the West Coast and adjacent interior **Saturday (8th) to Tuesday (12th)**.
  - Over the Swartland **Tuesday (12th) and Wednesday (13th)**.

- Significant daily rainfall totals may lead to waterlogged conditions and possibly flash flooding in isolated areas. Rainfall totals exceeding 50 mm, may occur:
  - Over the central to southern and eastern North West and Gauteng **Friday (8th) to Sunday (10th)**.
  - Central to eastern Northern Cape into the western to northwestern parts of the Free State **Saturday (9th)** and **Sunday (10th)**.
  - Along the coast of KZN **Monday (11th)**.

- Some thundershowers may become severe:
  - Central to northern and eastern North West, Gauteng and western Mpumalanga as well as southern Limpopo **Friday (8th)**.
  - Central to eastern Northern Cape into western Free State **Saturday (9th)**.
- Strong south-easterlies over the southwestern parts from **Thursday (7th) to Monday (11th)** may be conducive to the spread of wild fires where vegetation is dry.
- Cloudy to overcast, cool and possibly waterlogged conditions may adversely affect agricultural activities over the central to eastern parts from **Friday (8th) to Monday (11th)**.

Seasonal forecast

Recently, forecasts have shifted from an expectation of a return to neutral conditions, to a longer continuation of La-Niña into the SH winter. Seasonal forecasts for autumn over South Africa once again favor wetter conditions over the summer rainfall region after trending somewhat drier for February.

The Australian Bureau of Meteorology points out that the La Niña retreat stalls as trade winds strengthen

(Updated 29 March): The 2021–22 La Niña event has weakened slightly in the tropical Pacific over the past fortnight. Climate outlooks indicate a return to neutral El Niño–Southern Oscillation (ENSO) levels—neither La Niña nor El Niño—late in the southern hemisphere autumn. Even as La Niña weakens, it may continue to influence global weather and climate.

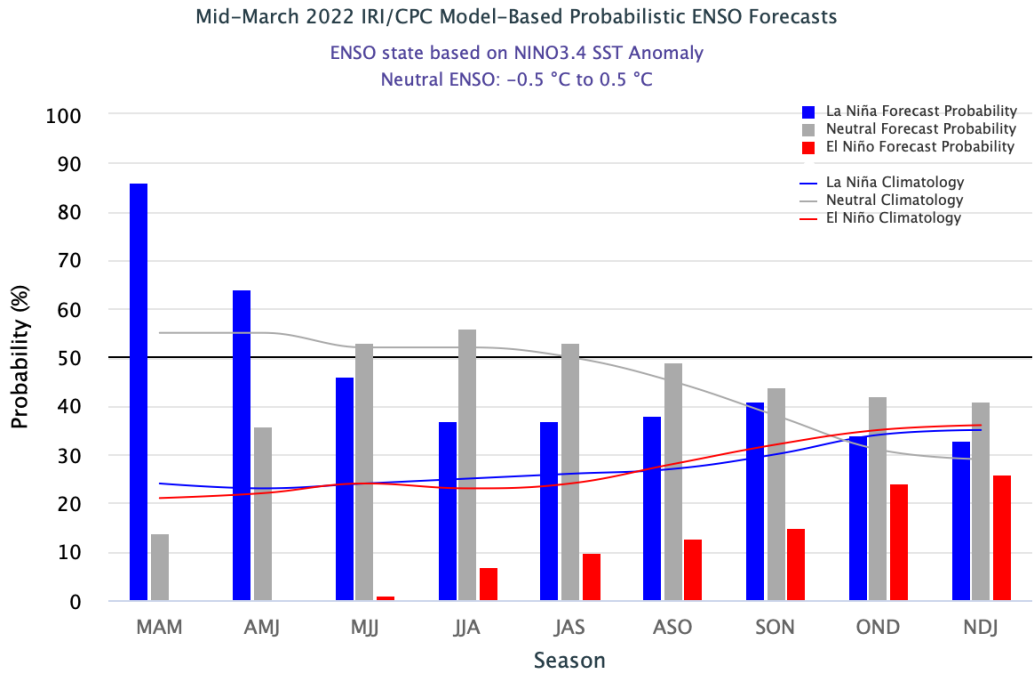
Atmospheric and oceanic indicators of ENSO persist at La Niña levels. Sea surface temperatures remain cooler than average along the equator, but have warmed slightly in the east as previously strong trade winds have eased in strength. Other indicators remain at La Niña levels, with decreased cloudiness persisting along the Date Line and a positive Southern Oscillation Index (SOI).

The Southern Annular Mode (SAM) index has recently been positive. It is forecast to generally remain neutral over the coming three weeks……..*Australian Bureau of Meteorology* - http://www.bom.gov.au

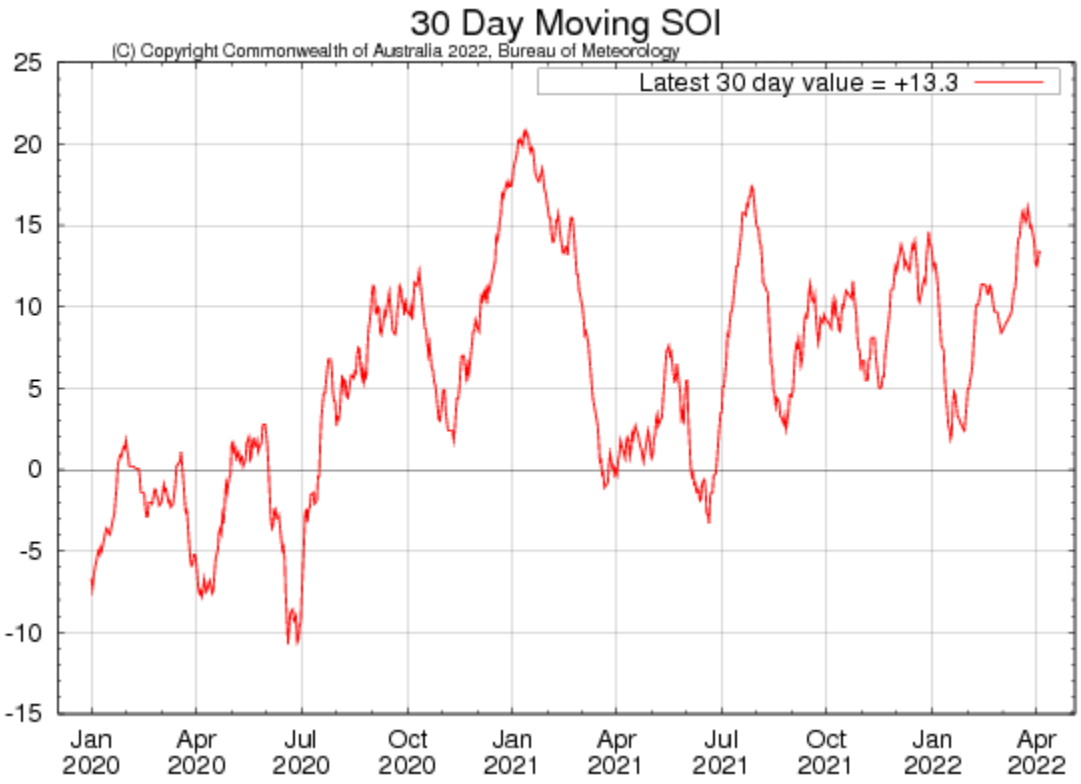
The International Research Institute for Climate and Society (IRI) also expects La Niña conditions to persist until autumn

According to the IRI (Updated 10 March): Below-average sea surface temperatures (SSTs) strengthened during February 2022 across the central and east-central tropical Pacific, with negative anomalies stretching from the central to eastern equatorial Pacific Ocean. In particular, the weekly Niño-3.4 index decreased from -0.6ºC at the beginning of February to -1.1ºC in the last week, while the other Niño SST regions were between -0.6ºC and -1.3ºC in the last week. Subsurface temperatures anomalies (averaged between 180º-100ºW and 0-300m depth) were near zero, as the recent warming associated with the downwelling Kelvin wave has attenuated. Below-average temperatures have expanded near the surface and at depth near ~150ºW. Tropical atmospheric anomalies strengthened during the past month, with the extension of enhanced low-level easterly winds across the equatorial Pacific and upper-level westerly wind anomalies remaining over the east-central and eastern Pacific Ocean. Suppressed convection strengthened around the Date Line, while convection was enhanced near Indonesia. Overall, the coupled ocean-atmosphere system reflected the continuation of La Niña.

The IRI/CPC plume average for the Niño-3.4 SST index continues to forecast a transition to ENSO-neutral during the Northern Hemisphere spring. This month, the forecaster consensus favors a slower decay of La Niña due to the recent renewal of ocean-atmosphere coupling, which contributed to cooler near-term forecasts from several state-of-the-art climate models. For the summer and beyond, there is large uncertainty in the state of ENSO; however forecasters lean toward negative Niño-3.4 index values even if the index does not reach La Niña thresholds. In summary, La Niña is favored to continue into the Northern Hemisphere summer (53% chance during June-August 2022), with a 40-50% chance of La Niña or ENSO-neutral thereafter….*International Research Institute for Climate and Society*- http://iri.columbia.edu/



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

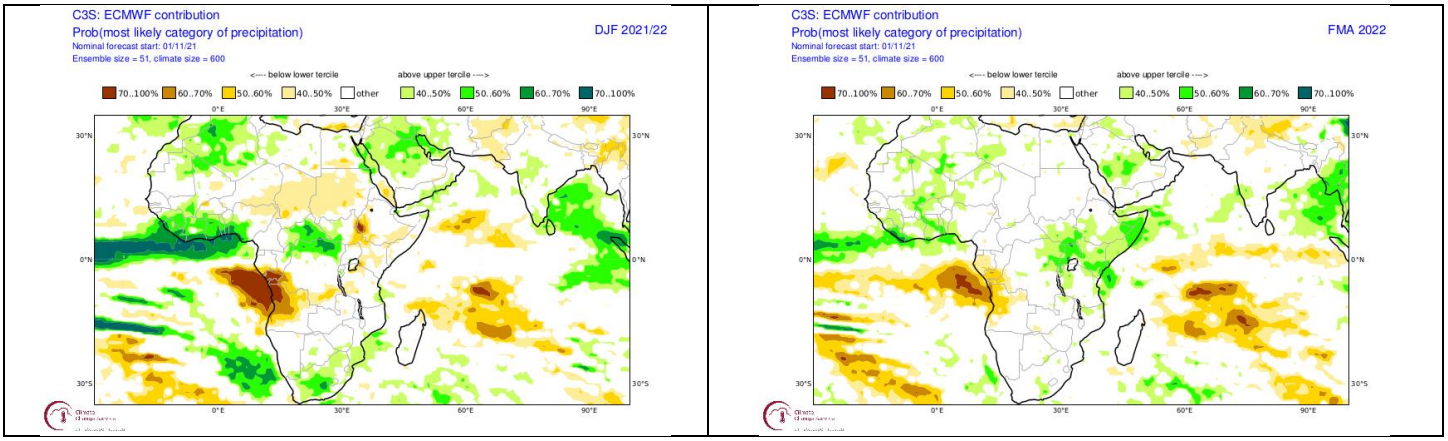


Australian Bureau of Meteorology - http://www.bom.gov.au

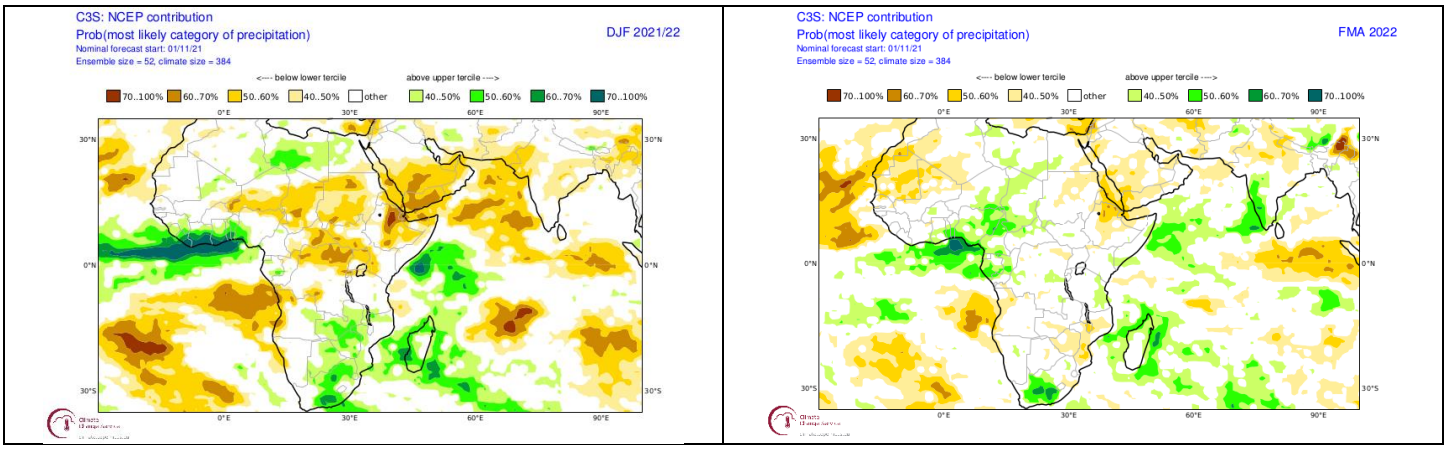
The Southern Oscillation Index is in positive territory (+13.3). This is indicative of atmospheric circulation patterns reflecting La Niña conditions.

Seasonal forecasts issued by various international institutions

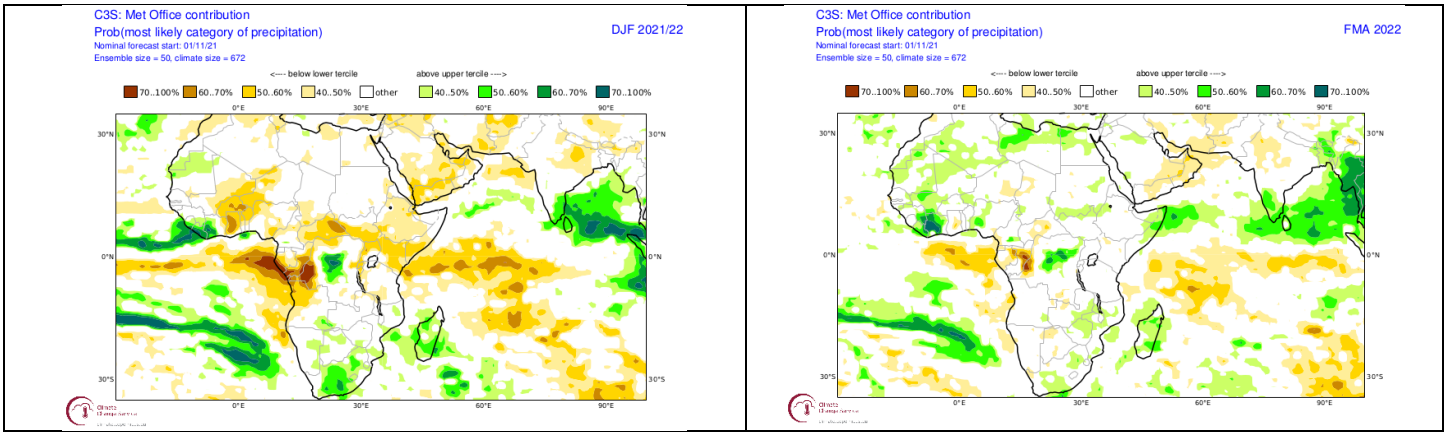
Seasonal forecasts by these institutions, as published by the COPERNICUS Programme (***https://climate.copernicus.eu/seasonal-forecasts***) for both mid-summer and late summer, reflect similar patterns with regards to rainfall for southern Africa as those by the IRI. The signal for relatively wet conditions 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).



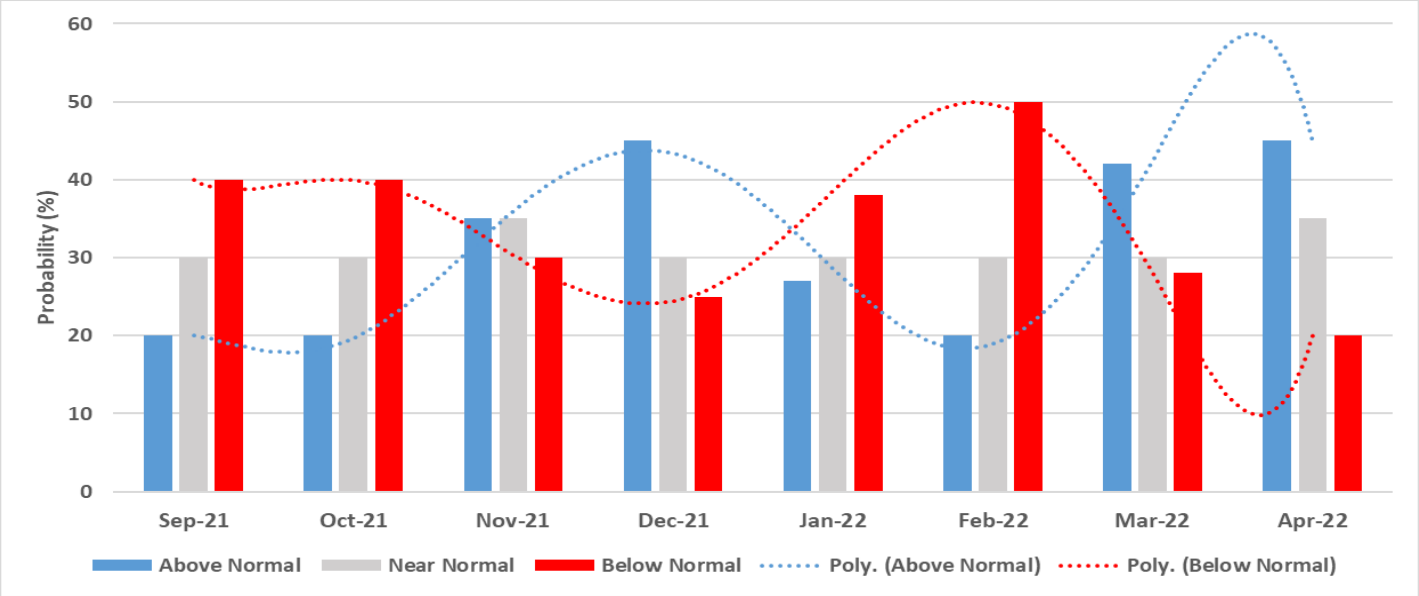
Same as above, but forecasts issued by the National Centres for Environmental Prediction.



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

CUMULUS seasonal outlook, based on decadal variability

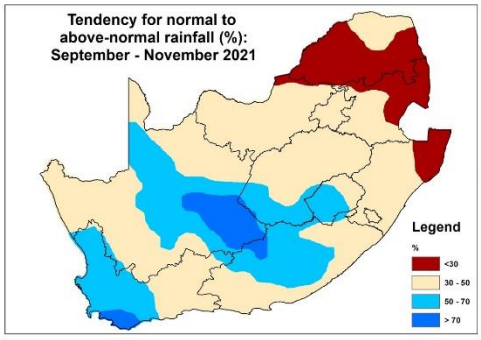
This outlook is based on the typical observed rainfall patterns over the ***north-eastern half*** of the country (including most of the summer grain production region), as associated with the cyclic variability of the global climate system. Summers that are similar to 2021/22 more often experience a 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:

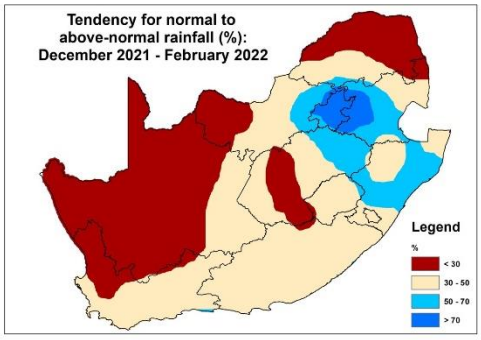


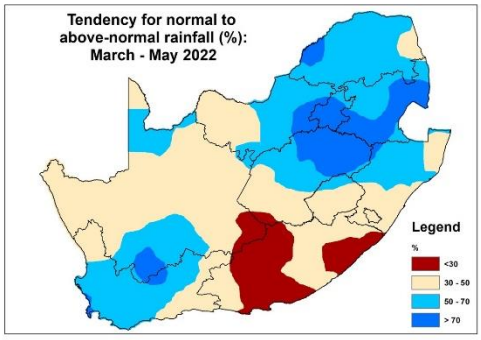
Probabilistic forecast for rainfall over the summer rainfall region, based on the natural cyclic nature of the climate system as seen in decadal variability, per month for the period September 2021 – April 2022 (Forecast issued in 2021-09).

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



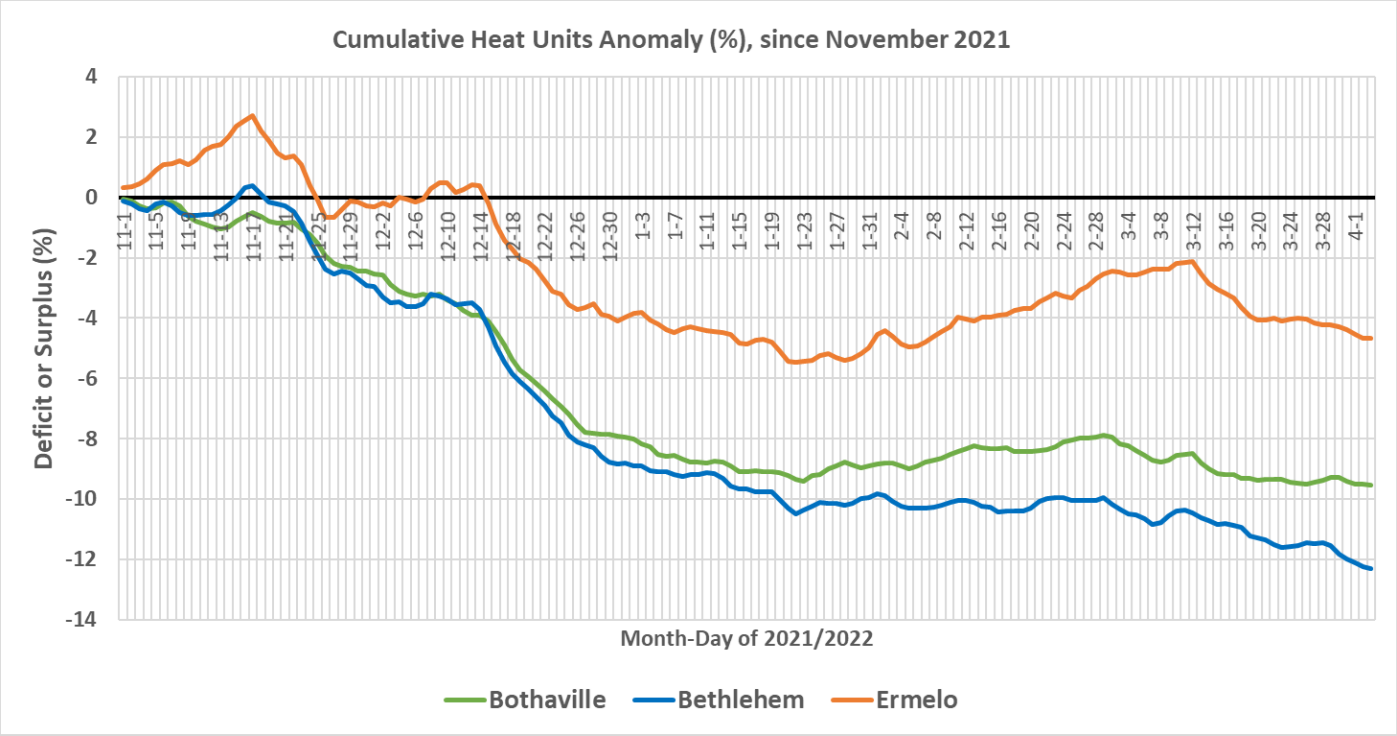




Typical patterns during summers analogous to 2021/22: Early summers during similar years tend to be relatively wet over the western parts of the country while drier than normal over the north-eastern parts of the country (map on the left). During December – February, relatively dry conditions tend to 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

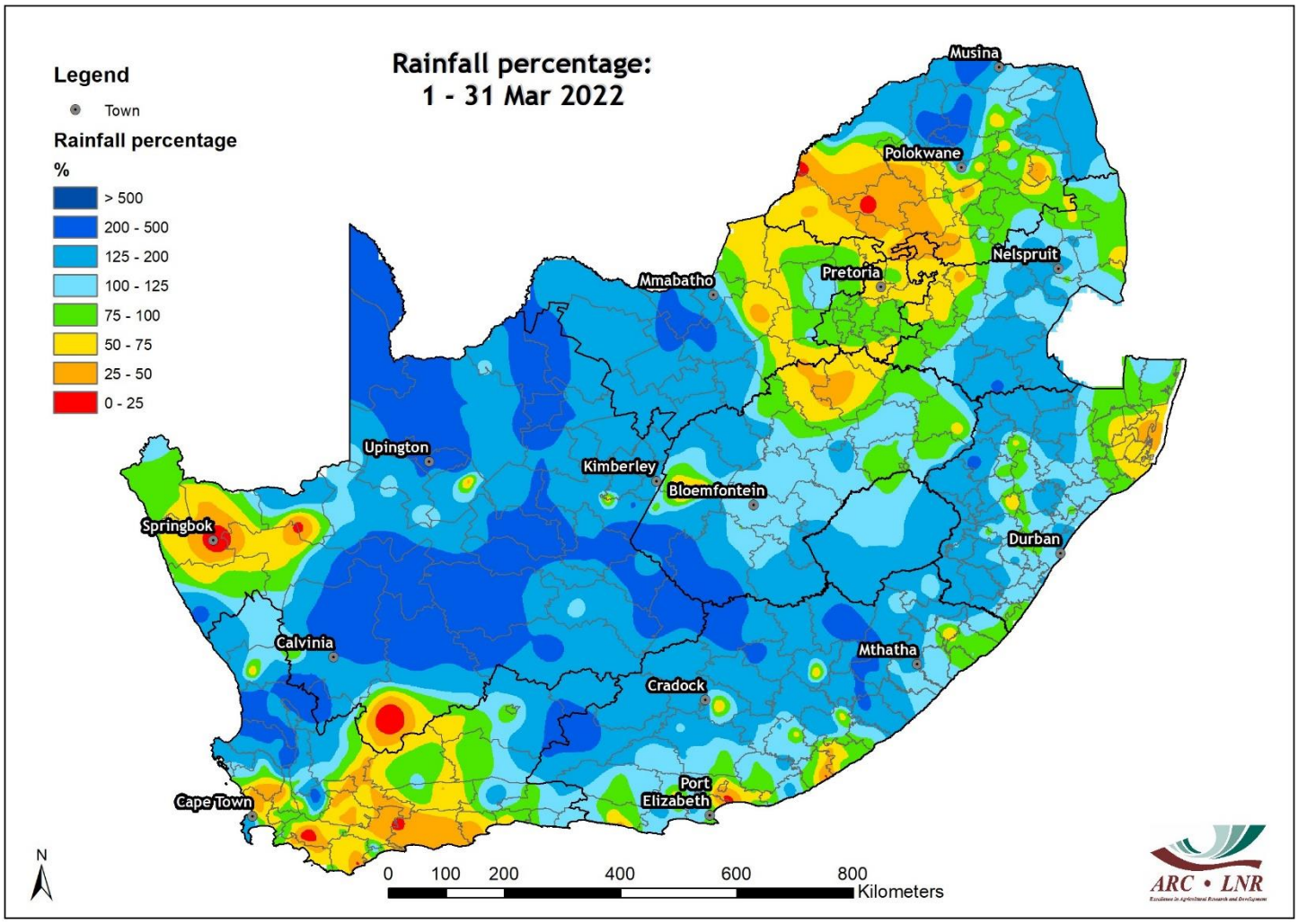
Heat Units: 1 November 2021 – 5 April 2022



Heat units have been less than the 2014 – 2020 norm the November – April period over the summer-grain production region due to long cloudy and rainy spells especially during December and early January. Given somewhat drier and warmer conditions during mid-January to February, deficits have decreased slightly, especially towards the north-eastern parts of the maize-production region. Since early March, cooler, wetter spells have resulted in a further cumulative deficit over the entire production area.

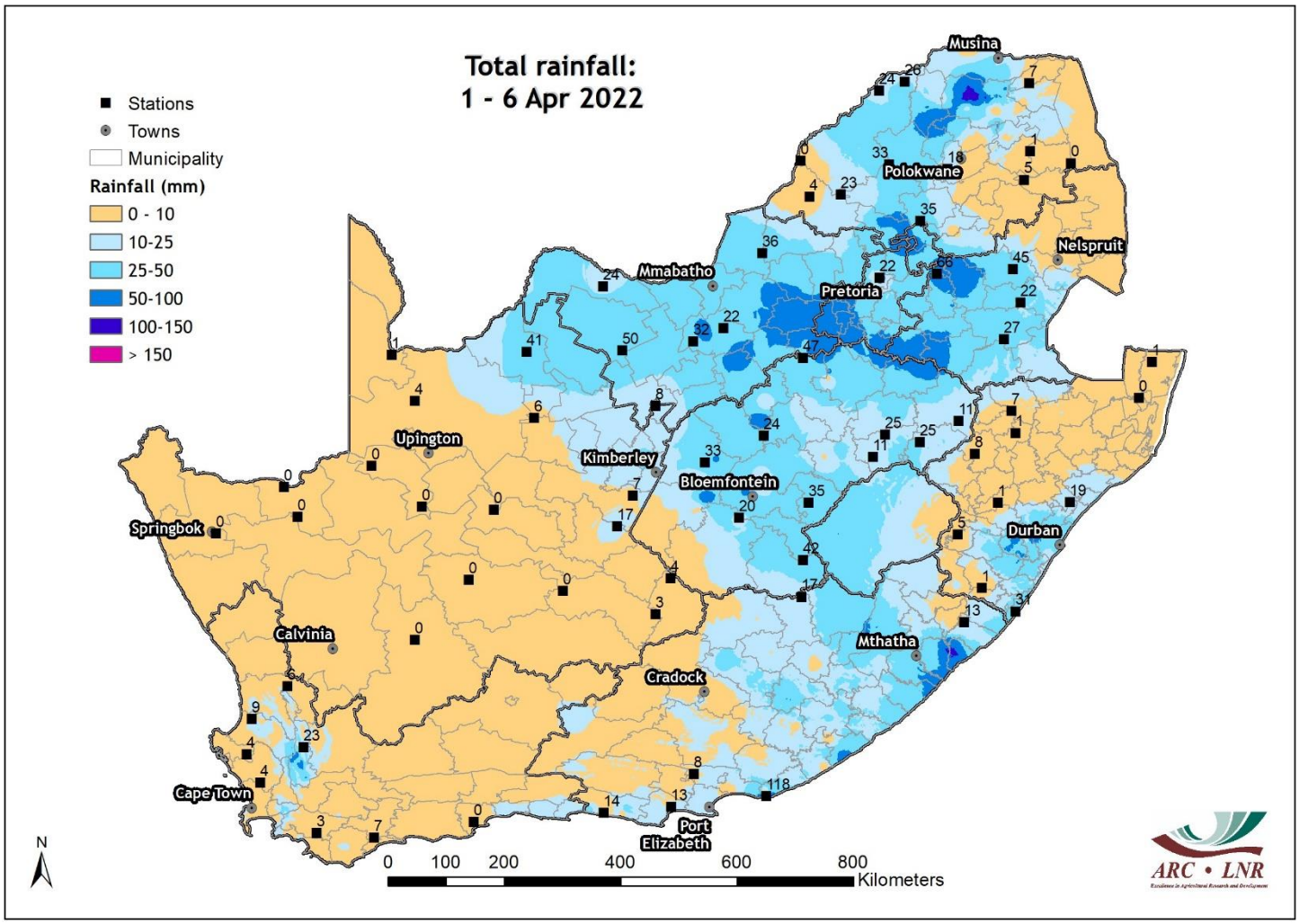
The graph shows the accumulated heat units during November 2021 until 5 April 2022, compared to the median value calculated over the 2014 – 2020 period, expressed as a percentage of the median value over the entire period. Largest negative anomalies are seen over the southern to central and western parts (around 10 – 15 %), with smaller deficits towards the northeast (Ermelo). The largest deficits occurred, at all three locations, during the mid-December to mid-January period, shown by the steeper downward slope in the graph. These deficits exceed 2 standard deviations for the same period during 2014 – 2020 at Bethlehem and Bothaville, and 1 standard deviation at Ermelo according to the recorded data.

Rainfall (% of long-term mean): March 2022



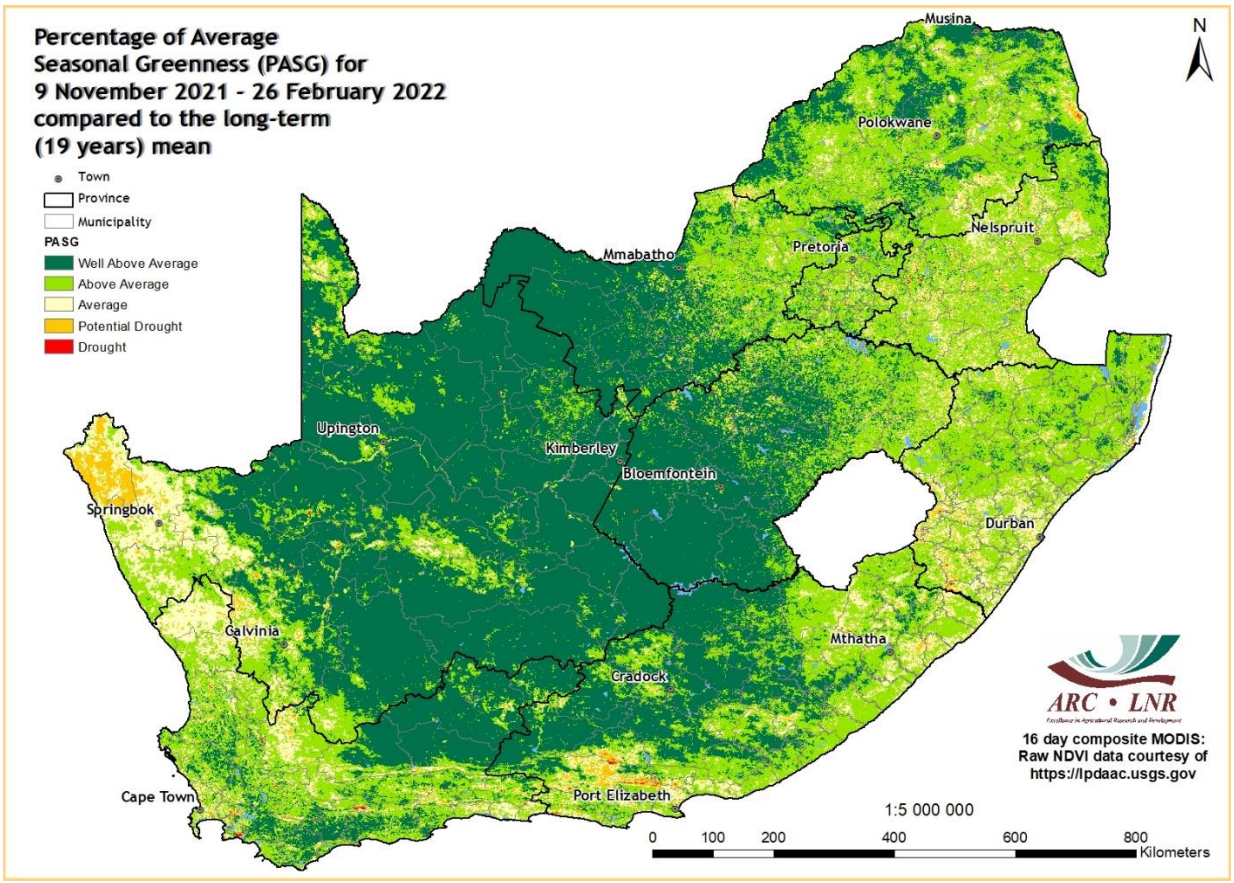
Rainfall was above average over most of the country during March. Smaller areas that were drier than average include the western parts of Limpopo together with the southern parts of the winter rainfall region, Garden Route and western Karoo.

Rainfall (mm): 1 – 6 April 2022



Large parts of North West, the southern Free State, Gauteng, Mpumalanga and Limpopo received in excess of 25 mm of rain during the first few days of the month.

Percentage of Average Seasonal Greenness: November 2021 – 26 February 2022



Cumulative vegetation activity since November is largely above normal, especially over the central interior, reflecting the excellent weather conditions in support of vegetation activity.

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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