CUMULUS

14 February 2023

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WE GET
AGRICULTURE'S *heartbeat*

Contents

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Summary

Cooler conditions with widespread precipitation to continue over large parts

Weather patterns currently and during the next few days over the interior of South Africa are dominated by the tropical low to the north. Recent forecasts have placed the system somewhat further south, with also an upper air trough in the southwest, which is a much more favorable situation for rainfall than what was expected according to forecasts last week. These two systems (tropical low to the north, upper-air trough in the southwest) together maintain favorable conditions for further showers and thundershowers over most of the summer rainfall region during the next few days as a conveyor of moisture is established from the low in the north, southeastwards with the support of the upper-air trough to the southwest. However, the highest concentration of rainfall will remain in the vicinity of the Low, currently deepening over Botswana.

For the summer-grain production region, the weather situation means that cloudy and mild to cool conditions with scattered to widespread showers and thundershowers will dominate until Friday/Saturday over the region and, according to current forecasts, until Sunday in the eastern parts of the region. The cloudy weather with high moisture levels will be conducive to the development and spread of fungal pathogens while access to fields may be difficult given the regular rainfall events. Again, weather model output is not great when it comes to the movement of tropical systems, but this sequence is expected according to current forecasts.

Current forecasts suggest that the tropical low should remain active over northern to eastern Botswana, keeping tropical moisture and scattered to widespread showers and thundershowers in place over the northeastern parts of the country. The system is expected to move out to the east during the weekend. During the movement towards the east, the system has the potential to result in very heavy rainfall again over Limpopo and Mpumalanga, especially the escarpment and the Lowveld. Some of the highest recorded flood levels over the northern parts of the Kruger National Park occurred in January 2013 during a similar sequence of events (tropical low moving across the region towards Botswana and then again out to the east a few days later), with a tropical system moving over the region twice in one week. This is however the current forecast and with regards to a tropical low, quite uncertain so far ahead of time.

If the tropical system to the north moves out east during the weekend, conditions over the interior should be warmer and drier from Sunday onwards.

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

General:

- Temperatures will on average be normal to below normal, but above normal over the northwestern interior.
- Rainfall during the period will be normal to above normal over the country except for the western interior and west coast, including the northern to western parts of the winter rainfall region.
- Partly cloudy to cloudy and mild conditions will dominate over the central to eastern and northeastern parts, with scattered showers and thundershowers, becoming widespread in places, until Saturday when it will clear from the west according to current forecasts.
- Widespread showers and thundershowers are expected over the eastern to northeastern parts on Saturday, before clearing by Sunday according to current forecasts.
- It will be partly cloudy to cloudy and mild over the Garden route with light showers, spreading into the Karoo at times and clearing by Saturday.
- Isolated thundershowers are also possible over the central parts until Friday when scattered falls are possible over the southern escarpment.
- Drier and warmer conditions are expected, according to current forecasts, over the central parts by Sunday and over the entire country by early next week.
- It will be warm to hot over the north-western interior, Swartland and northeastern parts of the Karoo on several days, extending to the west coast by early next week.
- The wind will be strong southeasterly over the southwestern parts of the Western Cape, becoming gale force south-easterly at times.
- Most of the summer-grain production region should experience partly cloudy to cloudy and cool conditions with scattered to widespread showers and thundershowers, clearing over the western parts by Saturday and clearing

over the eastern parts by Sunday. The cloudy and cooler conditions will be replaced by partly cloudy and warmer conditions with only isolated thundershowers by early next week according to current forecasts:

- Maximum temperatures over the western maize-production areas will be in the order of 19 – 30°C, with a warming trend from Saturday onwards. Minimum temperatures will be in the order of 14 – 19°C.
- Maximum temperatures over the eastern maize-production region will range between 15 and 26°C. Minimums will be in the order of 10 - 16°C.

Overview of expected conditions over the main agricultural production areas

The main factors influencing weather conditions over the summer rainfall region during the next few days will be the tropical low over Botswana, an upper-air trough in the westerlies over the southwestern parts as well as the presence of a high-pressure ridge towards the south maintaining an additional influx of moisture over the eastern parts and also maintaining the upper-air trough over the southwestern parts. The low to the north and trough to the southwest are expected to maintain a large area of scattered to widespread showers and thundershowers over the central to northeastern parts until Saturday. During this time, a higher concentration of rainfall is expected closer to the low and in a band stretching southeastwards from the low into the Northwest through to the northern Free State. The trough in the south and the low to the north are expected to move eastwards by Saturday, with clearance from the west. As the low move eastwards in the north, the precise track will determine whether heavy rain occurs once more over the Limpopo River Valley, Lowveld and northeastern escarpment by Saturday and Sunday. Current forecasts indicate warmer and drier conditions by next week as the upper air flow across the country becomes weaker and more anti-cyclonic.

Maize production region: Most of this region will experience cloudy and mild conditions with showers or thundershowers, clearing from the west by Saturday. Current forecasts indicate warmer conditions by early next week over the entire region with only isolated thundershowers. A lot of this forecast depend on how the tropical low to the north may move during the next few days, adding to the uncertainty of the forecast by the weekend and next week.

- Maximum temperatures over the western maize-production areas will be in the order of 19 – 30°C, with a warming trend from Saturday onwards. Minimum temperatures will be in the order of 14 – 19°C.
- Maximum temperatures over the eastern maize-production region will range between 15 and 26°C. Minimums will be in the order of 10 - 16°C.

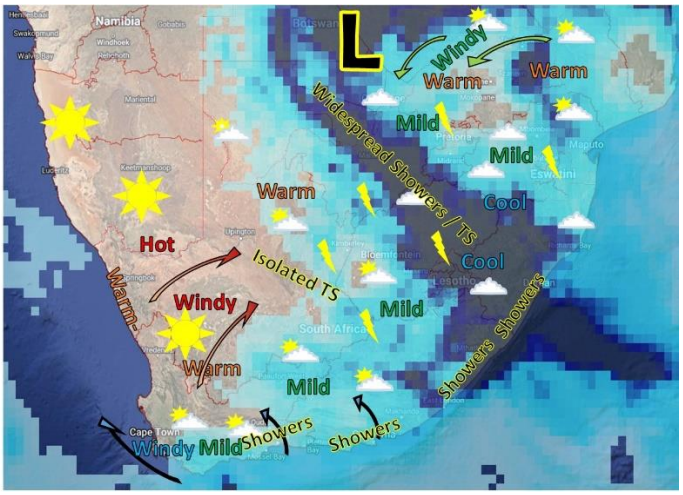
- **Wednesday (15th):** Partly cloudy to cloudy and mild with scattered showers and thundershowers, but widespread over the central parts.
- **Thursday (16th)**: Partly cloudy to cloudy and mild with scattered showers and thundershowers, but widespread over the central parts.
- **Friday (17th):** Partly cloudy and warm with scattered thundershowers over the western parts, but cloudy and cool with scattered to widespread showers over the central to eastern parts. .
- **Saturday (18th):** Cloudy and mild over the eastern to central parts with widespread showers or thundershowers, but partly cloudy over the western parts with isolated thundershowers. The wind will be moderate easterly.
- **Sunday (19th):** Partly cloudy and warm with isolated thundershowers, but cloudy and mild to cool in the east with showers. The wind will be moderate easterly in the east to north-easterly in the west.
- **Monday - Tuesday (20th – 21st):** Partly cloudy and warm with isolated thundershowers.

Cape Wine Lands and Ruens: The northern to western parts of this region, including the Swartland and Karoo, will be warm to hot on most days. It will be mild to cool and cloudy at times over the southern parts, mostly along the Garden Route, with light showers until Friday after which it will also become somewhat warmer over these southern areas. The wind in the southwest will be fresh to strong southeasterly.

Daily summary of expected conditions

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

Tuesday to Friday, 14 - 17 February



The wind over the southwestern parts of the Western Cape will be fresh to strong southeasterly.

It will be sunny, hot and windy over the western parts and southwestern interior.

It will be cloudy and mild over the eastern to central parts, with scattered showers or thundershowers.

Widespread showers are expected over the central to eastern North West, southern Gauteng, northern Free State, western to central and coastal KZN.

Isolated thundershowers over the west-central parts, becoming scattered over the southern parts on Friday.

It will be cloudy and mild along the southern KZN coast and coast of the Eastern Cape and adjacent interior with rain and showers from Wednesday onwards.

It will be sunny and warm to hot and dry over the far western to northwestern interior.

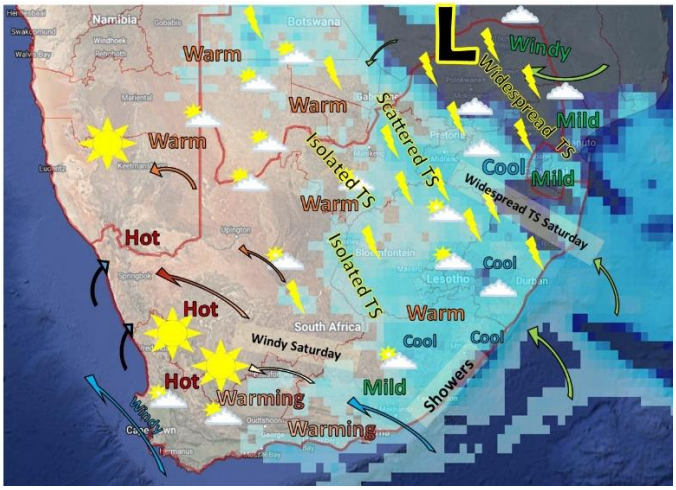
It will be windy and mild over the southern parts.

Partly cloudy to cloudy and mild with light showers over the Garden Route, spreading into the Karoo at times.

It will become cloudy from Wednesday over the southeastern coastal belt and adjacent interior with showers, preceded by thundershowers in some places.

Windy over the Limpopo River Valley and northeastern escarpment.

Saturday to Sunday, 18 - 19 February



It will be windy over the southern interior on Saturday.

The wind over the southwestern parts of the Western Cape will be fresh to strong southeasterly.

It will be cloudy, mild and windy with widespread rain and thundershowers over the Limpopo River Valley and northeastern escarpment, spreading southwards over the Lowveld.

It will be cloudy and cool with widespread rain and thundershowers over central to northern and western KZN and southern to eastern Mpumalanga on Saturday. Rain should clear over these areas later, but it will remain cloudy and cool on Sunday.

Showers along the eastern Garden Route and coast of the Eastern Cape will clear later on Saturday.

Partly cloudy and warm with isolated thundershowers over the central parts.

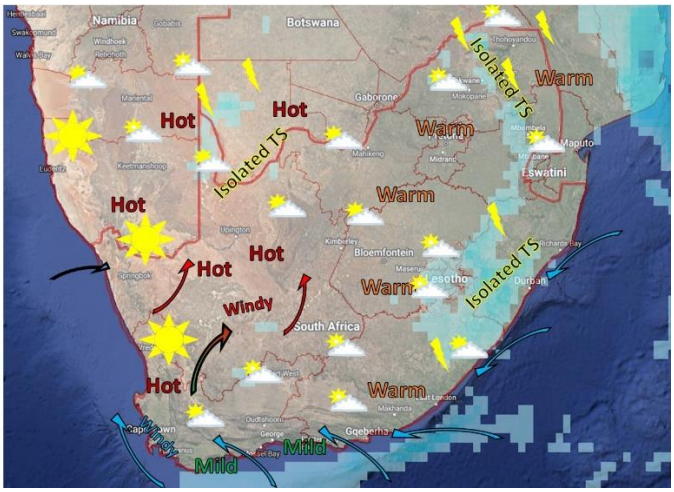
Warm to hot and dry over the western interior, west coast and northern to western parts of the winter rainfall region.

It will become warmer over the southern parts.

It will be warm and windy over the southwestern and western parts.

It will be windy over the eastern parts of the Limpopo River Valley and northeastern escarpment.

Monday to Tuesday, 20 – 21 February



Partly cloudy and warm over the central to eastern parts.

Isolated thundershowers are expected over the eastern escarpment into the northeastern Eastern Cape and southern KZN and Eastern Highveld.

Isolated thundershowers are possible also over the northern parts of the Northern Cape into Botswana.

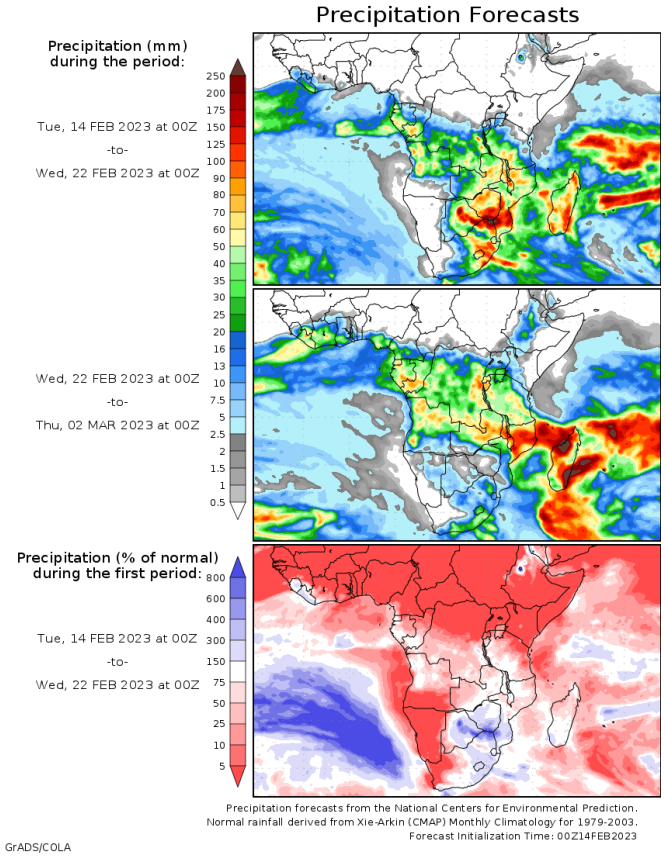
It will be sunny, hot and dry in the western to northwestern interior.

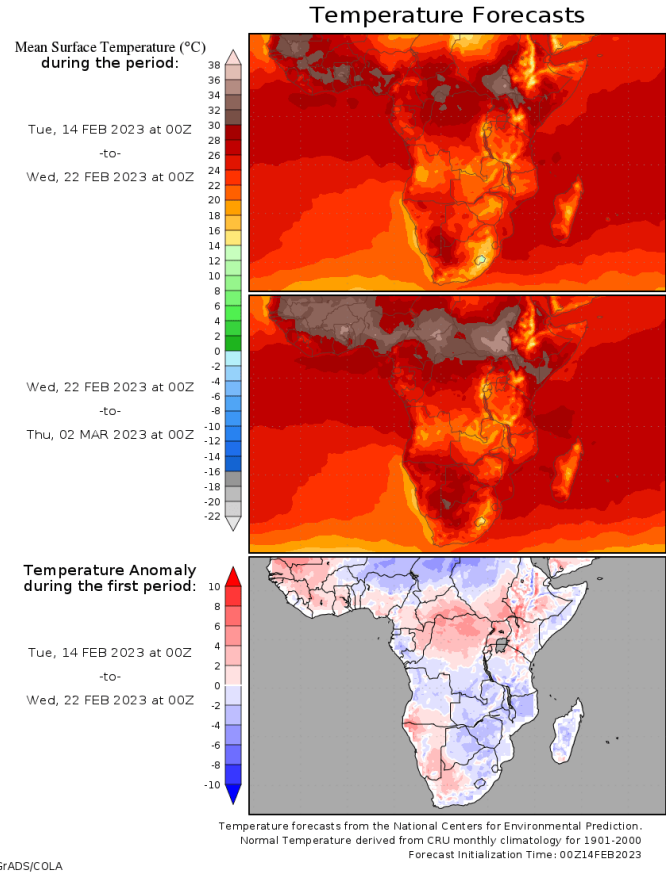
It will become slightly cooler over the winter rainfall region.

It will be partly cloudy and mild to warm along the Garden Route.

Strong southeasterly winds are expected over the southwestern parts of the Western Cape.

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 only 2 weather model (GFS and the ECMWF model) considered here in the beginning of a week-long (starting 14 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 / ECMWF models) of weather conditions during the coming week, the following may be deduced:

- **Mild conditions with extensive cloud cover and high humidity may result in the development and spread of fungal pathogens:**
  - Over the summer-grain production areas: **Tuesday to Friday (14th – 17th).**
  - Over the eastern summer-grain production areas: **Tuesday to Sunday (14th – 19th).**
- **It will be hot:**
  - Over the central to western and northwestern parts of the Northern Cape: **Tuesday to Friday (14th – 17h).**
  - Over the central to western and northwestern parts of the Northern Cape, northern parts of the Western Cape, Swartland and west coast: **Sunday to Tuesday (19th – 21st).**
- **It will be windy:**
  - Over the southern interior: **Tuesday to Saturday (14th – 18th).**
  - Over the eastern parts of the Limppo River Valley and northeastern escarpment: **Saturday to Sunday (18th - 19th).**
- **It will be hot and windy:**
  - Over the West Coast, west coast, western interior and northwestern parts of the Karoo: **Sunday to Monday (19th – 20th).**
- **Strong southeasterly winds are expected:**
  - Over the southwestern parts of the Western Cape: **Tuesday to Monday (14th – 21st).**
- **Significant daily rainfall totals, exceeding 50 mm in 24 h, may occur:**
  - Eastern North West, southern Gauteng and northern Free State: **Thursday to Friday (16th- 17th).**
  - Coast and adjacent interior of KZN: **Friday (17th)**
  - Limpopo River Valley and northeastern escarpment: Saturday **(18th).**
  - Eastern Limpopo River Valley, Lowveld and eastern Escarpment: **Sunday (19th).**
- **Thundershowers may become severe:**
  - Northern parts of the Eastern and Western Cape provinces and southern parts of the Northern Cape: **Friday (17th).**

Seasonal forecast

Seasonal forecasts for spring and summer over South Africa favor wetter conditions over the summer rainfall region, with a bias towards drier conditions over the winter rainfall region in the southwest.

ENSO forecasts indicate a further weakening of the current La Niña during the remainder of our summer, with a return to neutral conditions early in mid-2023. La Niña is associated with above-normal rainfall during mid- to late summer over the summer rainfall region of South Africa.

The Australian Bureau of Meteorology points out that the La Niña in the tropical Pacific is still expected to weaken further in the coming weeks

(Updated 14 February): La Niña continues in the tropical Pacific Ocean. While oceanic indicators, including sea surface temperatures (SSTs), have weakened to ENSO-neutral values, the atmosphere has been slower to respond and remains La Niña-like. Even as La Niña weakens, it can continue to influence global weather and climate.

All models anticipate SSTs in the central Pacific Ocean will warm further, but remain at neutral levels (neither La Niña nor El Niño) until at least mid-autumn. As accuracy is generally lower for long-range ENSO forecasts made during summer, ENSO outlooks that extend past autumn should be viewed with caution.

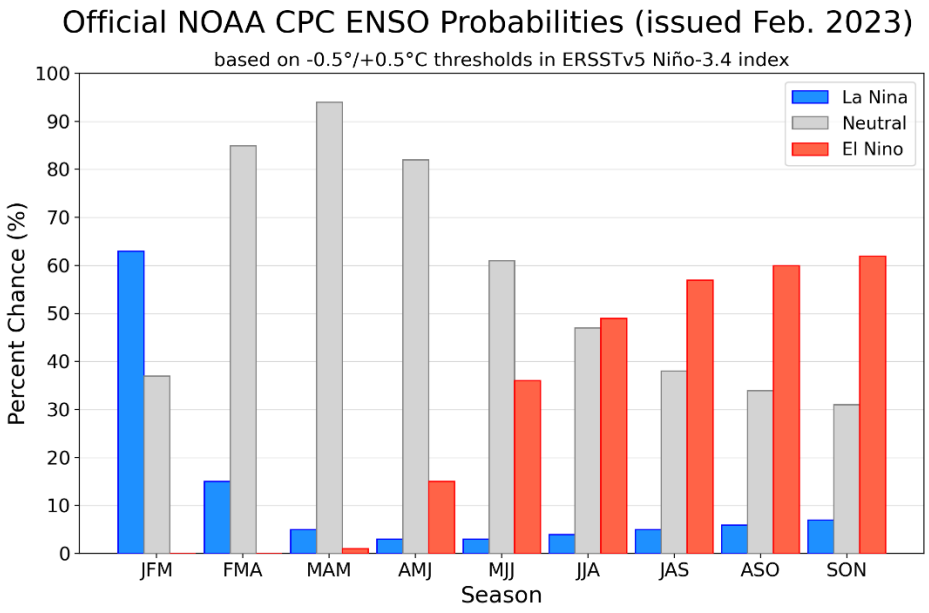
The Southern Annular Mode (SAM) is neutral but is expected to briefly dip into negative values before remaining neutral for the coming weeks to months.

A strong Madden–Julian Oscillation (MJO) pulse is currently over the western Pacific and is forecast to move into the eastern Pacific next week. An active pulse of the MJO over the Pacific Ocean may reduce trade wind strength and hence further weaken La Niña……..*Australian Bureau of Meteorology* - http://www.bom.gov.au

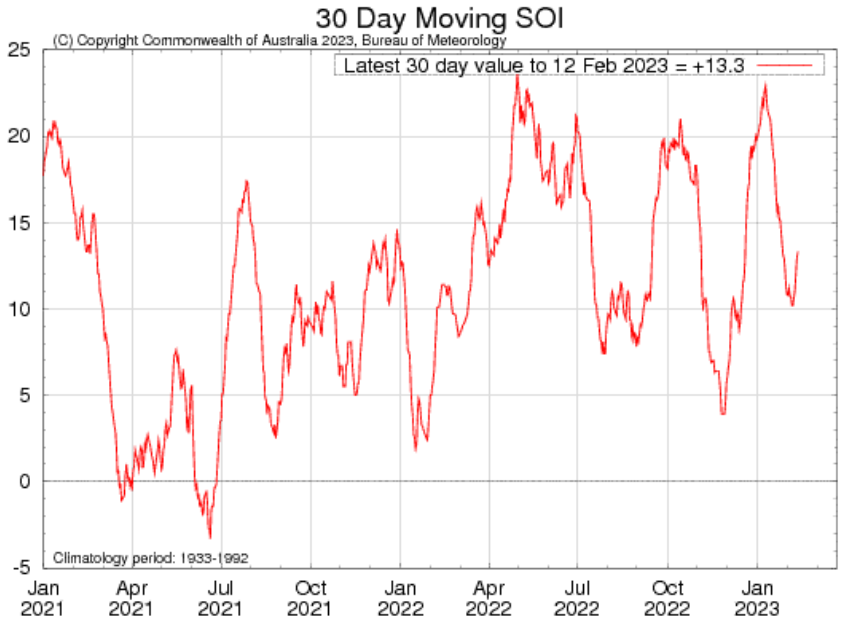
While La Niña conditions are associated with wetter than normal conditions over the summer rainfall region of South Africa, a positive SAM is associated with above-normal rainfall over the eastern parts during mid to late summer. A quick reduction in the SAM is often associated with the influence of west-wind troughs around South Africa and generally a large change in the position and strength of the pressure patterns to the south. The location of the MJO during the next few days (around Phase 7) is sometimes associated with above-normal rainfall or extreme events over South Africa.

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

According to the IRI (Updated 9 February): In mid-January 2023, sea surface temperatures in the central-eastern equatorial Pacific remain below-average. Key oceanic and atmospheric variables have remained consistent with La Niña conditions, though there are indications that this is weakening. A CPC La Niña Advisory still remains in place for January 2023. The majority of models (19 out of 23) in the IRI ENSO prediction plume predict SSTs to transition from the level of a La Niña to ENSO-neutral state during Feb-Apr, 2023. The likelihood of El Niño remains low through May-Jul 2023 (44% chance), but becomes the dominant category thereafter with probabilities in the 53-57% range…..*International Research Institute for Climate and Society*- http://iri.columbia.edu/



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



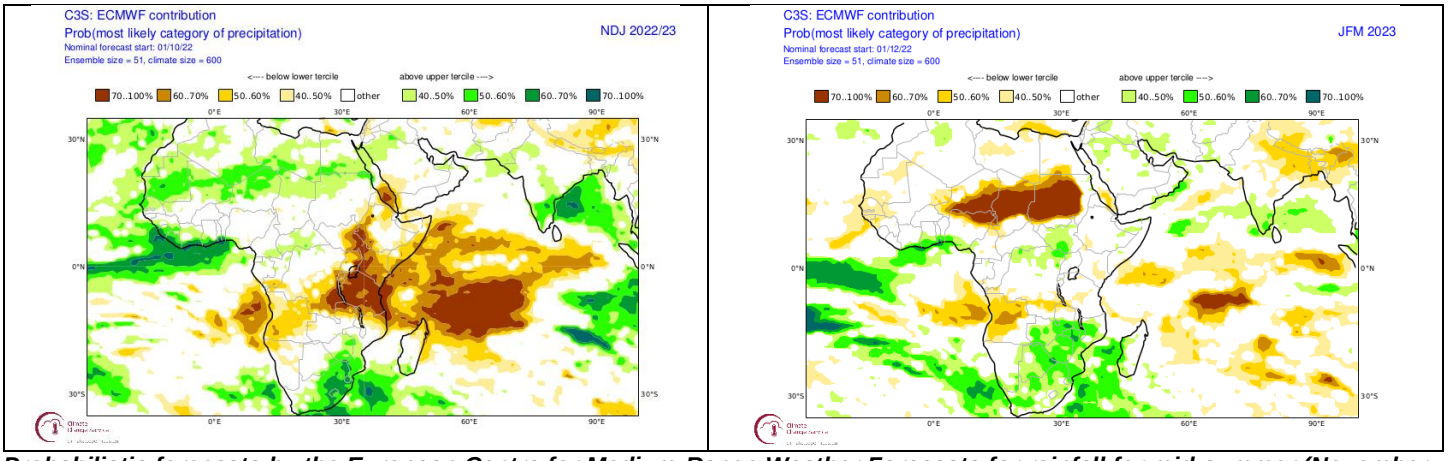
Australian Bureau of Meteorology - http://www.bom.gov.au

The Southern Oscillation Index is in positive territory (+10.2). This is indicative of atmospheric circulation patterns associated with La Niña conditions.

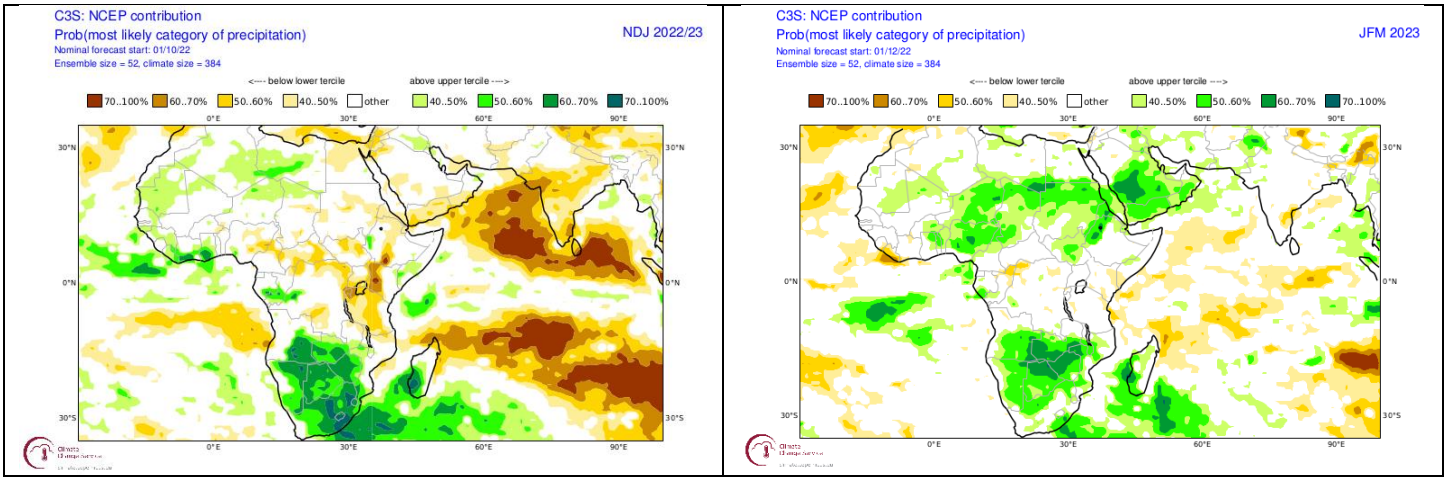
Seasonal forecasts issued by various international institutions

Seasonal forecasts (updated in October 2022) by these institutions, as published by the COPERNICUS Programme (***https://climate.copernicus.eu/seasonal-forecasts***) for both early to mid-summer, and mid-to late summer reflect an expectation for a relatively wet summer over the interior. The signal for relatively wet conditions over the summer rainfall region of South Africa is somewhat stronger for mid-summer (NDJ) than late summer (JFM) according to most of these

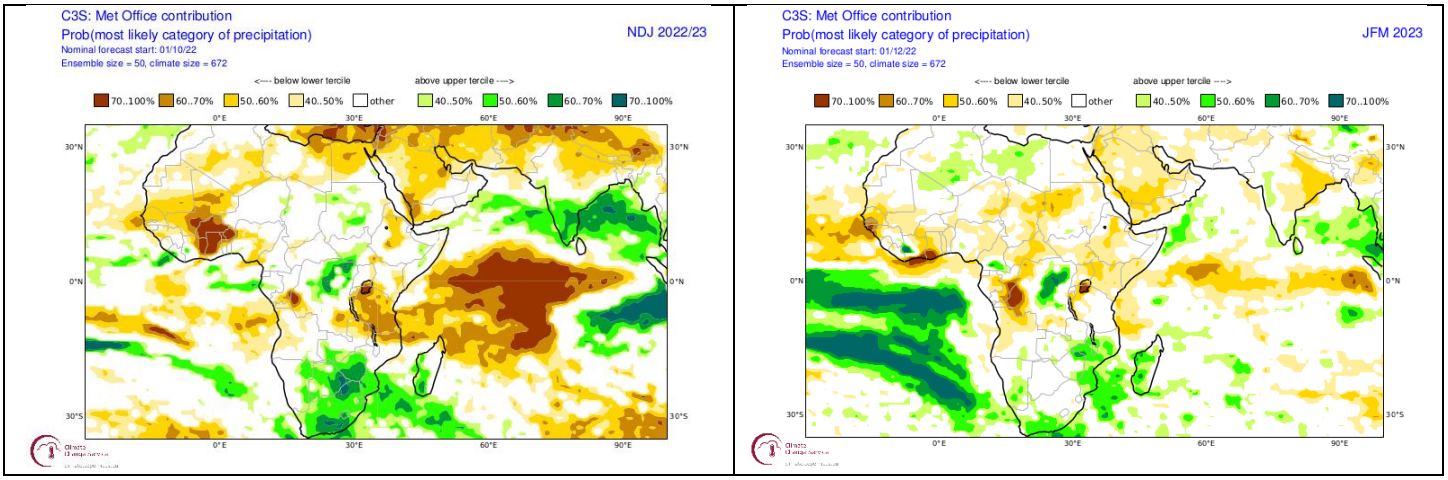
institutions. The relatively wet conditions expected are partly associated with the observed moderate La-Niña. Similar tendencies are also present in the IRI seasonal forecasts (not shown).



Probabilistic forecasts by the European Centre for Medium-Range Weather Forecasts for rainfall for mid-summer (November - January 2022/23; left – Forecast issued 2022-10) and late summer (January-March 2023; right - Forecast issued in 2022-12).



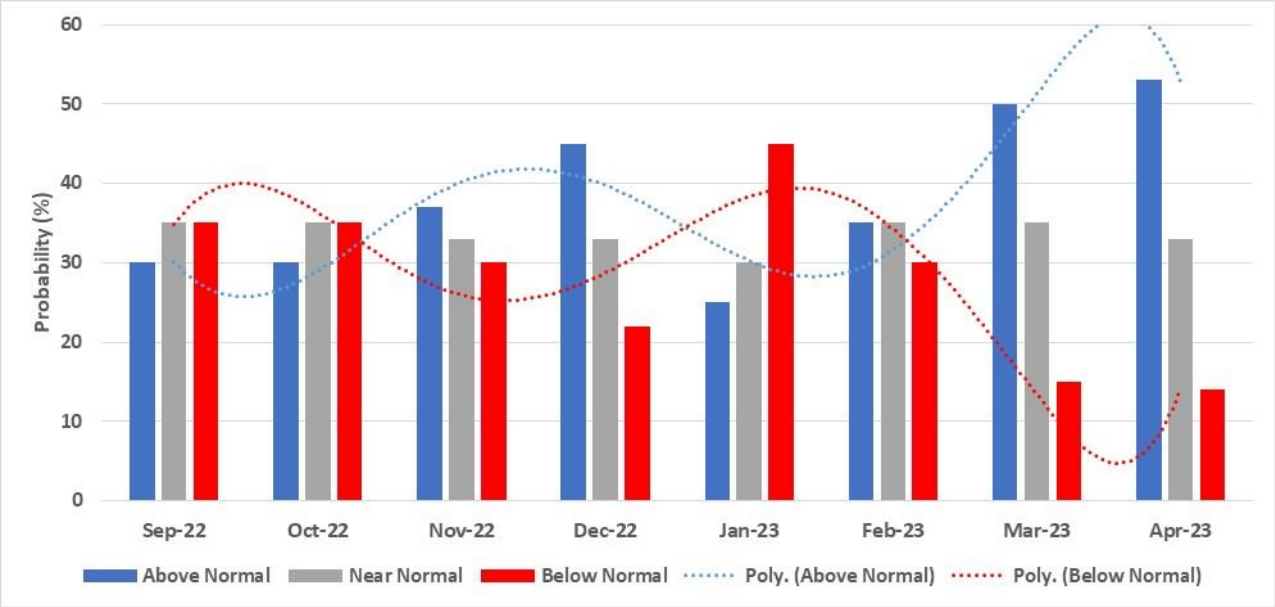
Same as above, but forecasts issued by the National Centres for Environmental Prediction.



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

CUMULUS seasonal outlook

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 2022/23 more often experience a seasonal rainfall curve that compares to normal conditions as indicated in the bar graph below, with wetter conditions focussing on November to December and again from mid-February to April while drier than normal conditions focus on October and January to mid-February:



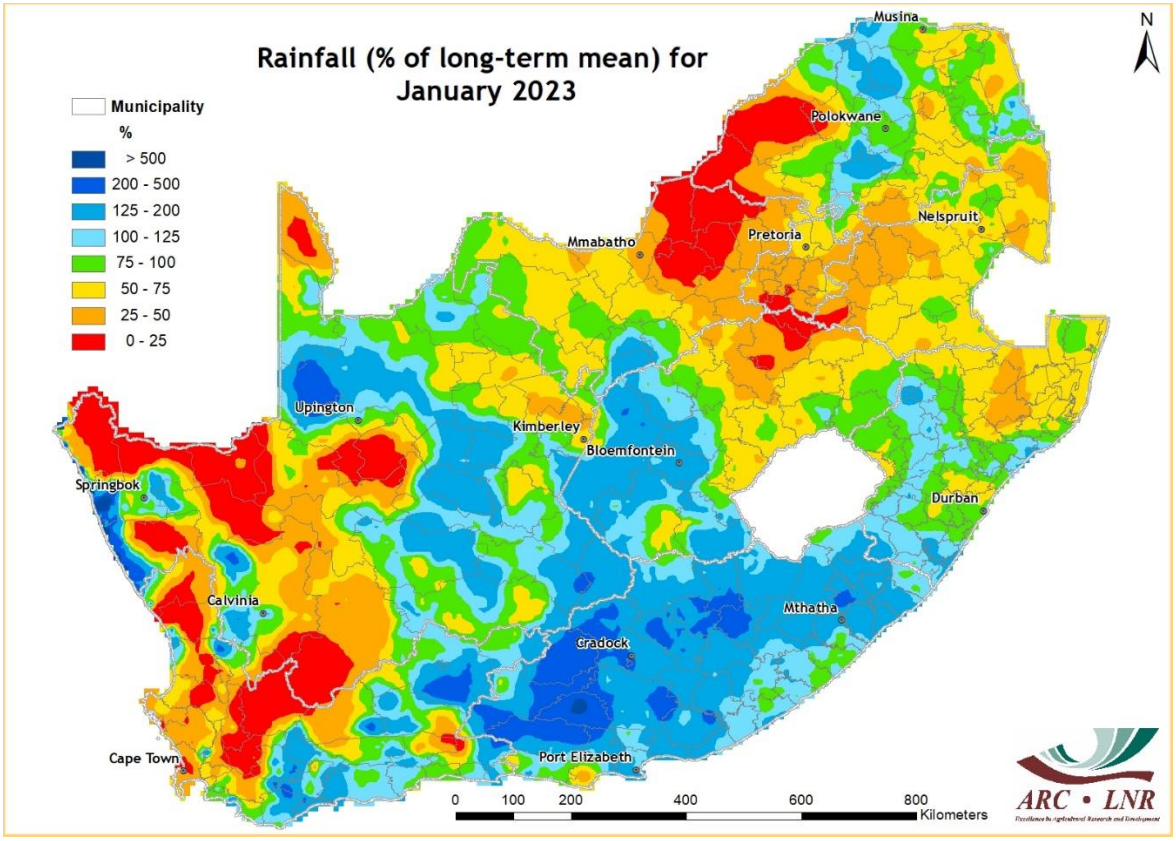
Probabilistic forecast for rainfall over the summer rainfall region, based on the natural cyclic nature of the climate system as seen in decadal variability, per month for the period September 2022 – April 2023 (Forecast issued in 2022-10).

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

- September – 9 October: Relatively dry conditions over the north-eastern half of the summer rainfall region
- 10 October – 10 November: Near-normal rainfall over the north-eastern half of the summer rainfall region
- 10 November – end of December: Near-normal to above-normal rainfall over the north-eastern half of the summer rainfall region
- January – mid-February: Below-normal rainfall over the north-eastern half of the summer rainfall region
- Mid-February - April: Above-normal rainfall over the north-eastern half of the summer rainfall region

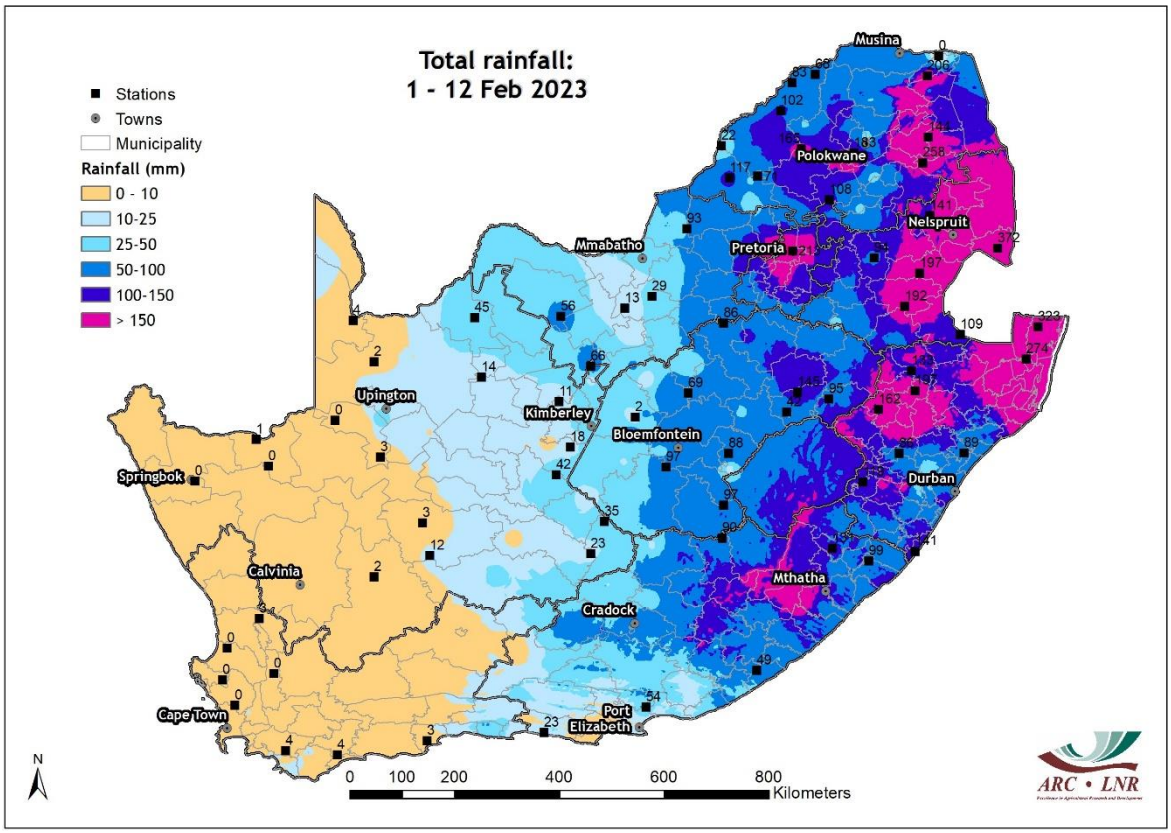
Observed conditions

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



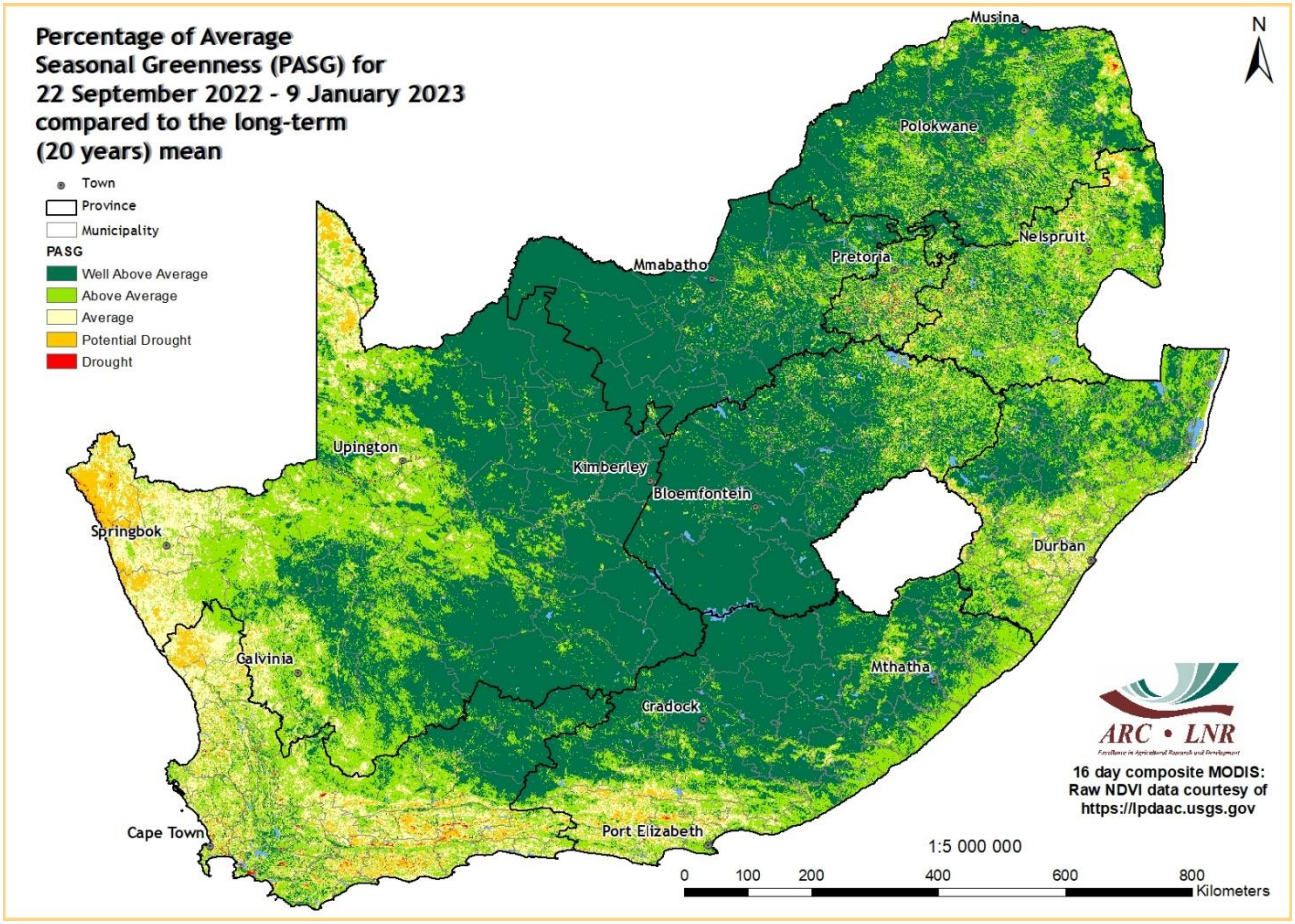
The northern half of the summer rainfall region received below-average rainfall during January while the southern parts received above-average rainfall. Rainfall over the winter rainfall region was mostly below average.

Rainfall (mm): 1 – 12 February 2023



Widespread rain occurred, especially over the eastern parts of the country, during the first half of February. Rainfall totals over the western parts of the summer-grain production region were somewhat disappointing so far, but these areas should receive widespread showers during the next few days.

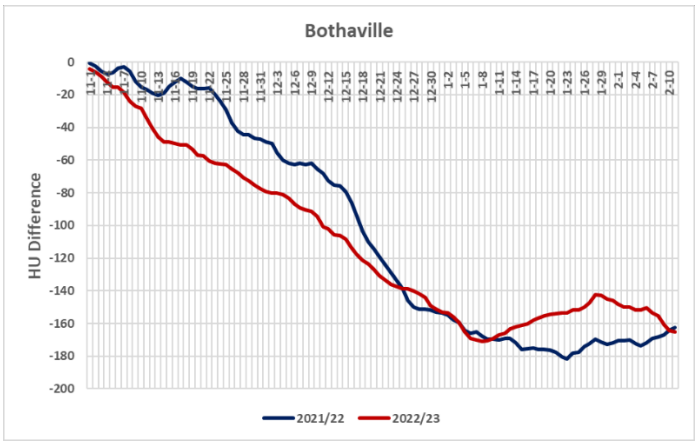
Percentage of Average Seasonal Greenness: September – January 2022

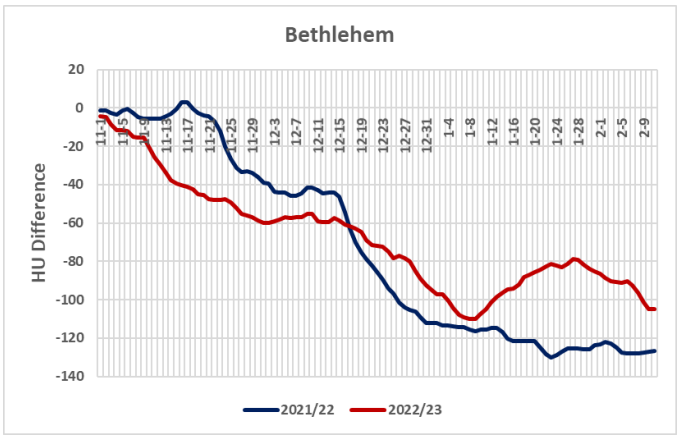


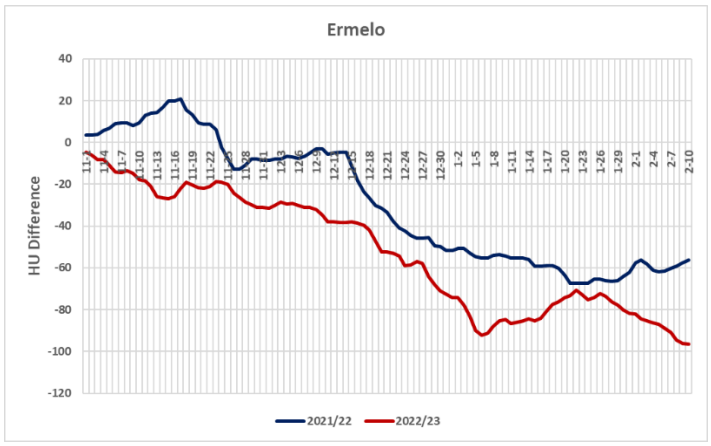
By early January, cumulative vegetation activity still reflected widespread above-normal rainfall since mid-October over most of the interior. Cumulative vegetation activity is below average over parts of the Karoo as well as the northern parts of the West Coast.

Heat units since 1 November 2022

Due to cool, rainy conditions around the middle of November and around mid- to late December together with cooler conditions since early February, heat units are behind the median value calculated over the last seven years over the summer-grain production region.







Cumulative heat units compared to the median over the last 7 years, for 1 November – 12 February 2021/22 (Blue) and for the same period in 2022/23 (Red) at Bothaville, Bethlehem and Ermelo. Positive (Negative) values indicate a surplus (deficit).

Cumulative heat units since 1 November still lag the 7-year median, but recent warm to hot and dry conditions have resulted in decreasing deficits relative to both last summer as well as the 7-year median. Cooler conditions currently may result in the deficit increasing further, especially over the eastern parts.

Sources of information

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

Rainfall, temperature and wind maps over South Africa for the past week:
Agricultural Research Council - Institute for Soil, Climate and Water (ISCW) – Climate Data Bank. Data recorded by the automatic weather station network of the ARC-ISCW.

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

Information related to: ENSO, IOD and SOI:
Australian Bureau of Meteorology - http://www.bom.gov.au
Climate Prediction Center - http://www.cpc.ncep.noaa.gov
International Research Institute for Climate and Society- http://iri.columbia.edu/

Information related to the SAM:
The Annular Mode Website - http://www.atmos.colostate.edu/ao/index.html

SST map:
NOAA Climate Prediction Center - http://www.cpc.ncep.noaa.gov

Daily conditions over South Africa:
Accumulations of GFS 6-hourly rainfall fields, done in Google Earth Engine

Tropical cyclone/hurricane/typhoon information:
Weather Underground - http://www.wunderground.com
Cooperative Institute for Meteorological Satellite Studies (CIMMS) - Tropical Cyclone Group -http://tropic.ssec.wisc.edu/
Tropical Cyclone Centre La Reunion -http://www.meteo.fr/temps/domtom/La_Reunion/webcmrs9.0/anglais/index.html

Information on drought conditions over the USA:
NOAA National Weather Service - http://www.weather.gov
United States Drought Monitor - http://droughtmonitor.unl.edu

Precipitation and temperature outlooks for the coming week:
Center for Ocean-Land-Atmosphere Studies (COLA) and Institute of Global Environment and Society (IGES) – http://Wxmaps.org
"COLA and IGES make no guarantees about and bear no responsibility or liability concerning the accuracy or timeliness of the images being published on these web pages. All images are generated by COLA and do not represent the actual forecasts issued by the National Weather Service. These products are not a substitute for official forecasts and are not guaranteed to be complete or timely. The underlying data are the direct product of the various operational forecast models.

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

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