Seasonal Climate Watch

January to April 2024

Date issued: 19 December 2023

1. Overview

The El Niño-Southern Oscillation (ENSO) is currently in a strong El Niño state. This El Niño event is predicted to persist through the 2023/2024 summer, whereafter it is predicted to weaken with ENSO neutral conditions by the coming winter. ENSO's typical impact on Southern Africa is in favour for generally drier and warmer conditions during the summer seasons However, current global forecasts indicate some 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 mostly below-normal rainfall over most of the country during Jan-Feb-Mar (JFM), Feb-Mar-Apr (FMA) and Mar-Apr-May (MAM) with the exception of the central and eastern coastal areas indicating higher likelihood of above-normal rainfall. As is evident with the last few cycles of the seasonal forecasts, there remain uncertainty on the exact outcome of rainfall over the summer rainfall areas. Therefore, caution is still advised when using the seasonal forecast for any planning purposes and the use of conservative strategies are recommended wherever possible.

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 third season (January-February-March) predictions for rainfall (Figure 1) and average temperature (Figure 2).

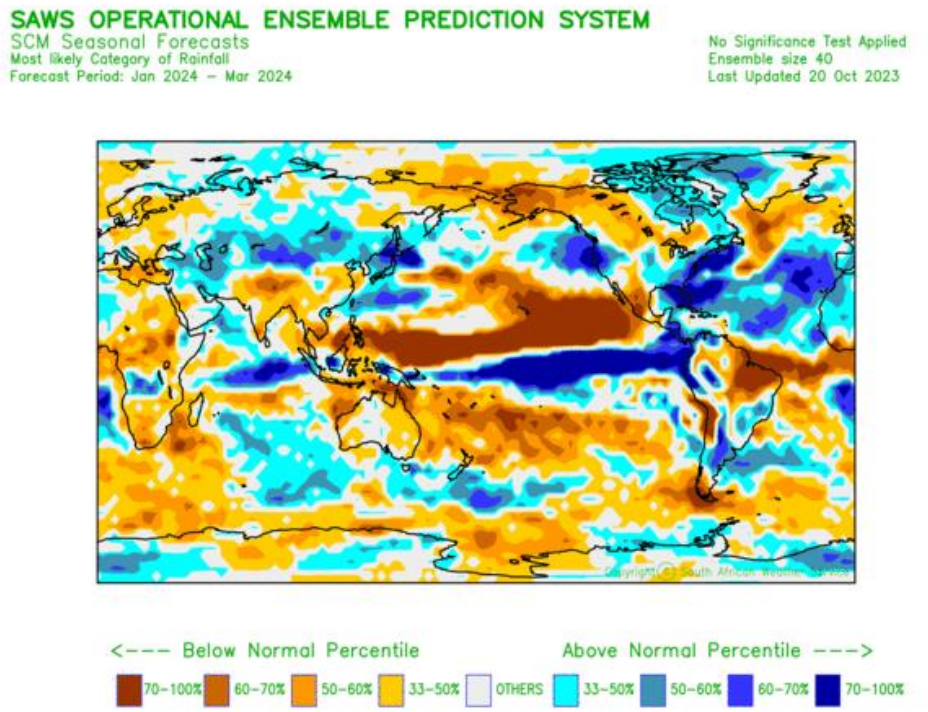

Figure 1: January-February-March, JFM (2024) global prediction for total rainfall probabilities

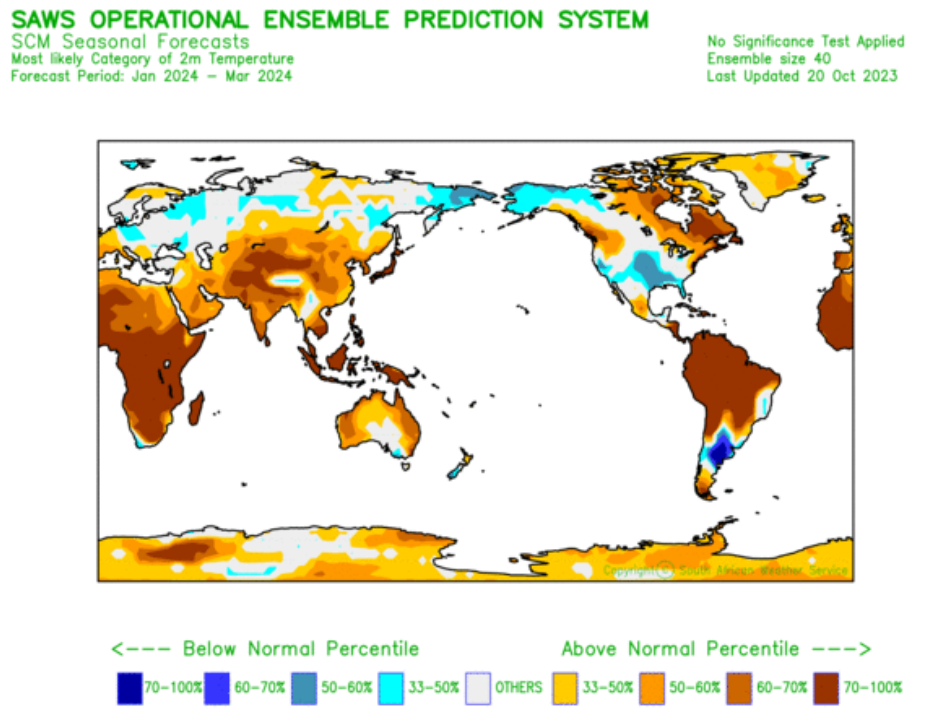

Figure 2: January-February-March, JFM (2024) global prediction for average temperature probabilities

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 November 2023 initial conditions, and are presented below:

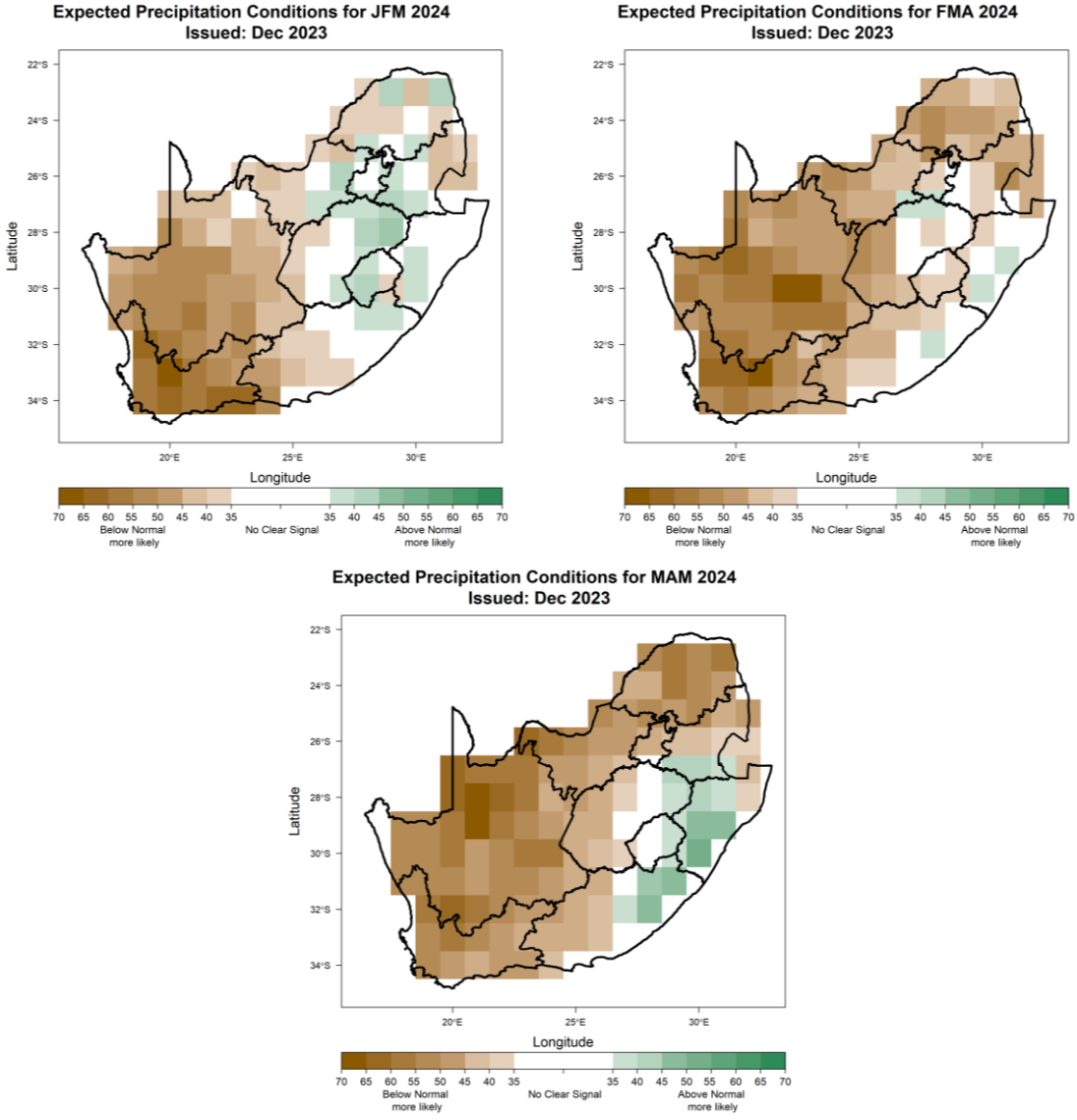

Figure 3: January-February-March 2024 (JFM; left), February-March-April 2024 (FMA; right), March-April-May 2024 (MAM; bottom) seasonal precipitation prediction. Maps indicate the highest probability of the above-normal and below-normal categories. Please refer to appendix figure A1 for forecast skill levels.

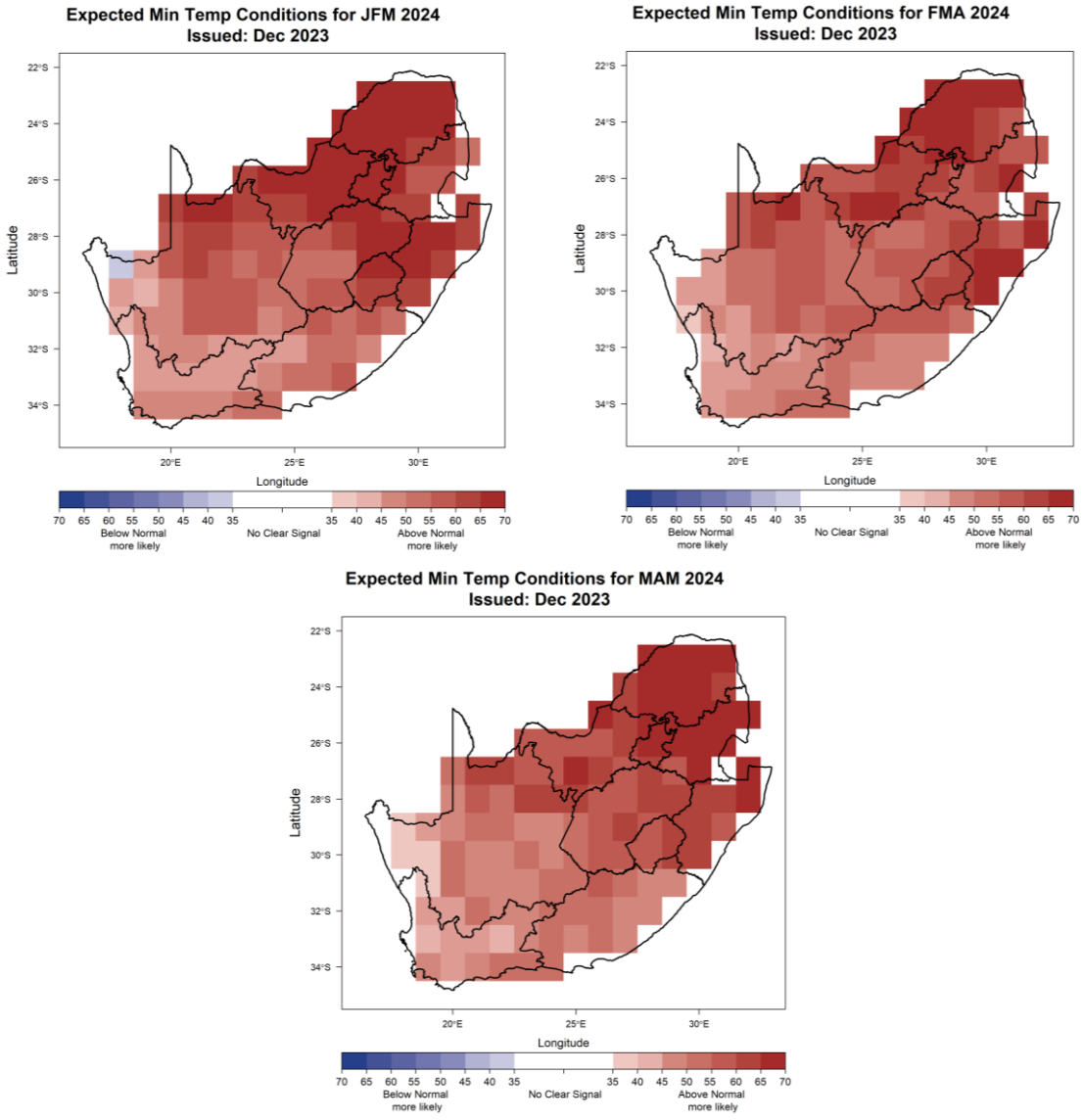

Figure 4: January-February-March 2024 (JFM; left), February-March-April 2024 (FMA; right), March-April-May 2024 (MAM; bottom) seasonal minimum temperature prediction. Maps indicate the highest probability of the above-normal and below-normal categories. Please refer to appendix figure A2 for forecast skill levels.

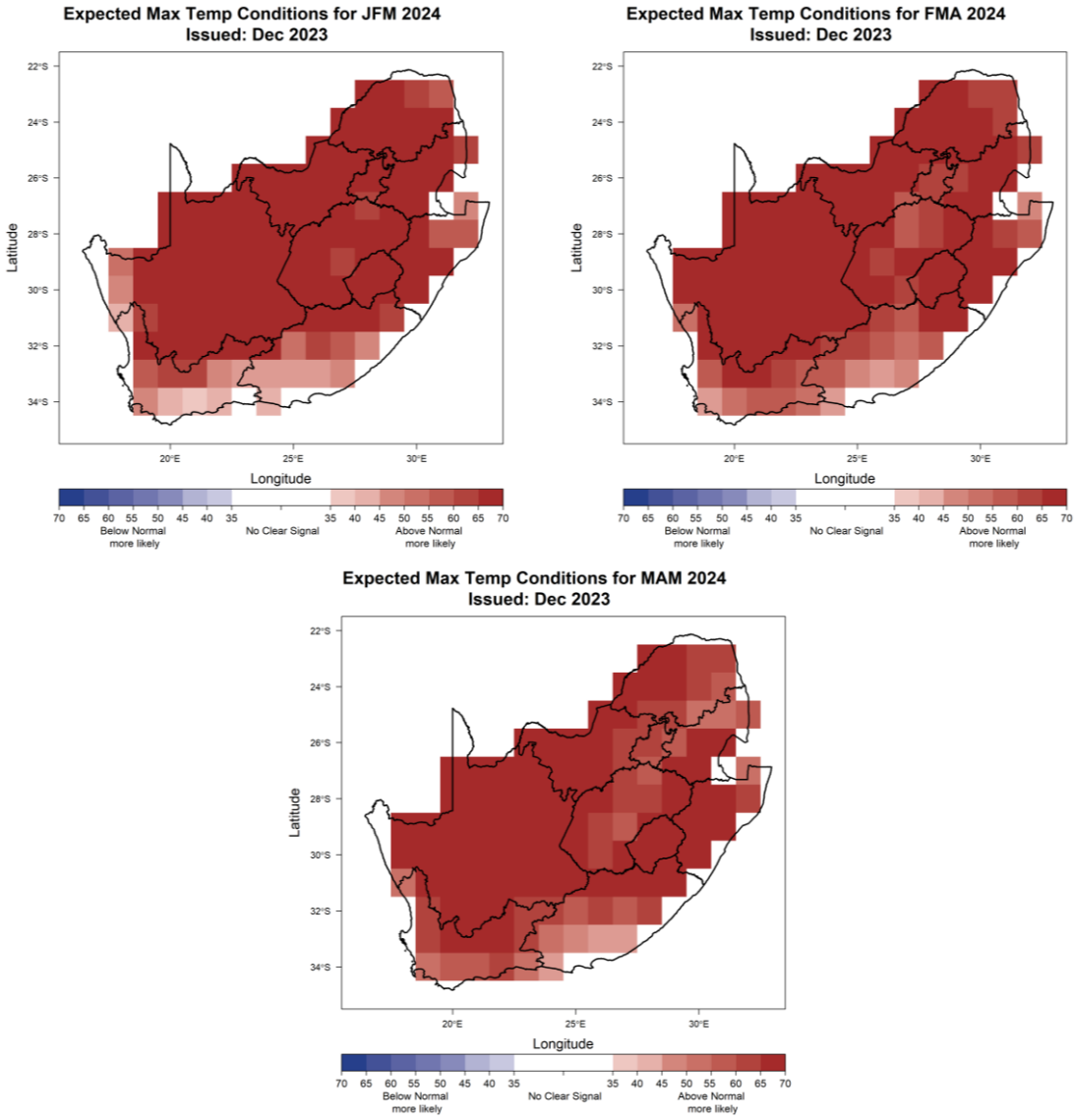

Figure 5: January-February-March 2024 (JFM; left), February-March-April 2024 (FMA; right), March-April-May 2024 (MAM; bottom) seasonal maximum temperature prediction. Maps indicate the highest probability of the above-normal and below-normal categories. Please refer to appendix figure A3 for forecast skill levels.

2.3. Climatological Seasonal Totals and Averages

The following maps indicate the rainfall and temperature (minimum and maximum temperature) climatology for the December-January-February, January-February-March and February-March-April 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.

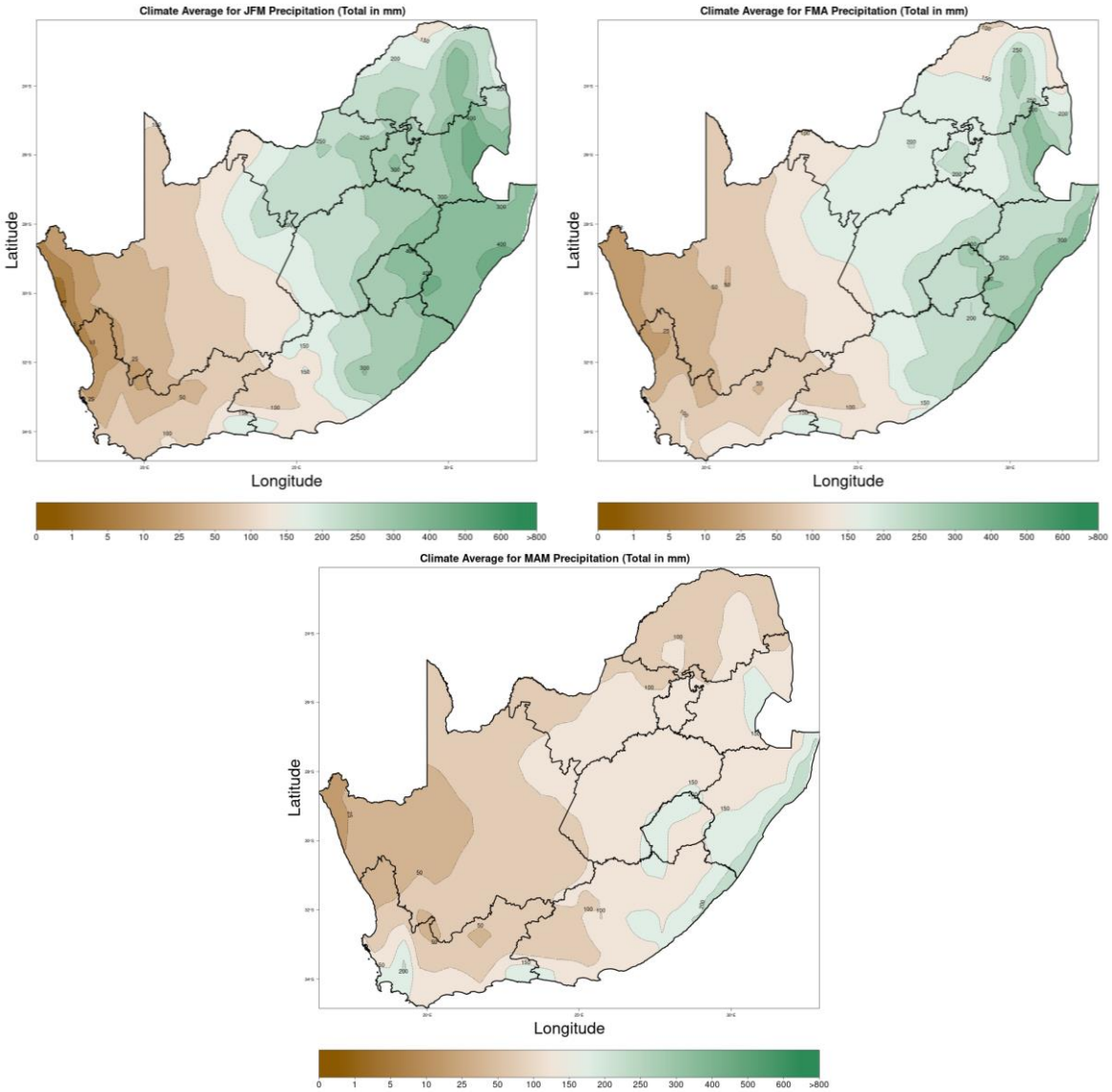

Figure 6: Climatological seasonal totals for precipitation during January-February-March (JFM; left), February-March-April (FMA; right) and March-April-May (MAM; bottom).

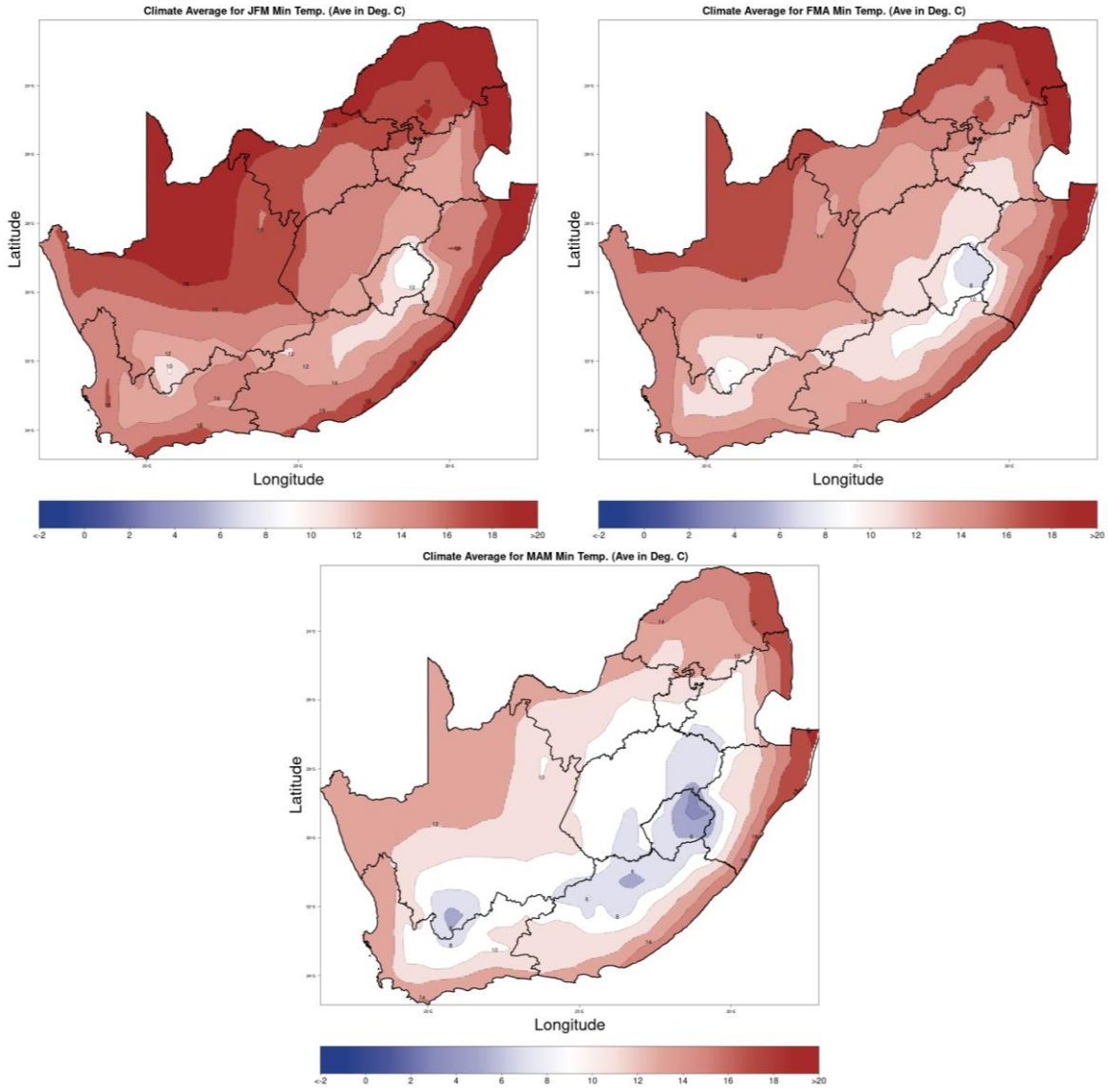

Figure 7: Climatological seasonal averages for minimum temperature during January-February-March (JFM; left), February-March-April (FMA; right) and March-April-May (MAM; bottom).

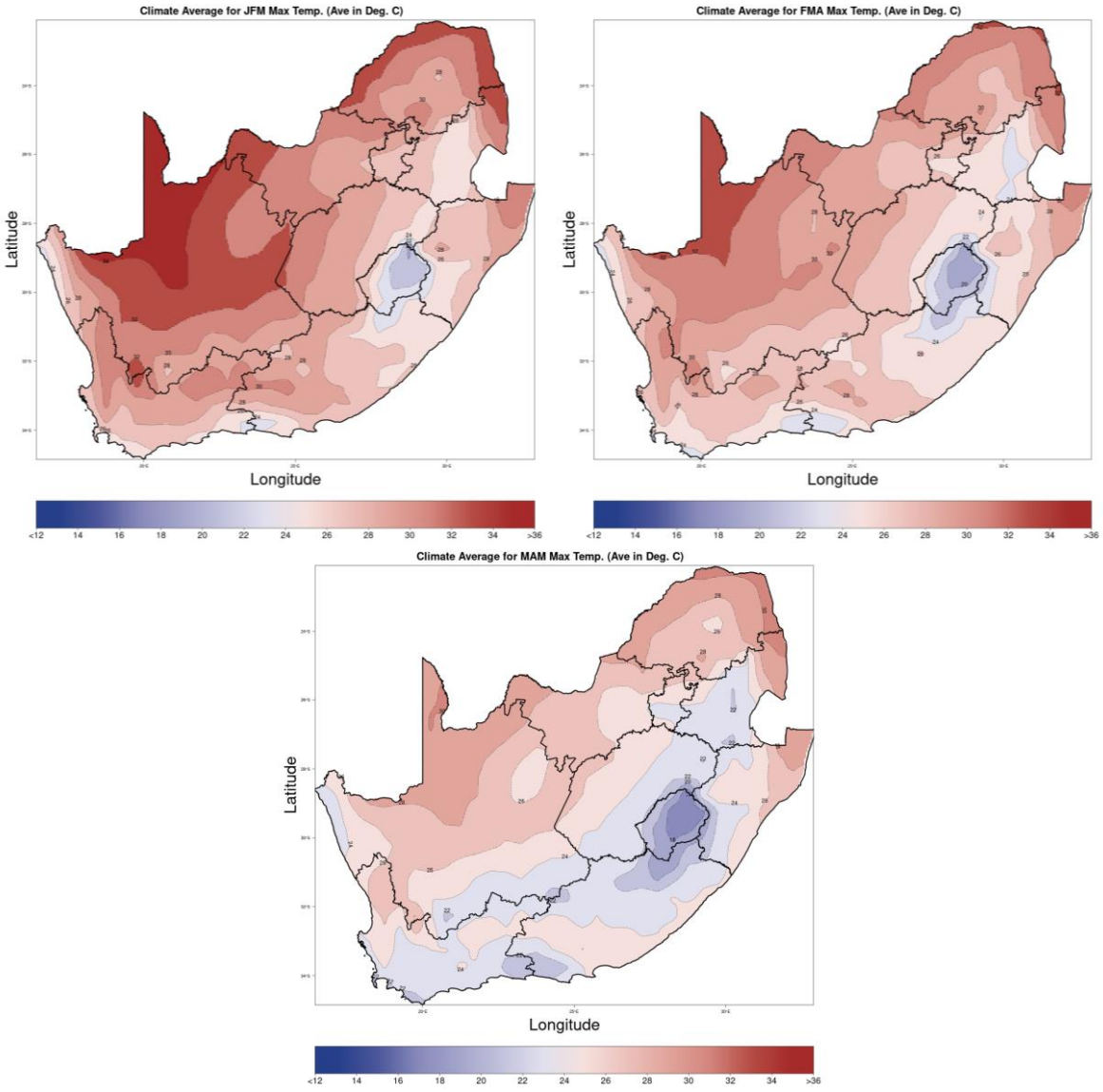

Figure 8: Climatological seasonal averages for maximum temperature during January-February-March (JFM; left), February-March-April (FMA; right) and March-April-May (MAM; bottom).

3. Summary implications to various economic sector decision makers

Water and Energy

The anticipated below-normal rainfall conditions, coupled with above-normal minimum and maximum temperatures, are likely to reduce water levels, in particularly in drought-affected areas. The expected mostly above-normal minimum and maximum temperatures countrywide are likely to increase the demand for cooling for the forecast period. Relevant decision-makers are encouraged to take note of these possible outcomes and communicate to affected businesses and communities.

Health

The forecast of above-average temperatures nationwide suggests increased risks due to prolonged UV exposure, potentially exceeding level 3 on the World Meteorological Organization's UV Index. This elevation in UV levels raises the likelihood of sunburn and other UV-related health issues. Higher temperatures may also amplify pollen and heat exposure, leading to more skin and eye allergies, and can accelerate the growth of foodborne pathogens, heightening the risk of foodborne illnesses. The public is advised to practice good food hygiene and follow local guidelines in these conditions. The predicted below-normal rainfall could lead to water scarcity, especially in areas with limited access to clean water, thereby increasing the risk of waterborne diseases like cholera, as well as heat-related illnesses and respiratory problems due to drier conditions. Conversely, above-normal rainfall expected in central and eastern coastal areas during the Jan-Feb-Mar, Feb-Mar-Apr, and Mar-Apr-May periods may lead to flooding in prone regions, posing immediate health risks such as drowning, injuries, hypothermia, and elevated risks of water-related and vector-borne diseases due to increased mosquito exposure. The public is urged to take precautionary measures and heed the advice of local authorities. Local authorities should monitor these risks, develop mitigation strategies, and enhance public health surveillance and response systems.

Agriculture

The rainfall forecasts indicate mostly below-normal rainfall over most parts of the country during mid and late-summer seasons. However, a higher likelihood of above-normal rainfall is predicted over parts of the central and eastern coastal areas. Therefore, the relevant decision-makers are encouraged to advise farmers 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.

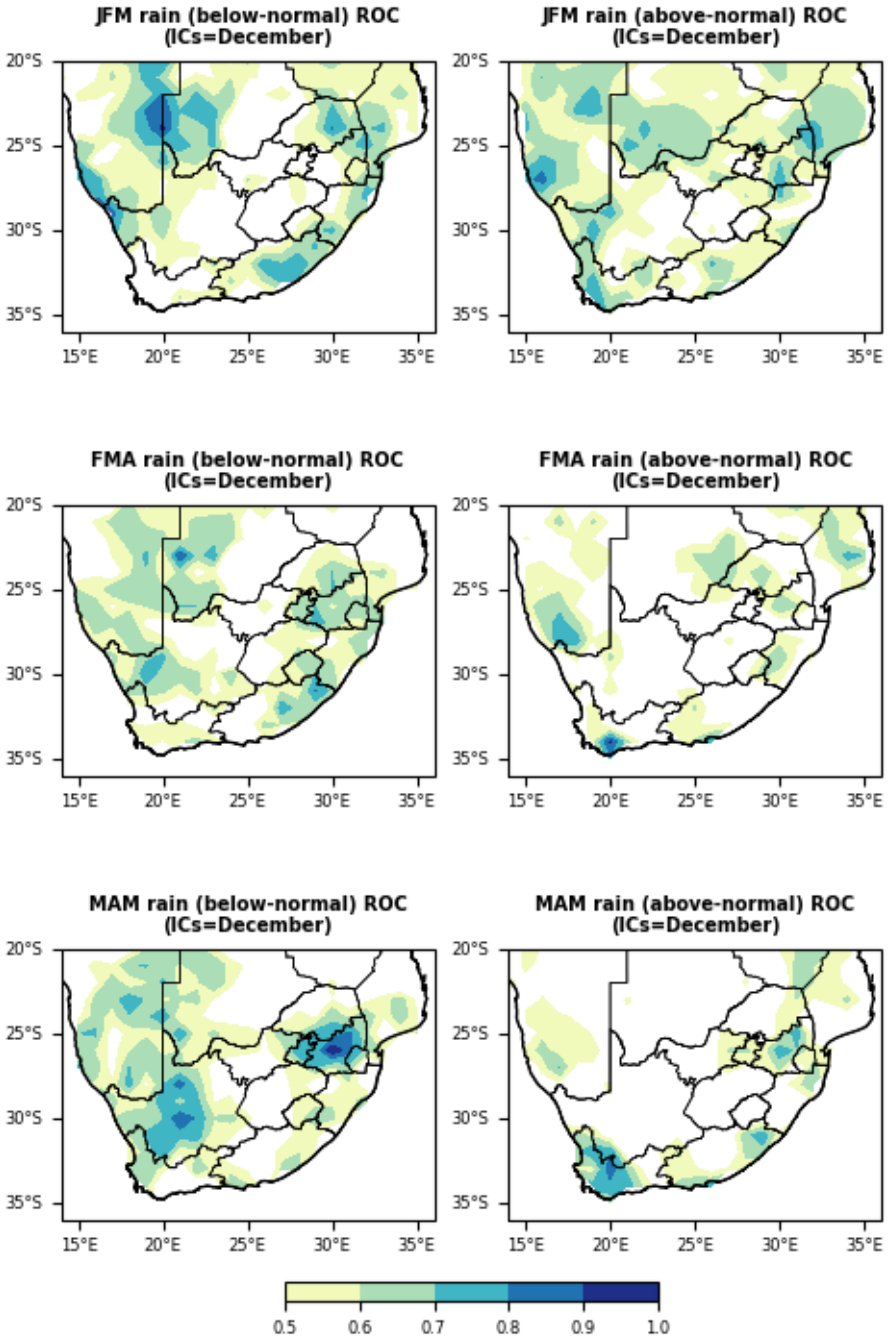

Figure A1: ROC scores for rainfall relevant to the current forecasts in figure 3.

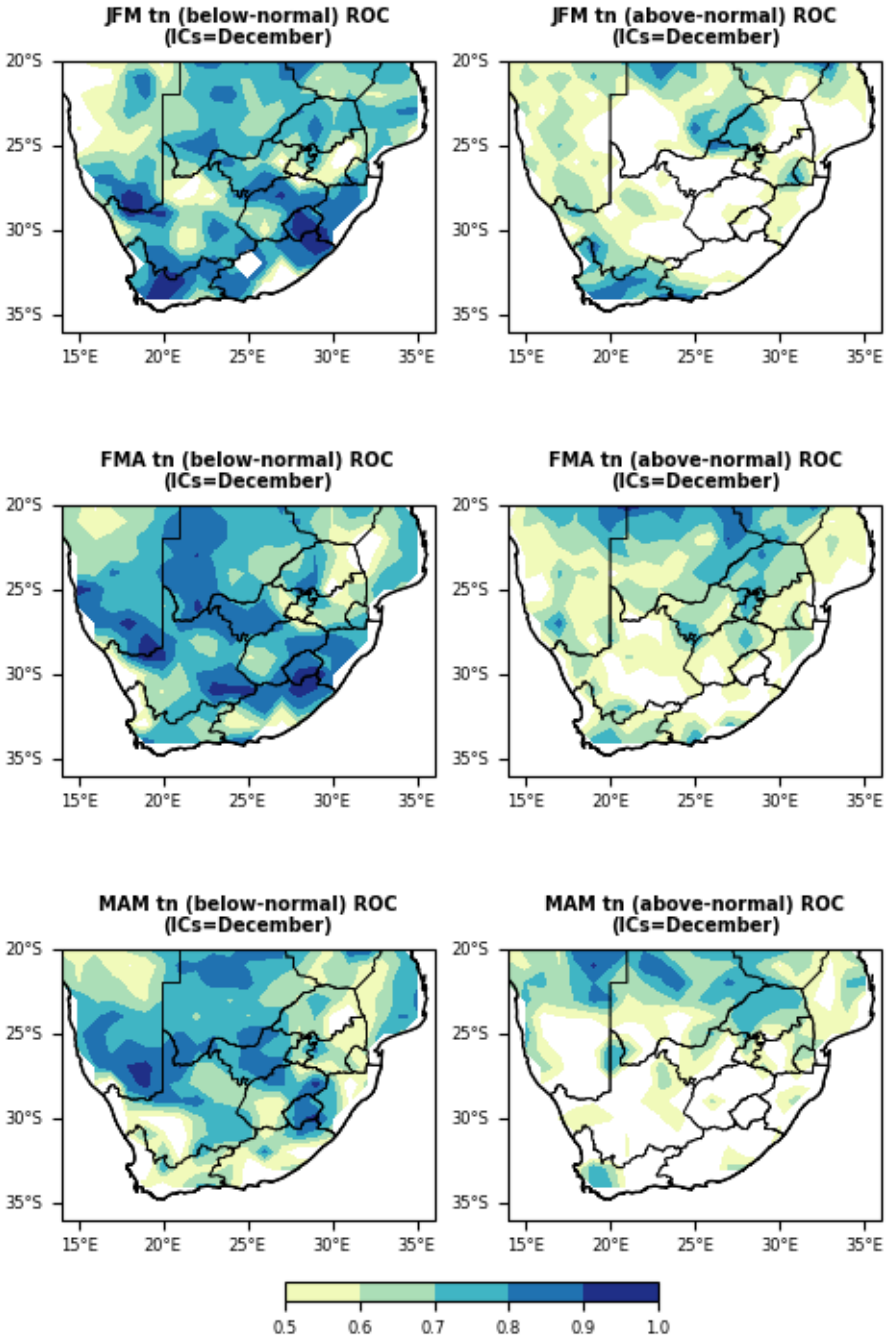

Figure A2: ROC scores for minimum temperatures relevant to the current forecasts in figure 4.

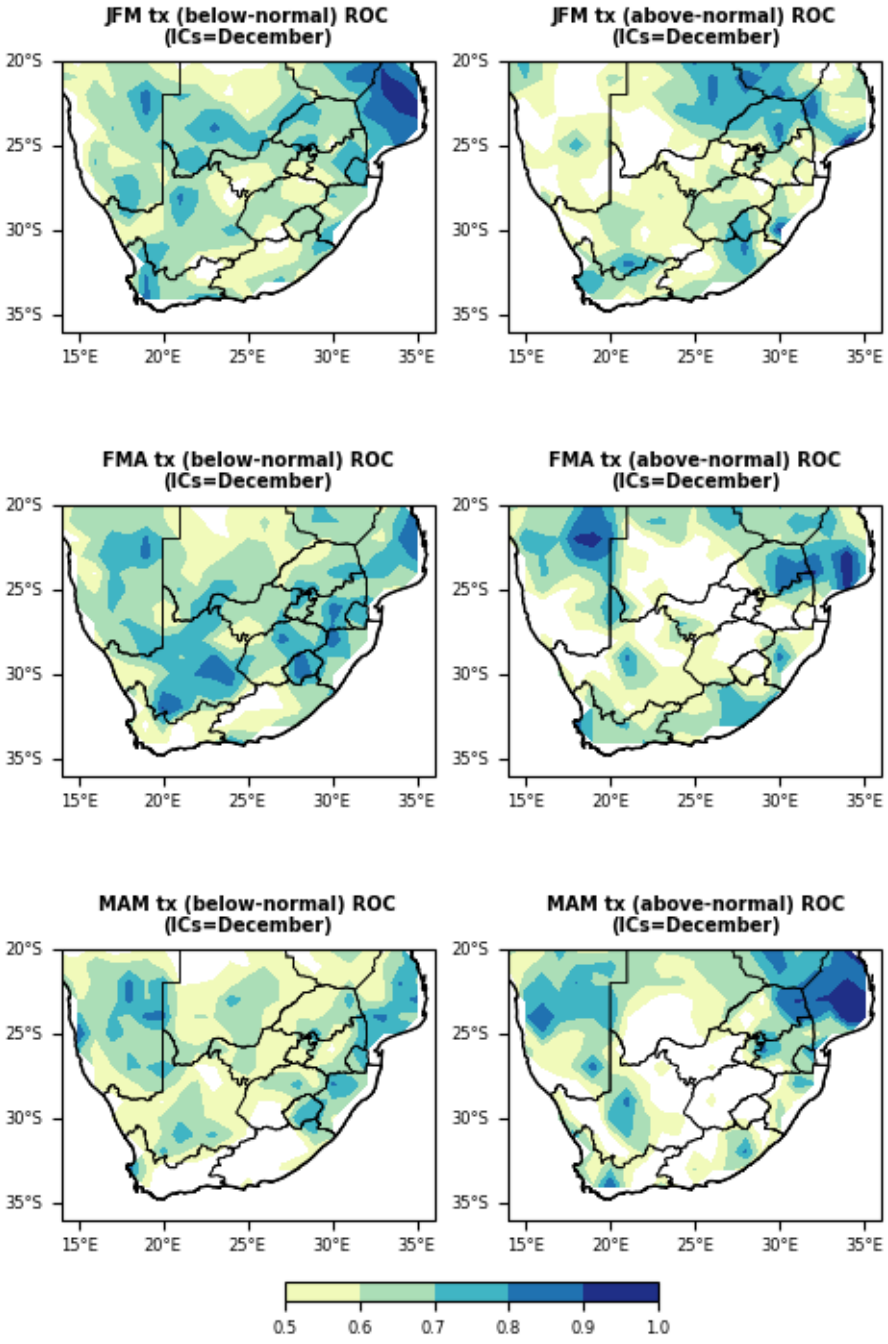

Figure A3: ROC scores for maximum temperatures relevant to the current forecasts in figure 5.