

Seasonal Climate Watch

November 2023 to March 2024

Date issued: 31 October 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. However, current global forecasts indicate a great deal of uncertainty for the typical drier conditions that South Africa experiences during typical El Niño seasons, in particular over the eastern parts of the country.

The South African Weather Service (SAWS) multi-model rainfall forecast indicates above-normal rainfall for the north-east of the country during Nov-Dec-Jan (NDJ), Dec-Jan-Feb (DJF) and Jan-Feb-Mar (JFM) with below normal rainfall predicted for the central and south-western parts of the country. Predictions still favour above-normal rainfall conditions over the north-eastern parts of the country, even with an El Niño in place. For most of the areas where above-normal rainfall is predicted, these probabilities are low. Caution is advised at this point as the El Niño effect might still manifest its influence in the next few months and change the outlook of the rainfall forecast for mid- and late-summer.

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

The 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 is the first season (November-December-January) 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: Nov 2023 – Jan 2024

No Significance Test Applied
Ensemble size 40
Last Updated 20 Oct 2023

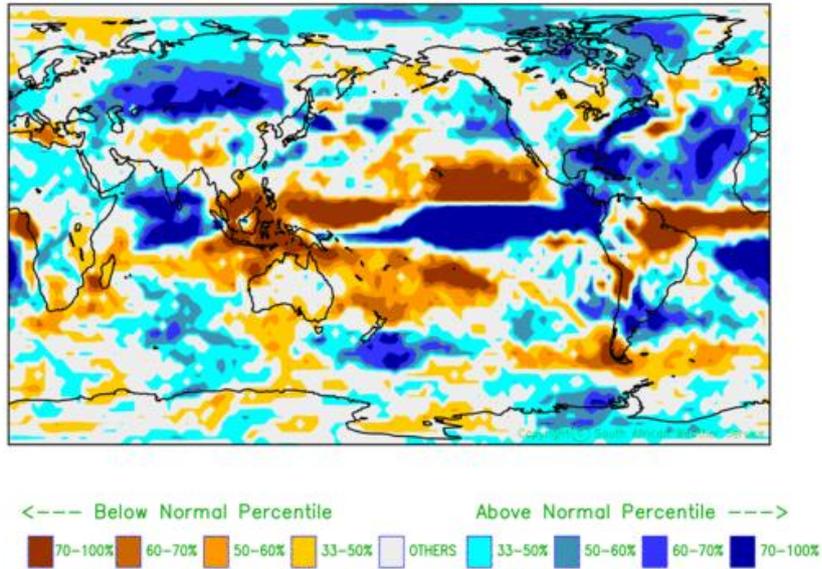


Figure 1: November-December-January, NDJ (2023) global prediction for total rainfall probabilities

SAWS OPERATIONAL ENSEMBLE PREDICTION SYSTEM

SCM Seasonal Forecasts
Most likely Category of 2m Temperature
Forecast Period: Nov 2023 – Jan 2024

No Significance Test Applied
Ensemble size 40
Last Updated 20 Oct 2023

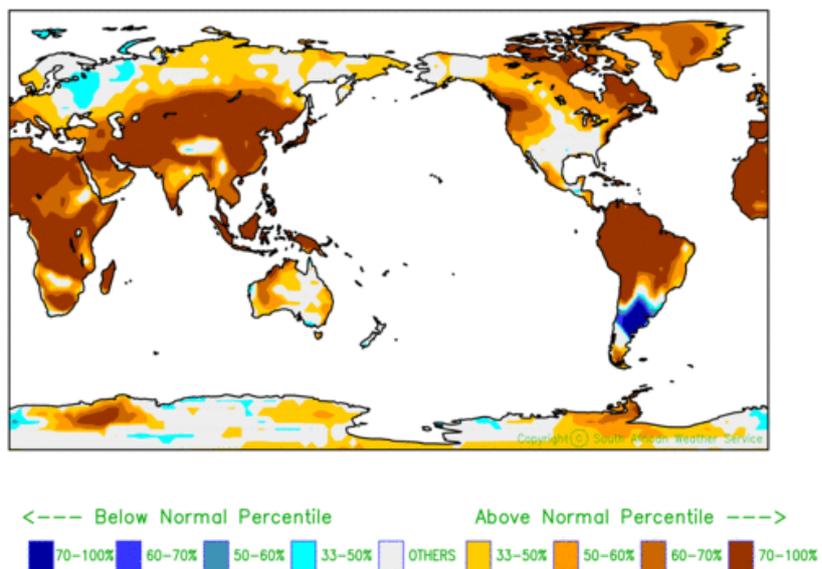


Figure 2: November-December-January, NDJ (2023) global prediction for average temperature probabilities

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 October 2023 initial conditions, and are presented below:

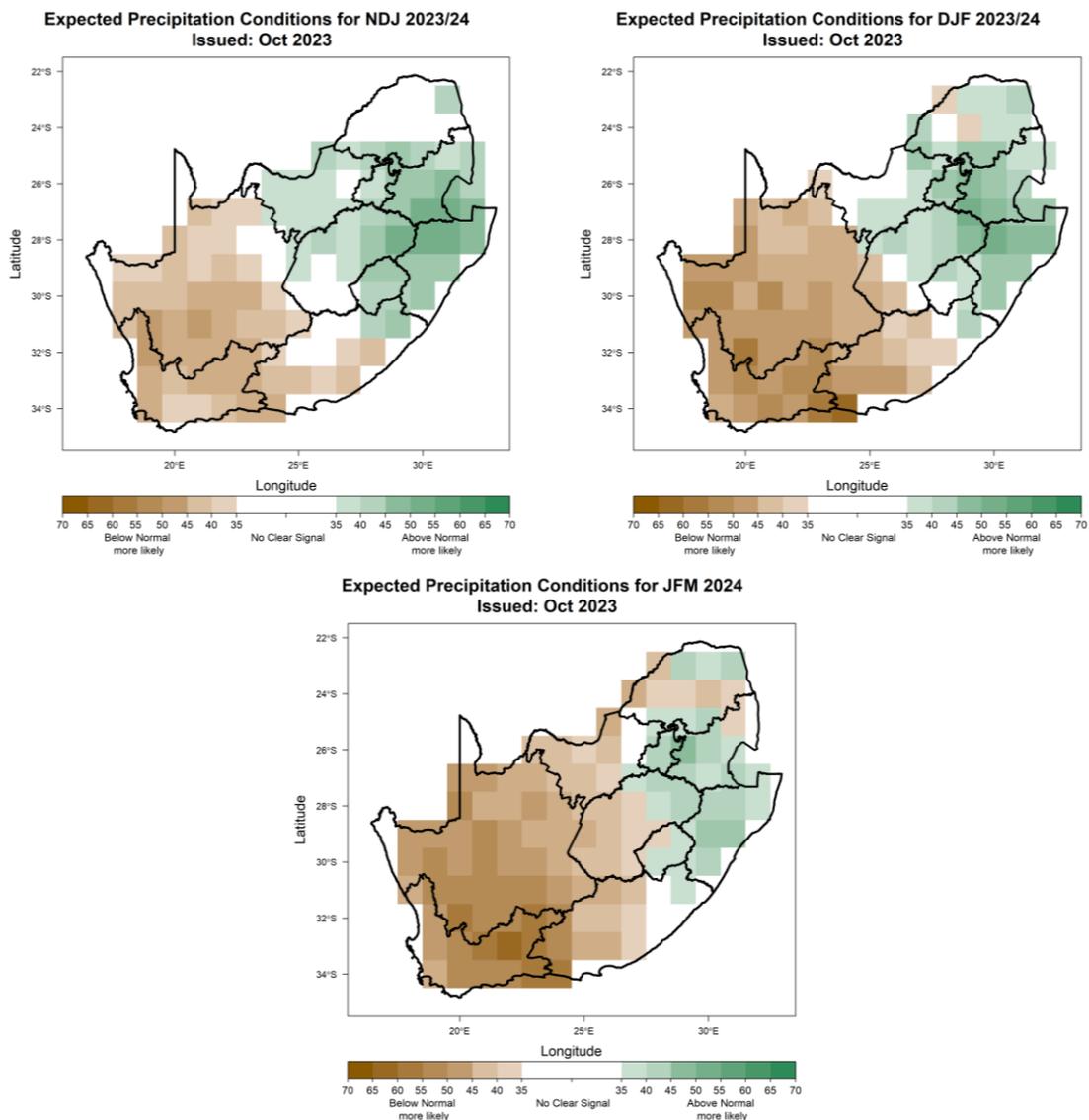


Figure 3: November-December-January 2023/24 (NDJ; left), December-January-February 2023/24 (DJF; right), January-February-March 2024 (JFM; bottom) seasonal precipitation prediction. Maps indicate the highest probability of the above-normal and below-normal categories. Please refer to appendix figure A1 for forecast skill levels.

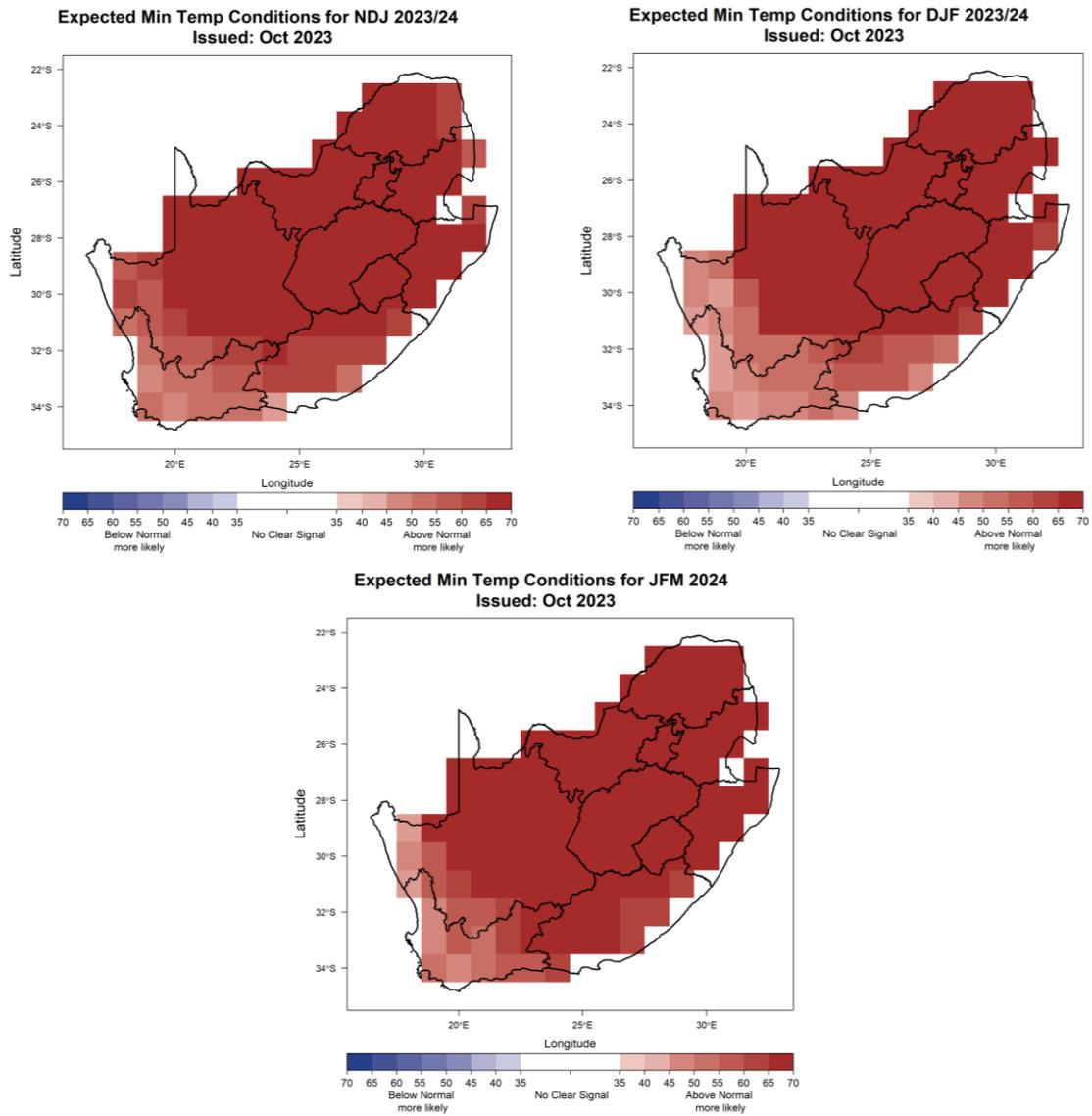


Figure 4: November-December-January 2023/24 (NDJ; left), December-January-February 2023/24 (DJF; right), January-February-March 2024 (JFM; bottom) seasonal minimum temperature prediction. Maps indicate the highest probability of the above-normal and below-normal categories. Please refer to appendix figure A2 for forecast skill levels.

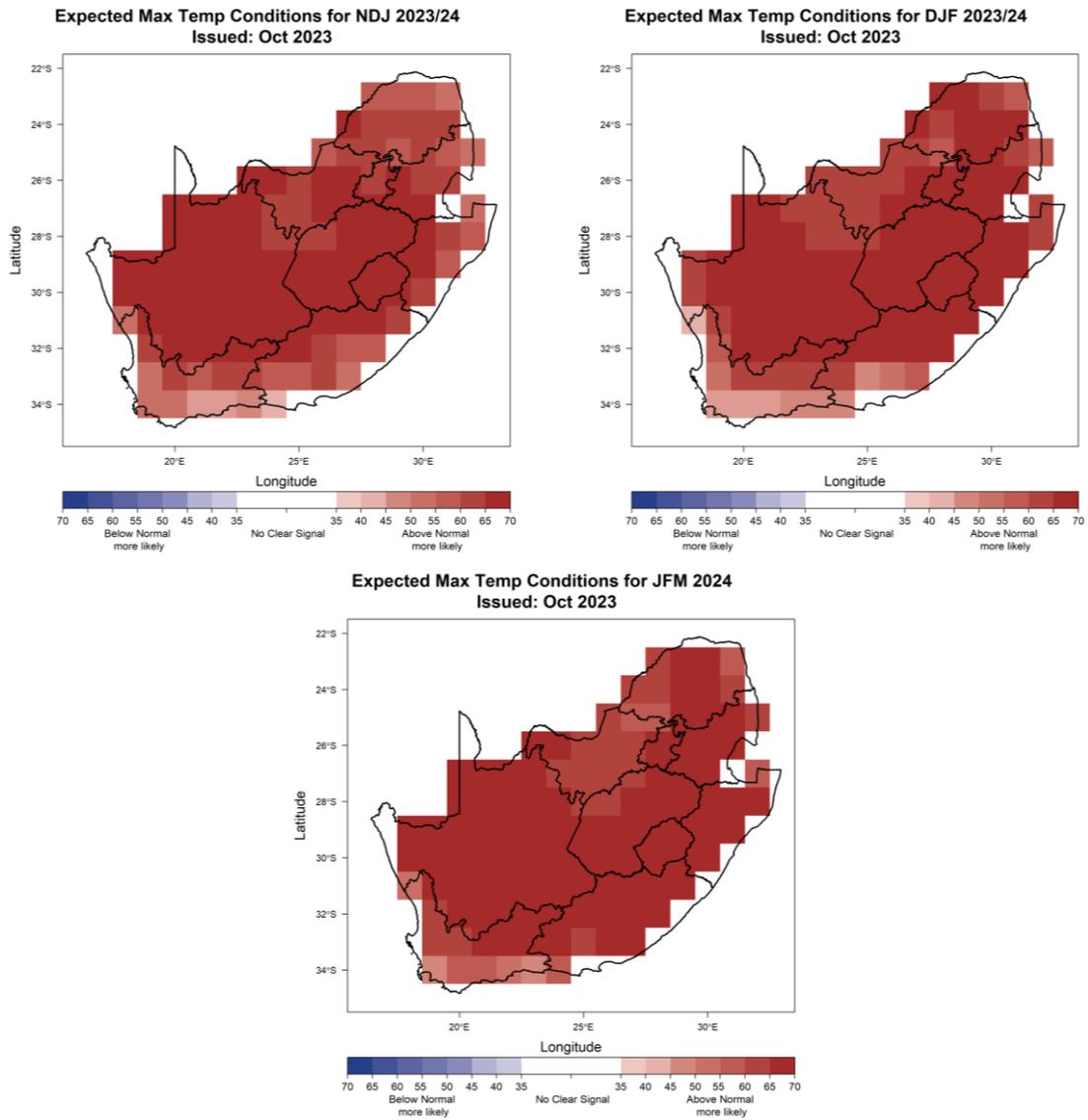


Figure 5: November-December-January 2023/24 (NDJ; left), December-January-February 2023/24 (DJF; right), January-February-March 2024 (JFM; bottom) seasonal maximum temperature prediction. Maps indicate the highest probability of the above-normal and below-normal categories. Please refer to appendix figure 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 November-December-January, December-January-February and January-February-March 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.

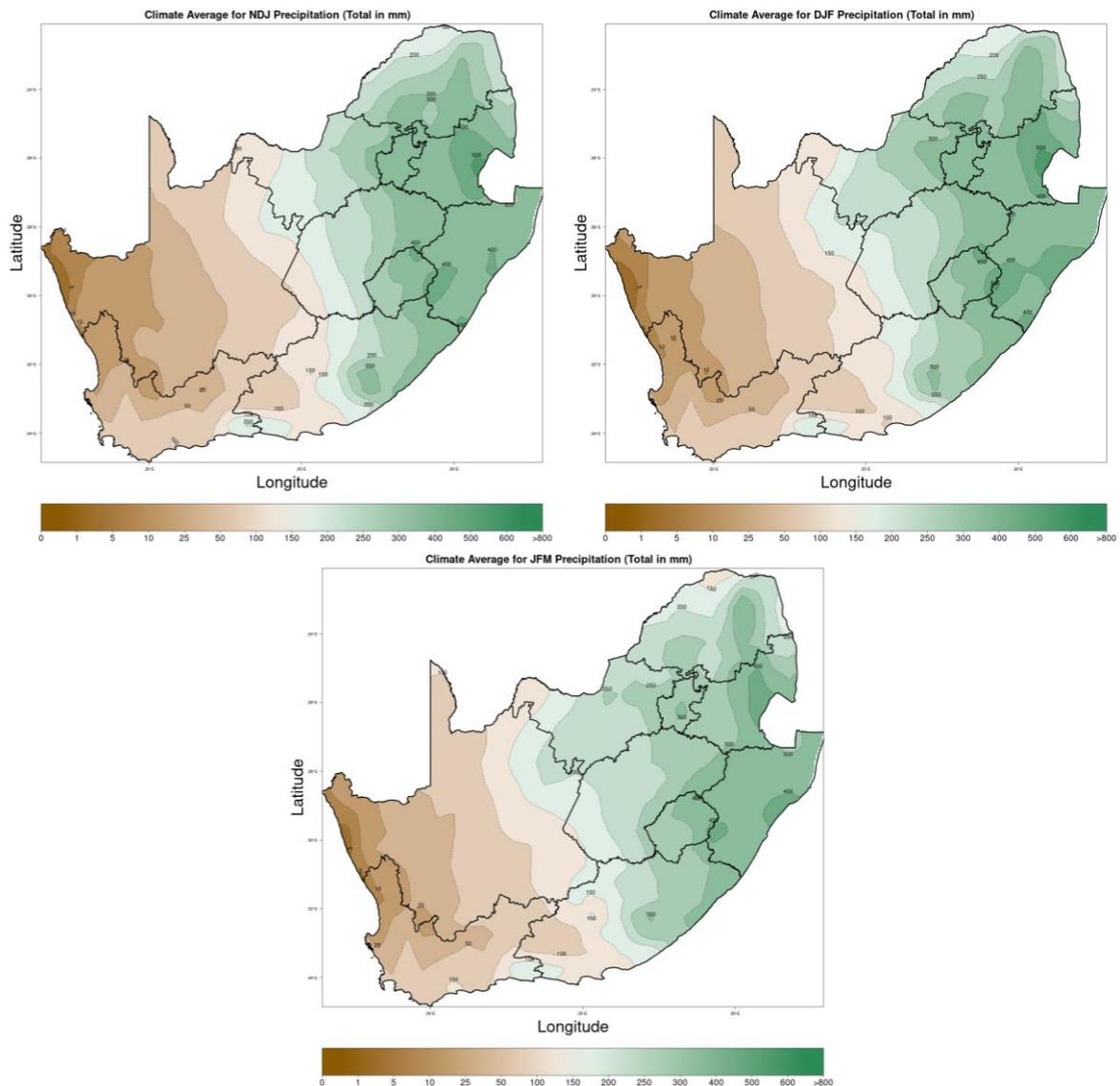


Figure 6: Climatological seasonal totals for precipitation during November-December-January (NDJ; left), December-January-February (DJF; right) and January-February-March (JFM; bottom).

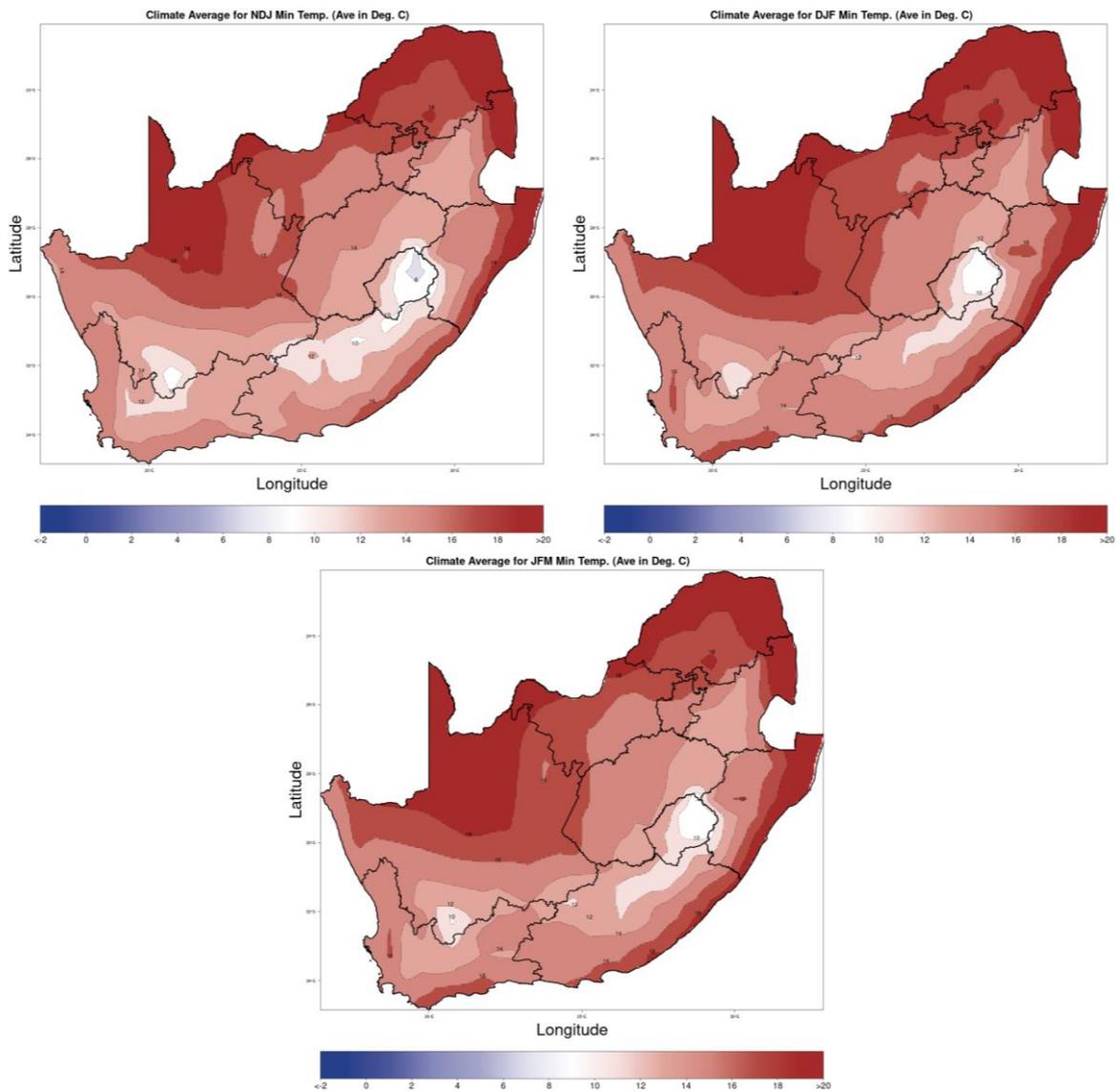


Figure 7: Climatological seasonal averages for minimum temperature during November-December-January (NDJ; left), December-January-February (DJF; right) and January-February-March (JFM; bottom).

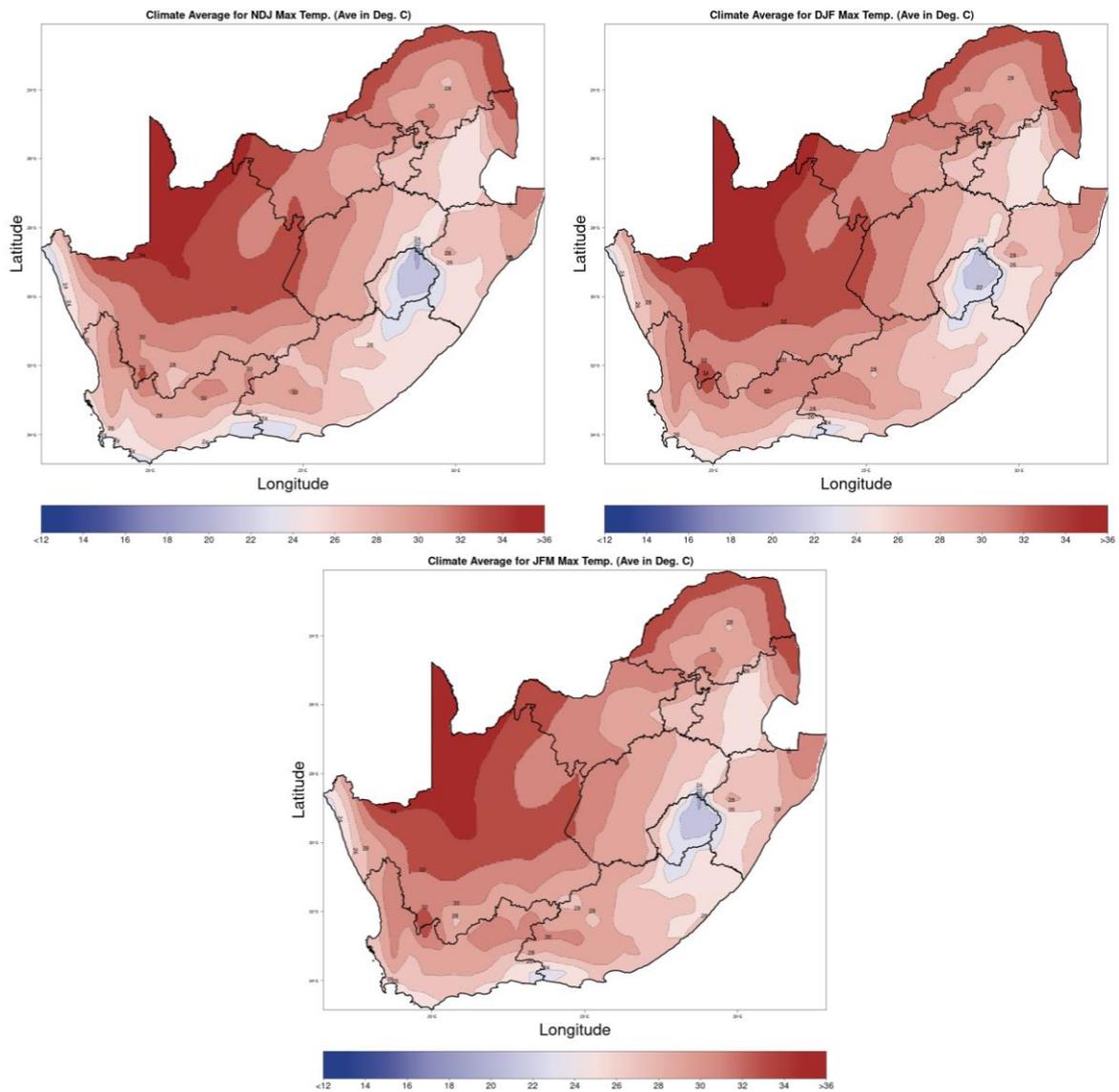


Figure 8: Climatological seasonal averages for maximum temperature during November-December-January (NDJ; left), December-January-February (DJF; right) and January-February-March (JFM; bottom).

3. Summary implications to various economic sector decision makers

Water and Energy

The anticipated above-normal rainfall for the north-east of the country across the seasons is likely to benefit water reservoirs in regions classified as summer rainfall areas. Water loss through evapotranspiration and other processes can be expected in the central and south-western parts of the country due to predicted below-normal rainfall and above-normal minimum and maximum temperatures during the forecasted period. The expected above-normal minimum and maximum temperatures countrywide would also likely increase the demand for cooling. Relevant decision-makers are encouraged to take note of these possible outcomes and communicate to affected businesses and communities.

Health

The predicted above-normal rainfall for the north-eastern regions of the country during Nov-Dec-Jan (NDJ), Dec-Jan-Feb (DJF), and Jan-Feb-Mar (JFM), may result in potential flooding, especially in flood-prone areas. This poses immediate health risks such as drowning, injuries, and hypothermia, as well as increased exposure to mosquito bites, heightening the risk of both water-related and vector-borne diseases. Additionally, the expected above-normal minimum and maximum temperatures throughout the entire forecast period, countrywide, may lead to prolonged UV exposure, with UV levels potentially exceeding 3 on the World Meteorological Organization's UV Index scale, increasing the risk of sunburn and UV-related health issues. Skin and eye allergies may rise due to increased pollen and heat. Furthermore, high temperatures can accelerate the growth of foodborne pathogens, heightening the risk of foodborne illnesses. To stay safe, it's essential for the public to practice good food hygiene and follow local authorities' guidelines and recommendations diligently during these weather conditions.

Agriculture

The rainfall forecasts indicate above-normal rainfall over the north-eastern parts of the country during the summer season. These above-normal rainfall forecasts would likely have a positive impact on crop and livestock production. However, below-normal rainfall is predicted over most parts of the central and south-western areas of the country during early and late-summer seasons. 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 show 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 the areas where 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.

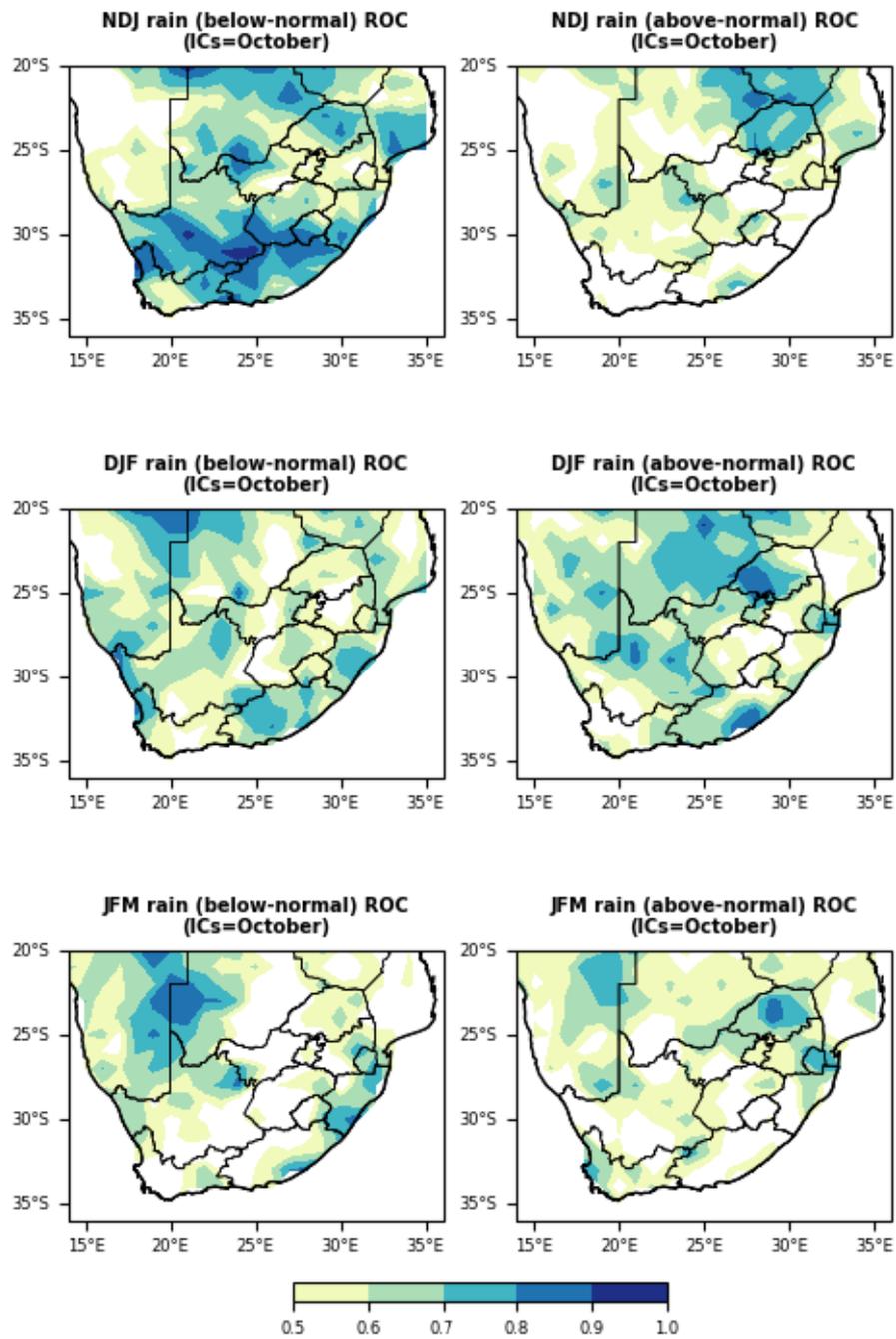


Figure A1: ROC scores for rainfall relevant to the current forecasts in figure 3.

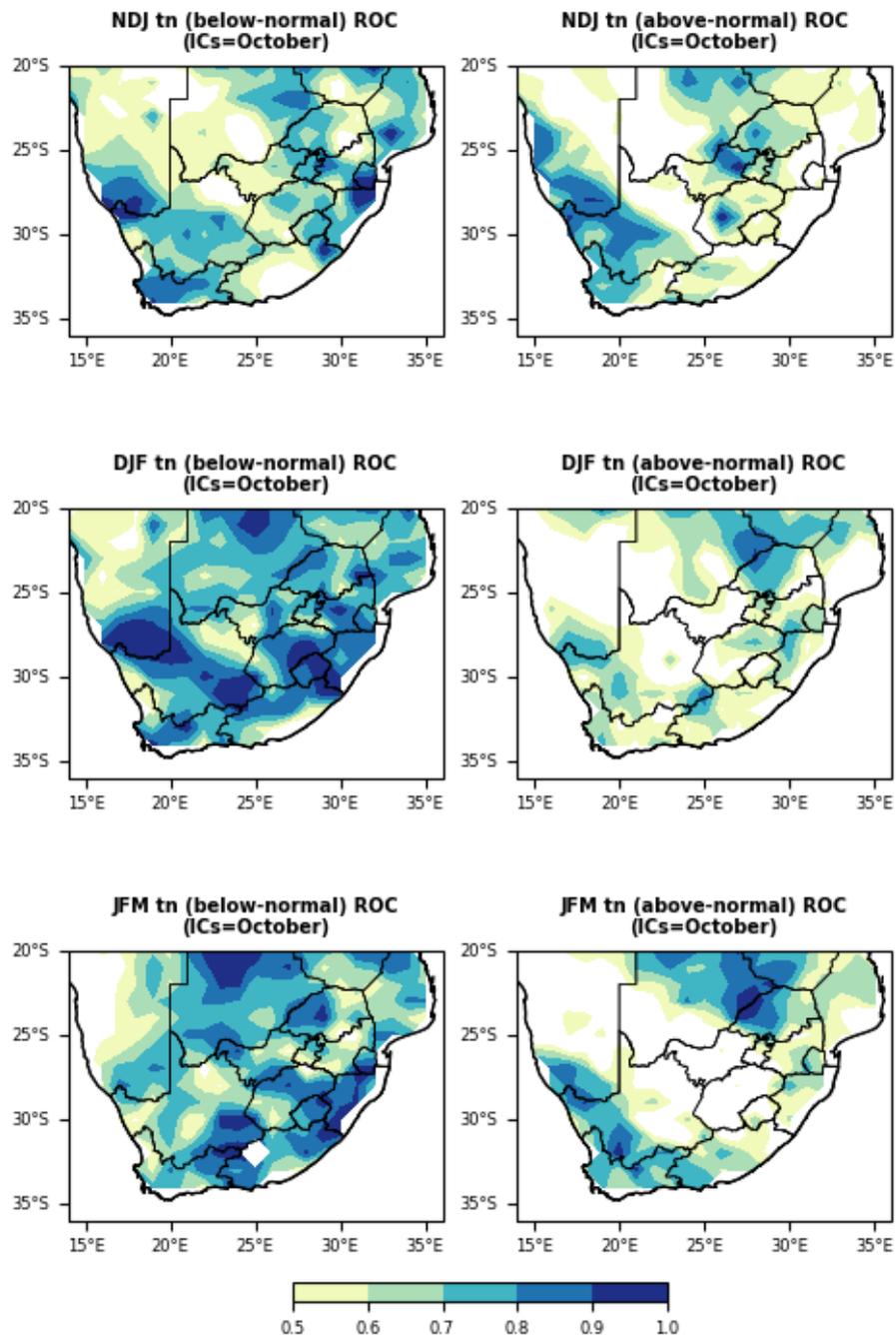


Figure A2: ROC scores for minimum temperatures relevant to the current forecasts in figure 4.

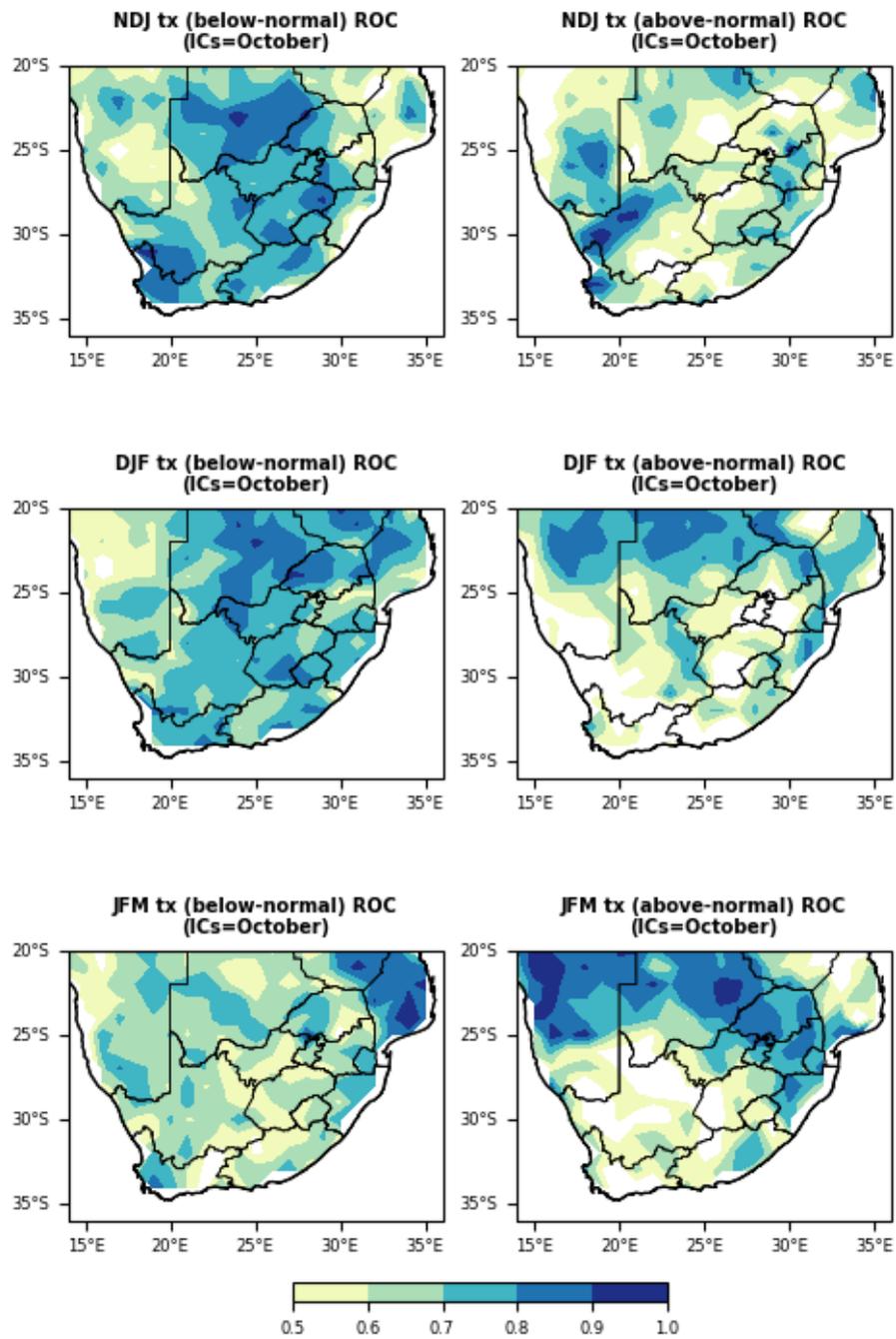


Figure A3: ROC scores for maximum temperatures relevant to the current forecasts in figure 5.