CUMULUS SEASON 2023/2024

by J Malherbe, R Kuschke

22 February 2024



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

Seker fall

AgriSeker Onderskrywingsbestuurder (Pty) Ltd. Reg No: 2014/235270/07 is an Authorised Financial Service Provider FSP no: 45767. 22 Steenbok St, La Provance, P.O. Box 1479, Bethlehem, 9700. Underwritten by Land Bank Insurance (SOC) Ltd. Reg No: 2012/115426/30

Contents

Summary	3
Mostly warm and relatively dry conditions continue	3
Overview of expected conditions over the main agricultural production are	as4
Daily summary of expected conditions	6
Medium term rainfall and temperature summary	9
Possible extreme conditions - relevant to agriculture	10
Seasonal forecast	11
Current ENSO conditions:	11
Seasonal forecasts issued by various international institutions	13
CUMULUS seasonal outlook	15
Observed conditions	16
Rainfall (% of long-term mean): January 2024	16
Rainfall (% of long-term mean): 16 January – 21 February 2024	17
Rainfall (mm): 1 – 21 February 2024	18
Vegetation Condition Index: Late January 2024	19
Soil moisture conditions	20
Sources of information	21





Summary

Mostly warm and relatively dry conditions continue

Relatively dry and warm weather is expected to continue over the central interior. High temperatures and low rainfall will in most parts of the western summer-grain production region likely result in stressed conditions. However, isolated to scattered thundershowers will bring relief in some areas. Rainfall associated with thundershowers over the interior will likely again be very unevenly distributed. Due to the dry air invading from the west on a regular basis, thundershowers will again have an enhanced tendency to produce strong winds and also hail in places. Thundershowers are expected to be limited to the northeastern to northern parts from Sunday onwards while current forecasts indicate drier conditions further west, including the western summer grain-production region.

Once again, a significant cold front for this time of the year will invade the country from the southwest during the weekend. The system will result in cool, windy conditions over the southern parts of the country with some showers over the winter rainfall region and Garden Route. As mentioned last week, such a pattern, consisting of a low-pressure system over the southern parts with a frontal system moving across the southern parts of the country and dry air introduced over the interior from the west, is a feature more often associated with dry periods during summer. It reinforces the El Niño footprint in South Africa, consisting of below normal rainfall over the summer rainfall region while rainfall over the winter rainfall region is normal to above normal. The dry westerly to southerly winds will further enhance potential evaporation over the central interior, including large parts of the grain-production region. While lower temperatures are expected especially over the southern parts of the interior, current forecasts limit the extent of temperatures that may result in frost to the southern than with the previous cold front, even though still within single digits over the southern to eastern Free State early next week according to current forecasts. The potential for early frost is somewhat enhanced during El Niño or generally dry summers over the interior, as the same atmospheric circulation patterns resulting in relatively dry conditions are also responsible for the occasional influx of colder dry air over the interior.

It will become cooler over the eastern parts next week as the high pressure system behind the abovementioned cold front ridges to the south, but the central interior is expected to remain hot.

Looking further ahead, large-scale circulation patterns in the southern African region remains unfavorable, resulting in relatively dry conditions over most of the subcontinent under the influence of an upper-air high. Equatorial convection globally are not indicative of a strong forcing currently. During early March, there is potential for an upper-air system to develop and cause more widespread rainfall, but current forecasts are very uncertain for that specific period and the exact evolution of the system will be important. More broadly, forecast models still are not picking up on any large-scale shift in atmospheric circulation over the adjacent oceans that may result in widespread wet weather over South Africa, signaling a potential continuation of relatively dry conditions into March. However, generally speaking, one or two more widespread rainfall events during March in El Niño summers are not uncommon. However, during some of those summers, these events are mostly limited to the northeastern parts.





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

- Temperatures will be above normal over most of the interior, but below normal over the southwestern parts, including the winter rainfall region and the Garden Route.
- It will be hot to very hot at times over most of the interior.
- Cooler air will invade the winter rainfall region in the southwest by Saturday, spreading over the southern parts of
 the country and eventually along the southern to southeastern escarpment on Sunday. This invasion of cool to cold
 air over the southern parts may again result in low minimum temperatures for this time of the year and even a small
 chance for frost over the southern to southeastern escarpment on Monday and Tuesday morning according to
 current forecasts.
- Cooler easterly winds will invade the interior early next week, resulting in lower temperatures over the eastern half of the country, a moderation in temperatures over the central interior, but a continuation of hot conditions in the west.
- Rainfall will be below normal over most of the country. Near normal to above-normal rainfall may occur in places over the northeastern interior as well as in the far west and winter rainfall region.
- Showers are possible over the winter rainfall region on Saturday.
- Isolated to scattered thundershowers are expected over the central to eastern and northeastern parts of the country until Sunday, but will be confined to the northern and eastern parts from Monday onwards according to current forecasts, as dry air invades the central to western parts.
- Thundershowers over the northern to eastern interior will have an enhanced tendency to become severe, producing strong winds and possibly hail in some instances.
- The winter rainfall region will be cool and windy with showers during the weekend as a cold front moves through. With easterly winds expected to be present over the region from Sunday onwards, temperatures will increase and it will be hot again from Tuesday onwards over the western areas and interior while it may remain mild along the Garden Route in the south. Except for some showers during the weekend, the region is expected to remain mostly dry.
- The summer-grain production region: It will be hot on most days over the central to western parts of the region. Thundershowers will occur initially over the entire region, but mostly over the eastern to northern and central parts of the region from Sunday onwards when the west will be dry according to current forecasts. Cooler, dry air will invade the region from the south on Sunday, resulting in lower minimum temperatures once again over the southern parts. While forecasts may still change, temperatures are not expected to fall as low as during the previous cold event last weekend. However, light frost may again occur over the southern high-lying areas mostly to the south of the Free State and in Lesotho, but forecasts may still change closer to the time. Cooler air will also invade the region in the form of easterly winds which will result in lower temperatures over the central to eastern parts of the region from late Sunday onwards, but maximum temperatures over the western parts should remain in the lower-to-mid 30s while the east is cooler.





Overview of expected conditions over the main agricultural production areas

Atmospheric circulation patterns will not be conducive of widespread rainfall over the interior, but will support isolated to scattered thundershowers over the central to northeastern parts at times. A cold front will bring cooler and windy weather to the southern parts during the weekend while a ridging high behind the front will also bring cooler weather to the southeastern to eastern parts early next week.

Maize production region:

It will be a warm to hot period, especially over the central to western parts of the region. Thundershowers are expected initially over the entire region but may be confined to the northern and eastern parts by next week. It will be somewhat cooler with a westerly to southerly wind over the southern parts from Sunday evening until early Tuesday, with minimum temperatures on Monday and Tuesday morning around 10°C over the western to southern parts and along the Drakensberg:

- Maximum temperatures over the western maize-production areas will range between 33 and 39°C on most days.
 Minimum temperatures will be in the order of 16 21°C, but closer to 10°C towards the south early next week.
- Maximum temperatures over the eastern maize-production region will range between 31 and 35°C until Sunday, but may moderate to the lower and mid-20s early next week. Minimum temperatures will be in the order of 11 - 16°C, but closer to 10°C early next week.
- **Thursday (22nd):** Partly cloudy and hot, with fresh north-westerly to westerly winds over the central to western parts. Isolated thundershowers are expected over the central to eastern parts from the afternoon.
- Friday (23rd): Partly cloudy and warm to hot in the west with fresh north-westerly winds. Isolated thundershowers are possible in the afternoon and evening, but scattered in the western and central areas of the region.
- Saturday (24th): Partly cloudy and warm, but hot over the central to western parts with fresh north-westerly winds. Scattered thundershowers are possible.
- Sunday (25th): Partly cloudy and hot, with fresh northwesterly winds over the central to western parts where it will be hot. Scattered thundershowers are expected over the eastern to north-eastern parts. It will become cooler by the evening over the southern parts.
- Monday (26th) to Wednesday (28th): According to current forecasts, thundershowers will remain in place over the eastern parts early in the week. It will also be significantly cooler over the eastern to central parts as easterly winds with somewhat more extensive cloud cover will be present from Sunday into the week. It will however remain hot over the western parts where it should be dry until at least Tuesday. The cooler air invading the southern to eastern high-lying parts of the region early in the week will result in minimum temperatures in the single digits. Current forecast however are not indicative of frost over the region, but possibly towards the south over the high-lying parts of the Eastern Cape and Lesotho.

Cape Wine Lands and Ruens: A cold front will result in light showers during the weekend. From early next week, current forecasts indicate the re-emergence of hot conditions, especially over the western parts and interior.

Daily summary of expected conditions

(GFS forecast downscaled using WRF)



- Showers are expected over the winter rainfall region and further east along the Garden Route and southern Karoo on Saturday and early Sunday.
- A band of thundershowers will develop over the central to northeastern parts daily, relocating further east while the central parts may be dry from Sunday onwards.
- Light showers will occur along the southeastern to eastern coastal region from Sunday onwards.



Average minimum temperatures

- Average minimum temperatures over the interior will range between 10 and 20°C, with highest temperatures in the north and lower temperatures over the higher lying southern interior.
- Average minimum temperatures will exceed 20°C over the eastern coastal areas and in the north towards Botswana.

Lowest minimum temperatures

- Lowest minimum temperatures will remain above 5°C over the summer grain production region.
- Lowest minimum temperatures over the southern high-lying areas will again fall below 5°C. Current forecasts don't indicate such low temperatures over the southern Free State as during the previous forecast.







Average maximum temperatures

- Average maximum temperatures will be above 30°C over most of the interior to the north of the Orange River.
- It will be consistently hot on average over the northern parts with average maximum temperatures exceeding 35°C.



Highest maximum temperatures

- Hot conditions, with maximum temperatures exceeding 40°C, will occur at times over the northern parts of the Northern Cape and possibly the eastern parts of KZN and the Eastern Cape.
- Highest maximum temperatures during the next few days will exceed 35°C over most areas except the escarpment, Eastern Highveld and southeastern parts.





Medium term rainfall and temperature summary



GrADS/COLA



GrADS/COLA

GEFS Accumulated Precip. Anomaly (mm) from 12z21Feb2024 to 12z28Feb2024 (Days 1-7) GEFS Accumulated Precip. Anomaly (mm) from 12z28Feb2024 to 12z06Mar2024 (Days 8-14) TROPICAL TIDBITS.COM ROPICALTIDBITS.COM 21 2024 205 -60 -80 -100 150 250

The GFS ensemble forecast (consisting of several forecasts with small initialization differences) favors near normal to above-normal rainfall over the interior but below-normal rainfall over the larger southern African region during the next few days (left). For the remainder of the period into early March (right), the familiar patterns of above-normal rainfall is indicated over the eastern interior with near-average rainfall over the rest of the country. However, overall, the drier signal over the larger southern African region south of 15°S is still consistent with an El Niño situation.

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 22 February) period. It is therefore advised to keep track of warnings that may be issued by the SAWS (<u>www.weathersa.co.za</u>) as the week progresses.

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

- It will be hot and humid:
 - Limpopo River Valley: Thursday to Sunday (22nd to 25th).
 - Lowveld: Thursday to Sunday (22nd to 25th), extremely hot by Saturday and Sunday.
 - Eastern KZN and northeastern Eastern Cape: Sunday (25th).
 - Central to northern KZN: Friday to Sunday (22nd to 25th).
- It will be hot:
 - Northern half of the Northern Cape: Thursday to Saturday (22nd to 24th), Monday to Wednesday (26th to 28th).
 - North West, Limpopo, Gauteng, northern to western and Free State: **Thursday to Sunday (22nd to 25th).**
 - Winter rainfall region: Monday to Wednesday (26th 28th).
 - Karoo (Western and Eastern Cape) and rest of the interior of the Western and Eastern Cape: Friday and Saturday (23rd – 24th).
 - Western parts of the Northern Cape: Monday to Wednesday (26th to 28th).
- It will be warm to hot and windy, enhancing the fire hazard where vegetation is dry:
 - Western to southern, southeastern and central interior: Friday and Saturday (23rd 24th).
- Some thundershowers may become severe:
 - Free State, North West: **Saturday (24th).**
 - Eastern North West, Gauteng, western to central Mpumalanga, western KZN, northeastern Free State, western to central Limpopo: Sunday and Monday (25th 26th).
- Colder conditions may adversely affect small stock:
 - Cool to cold, windy conditions with showers over the mountainous southern parts of the Western Cape and southwestern parts of the Eastern Cape: Saturday to Sunday (24th – 25th).
 - Cool to cold and windy over the Eastern Cape interior and adjacent parts of neighboring provinces: Sunday to
 Monday (25th 26th).
- Light frost is possible:
 - High-lying interior of the Eastern Cape, Lesotho: Monday and Tuesday morning (26th 27th).
 - Forecasts should be watched for early next week, current forecast are still not indicative of frost over the highlying southern to eastern parts of the Free State. It is advisable to track forecasts with regard to the cold invasion around early next week, in the light of recent light frost in the region (southern to eastern high-lying areas of the Free State): Monday and Tuesday morning (26th – 27th).

Seasonal forecast

Current ENSO conditions:

The current El Niño event is expected to last through our summer at least into early 2024 and it is unlikely that this outlook will change much during the next few months. Atmospheric indicators were consistent with an event where coupling between the ocean and atmosphere is present until December, showing a mature state of the event. Observed trade winds in the Equatorial Pacific were weaker than average until December also, but have recently become near average. Likewise, the Southern Oscillation Index have trended positive during the last month and is now in neutral to positive territory. Both these trends remain indicative of atmospheric patterns becoming less characteristic of that associated with El Niño.

The International Research Institute for Climate and Society (IRI)'s latest ENSO forecast however maintains the expectation of a continuation of El Niño, at least in terms of Sea Surface Temperatures, into autumn:



Official NOAA CPC ENSO Probabilities (issued Jan. 2024)

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

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



El Niño persists

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

In their most recent update (issued 19 January), the IRI notes As of mid-Jan 2024, El Niño conditions in the centraleastern equatorial Pacific remain strong with key oceanic and atmospheric variables consistent with an ongoing El Niño event. However, the traditional Southern Oscillation Index is in ENSO-neutral range. A CPC El Niño advisory remains in place for January 2024. Almost all the models in the IRI ENSO prediction plume forecast a continuation of the El Niño event until *about March* 2024, which rapidly weakens thereafter. ENSO-neutral conditions become the most likely category in Apr-Jun, and May-Jul of 2024. For Jun-Aug 2024, no single category stands out as dominant, with ENSO-neutral and La Niña being almost equally likely. By Jul-Sep 2024, La Niña becomes the most probable category, with a likelihood of 58%... <u>https://iri.columbia.edu</u>

In their most recent update (20 February), the Australian Bureau of Meteorology states that "El Niño persists, although a steady weakening trend is evident in the oceanic indicators. Sea surface temperatures in the central tropical Pacific and temperatures in the Pacific sub-surface show a clear cooling trend, in line with typical event decay. Atmospheric indicators have been mixed over the past fortnight; cloudiness near the Date Line has increased, while the 30-day Southern Oscillation Index (SOI) has returned to negative values (both characteristic of an El Niño state). This is expected to be a temporary fluctuation (often observed during summer) and most likely the result of the slow-moving Madden Julian Oscillation in the region.

International climate models suggest the central tropical Pacific Ocean will continue to cool in the coming months, with four of seven climate models indicating the central Pacific is likely to return to neutral El Niño–Southern Oscillation (ENSO) levels in April (i.e., neither El Niño nor La Niña), and all models neutral in May. ENSO predictions made in late summer and autumn tend to have lower accuracy than predictions made at other times of the year. This means that current forecasts of the ENSO state beyond May should be used with caution.

Based on the historical record from 1900, around 50% of El Niño events have been followed by a neutral year, and 40–50% have been followed by La Niña. However, global oceans have warmed significantly over the past 50 years. The oceans have been the warmest on record globally between April 2023 and January 2024. These changes may make a difference when predicting future ENSO events based on historical activity. - <u>http://www.bom.gov.au</u>.

The 30-day Southern Oscillation Index (SOI) is currently -17.1 and therefor indicative of atmospheric pressure patterns in the Australia – Pacific region being in El Niño mode. This is associated with lower rainfall over southern Africa.



Australian Bureau of Meteorology - <u>http://www.bom.gov.au</u> Page 12 of 22

Seasonal forecasts issued by various international institutions

Seasonal forecasts (updated in January 2024) by various institutions, as published by the COPERNICUS Programme (*https://climate.copernicus.eu/seasonal-forecasts*) and by the IRI, still expect drier conditions for the remainder of summer. The drier pattern expected across most of southern Africa is to be expected with regard to seasonal forecasts given the current El Niño event. Forecasts still lean more strongly towards drier than normal conditions over the central to western parts of the country with the somewhat wetter or near normal signal over the eastern parts.



Probabilistic forecasts by the European Centre for Medium-Range Weather Forecasts for rainfall for mid-to-late summer (January-March 2024; left - Forecast issued in 2023-11; and for late summer (February to March 2024 right – Forecast issued in 2024-01).



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







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



Probabilistic forecasts by the International Research Institute for Climate and Society (IRI) for rainfall for mid-to-late summer (January-March 2024; left - Forecast issued in 2023-11) and late summer (February to April, right – Forecast issued in 2024-01).





CUMULUS seasonal outlook

This outlook is based on the typical observed rainfall patterns over the **north-eastern half** of the country (including most of the summer grain production region), as associated with the cyclic variability of the global climate system. Summers that are similar to 2023/24 usually experience near normal to below normal rainfall in total, with alternating wet and dry periods throughout the summer rather than one half of the summer being dry while the other half is wet.



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

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

- September first half of October: Relatively dry conditions over the north-eastern half of the summer rainfall region
- Second half of October early November: Near-normal rainfall over the north-eastern half of the summer rainfall region
- First half of November: Near-normal to below-normal rainfall over the north-eastern half of the summer rainfall region
- Late November and December to early January: Above-normal rainfall over the north-eastern half of the summer rainfall region
- Rest of January: Below-normal rainfall over the north-eastern half of the summer rainfall region
- February: Normal to above-normal rainfall over the north-eastern half of the summer rainfall region
- Late February and early March: Below-normal rainfall over the north-eastern half of the summer rainfall region
- Late March into Early April: Normal to above-normal rainfall over the north-eastern half of the summer rainfall region





Observed conditions

Rainfall (% of long-term mean): January 2024



Most of the country received near to above-average rainfall during January in total. Most of the rain over the interior occurred before the middle of the month. Parts of the northern to eastern Free State and southern Mpumalanga received below-average rainfall.





Rainfall (% of long-term mean): 16 January – 21 February 2024



Following above-average rainfall during December and early January, the period from mid-January to February so far was characterized by relatively dry conditions over especially the central to southern parts. Rainfall over the northeastern parts was closer to the average and in some areas above average.





Rainfall (mm): 1 – 21 February 2024



The central to western interior saw little in the way of rain during February so far. The western to central parts of Limpopo, large parts of Mpumalanga and interior of KZN received in excess of 50 mm of rain.





Vegetation Condition Index: Late January 2024



By late January, below-normal vegetation activity was confined to the Northern Cape, small areas of central to northern North West, the Lowveld of Mpumalanga and parts of the Karoo. Vegetation activity was above normal over most of the rest of the country.





Soil moisture conditions



The Root Zone (top 1 meter) Drought Indicator shows that soil moisture is below normal (between the 20th and 5th percentile) for this time of the year (by 19 February) over large parts of the summer-grain production region (indicated on the map) following drier conditions during the second half of January and February. Recent thundershowers however resulted in near-normal root zone moisture over large parts of the eastern production areas in Mpumalanga

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





Sources of information

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

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

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

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

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

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

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

Daily conditions over South Africa: WRF model downscalings of GFS forecasts.

Fires:

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

Soil moisture: https://nasagrace.unl.edu/

Precipitation and temperature outlooks for the coming week:

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





YOUNG PEOPLE SEE THE FUTURE



The way in which **young people see the future** speaks of a positive attitude – and of the choice to be relevant in a new era. AgriSeker shares this excitement about the future of agriculture in South Africa. Our motto is 'A certain future', after all.

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.

Ask your insurance broker or find us online at agriseker.co.za

AgriSeker Onderskrywingsbestuurder (Pty) Ltd. Reg no. 2014/235270/07 is an Authorised Financial Service Provider: FSP no. 45767. Underwritten by Land Bank Insurance (SOC) Ltd. Reg no. 2012/115426/30.