

Seasonal forecasts

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<https://tinyurl.com/ybrb3a72>



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Seasonal Forecast Worx

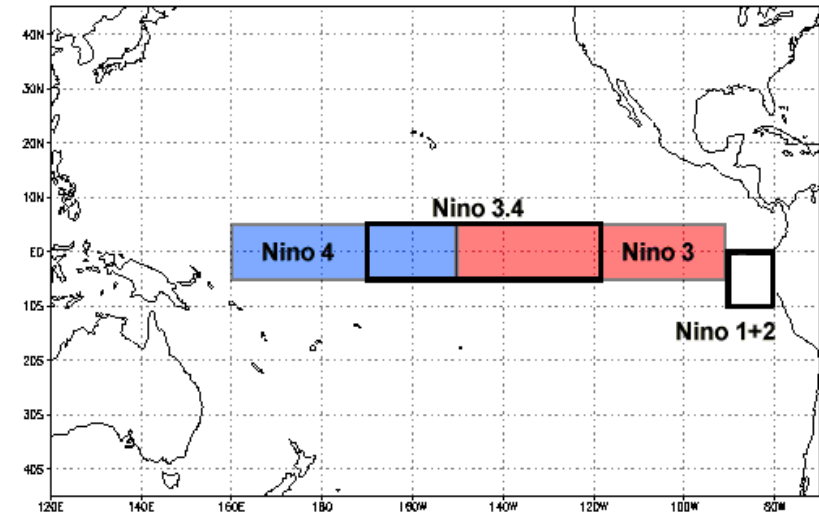
Latest Update: 8 July 2019

- The seasonal forecasts presented here by **Seasonal Forecast Worx** are based on forecast output of the coupled ocean-atmosphere models administered through the North American Multi-Model Ensemble (NMME) prediction experiment (<http://www.cpc.ncep.noaa.gov/products/NMME/>; Kirtman et al. 2014). NMME real-time seasonal forecast and hindcast (re-forecast) data are obtained from the data library (<http://iridl.ldeo.columbia.edu/>) of the International Research Institute for Climate and Society (IRI; <http://iri.columbia.edu/>).
- NMME forecasts are routinely produced and are statistically improved and tailored for southern Africa and for global sea-surface temperatures by employees and post-graduate students in the Department of Geography, Geoinformatics and Meteorology at the University of Pretoria (<http://www.up.ac.za/en/geography-geoinformatics-and-meteorology/>). Statistical post-processing is performed with the CPT software (<http://iri.columbia.edu/our-expertise/climate/tools/cpt/>).
- Why do we apply statistical methods to climate model forecasts?
 “...**statistical correction methods treating individual locations (e.g. multiple regression or principal component regression) may be recommended for today’s coupled climate model forecasts**”. (Barnston and Tippett, 2017).
- Why do we not use just a single model in our forecasts?
 “...**multi-model forecasts outperform the single model forecasts...**” (Landman and Beraki, 2012).
- For the official seasonal forecast for South Africa, visit the South African Weather Service website at <http://www.weathersa.co.za/images/data/longrange/gfcsa/scw.pdf>

ENSO and Global SST Forecasts

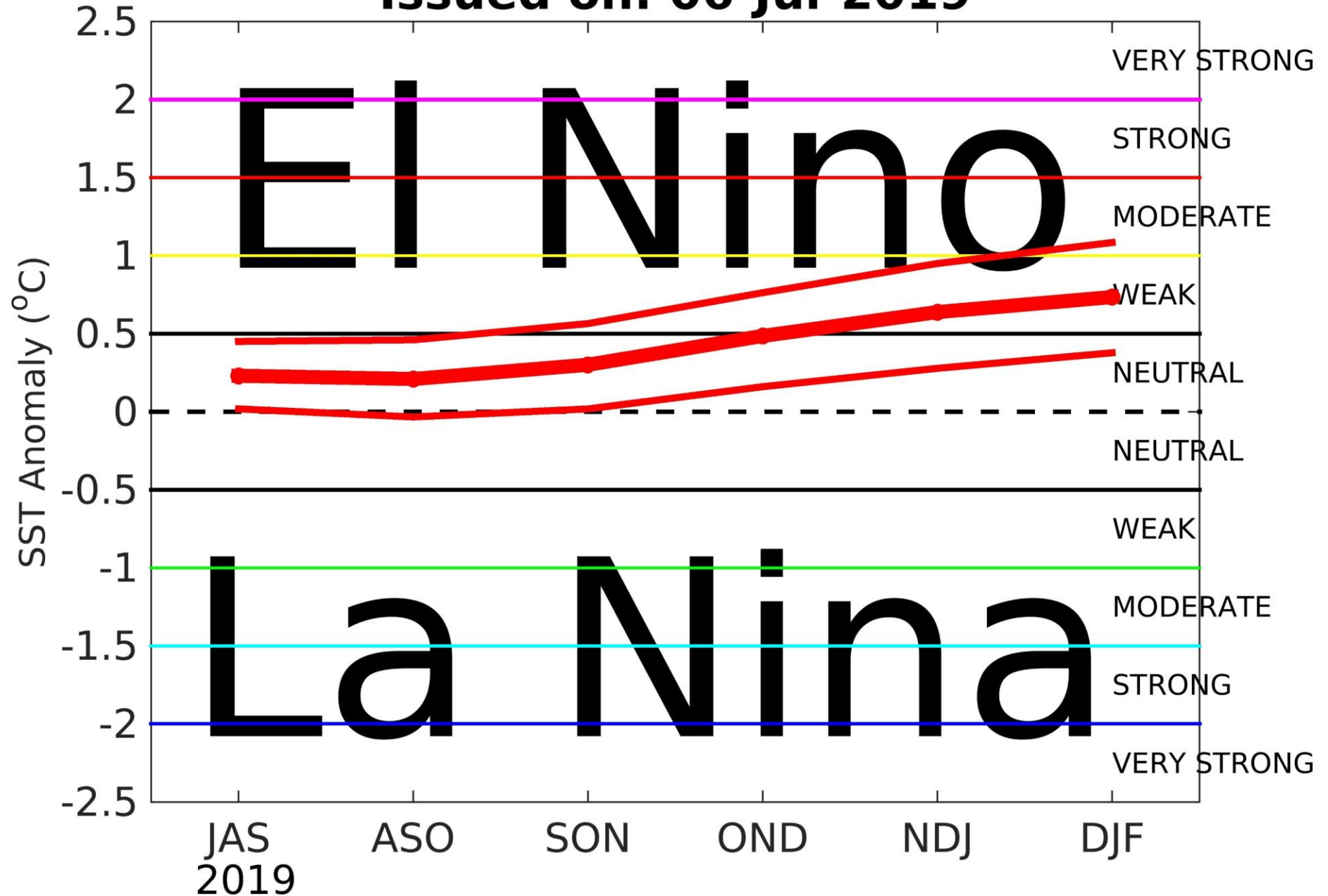
Prediction Method

- Forecasts for global sea-surface temperature (SST) fields are obtained through a combination of NMME models and a linear statistical model that uses antecedent SST as predictor (Landman et al. 2011). Forecasts for the Niño3.4 area (see insert) are derived from the global forecasts.
- SST forecasts from the NMME models are variance and bias corrected.
- Three-month Niño3.4 SST forecasts are produced for three categories:
 - **El Niño:** SST above the 75th percentile
 - **La Niña:** SST below the 25th percentile
 - **Neutral:** Neither El Niño nor La Niña



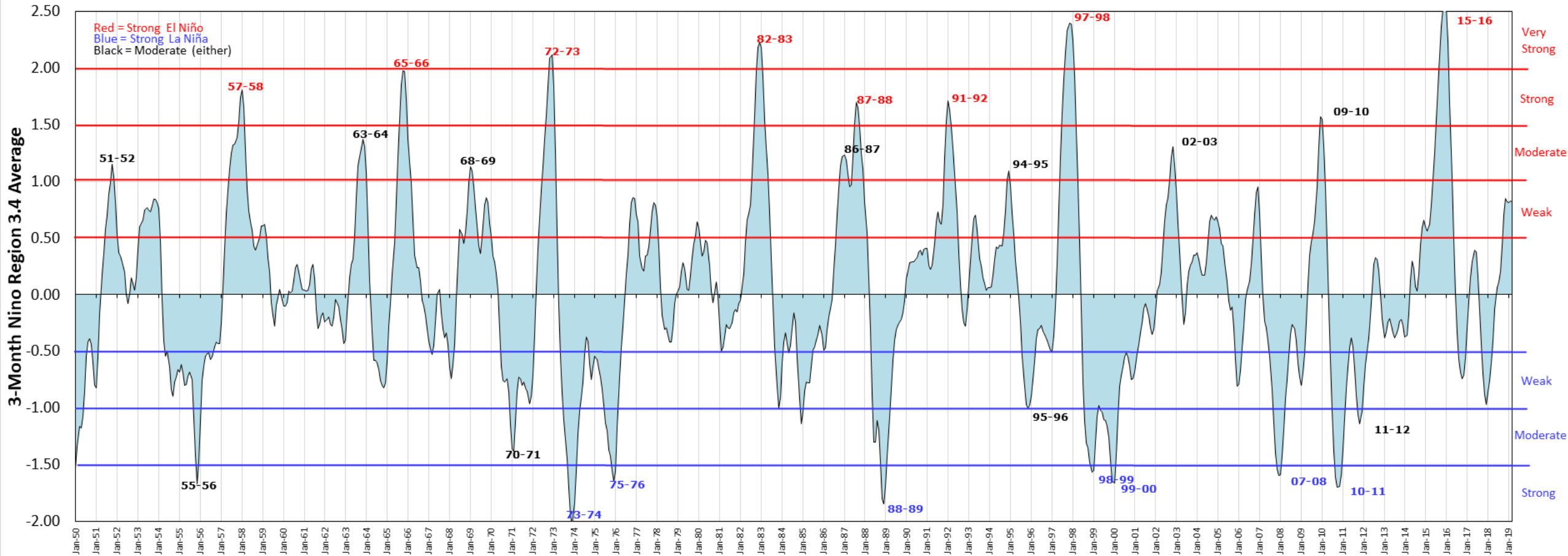
CSiriMM Nino3.4 SST Forecast

Issued on: 06-Jul-2019

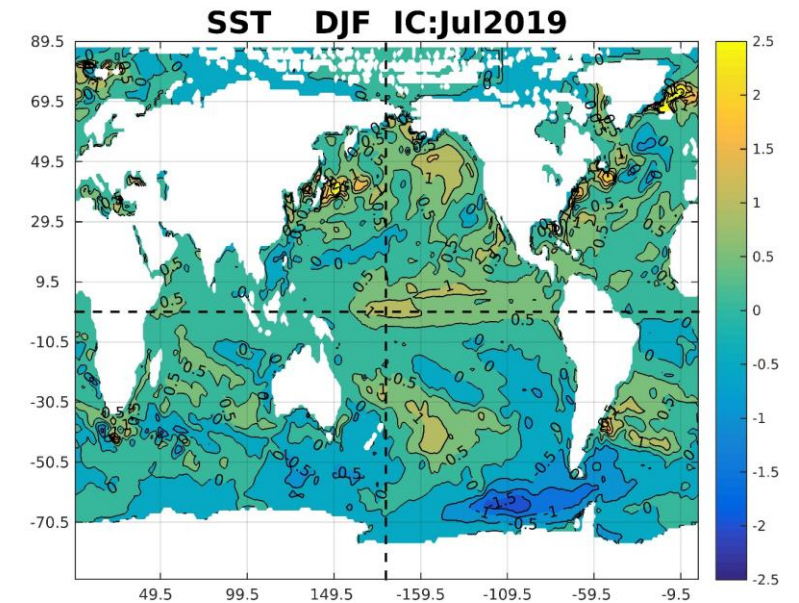
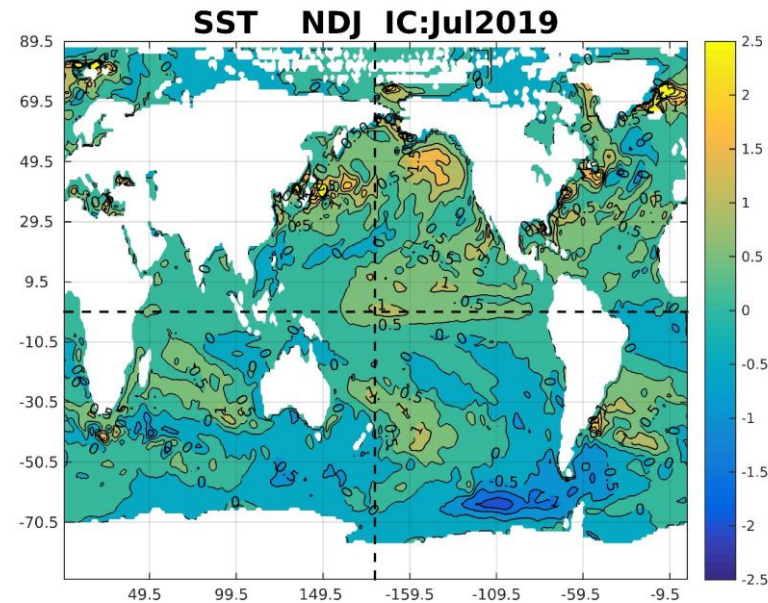
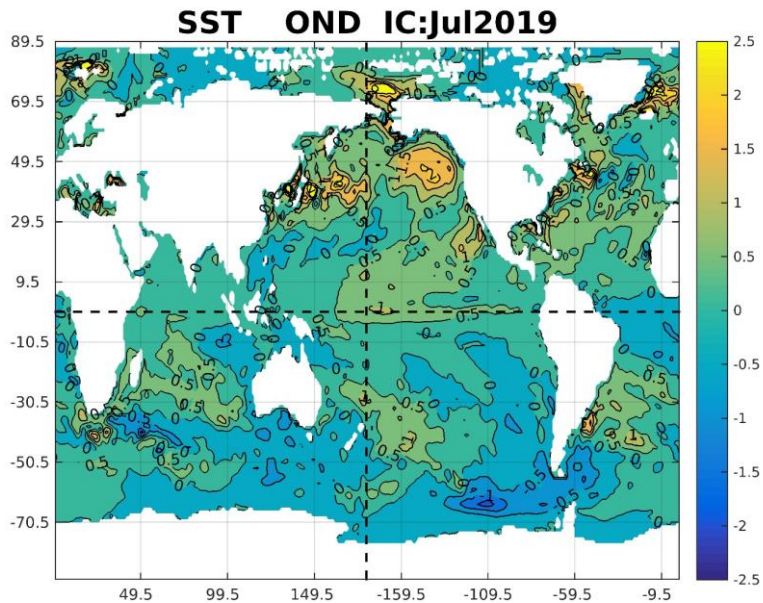
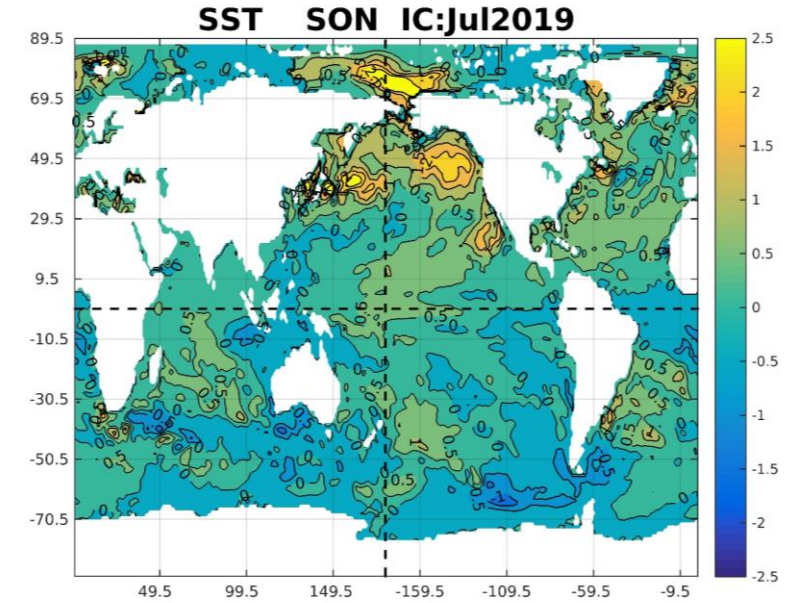
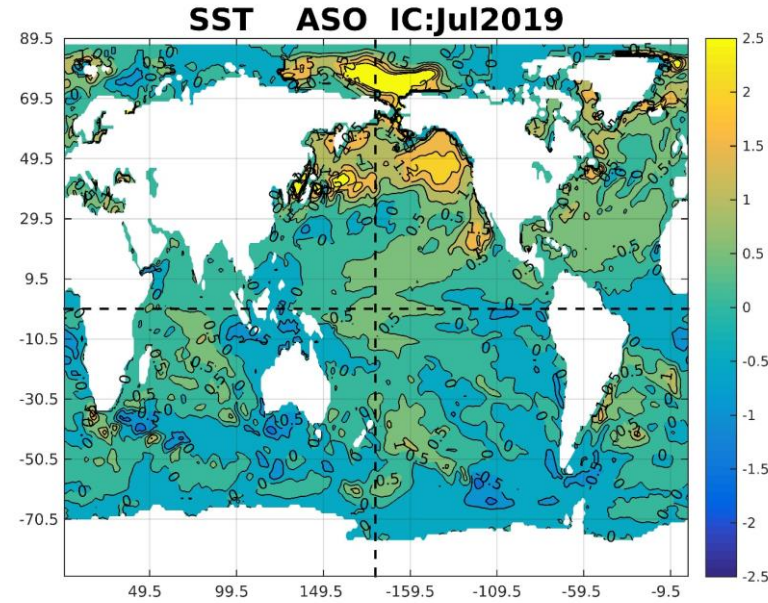
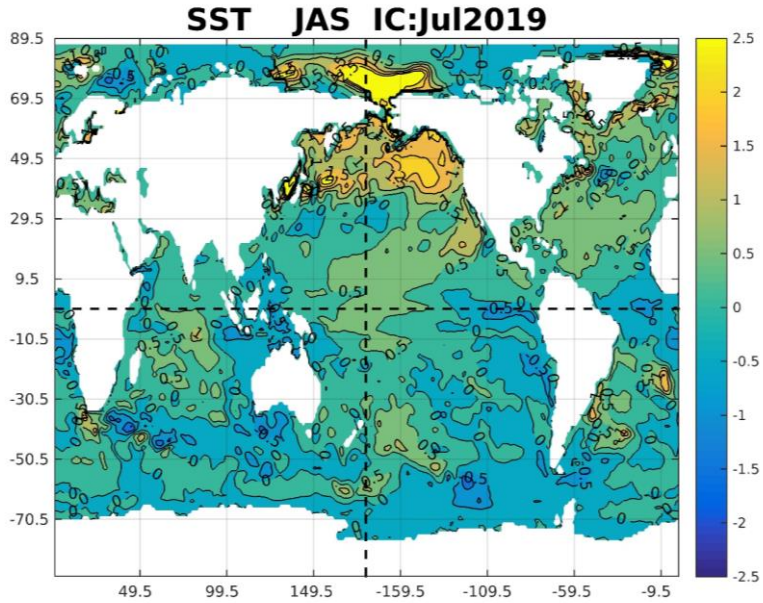


Oceanic Niño Index (ONI)

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.shtml



SST anomalies



Round-up: ENSO

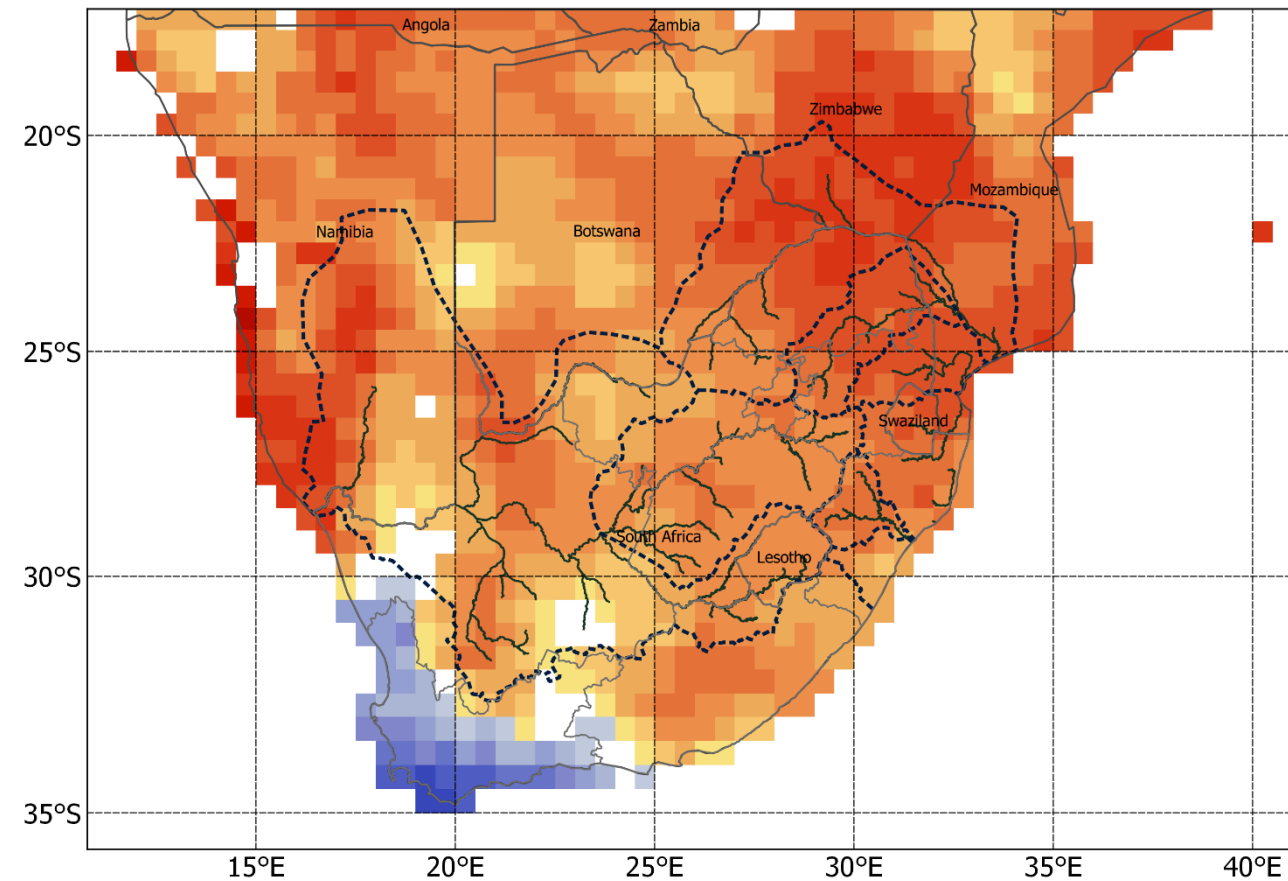
- Predicted warming of central Pacific Ocean SST suggests a weak to moderate El Niño event towards summer.
- *From the CPC/IRI El Niño Watch in June: El Niño is predicted to persist through the Northern Hemisphere summer 2019 (66% chance), with lower odds of continuing through the fall and winter (50-55% chance).*

Southern Africa Forecasts

Prediction Method

- Three-month seasons for seasonal rainfall totals and average maximum temperatures of NMME ensemble mean forecasts are interpolated to Climatic Research Unit (CRU; Harris et al. 2014) grids ($0.5^{\circ} \times 0.5^{\circ}$) by correcting the mean and variance biases of the NMME forecasts. Probabilistic forecasts are subsequently produced from the error variance obtained from a 5-year-out cross-validation process (Troccoli et al. 2008). Forecasts cover a 6-month period.
- Forecasts are produced for three categories:
 - **Above:** Above-normal (“wet” / “hot”, rainfall totals / maximum temperatures higher than the 75th percentile of the climatological record)
 - **Below:** Below-normal (“dry” / “cool”, rainfall totals / maximum temperatures lower than the 25th percentile of the climatological record)
 - **Normal:** Near-normal (“average” season)
- Verification:
 - ROC Area (Below-Normal) – The forecast system’s ability to discriminate dry or cool seasons from the rest of the seasons over a 32-year test period. ROC values should be higher than 0.5 for a forecast system to be considered skilful.
 - ROC Area (Above-Normal) – The forecast system’s ability to discriminate wet or hot seasons from the rest of the seasons over a 32-year test period. ROC values should be higher than 0.5 for a forecast system to be considered skilful.

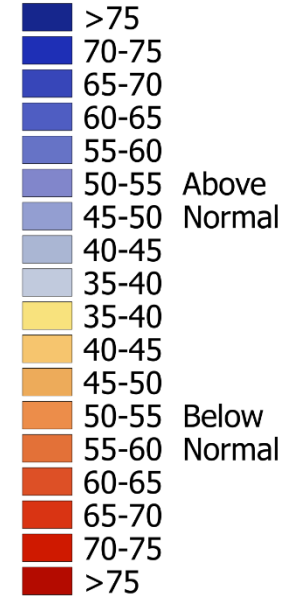
JAS 2019 Rainfall; ICs: July



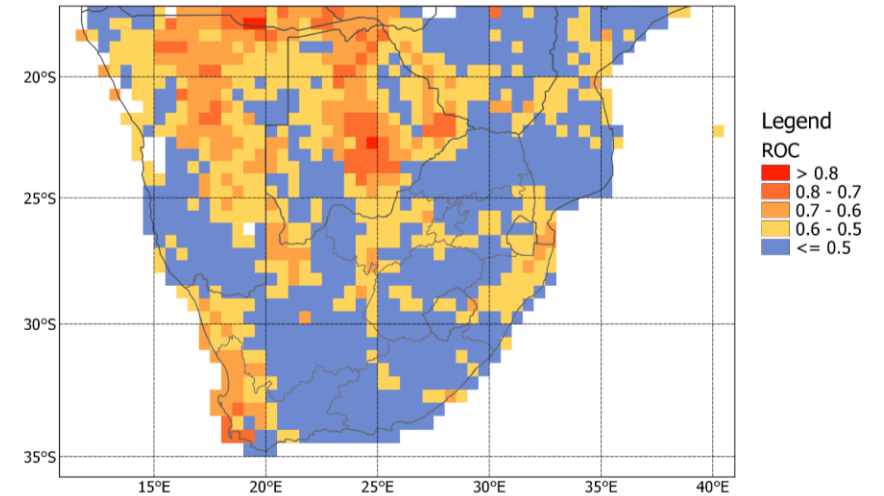
Legend

--- Catchment Area
— Main Rivers

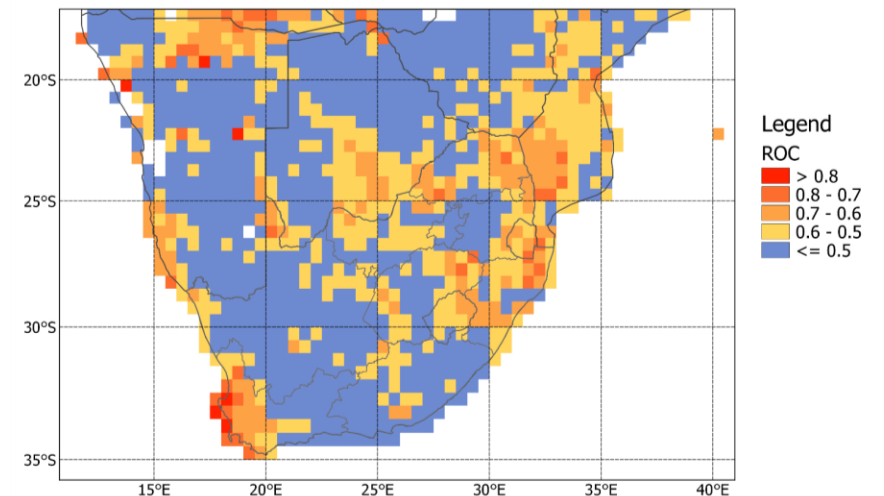
Rainfall Prob



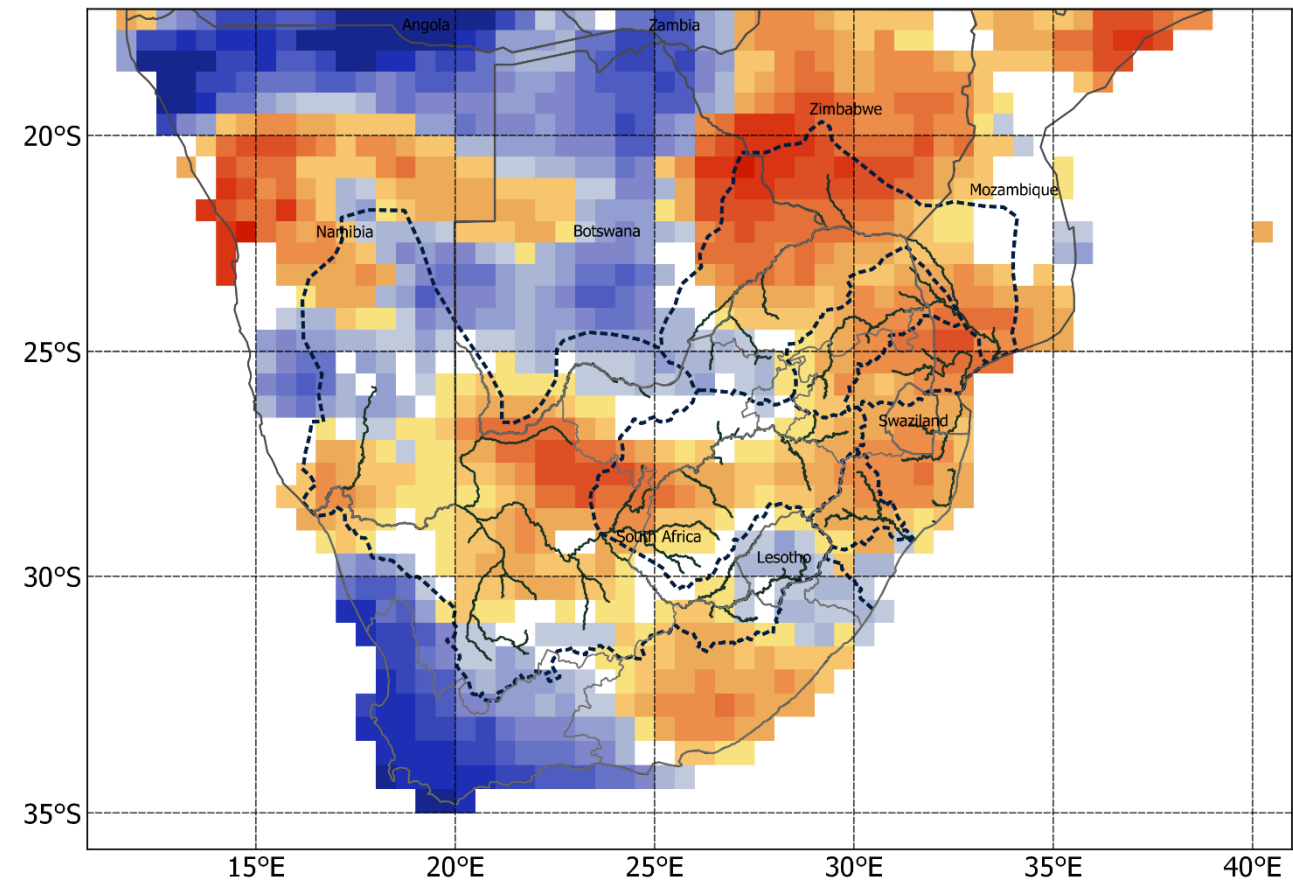
ROC Area (Above-Normal): JAS Rainfall



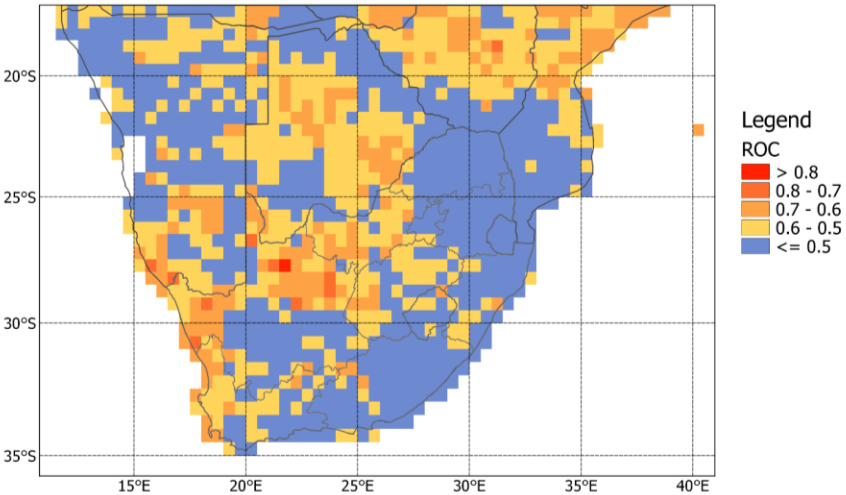
ROC Area (Below-Normal): JAS Rainfall



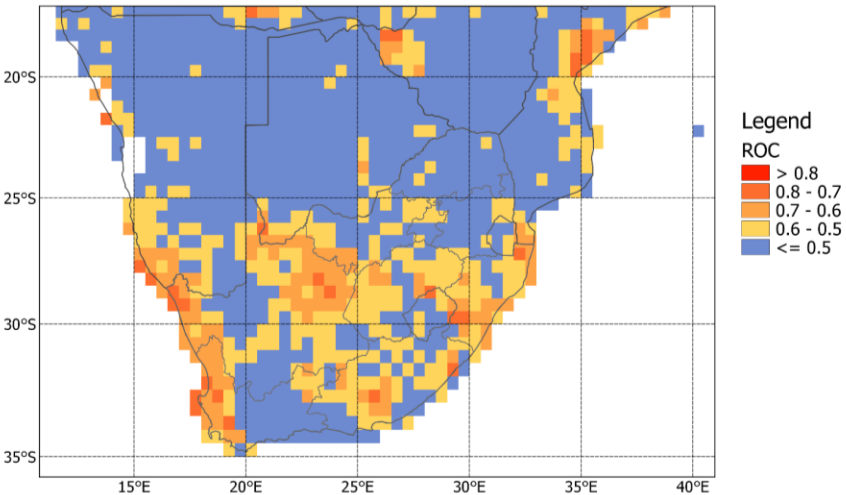
ASO 2019 Rainfall; ICs: July



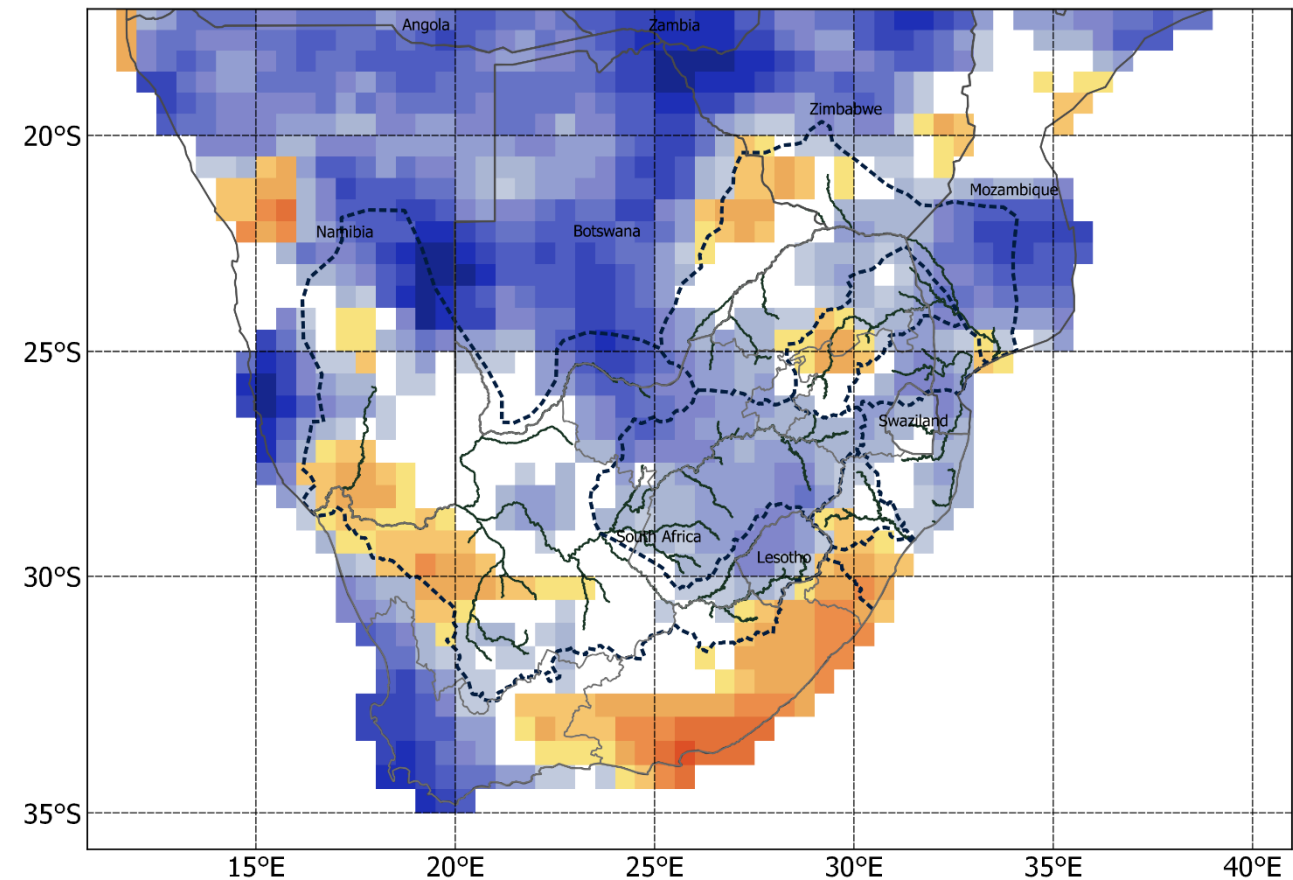
ROC Area (Above-Normal): ASO Rainfall



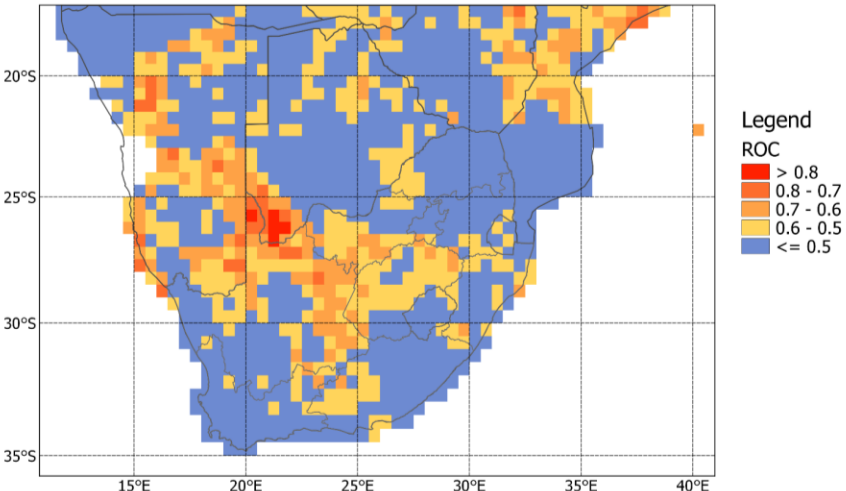
ROC Area (Below-Normal): ASO Rainfall



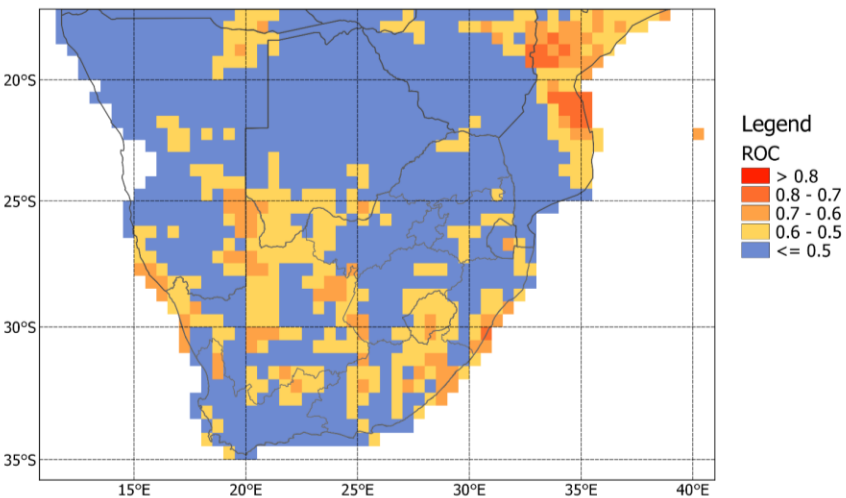
SON 2019 Rainfall; ICs: July



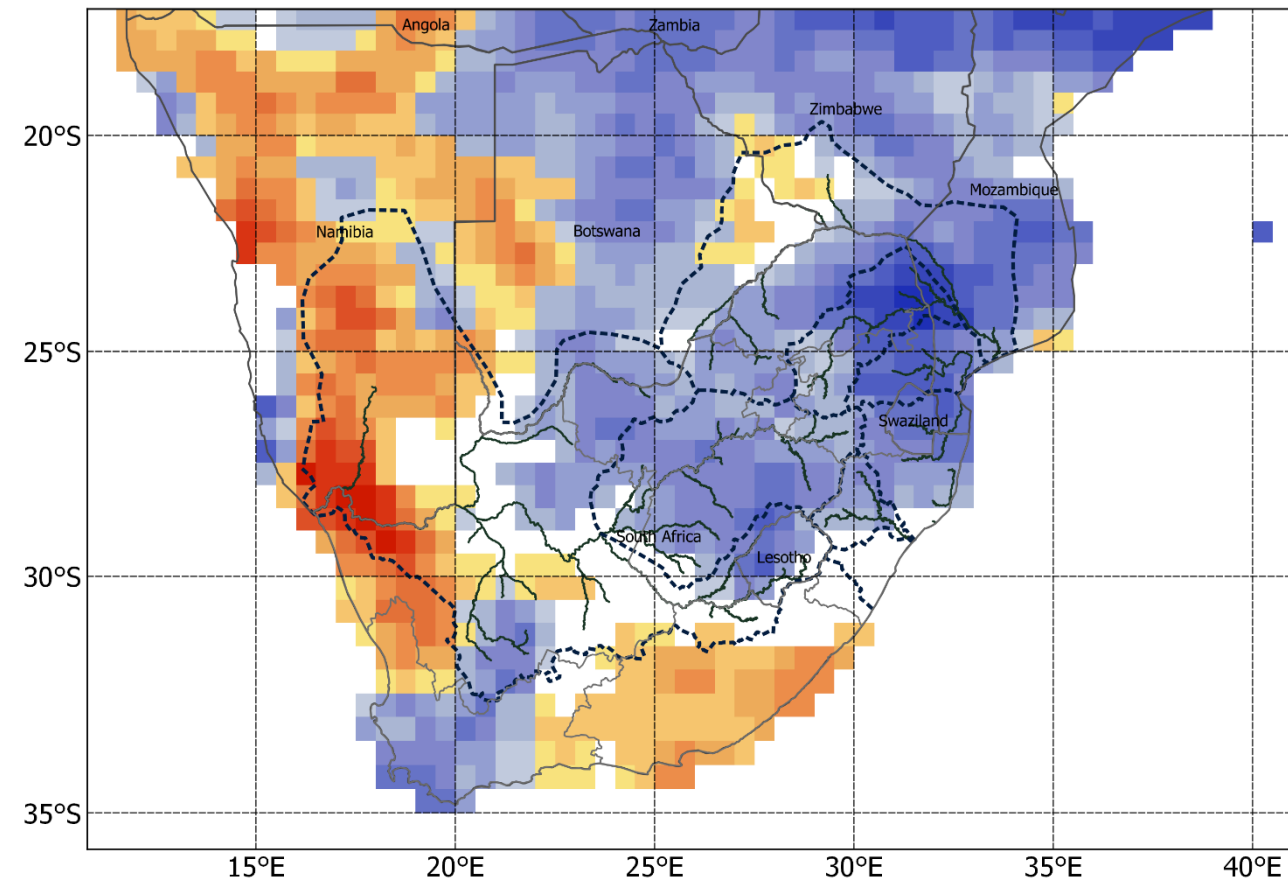
ROC Area (Above-Normal): SON Rainfall



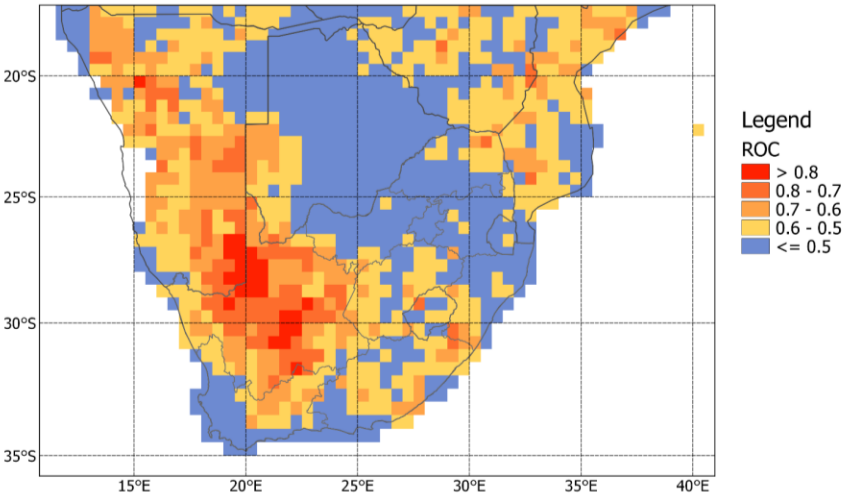
ROC Area (Below-Normal): SON Rainfall



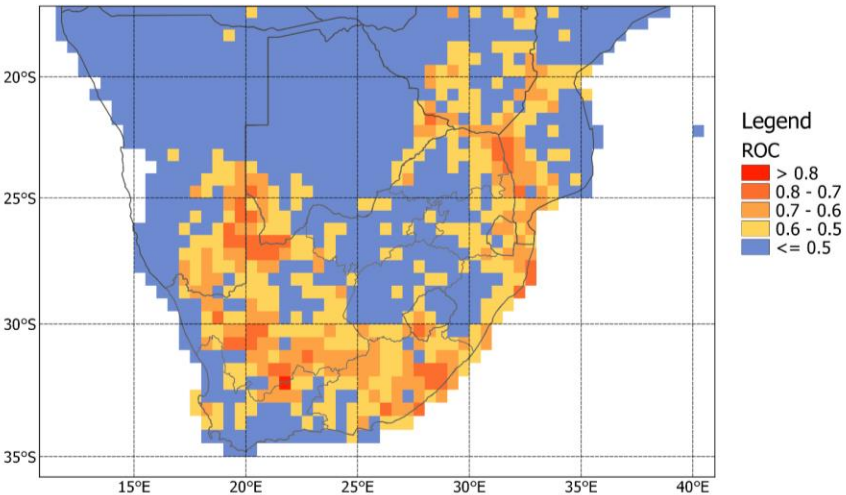
OND 2019 Rainfall; ICs: July



ROC Area (Above-Normal): OND Rainfall



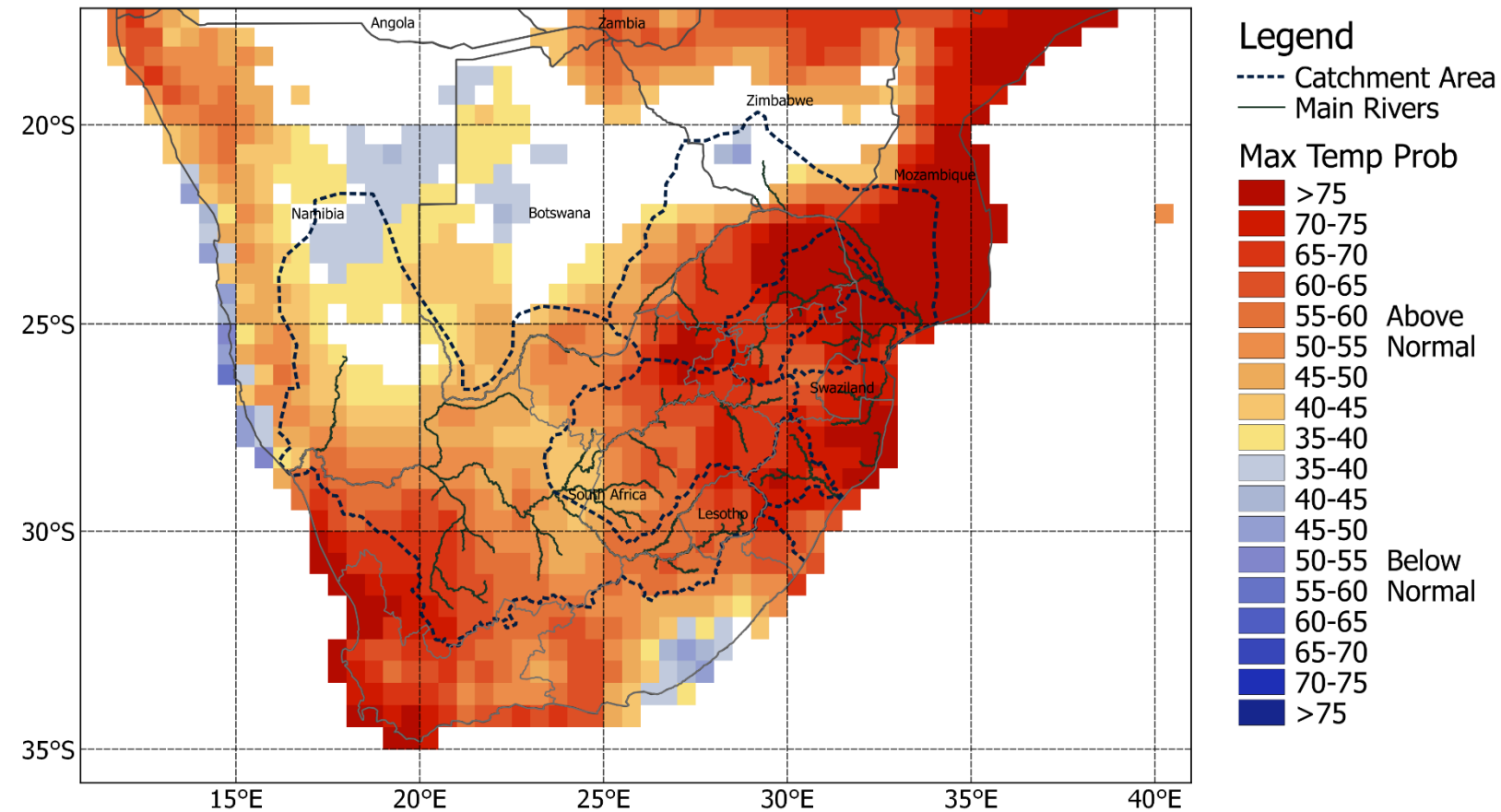
ROC Area (Below-Normal): OND Rainfall



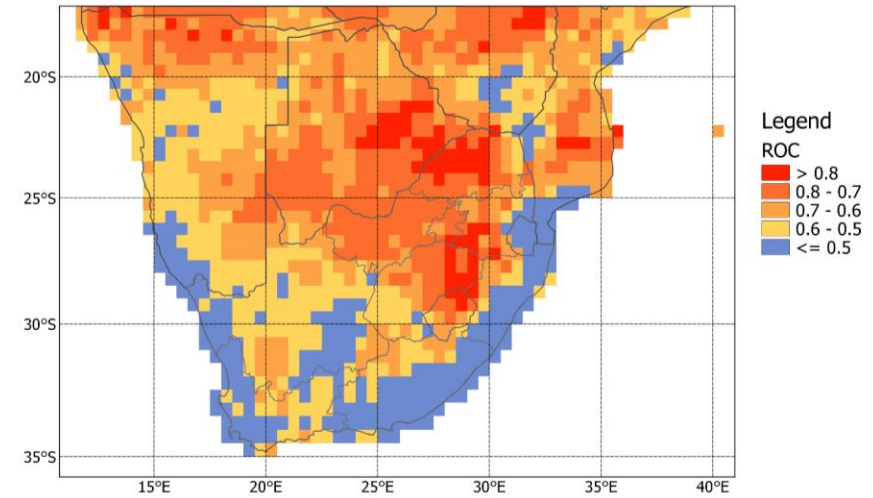
Round-up: SADC Rainfall

- Areas most likely associated with favourable winter rainfall outcomes are mainly restricted to the southwestern coastal and interior regions.
- Favourable spring rain is possible over parts of the summer rainfall region.

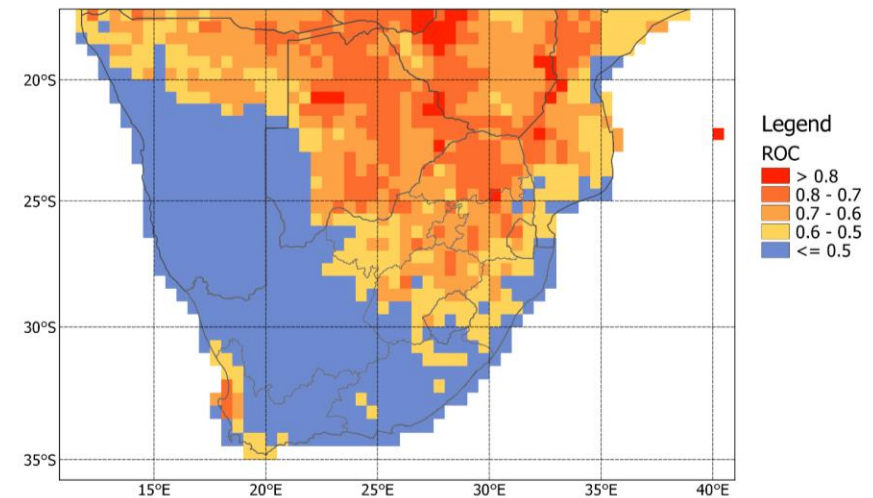
JAS 2019 Max Temp; ICs: July



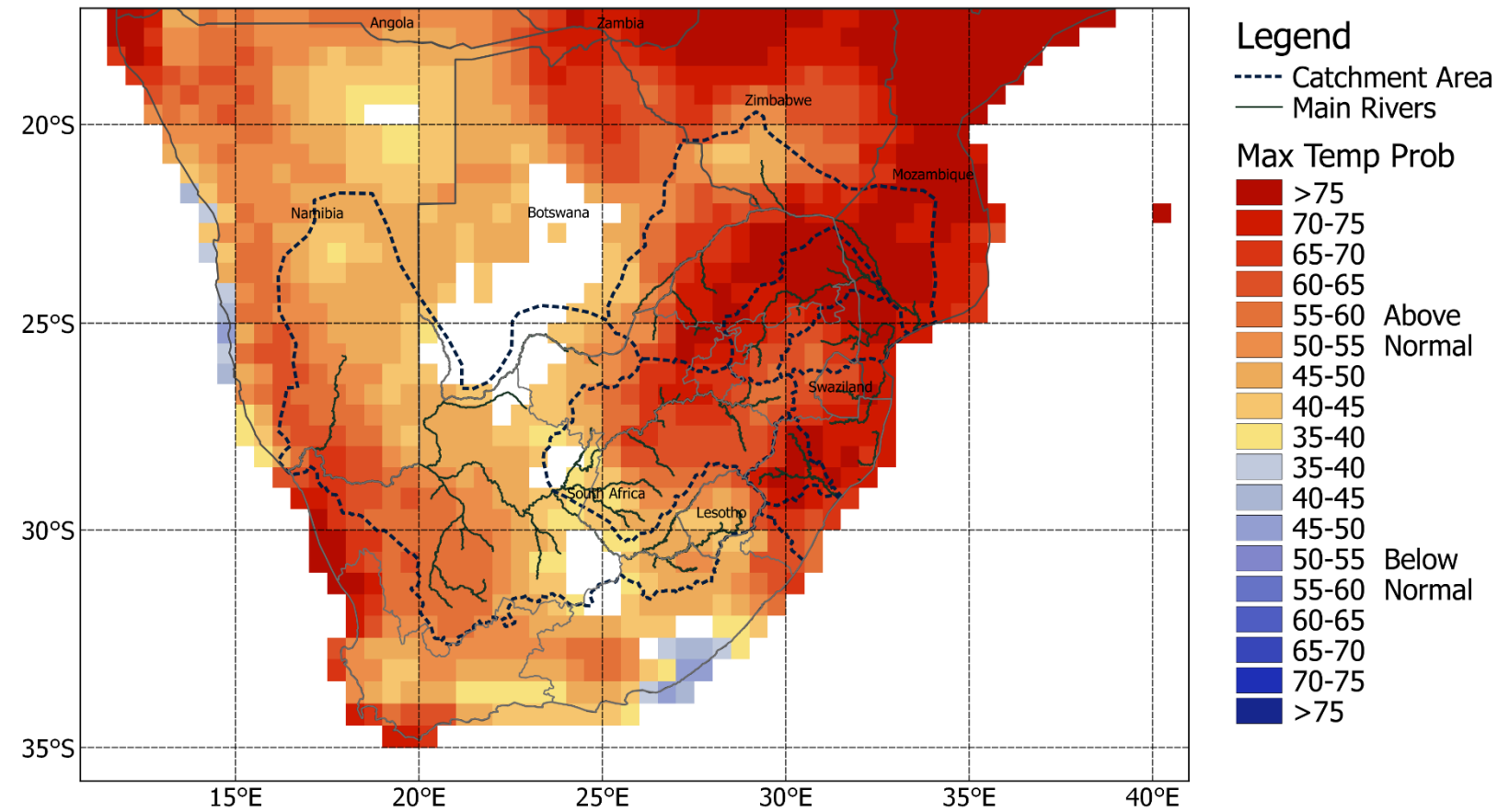
ROC Area (Above-Normal): JAS Max Temp



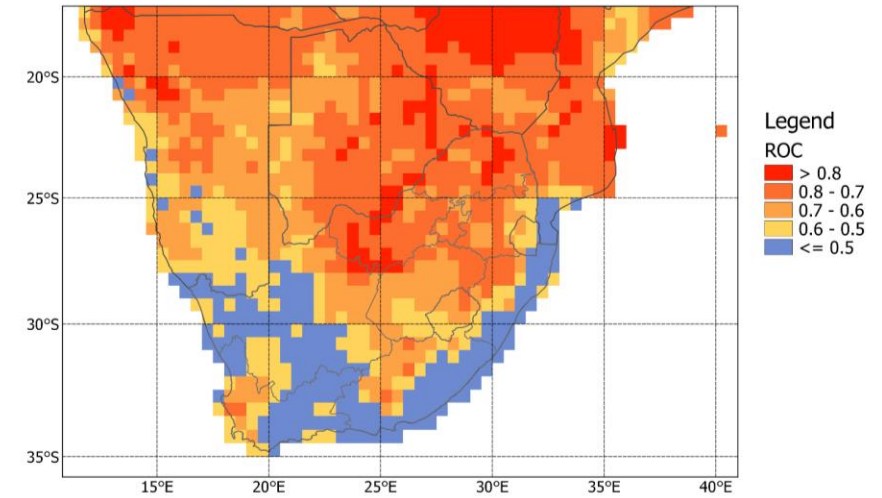
ROC Area (Below-Normal): JAS Max Temp



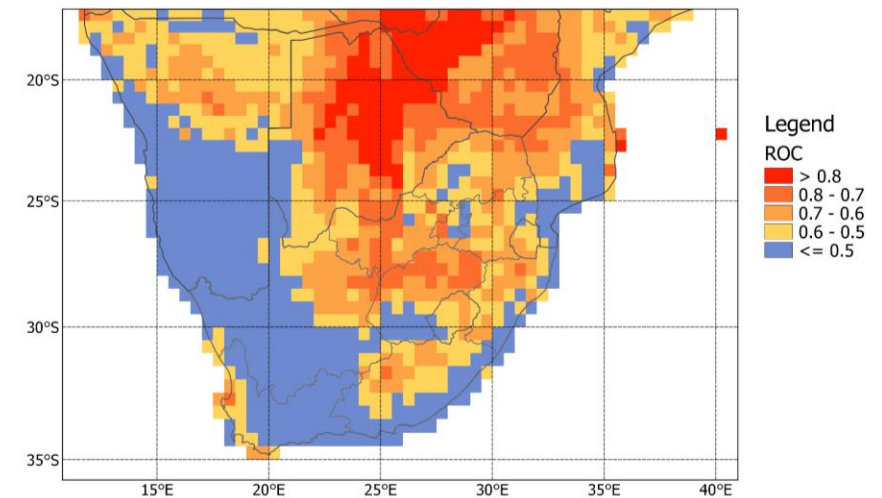
ASO 2019 Max Temp; ICs: July



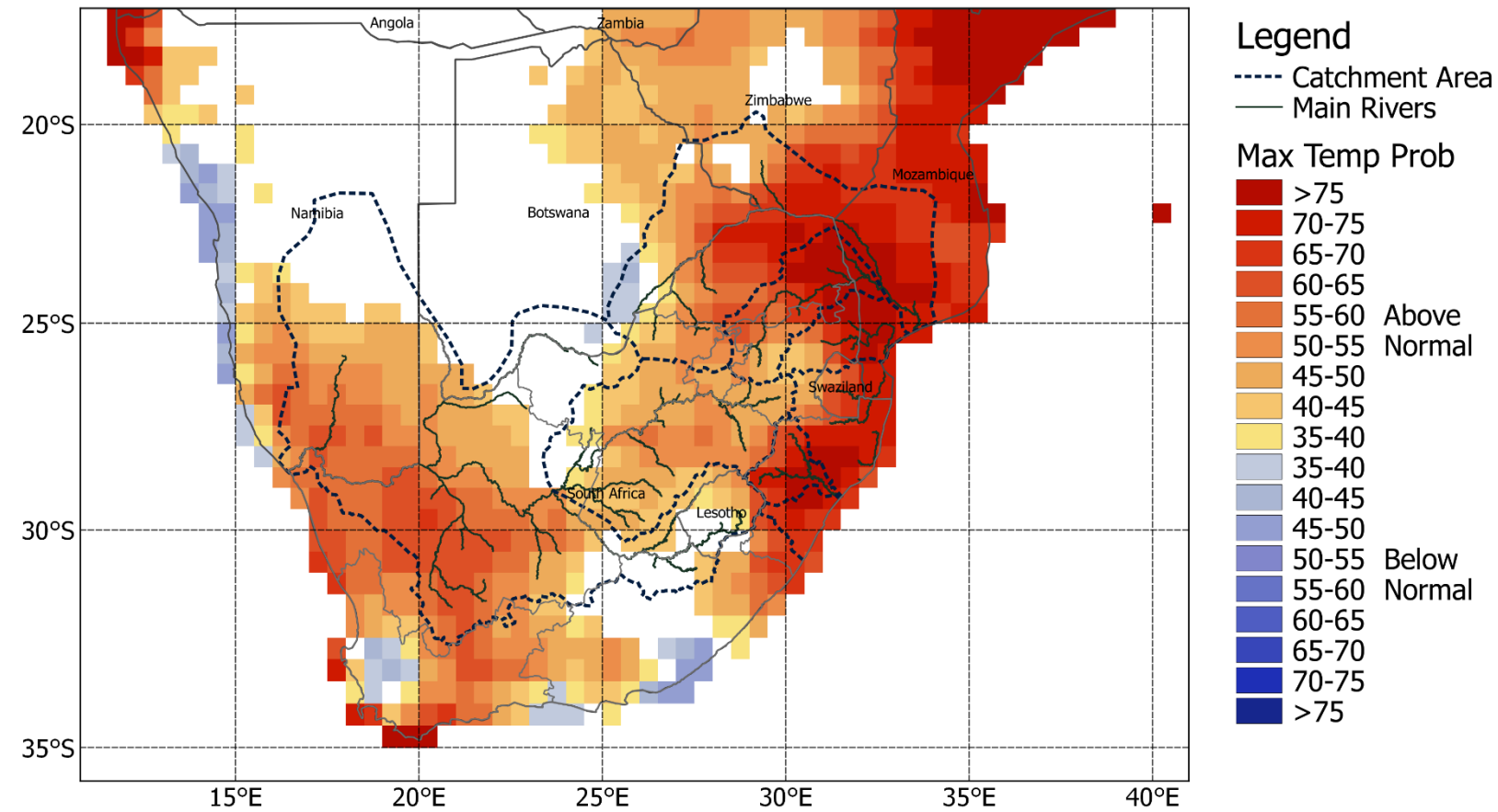
ROC Area (Above-Normal): ASO Max Temp



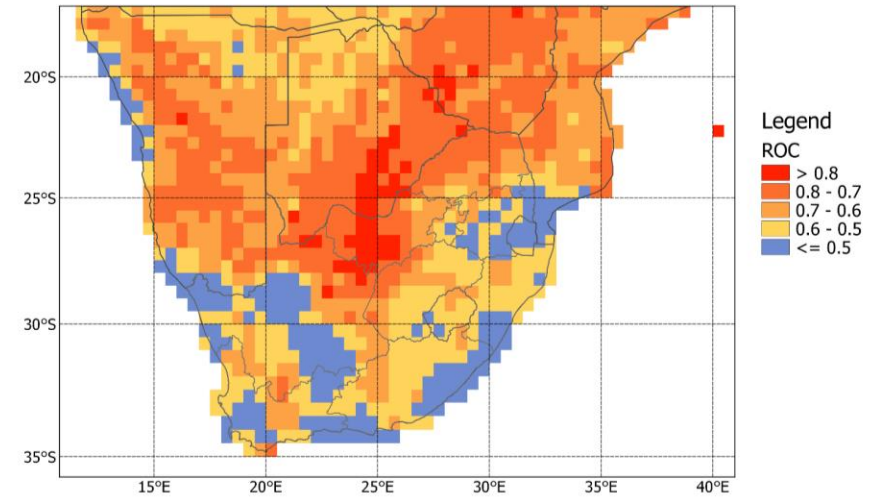
ROC Area (Below-Normal): ASO Max Temp



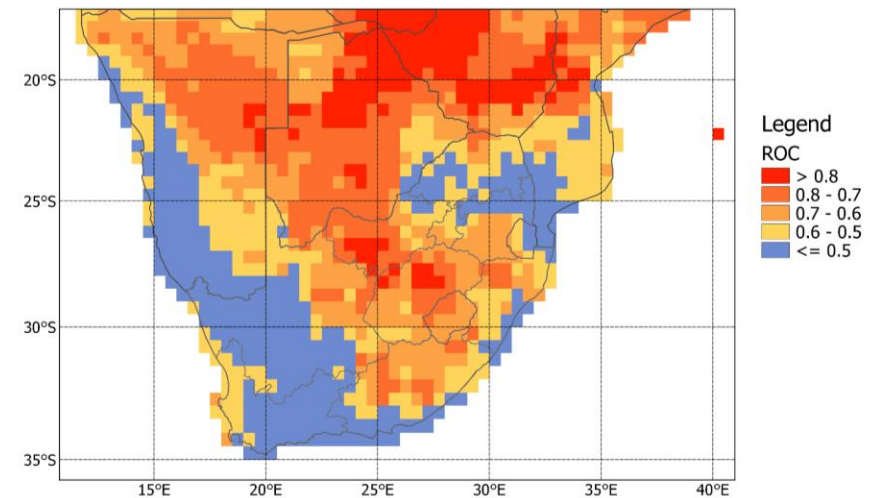
SON 2019 Max Temp; ICs: July



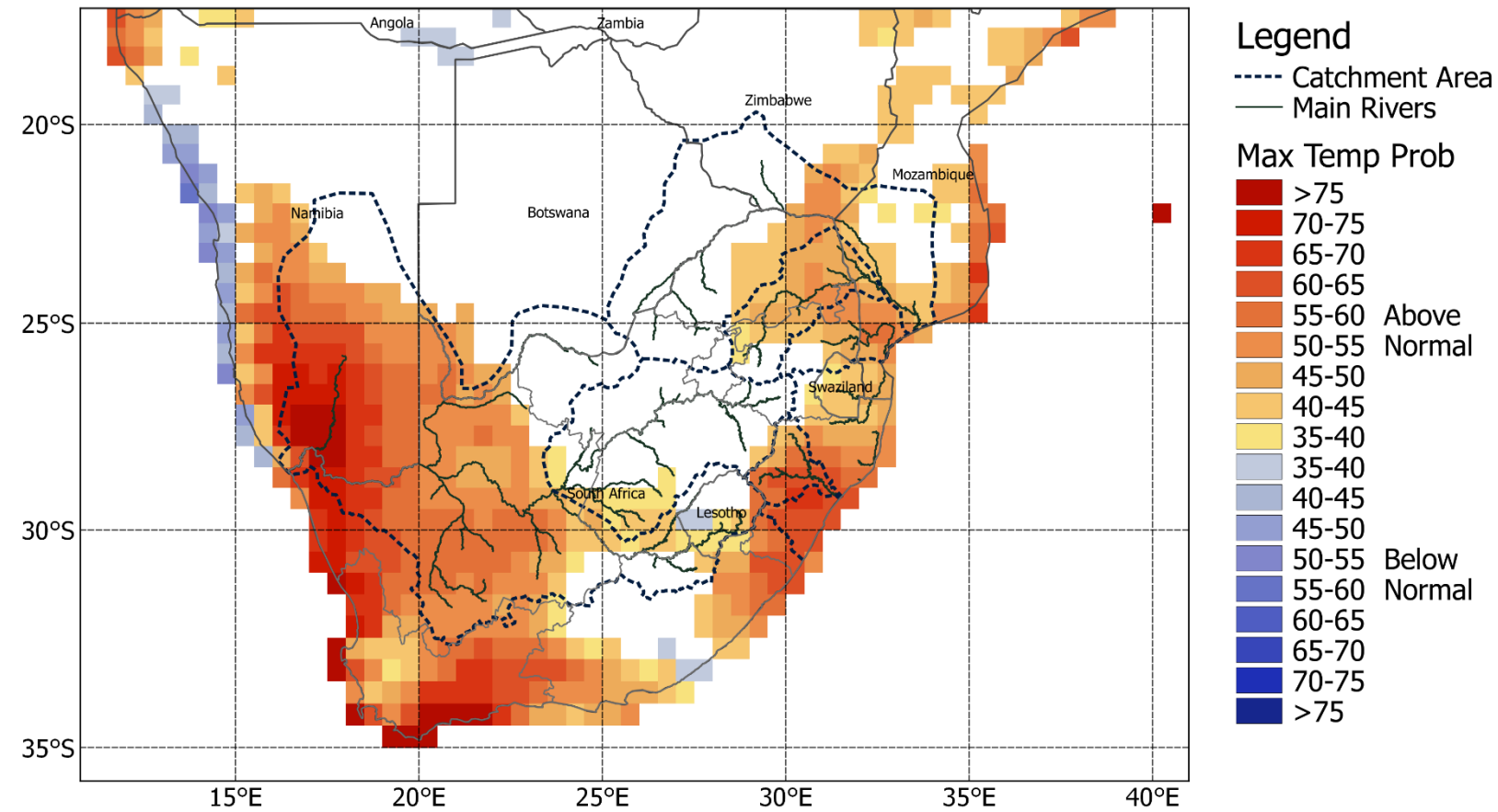
ROC Area (Above-Normal): SON Max Temp



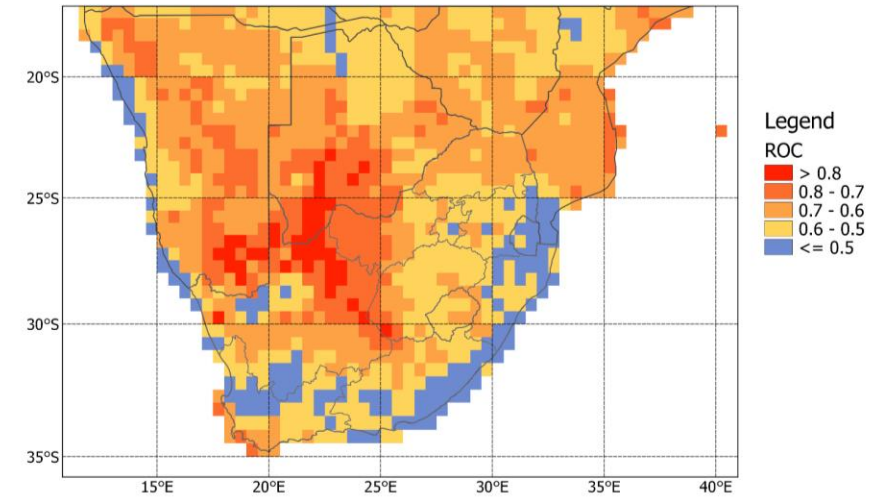
ROC Area (Below-Normal): SON Max Temp



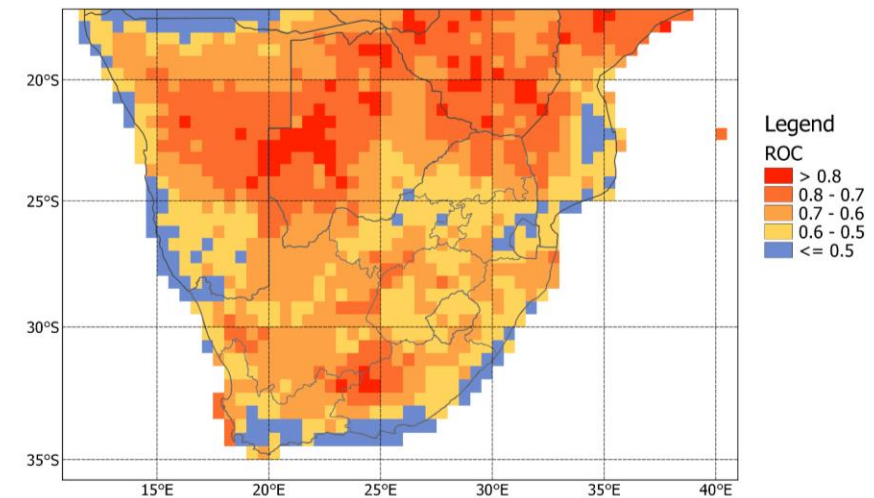
OND 2019 Max Temp; ICs: July



ROC Area (Above-Normal): OND Max Temp



ROC Area (Below-Normal): OND Max Temp



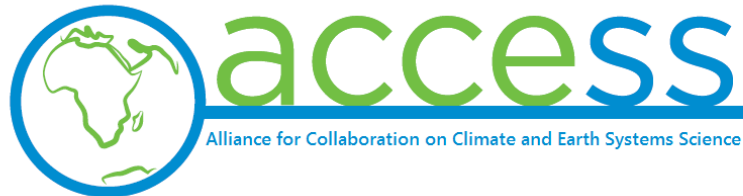
Round-up: SADC Max Temp

- The larger part of the region can expect high maximum temperatures.

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- The National Research Foundation through the Incentive Funding for Rated Researchers
- ACCESS (Alliance for Collaboration on Climate and Earth System Science) through the project “Investigating predictability of seasonal anomalies for societal benefit”



Student participation in forecast system development



Stephanie Hinze, BSc (Honours)(Meteorology):

Statistical downscaling using large and high-resolution data sets, forecast displays for SADC rainfall and maximum temperatures, forecast verification



Surprise Mhlongo, BSc (Honours)(Meteorology):

Improving on SST forecast system through pattern correction, correlation vs covariance approaches, forecast output combination (multi-model approaches), mean and bias correction, and correct for skill