

Seasonal Climate Watch

September 2023 to January 2024

Date issued: Aug 28, 2023

1. Overview

The El Niño-Southern Oscillation (ENSO) is currently in an El Niño state and according to the latest predictions is expected to persist through most of the summer months. ENSO's typical impact on Southern Africa is in favour for generally drier and warmer conditions during the summer seasons from October to March. Current global forecasts indicate a great deal of uncertainty for the typical drier conditions that South Africa experiences during an El Niño.

The multi-model rainfall forecast indicates above-normal rainfall for most of the country during mid-spring (Sep-Oct-Nov) and late-spring (Oct-Nov-Dec). The early-summer (Nov-Dec-Jan) however, indicates below-normal rainfall over the central parts of the country and above-normal rainfall for the north-east.

Minimum and maximum temperatures are expected to be mostly above-normal countrywide for the forecast period.

The South African Weather Service (SAWS) will continue to monitor the weather and climate conditions and provide updates on any future assessments that may provide more clarity on the current expectations for the coming season.

2. South African Weather Service Prediction System

2.1. Ocean-Atmosphere Global Climate Model

The SAWS is currently recognised by the World Meteorological Organization (WMO) as a Global Producing Centre (GPC) for Long-Range Forecasts (LRF). This is owing to its local numerical modelling efforts, which involve coupling of both the atmosphere and ocean components to form a fully interactive coupled modelling system, named the SAWS Coupled Model (SCM), the first of its kind in both South Africa and the region. Below are the first season (September-October-November) predictions for rainfall (Figure 1) and average temperature (Figure 2).

SAWS OPERATIONAL ENSEMBLE PREDICTION SYSTEM

SCM Seasonal Forecasts
Most likely Category of Rainfall
Forecast Period: Sep 2023 – Nov 2023

No Significance Test Applied
Ensemble size 40
Last Updated 15 Aug 2023

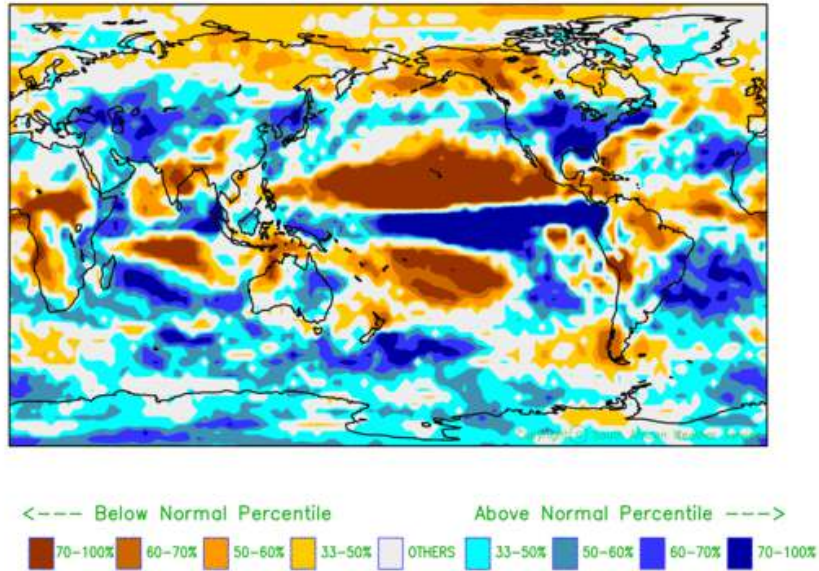


Figure 1: September-October-November, SON (2023) global prediction for total rainfall probabilities

SAWS OPERATIONAL ENSEMBLE PREDICTION SYSTEM

SCM Seasonal Forecasts
Most likely Category of 2m Temperature
Forecast Period: Sep 2023 – Nov 2023

No Significance Test Applied
Ensemble size 40
Last Updated 15 Aug 2023

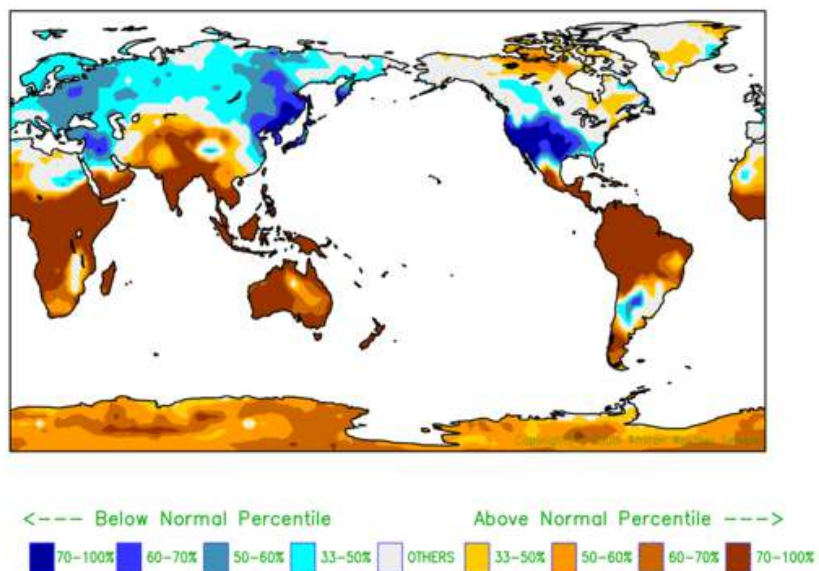


Figure 2: September-October-November, SON (2023) global prediction for average temperature probabilities

2.2. Seasonal Forecasts for South Africa from the SAWS seasonal prediction system

The above-mentioned global forecasting systems' forecasts are combined with the GFDL-SPEAR and COLA-RSMAS-CCSM4 systems (part of the North American Multi-Model Ensemble System) for South Africa, as issued with the August 2023 initial conditions, and are presented below:

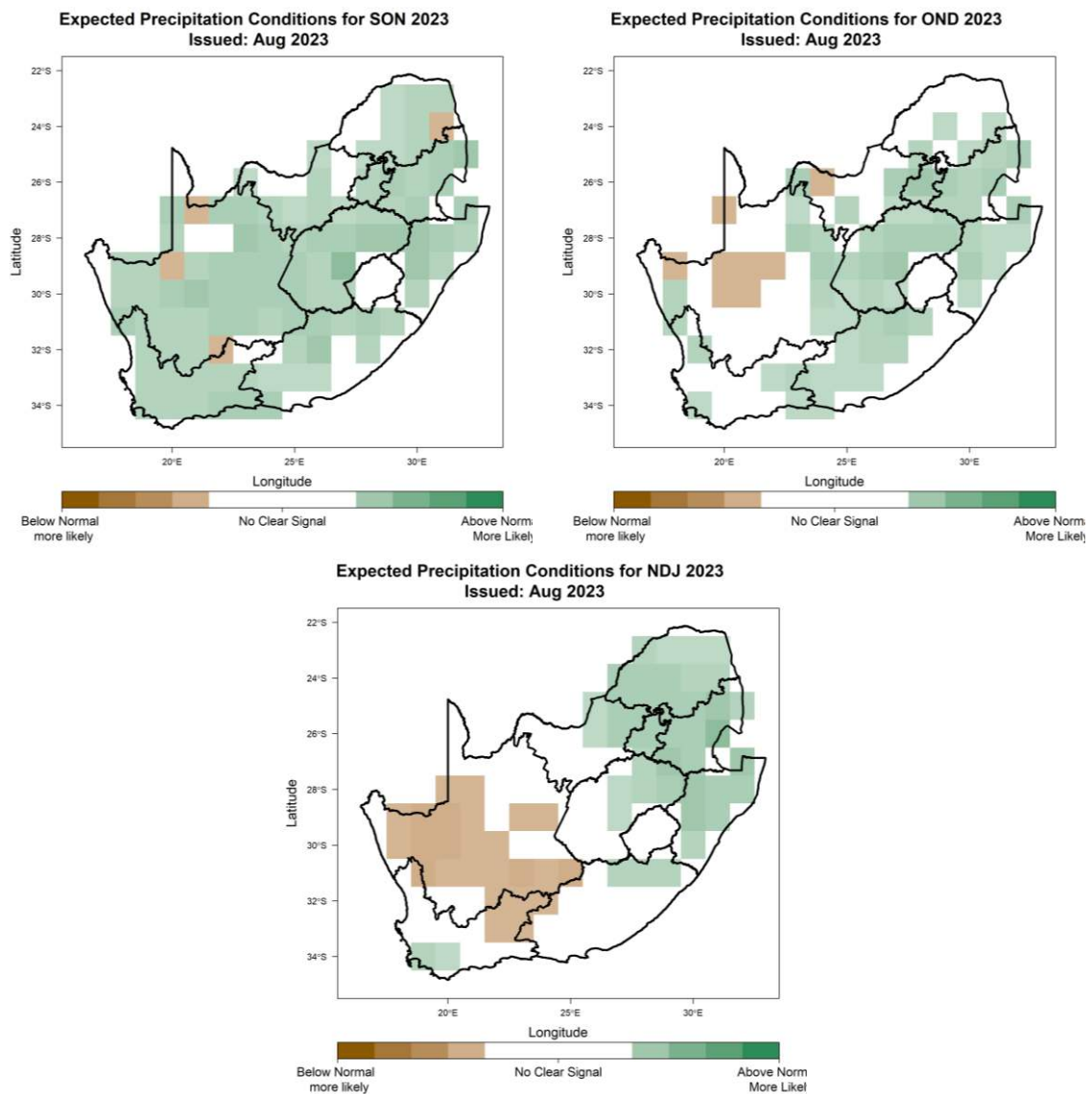


Figure 3: September-October-November 2023 (SON; left), October-November-December 2023 (OND; right), November-December-January 2023/24 (NDJ; bottom) seasonal precipitation prediction. Maps indicate the highest probability of the above-normal and below-normal categories. Please refer to appendix figure A1 for forecast skill levels.

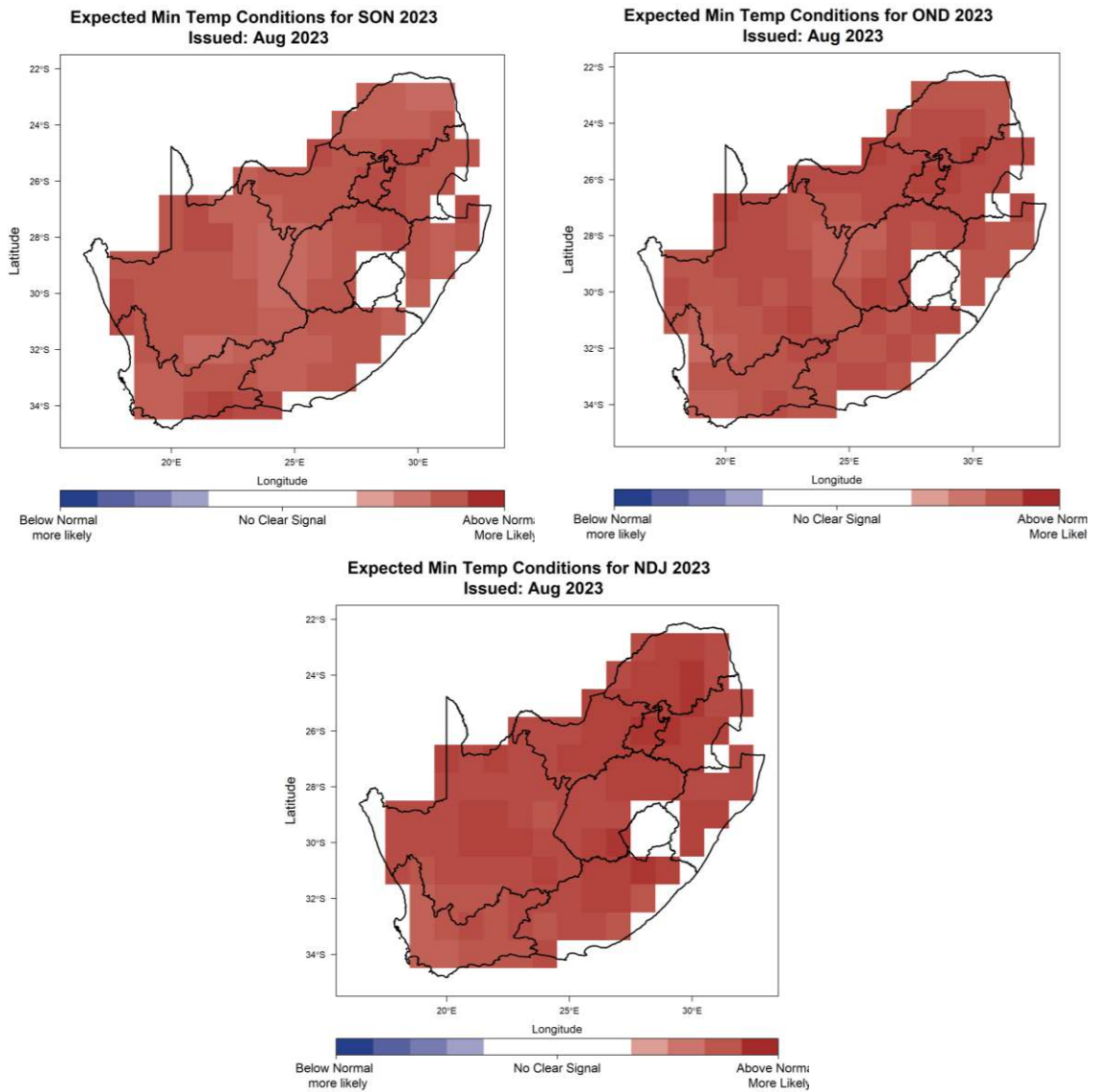


Figure 4: September-October-November 2023 (SON; left), October-November-December 2023 (OND; right), November-December-January 2023/24 (NDJ; bottom) seasonal minimum temperature prediction. Maps indicate the highest probability of the above-normal and below-normal categories. Please refer to appendix figure A2 for forecast skill levels.

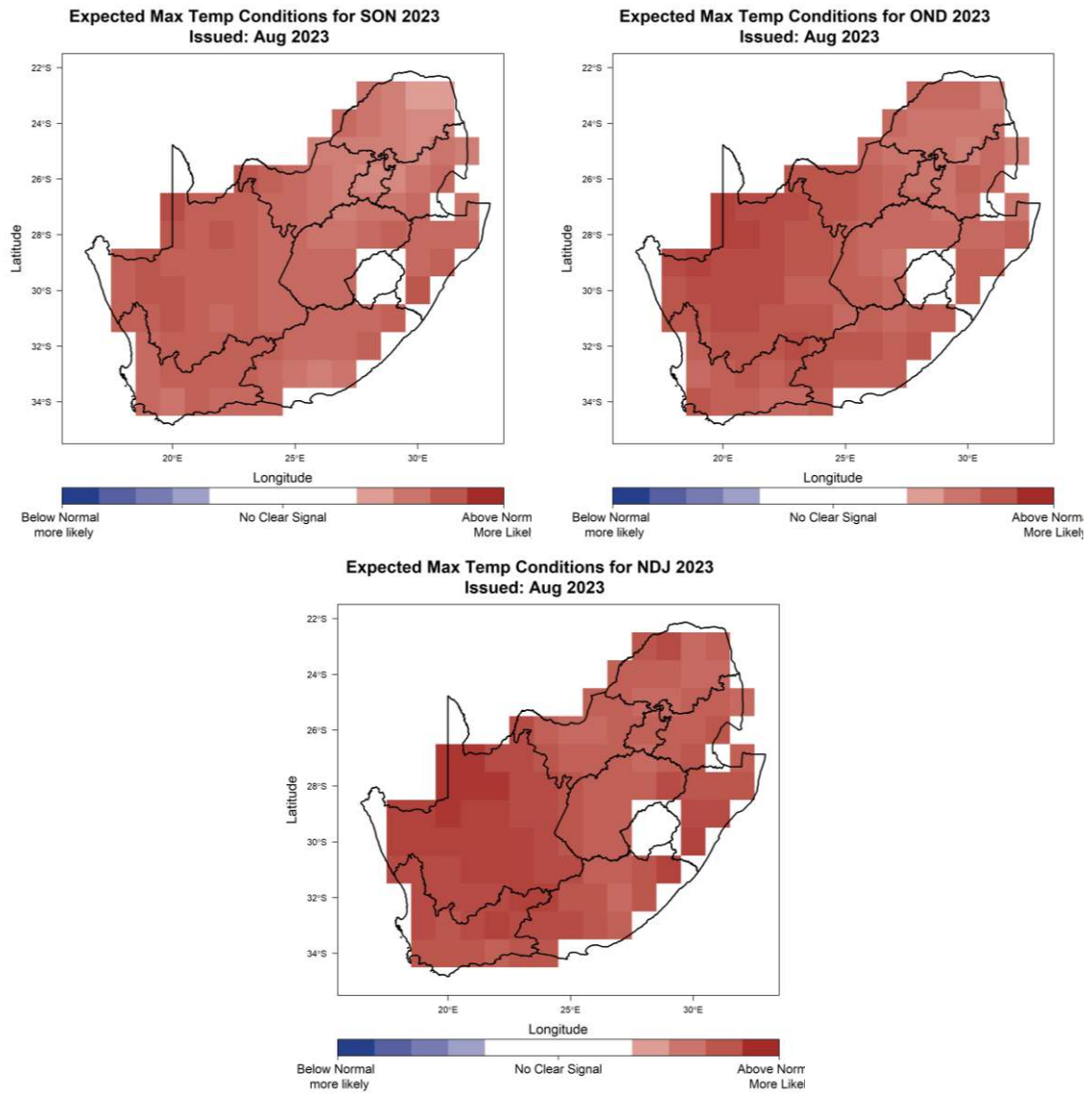


Figure 5: September-October-November 2023 (SON; left), October-November-December 2023 (OND; right), November-December-January 2023/24 (NDJ; bottom) seasonal maximum temperature prediction. Maps indicate the highest probability of the above-normal and below-normal categories. Please refer to appendix figure A3 for forecast skill levels.

2.3. Climatological Seasonal Totals and Averages

The following maps indicate the rainfall and temperature (minimum and maximum temperature) climatology for the August-September-October, September-October-November and October-November-December seasons. The rainfall and temperature climates are representative of the average rainfall and temperature conditions over a long period of time for the relevant 3-month seasons presented here.

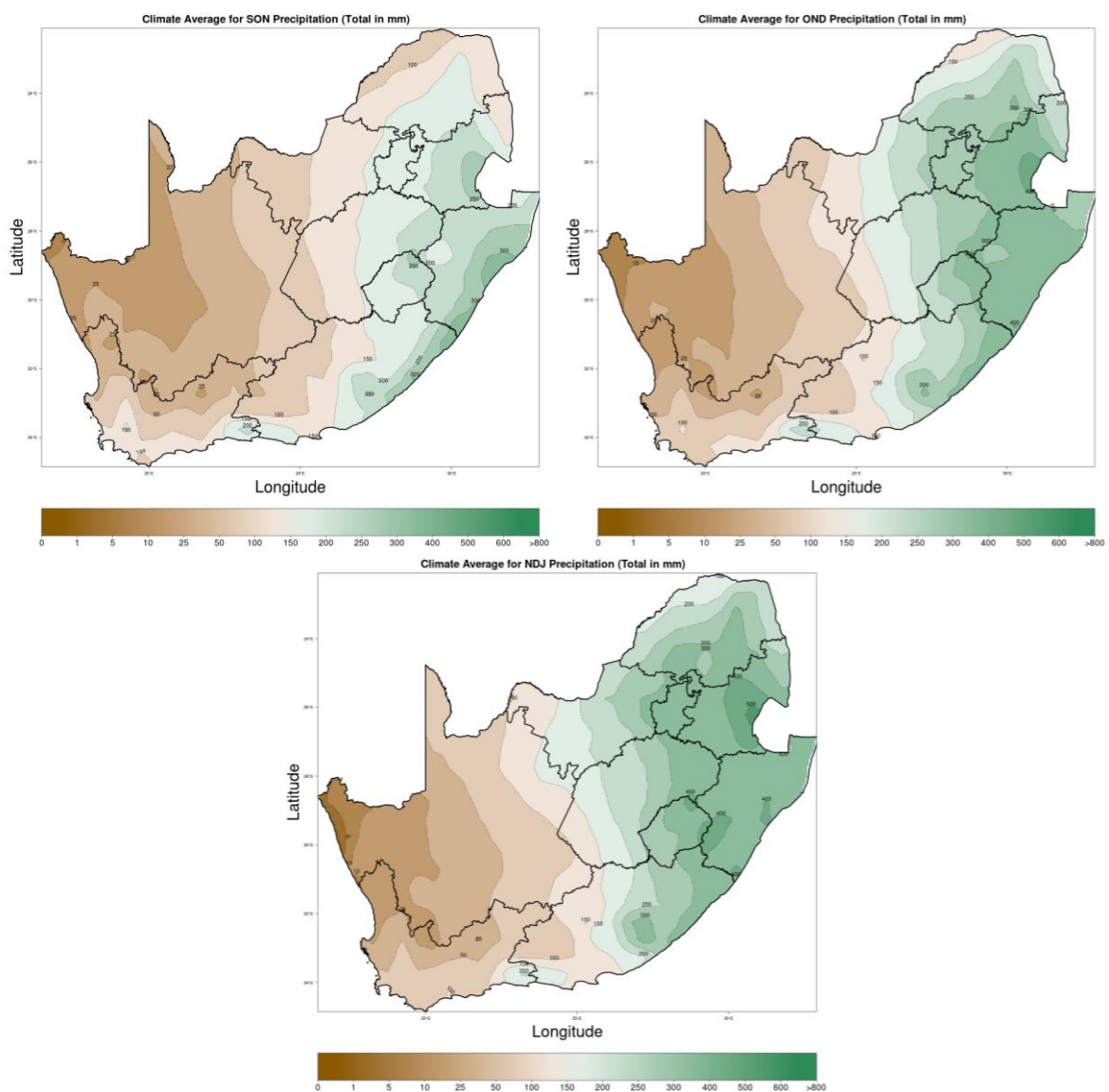


Figure 6: Climatological seasonal totals for precipitation during September-October-November (SON; left), October-November-December (OND; right) and November-December-January (NDJ; bottom).

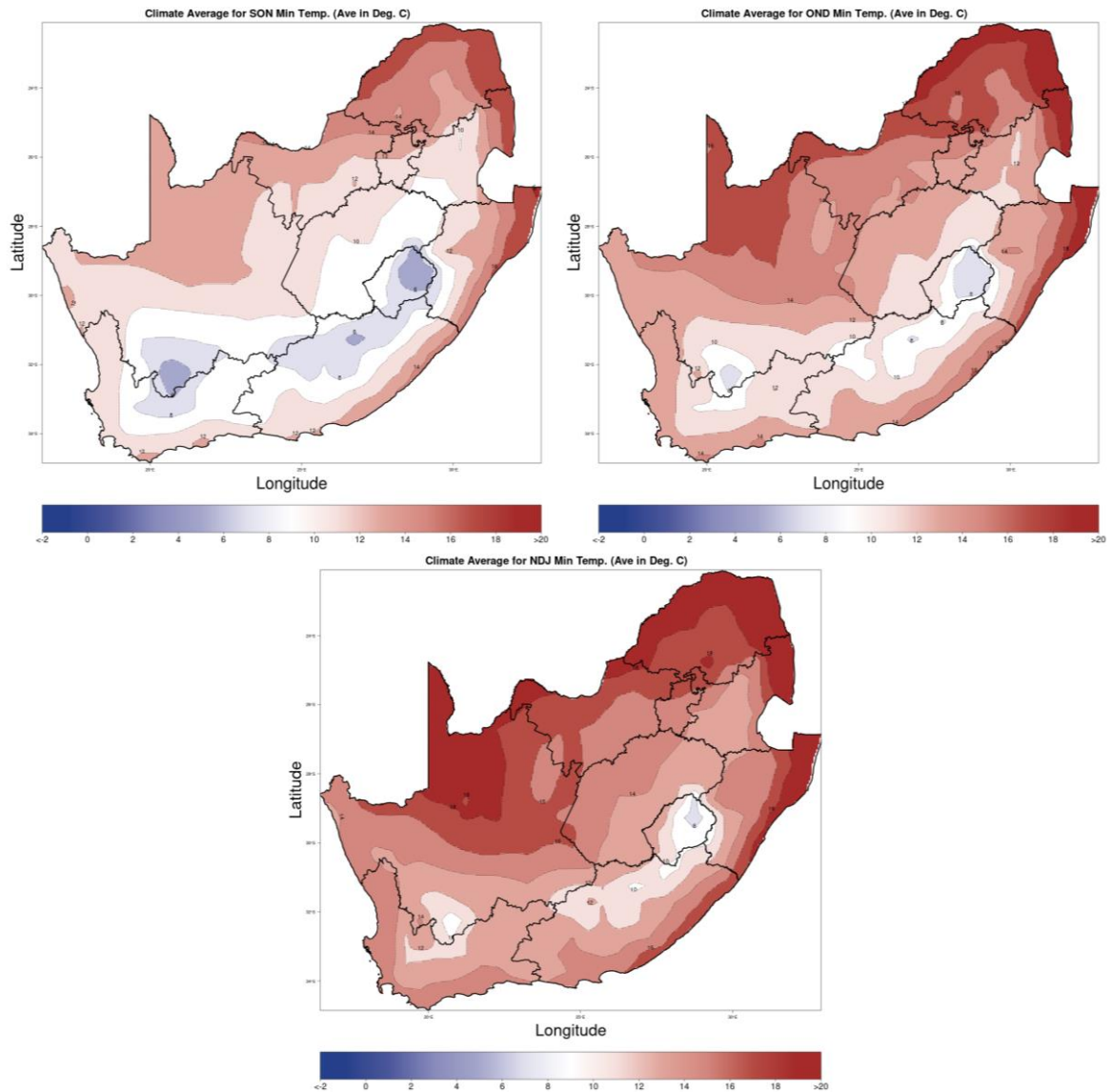


Figure 7: Climatological seasonal averages for minimum temperature during September-October-November (SON; left), October-November-December (OND; right) and November-December-January (NDJ; bottom).

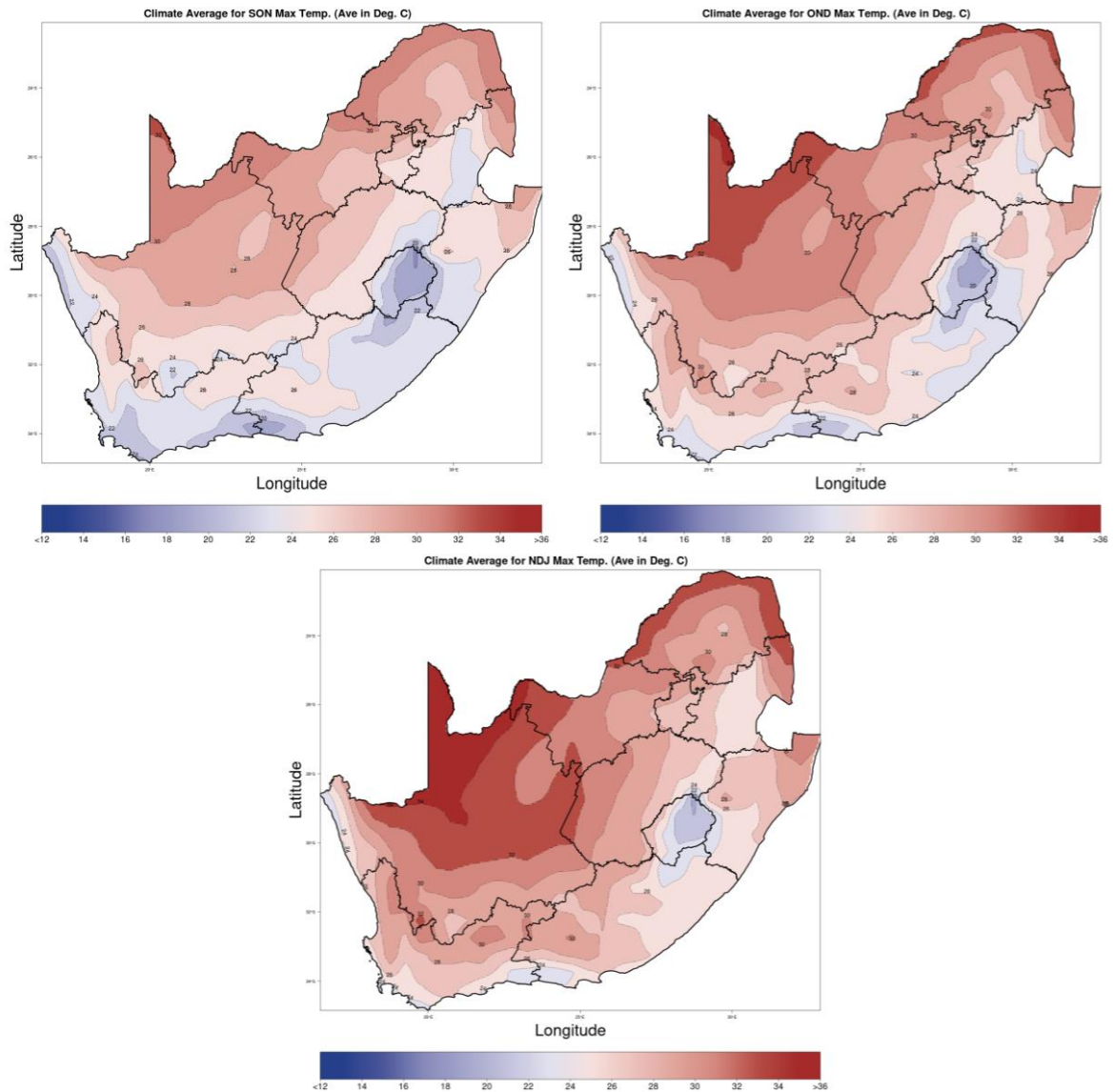


Figure 8: Climatological seasonal averages for maximum temperature during September-October-November (SON; left), October-November-December (OND; right) and November-December-January (NDJ; bottom).

3. Summary implications to various economic sector decision makers

Water and Energy

The above-normal rainfall expected in most parts of the country during mid-spring, and late-spring seasons may not result in meaningful impact in terms of improving water levels in most of the dams. Water levels particularly in areas (e.g., the Northern and Eastern Cape) that are still experiencing long-term drought conditions are likely to be impacted due to possible water loss through evapotranspiration processes attributed to anticipated above-normal minimum and maximum temperatures across the forecasted seasons. Minimum and maximum temperatures are expected to be mostly above normal, and this will likely increase the demand for cooling during the forecast period. Relevant decision-makers are encouraged to take note of these possible outcomes and communicate to affected businesses and communities.

Health

The predicted minimum and maximum temperatures suggest prevailing warmer conditions across the country throughout the projected period. Anticipated ultraviolet radiation (UV) levels are likely to surpass the 3 UVI threshold, based on the World Meteorological Organization (WMO) Universal UV Index scale. The public is advised to implement appropriate sun protection measures to minimize potential risks associated with heat and UV exposure. The forthcoming forecast points towards above-normal rainfall during mid-spring (Sep-Oct-Nov) and late-spring (Oct-Nov-Dec), this could elevate the risk of flash floods, particularly in regions prone to flooding and those lacking proper drainage systems. These wet conditions also have the potential to give rise to waterborne infections and water-related accidents and injuries. The public is strongly advised to take essential precautions and closely follow the guidelines and recommendations issued by local authorities.

Agriculture

Above-normal rainfall is expected for most parts of the country during mid- to late-spring seasons. Above-normal rainfall is also expected in early summer for the north-eastern parts of the country. These above-normal rainfall forecasts for the summer rainfall regions will likely have a positive impact on crop and livestock production. However, below-normal rainfall is predicted over the central (parts of the North West, Free State, Eastern Cape, and Northern Cape) areas of the country during early summer season. Therefore, the relevant decision-makers are encouraged to advise farmers in these regions to practice soil and water conservation, proper water harvesting and storage, establishing good drainage systems, and other appropriate farming practices.

This forecast is updated monthly, and users are advised to monitor the updated forecasts, as there is a possibility for them to change, especially the longer lead-time forecasts. Moreover, farmers are advised to keep monitoring the weekly and monthly forecasts issued by the SAWS. Farmers are also advised to keep on monitoring advisories from the Department of Agriculture and make changes as required.

4. Contributing Institutions and Useful Links

All the forecasts presented here are a result of the probabilistic prediction based on the ensemble members from the coupled climate model from the SAWS and two models from the NMME. Other useful links for seasonal forecasts are:

- <http://www.weathersa.co.za/home/seasonal> (Latest predictions from the SAWS for the whole of SADC)
- <https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/> (ENSO predictions from various centres)
- <https://iri.columbia.edu/our-expertise/climate/forecasts/seasonal-climate-forecasts/> (Copernicus Global forecasts)



Appendix – Verification

The following three figures shows the Relative Operating Characteristic (ROC) scores for the relevant multi-model forecasts in the main document. The ROC scores are commonly used in seasonal forecasts to determine which areas the forecasts perform well, so that the user can make more informed decisions on using the given forecast. As a general guideline, a score over 0.5 is technically better than chance, however, scores around and higher than 0.6 are considered to have significant skill to add confidence to the forecast.

From the figures there will be two ROC scores per season per variable, which indicates the score when a certain rainfall or temperature category is favoured. For example, if an area is favoured to receive above-normal rainfall, then the ROC score to look at would be the one calculated for the above-normal category (right side of the figures below). Also make sure to look at the correct corresponding seasons indicated in the title of each map.

The aim of these maps is to add (or remove) confidence of a particular forecast over certain areas for specific seasons. Seasonal model skill over South Africa can be highly variable, highlighting the importance of knowing exactly where the forecasting system generally performs well or where it may struggle. It is important to note that the maps do not indicate where the current forecast will be correct or incorrect, but rather highlights confidence levels in the forecasting system.

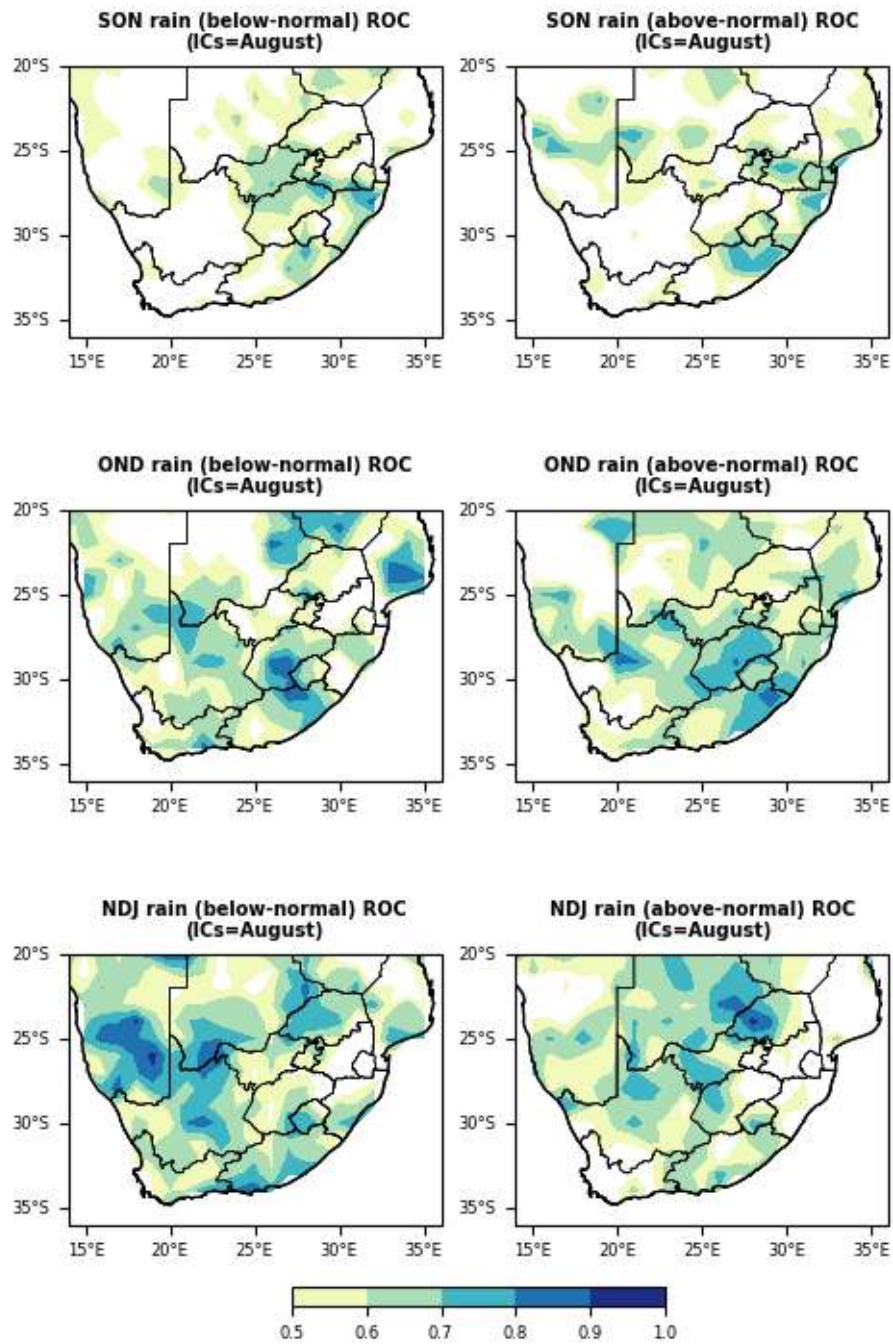


Figure A1: ROC scores for rainfall relevant to the current forecasts in figure 3.

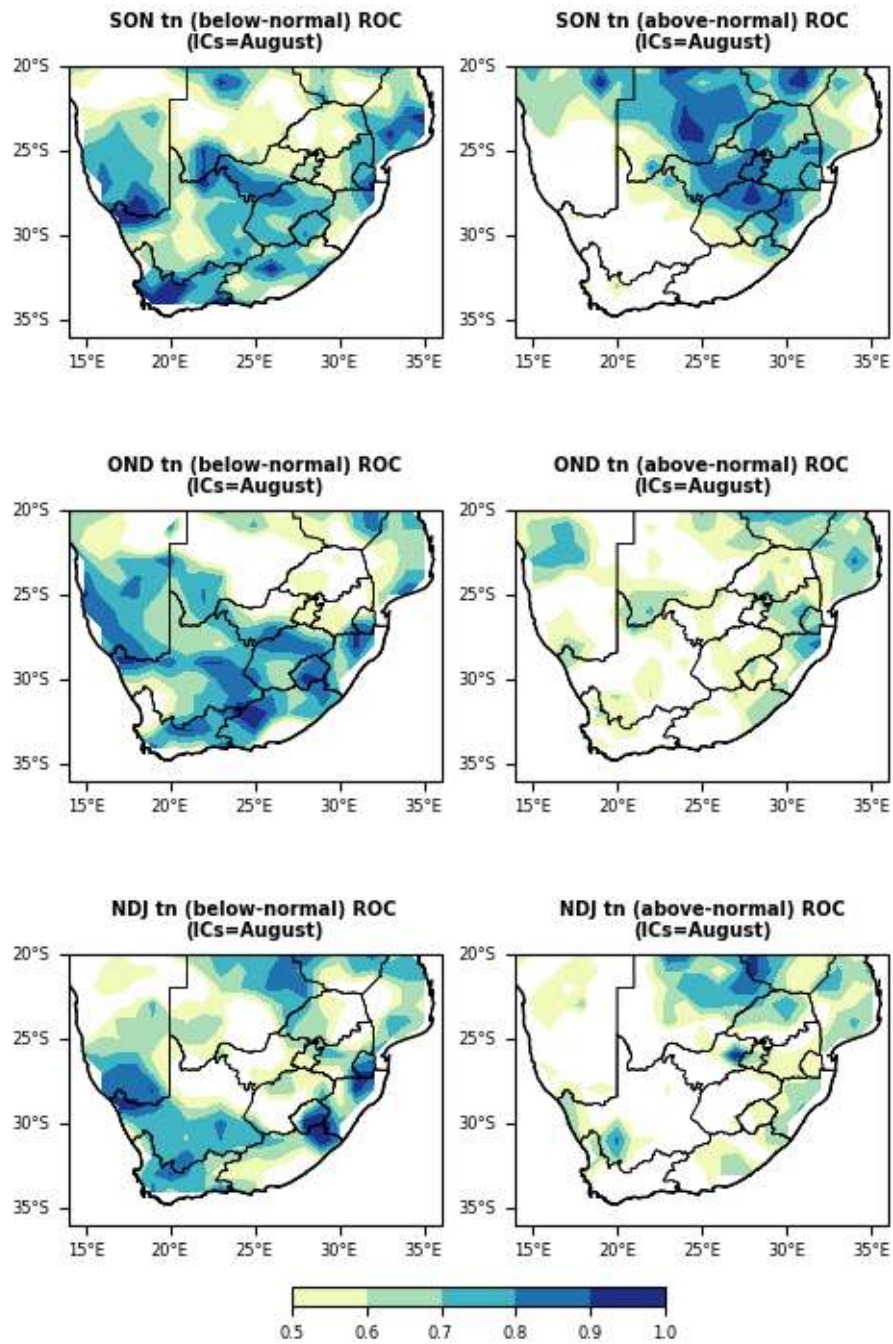


Figure A2: ROC scores for minimum temperatures relevant to the current forecasts in figure 4.

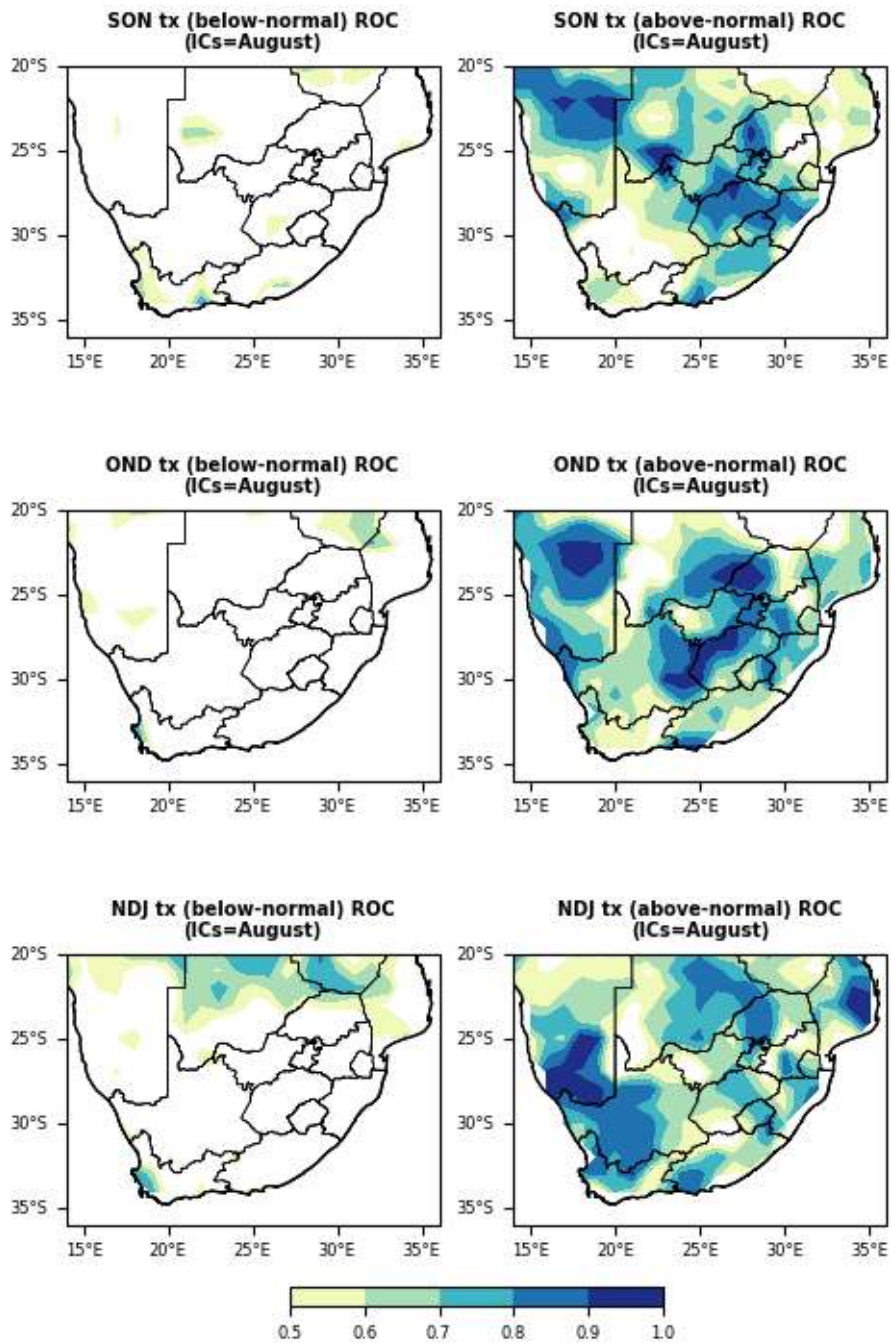


Figure A3: ROC scores for maximum temperatures relevant to the current forecasts in figure 5.