CUMULUS

23 February 2022

by J Malherbe, R Kuschke

AgriSeker Onderskrywingsbestuurder (Pty) Ltd. Reg No: 2014/235270/07 is an Authorised Financial Service Provider FSP no:45767
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Summary

Mostly dry over the interior, thundershowers expected to become more widespread later

It will be warm and dry over especially the central parts of the country during the next few days, including the western maize-production region. Warm and dry westerly winds should invade parts of the Free State and North West on several days, a welcome break from earlier wet conditions. Isolated to scattered thundershowers will initially be concentrated over the far eastern and northeastern parts, focusing on Mpumalanga, Limpopo, KZN and Gauteng. As the week progresses, the area of thundershowers should slowly expand westwards. Current forecasts indicate increased chances for thundershowers returning to the Free State and North West from Friday onwards.

The mostly dry conditions over much of the interior is a result of a continuation of the unfavorable large-scale atmospheric circulation in the region, with upper-air high-pressure systems focusing on the southern-African subcontinent, centered on Botswana and resulting in an absence of tropical moisture over South Africa. Thundershowers therefore are much less widespread than earlier this summer, and some tend to become severe as moisture from the east interacts with dry air from the interior. So, even though thundershowers are not very widespread, nor strongly supported by upper-air conditions, the interaction between the moisture to the east and dry air over the western to central interior will result in some of the thundershowers in the east producing hail and strong winds. While still somewhat uncertain, current forecasts indicate the possibility of more widespread thundershowers over much of the interior next week when upper-air troughs may start to influence especially the southern to central parts.

The unfavorable large-scale atmospheric circulation pattern will steer the tropical cyclone currently in the vicinity of southern Madagascar (Tropical Cyclone Emnati) towards the south, keeping it far to the east of South Africa and enhancing the dry conditions over large parts of the interior.

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

- **General:**
  - Temperatures will be near normal to above normal for this time of the year.
  - Rainfall will be below normal over most of the country, but near normal over the far eastern and north-eastern areas.
  - The central to western parts of the country should be warm to hot and dry on most days, with westerly winds at least until the weekend.
  - Isolated to scattered thundershowers are expected over the far eastern and northeastern parts during the remainder of the week, possibly spreading into the central parts during the weekend and early next week.
  - Thundershowers are also possible over the southeastern parts later this week.
  - The eastern part of the summer-grain production region should receive isolated to scattered thundershowers on most days while the western parts should remain dry initially, with thundershowers possibly from Friday onwards.
  - Strong to gale-force southeasterlies are expected in the southwest later this week and again by Tuesday next week.
  - Current forecasts indicate the possibility of a cold front over the winter rainfall region early next week, possibly resulting in light showers over parts of the region. The long lead time makes this outlook very uncertain.
  - Temperatures over the summer-grain production area will remain somewhat higher than earlier this summer:
    - Maximum temperatures over the eastern maize-production areas will be in the order of 24 – 31°C. Minimums will be in the order of 11 – 17°C.
    - Maximum temperatures over the western maize-production region will range between 29 and 35°C, with highest temperatures towards the southwest. Minimums will be in the order of 14 – 18°C.

Overview of expected conditions over the main agricultural production areas

With a high-pressure system present in the upper air for most of the time, it is expected to be relatively dry over most areas. Isolated to scattered thundershowers are expected in the far east, spreading somewhat westwards towards and during the weekend and early next week.

Maize production region: Sunny to partly cloudy and warm conditions with isolated to scattered thundershowers on most days, but it will be hot and dry in the west until at least Friday:

- Maximum temperatures over the eastern maize-production areas will be in the order of 24 – 31°C. Minimums will be in the order of 11 – 17°C.
- Maximum temperatures over the western maize-production region will range between 29 and 35°C, with highest temperatures expected over the southwestern parts of this region. Minimums will be in the order of 14 – 18°C.

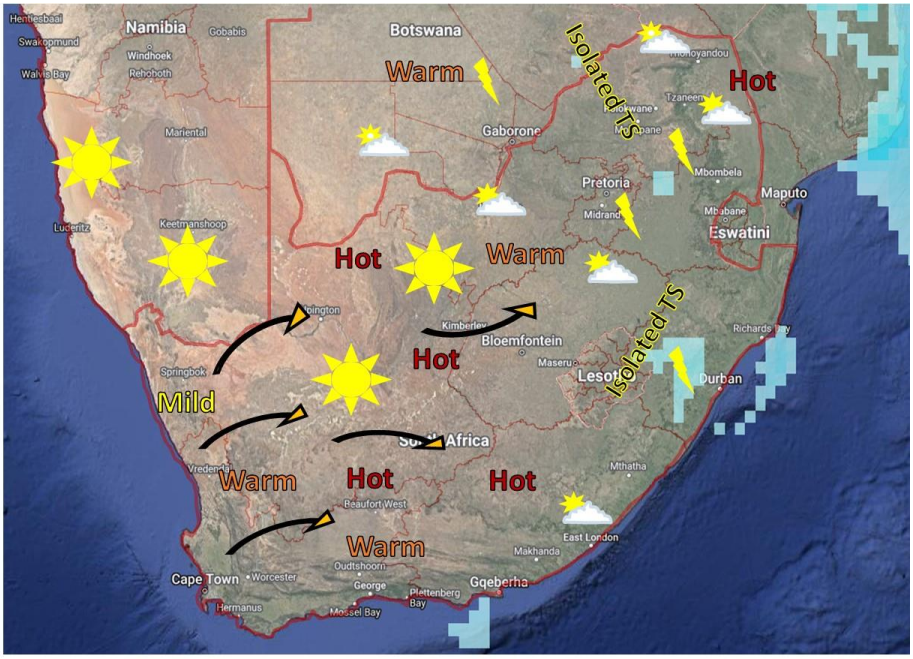
- **Wednesday - Thursday (23rd – 24th)**: Partly cloudy and warm, but sunny and hot in the west. Isolated to scattered thundershowers are expected over the eastern parts.
- **Friday - Saturday (25th – 26th)**: Partly cloudy and warm, but sunny and hot in the west with westerly winds. Isolated to scattered thundershowers are expected over the eastern parts, with thundershowers spreading into the central parts of the region.
- **Sunday - Monday (27th – 28th)**: Partly cloudy and warm, with westerly winds in the west. Isolated thundershowers are expected, but scattered in the east.
- **Tuesday (1st)**: Partly cloudy and warm with isolated thundershowers, but scattered in the east.

Cape Wine Lands and Ruens: It will be warm to hot over the region, but cooler in the south with light showers on **Thursday and Friday (24th and 25th)**. The entire region will become cooler on **Monday (28th)** with light showers in the south and southwest according to current forecasts, as a frontal system is expected to influence the area. Strong southeasterlies are expected in the southwest on **Thursday to Saturday (24th to 26th)** and again by **Tuesday (1st)** according to current forecasts.

Daily summary of expected conditions

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

Wednesday, 23 February

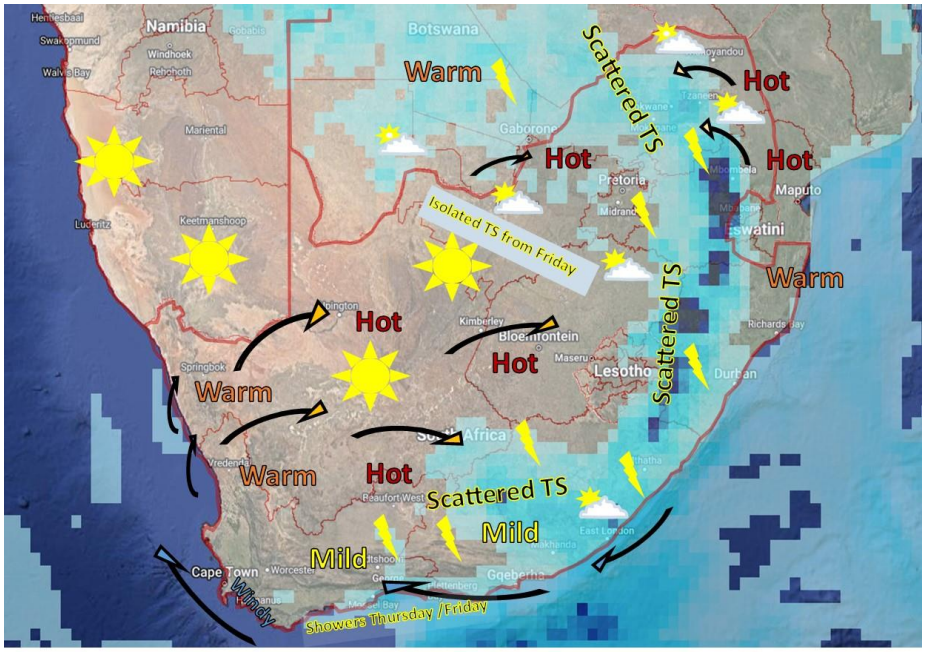


Isolated thundershowers over the far eastern to northeastern and southeastern parts.

Sunny, warm and dry over most of the central to western and southern interior.

It will be hot over the central parts and the Lowveld.

Thursday to Sunday, 24 - 27 February



Scattered thundershowers are expected over the far northeastern, eastern and southeastern parts, as far west as parts of the Karoo.

Isolated thundershowers will spread into the central parts from Friday onwards.

Light showers are expected along the Garden Route on Thursday and Friday.

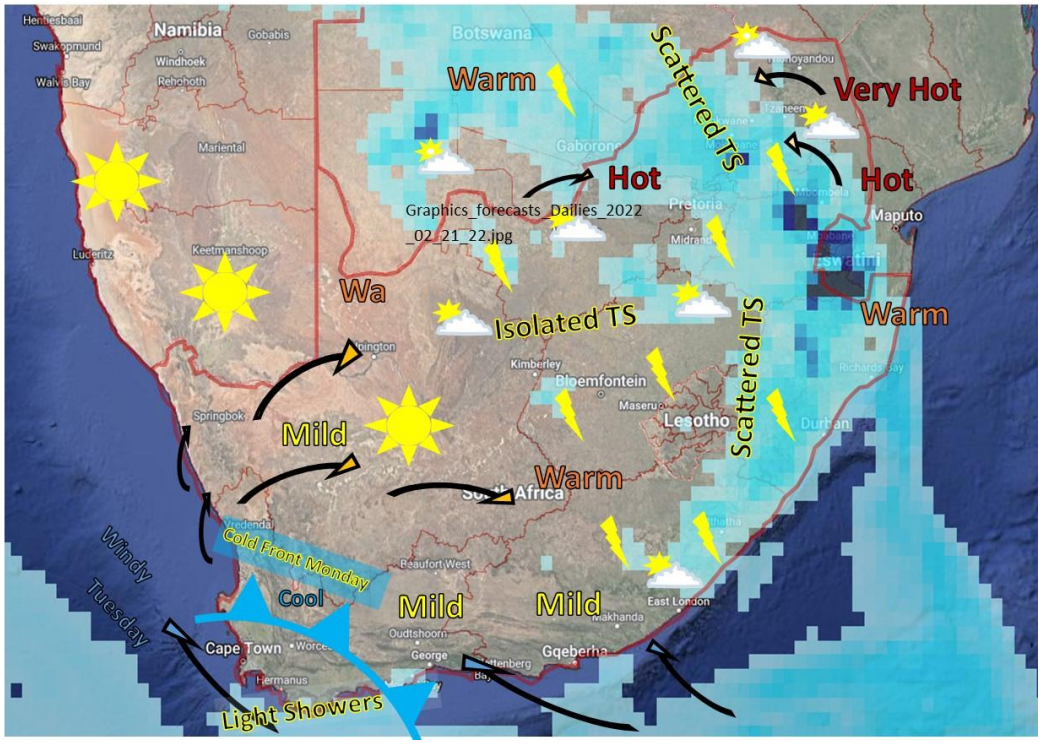
The central to western parts will be mostly dry with westerly winds.

It will be hot over the central and northern parts and the Lowveld.

It will be mild in the south.

Strong southeasterlies in the southwest until Saturday.

Monday – Tuesday, 28 February – 1 March



Scattered thundershowers are expected over the far northeastern, eastern and southeastern parts into the Eastern Cape.

Isolated thundershowers are expected over the central parts.

Light showers are expected along the Garden Route in the west, southwestern parts of the Karoo and southern parts of the West Coast.

The western to northwestern parts will be mostly dry.

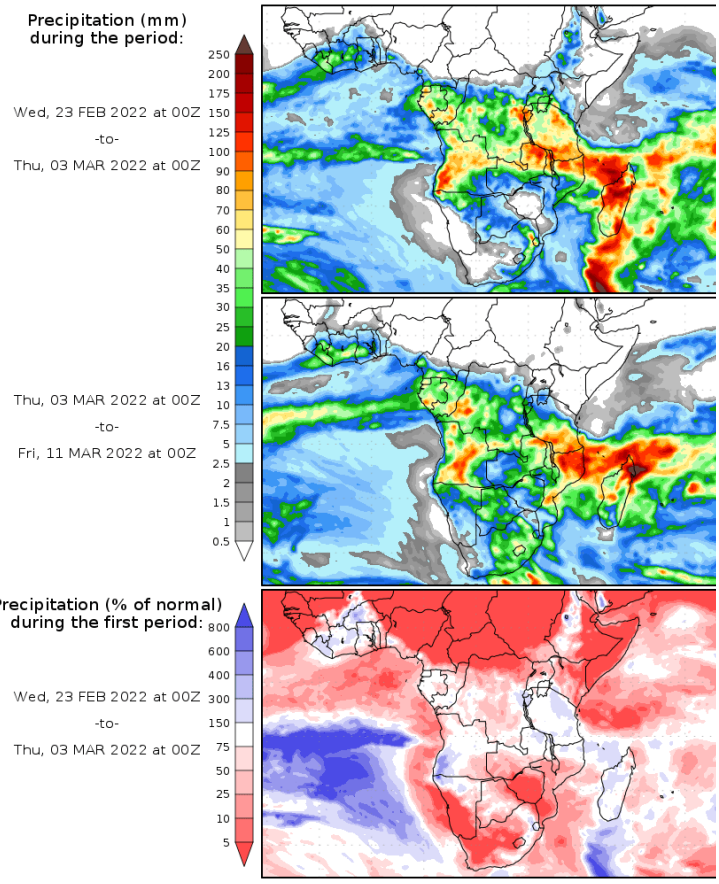
A cold front will bring mild to cool conditions to the southwestern parts and West Coast.

It will be very hot in the Lowveld.

Strong southeasterlies in the southwest by Tuesday.

Medium term rainfall and temperature summary

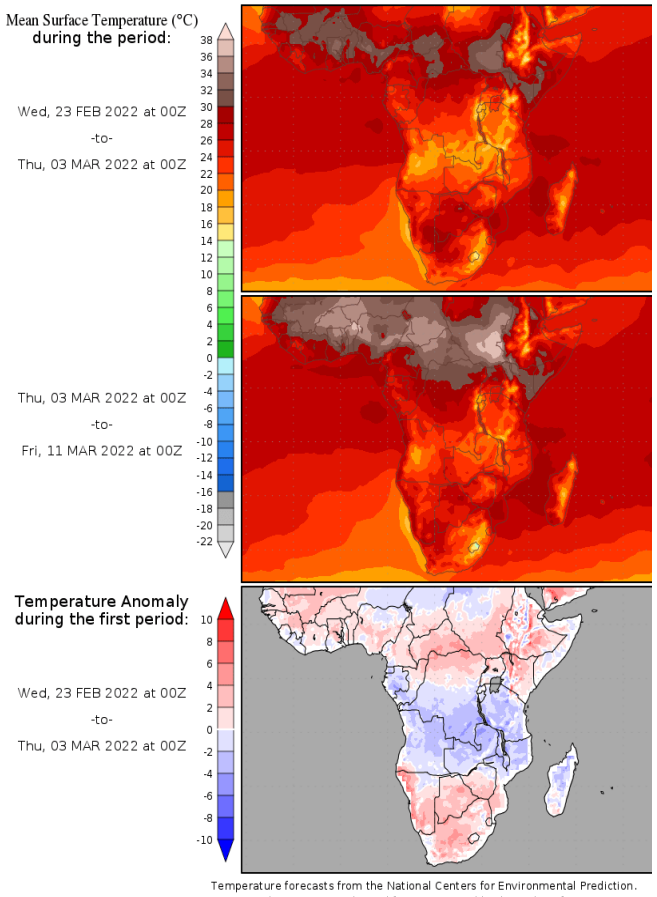
Precipitation Forecasts



Precipitation forecasts from the National Centers for Environmental Prediction.
Normal rainfall derived from Xie-Arkin (CMAP) Monthly Climatology for 1979-2003.
Forecast Initialization Time: 00Z23FEB2022

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: 00Z23FEB2022

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 23 February) 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:

- It will be hot:
  - Over the Lowveld **most of the time,** becoming very hot early next week.
  - Over the western Karoo and southwestern parts, especially the Swartland, until **Sunday (23rd - 27th)**.
  - Over the central to northern interior Thursday to Sunday **(24th - 27th)**.
- Thundershowers may become severe:
  - While not widespread, isolated storms can become severe over Limpopo, Mpumalanga, the Drakensberg and Gauteng **throughout the period**.
  - Over the Free State and North West from **Saturday (26th) onwards**. Again, these will not be widespread, but can occur in isolated instances.
  - Northeastern parts of the Karoo, and eastwards into the northern to eastern parts of the Eastern Cape from **Thursday (24th) until Saturday (26th)**.
- Hot, dry and windy conditions over the southwestern parts **from Thursday (24th) until Saturday (26th) and Tuesday (1st)** may be conducive to the spread of wild fires where vegetation is dry.

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 to eastern equatorial parts of the Pacific Ocean. These are at La Niña thresholds and indicative of a weak La Niña in progress.

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 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.

More recently, seasonal forecasts for southern Africa for the remainder of summer have drifted towards a drier outlook.

The Australian Bureau of Meteorology points out that La Niña conditions are present.

(Updated 15 February): Climate models and observations suggest the 2021–22 La Niña has peaked, and will most likely return to neutral El Niño–Southern Oscillation (ENSO) (neither La Niña nor El Niño) during the southern hemisphere autumn.

Atmospheric and oceanic indicators remain at La Niña levels, but have likely peaked in strength. While eastern tropical Pacific sea surface temperatures remain cooler than average, beneath the surface, waters in the central and eastern Pacific are now warming. These changes in the sub-surface typically foreshadow a breakdown in a La Niña event, which normally occurs in the southern autumn. In the atmosphere, decreased cloudiness along the Date Line, strengthened trade winds in the western Pacific and a positive Southern Oscillation Index (SOI) reflect a mature La Niña.

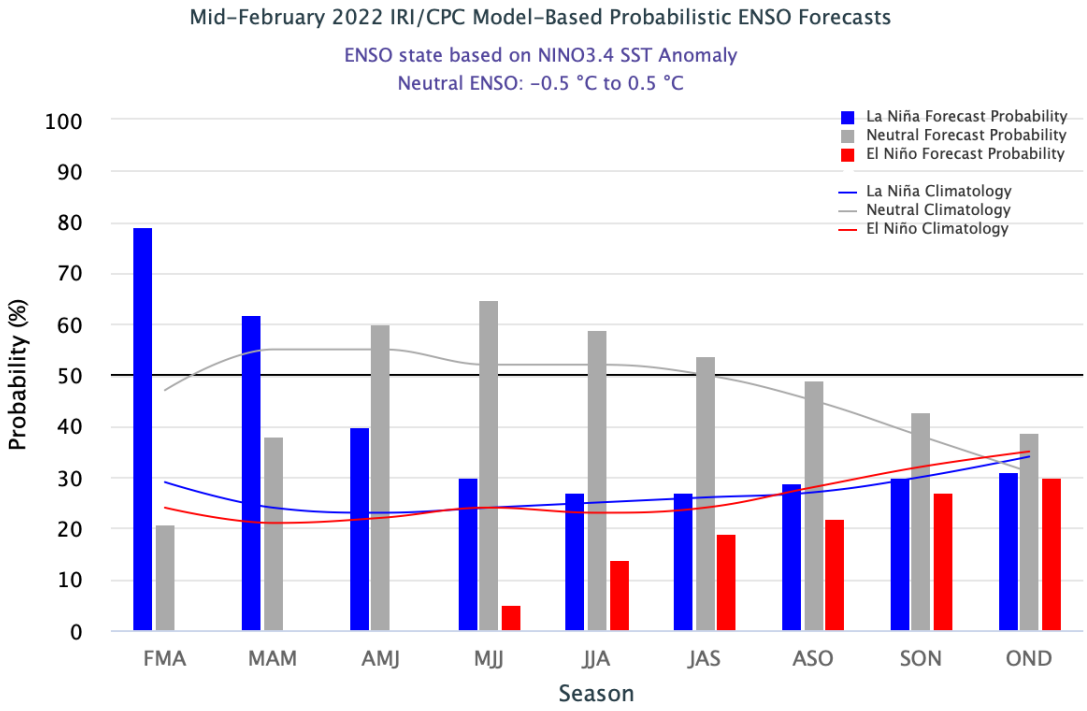
The Southern Annular Mode (SAM) is neutral, and is forecast to remain neutral over the coming three weeks. A neutral SAM has little influence on Australian climate.

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

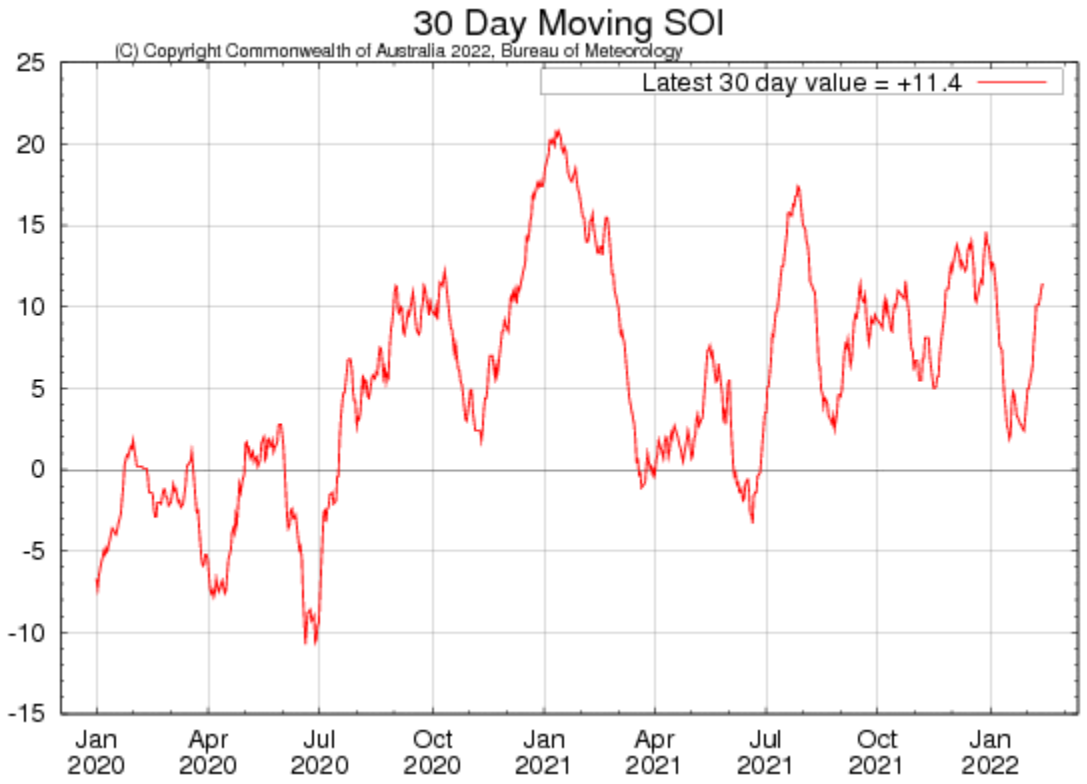
The Southern Annular Mode (SAM) was positive going into February. It has gradually weakened into negative or neutral territory during the last few days. A positive SAM during summer typically brings wetter weather to the summer rainfall region of South Africa.

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

According to the IRI (Updated 18 February): In mid-February, Sea Surface Temperatures remain below-average in the central-eastern equatorial Pacific. The evolution of key oceanic and atmospheric variables is consistent with weak La Niña conditions, and therefore, a La Niña Advisory remains in place for Feb 2022. A large majority of the models in the plume predict SSTs to stay below-normal at the level of a weak La Niña until Mar-May, and then return to ENSO-neutral levels in Apr-Jun 2022. Similar to the most-recent official CPC/IRI ENSO Outlook issued on February 10, 2022, this objective model-based ENSO outlook also predicts a continuation of the weak La Niña event with high probability during Mar-May. However, there is a slight disagreement between the two forecast methods on the dissipation of the current event. The objective model-based forecast shows transition to ENSO-neutral during Apr-Jun (60% chance), while subjective consensus indicates the same happening in May-Jul (56% chance)….*International Research Institute for Climate and Society*- http://iri.columbia.edu/



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

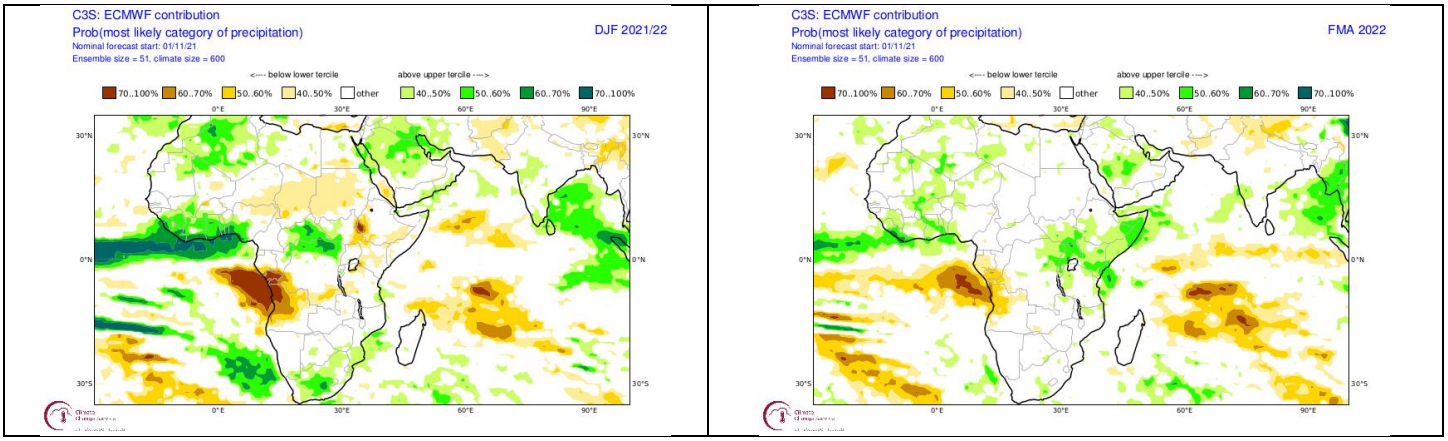


Australian Bureau of Meteorology - http://www.bom.gov.au

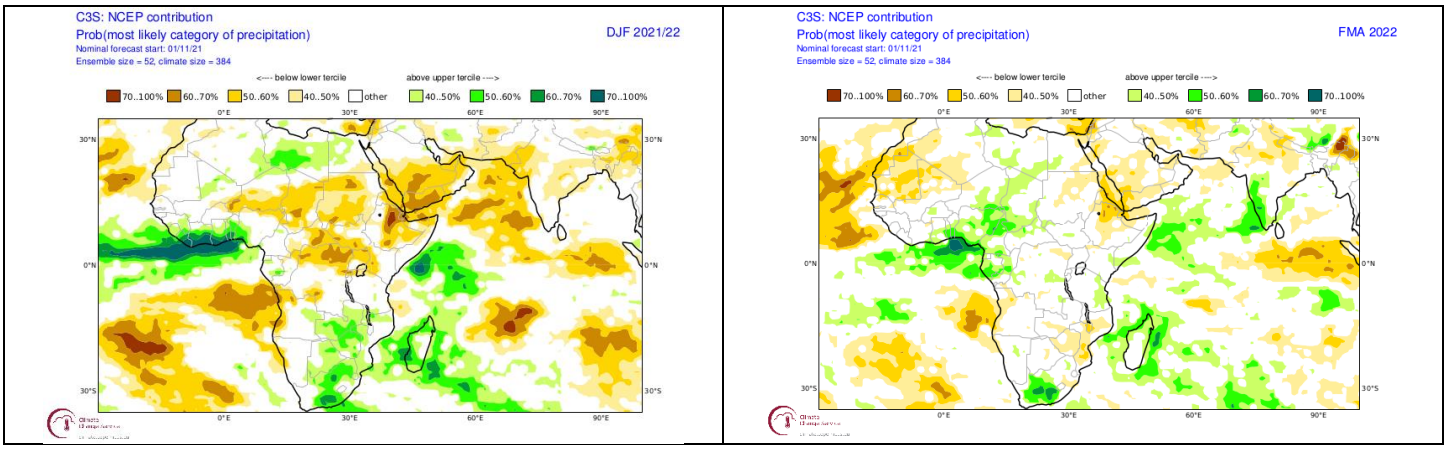
The Southern Oscillation Index is in positive territory (+11.4). This is indicative of atmospheric circulation patterns reflecting La Niña conditions.

Seasonal forecasts issued by various international institutions

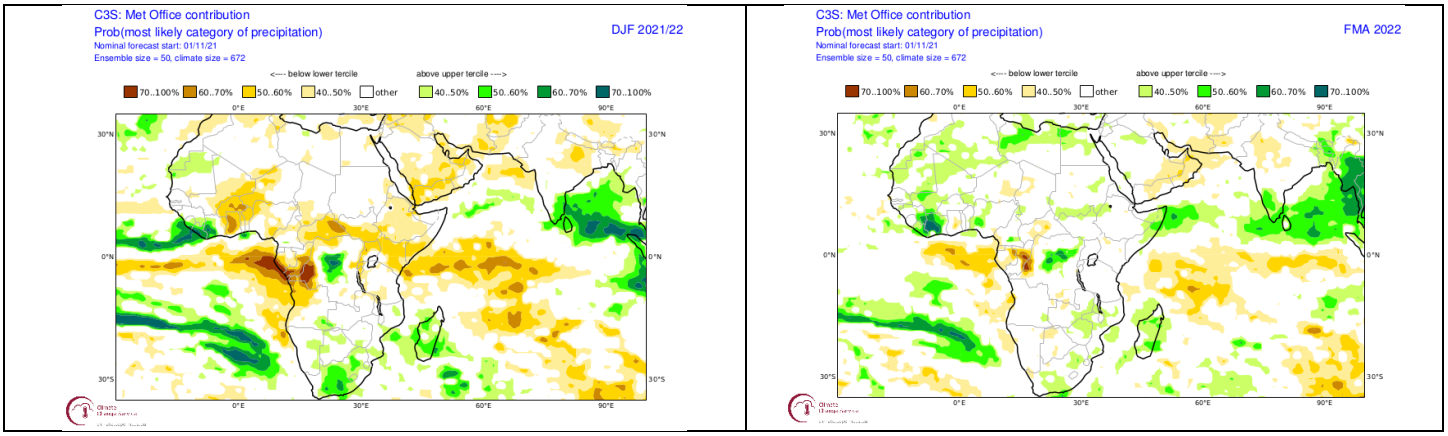
Seasonal forecasts by these institutions, as published by the COPERNICUS Programme (***https://climate.copernicus.eu/seasonal-forecasts***) for both mid-summer and late summer, reflect similar patterns with regards to rainfall for southern Africa as those by the IRI. The signal for relatively wet conditions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



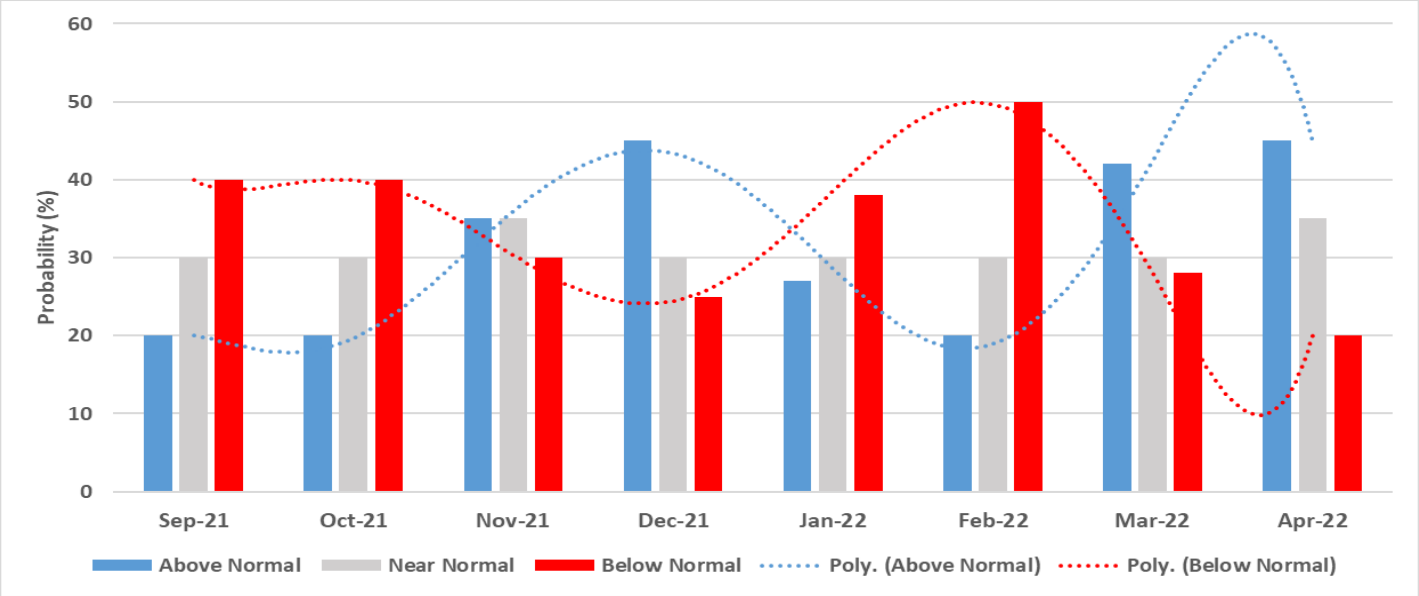
Same as above, but forecasts issued by the National Centres for Environmental Prediction.



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

CUMULUS seasonal outlook, based on decadal variability

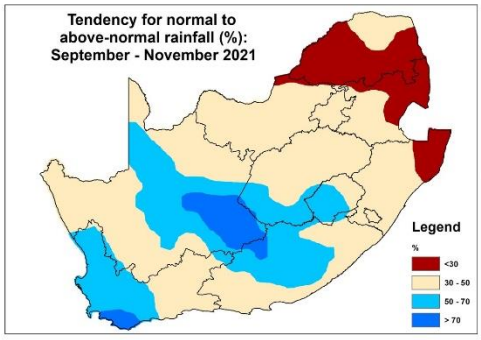
This outlook is based on the typical observed rainfall patterns over the ***north-eastern half*** of the country (including most of the summer grain production region), as associated with the cyclic variability of the global climate system. Summers that are similar to 2021/22 more often experience a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

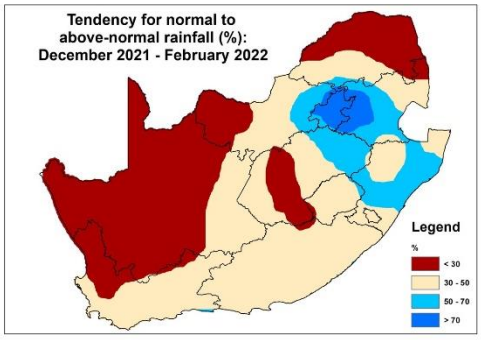


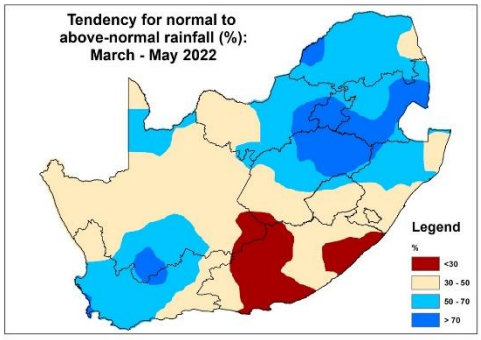
Probabilistic forecast for rainfall over the summer rainfall region, based on the natural cyclic nature of the climate system as seen in decadal variability, per month for the period September 2021 – April 2022 (Forecast issued in 2021-09).

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



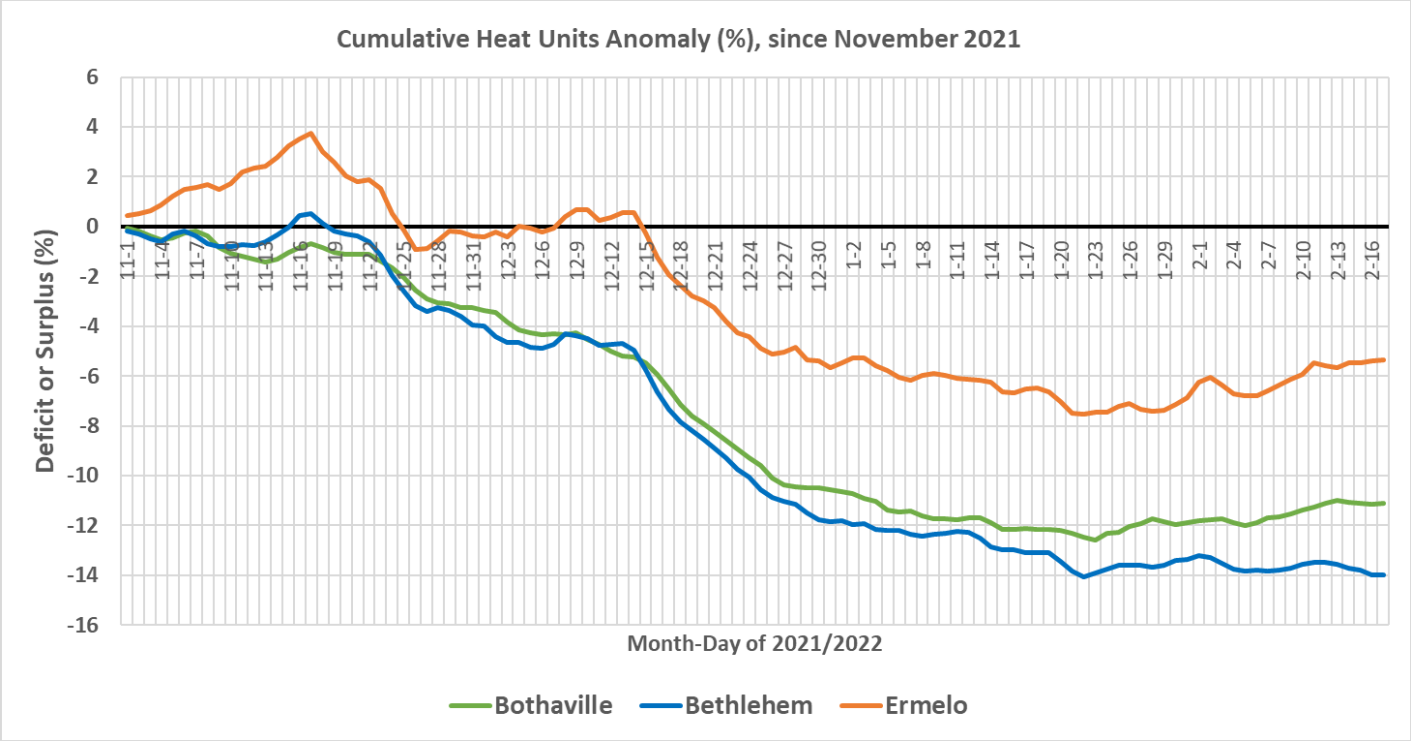




Typical patterns during summers analogous to 2021/22: Early summers during similar years tend to be relatively wet over the western parts of the country while drier than normal over the north-eastern parts of the country (map on the left). During December – February, relatively dry conditions tend to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

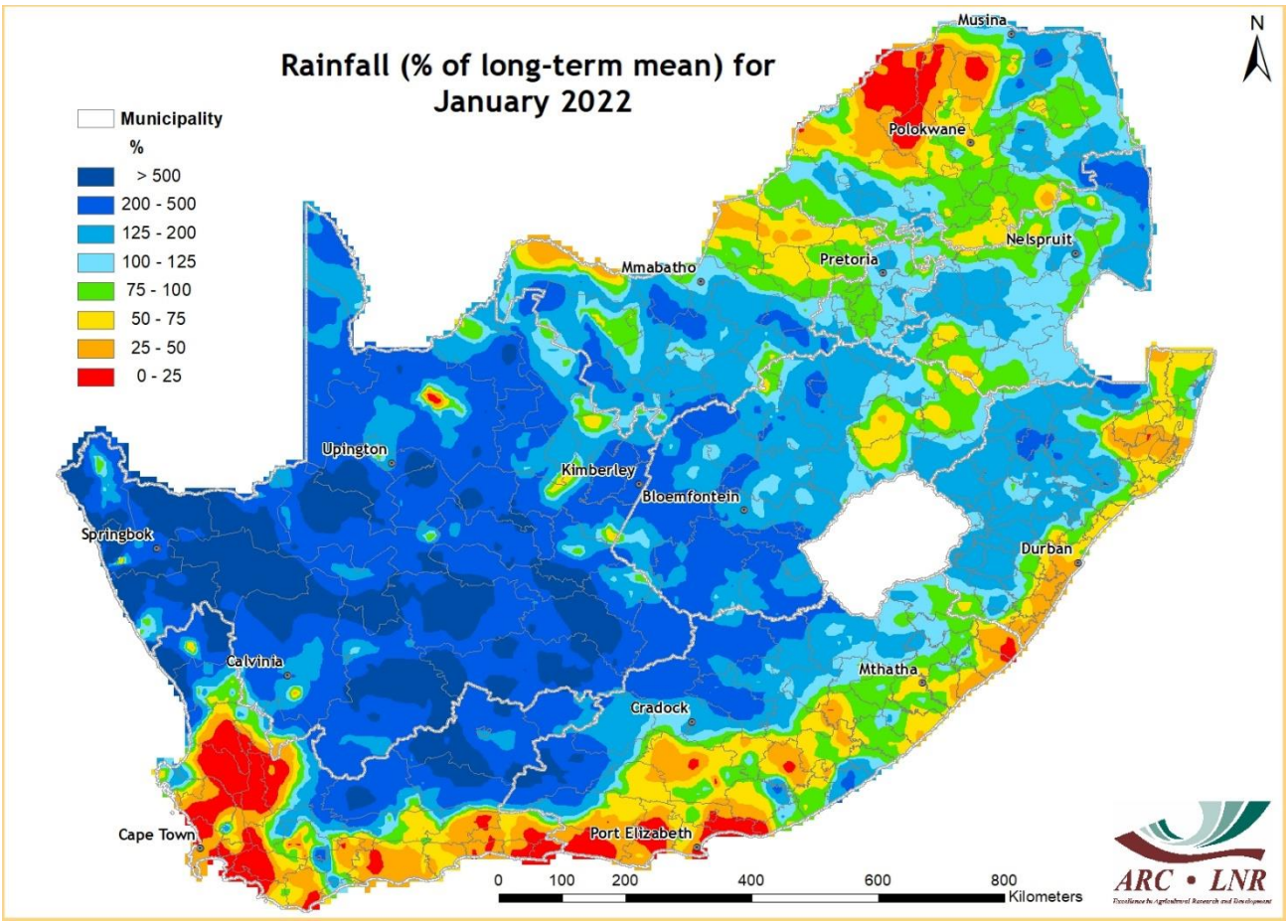
Heat Units: 1 November 2021 – 18 February 2022



Heat units have been less than the 2014 – 2020 norm the November – February 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 since mid-January, deficits have decreased slightly, especially towards the north-eastern parts of the maize-production region. Warmer conditions this week will further lessen the cumulative deficits in most areas, especially the west.

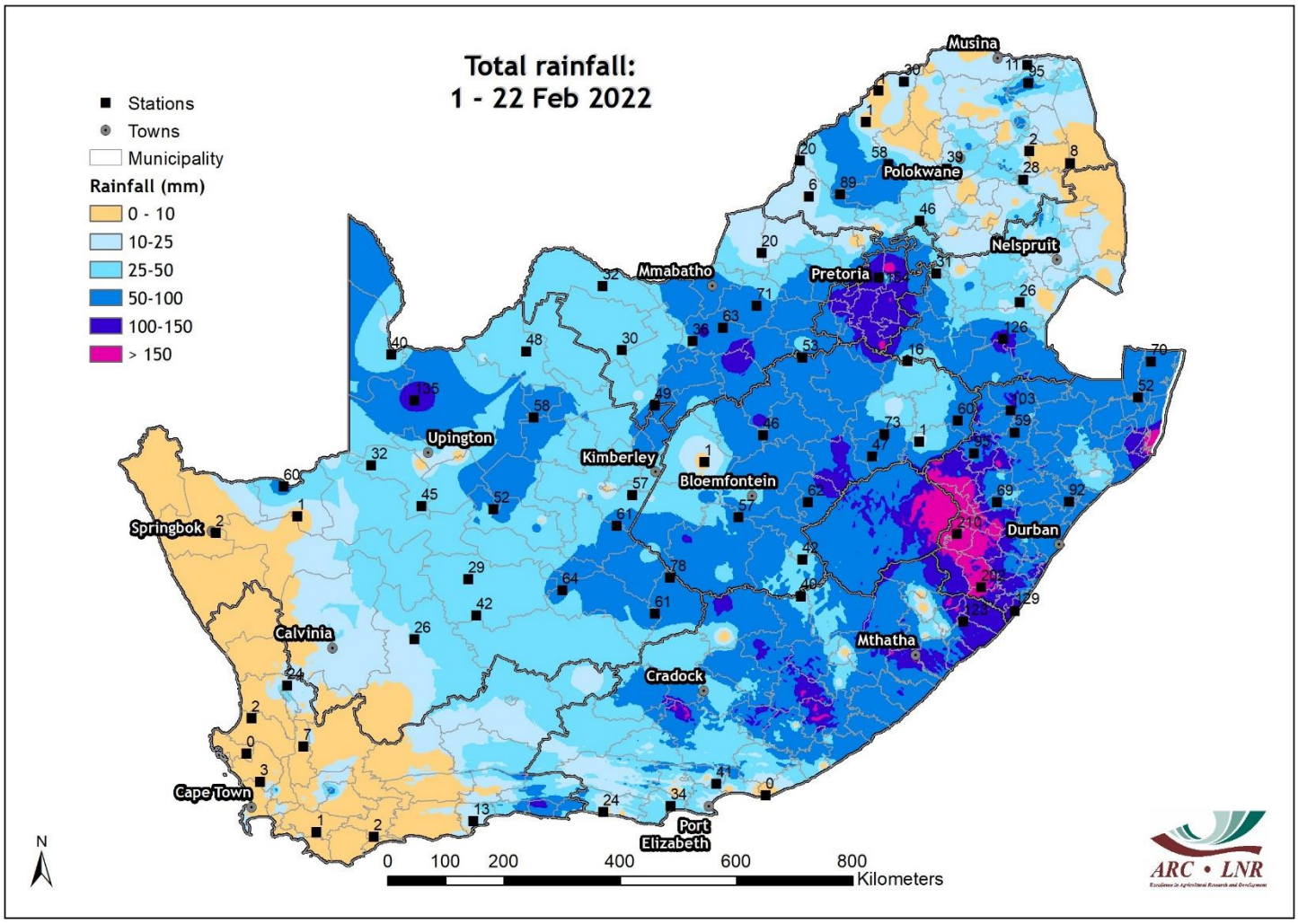
The graph shows the accumulated heat units during November 2021 until February 2022, compared to the median value calculated over the 2014 – 2020 period, expressed as a percentage of the median value. Largest negative anomalies are seen over the southern to central and western parts (around 10 – 15 %), 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): January 2022



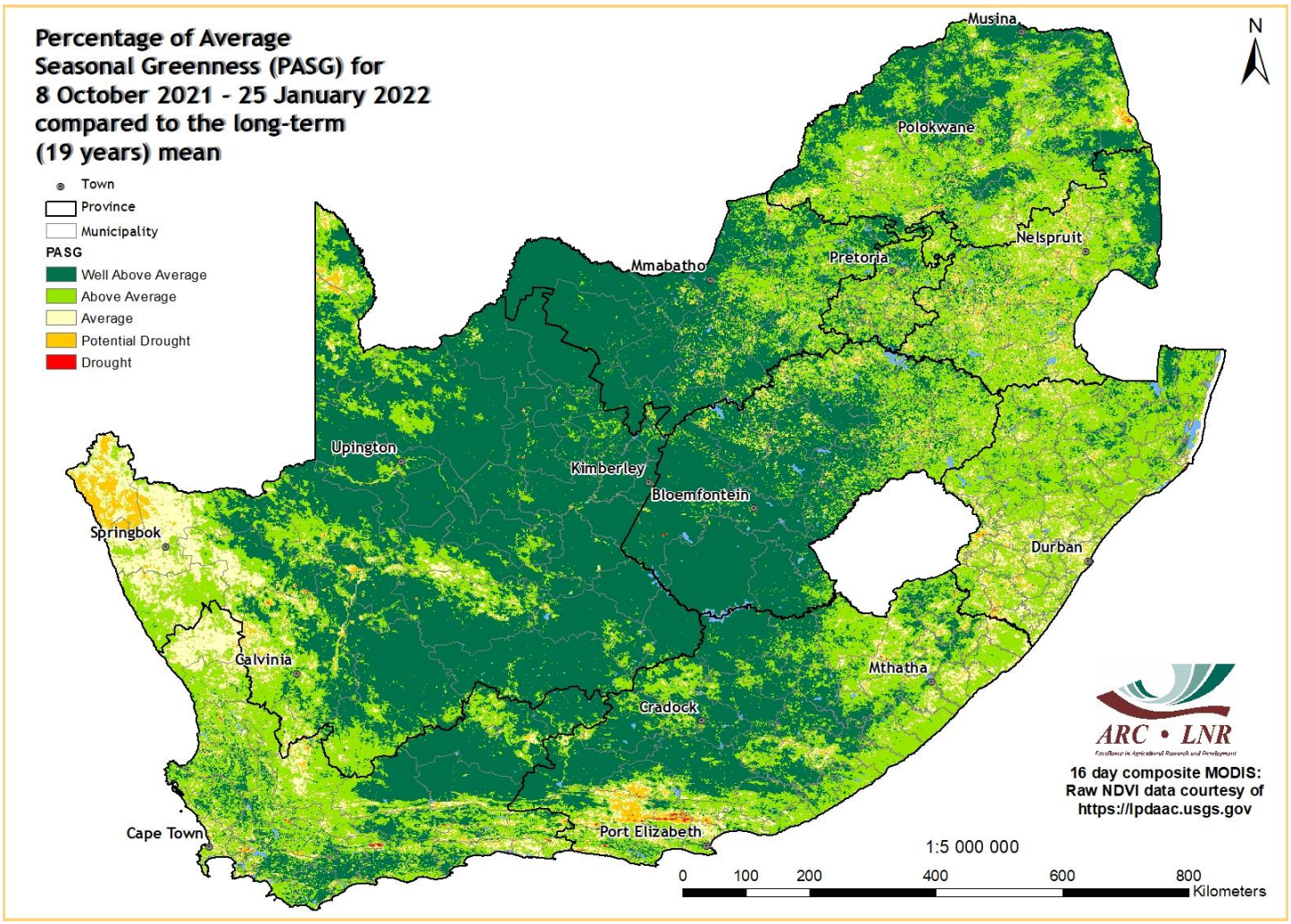
Rainfall was above average over especially the central to western interior during January, with relatively dry conditions over the winter rainfall region and Garden Route through to the coast of KZN as well as the northeastern parts.

Rainfall (mm): 1 – 22 February 2022



Rainfall during the first 22 days of February was unevenly spread across the summer-grain production region, with rainfall exceeding 50 mm over the central to northwestern Free State and the southern half of North West. Areas in the north-eastern Free State and in isolated areas over southern Mpumalanga and also northeastern Mpumalanga received much less rain.

Percentage of Average Seasonal Greenness: October 2021 – 25 January 2022



Cumulative vegetation activity since late October 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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