Seasonal forecasts

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https://tinyurl.com/ybrb3a72

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Seasonal Forecast Worx

Latest Update: 7 August 2018

- 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 for southern Africa?

  "…multi-model forecasts outperform the single model forecasts…" (Landman and Beraki, 2012).

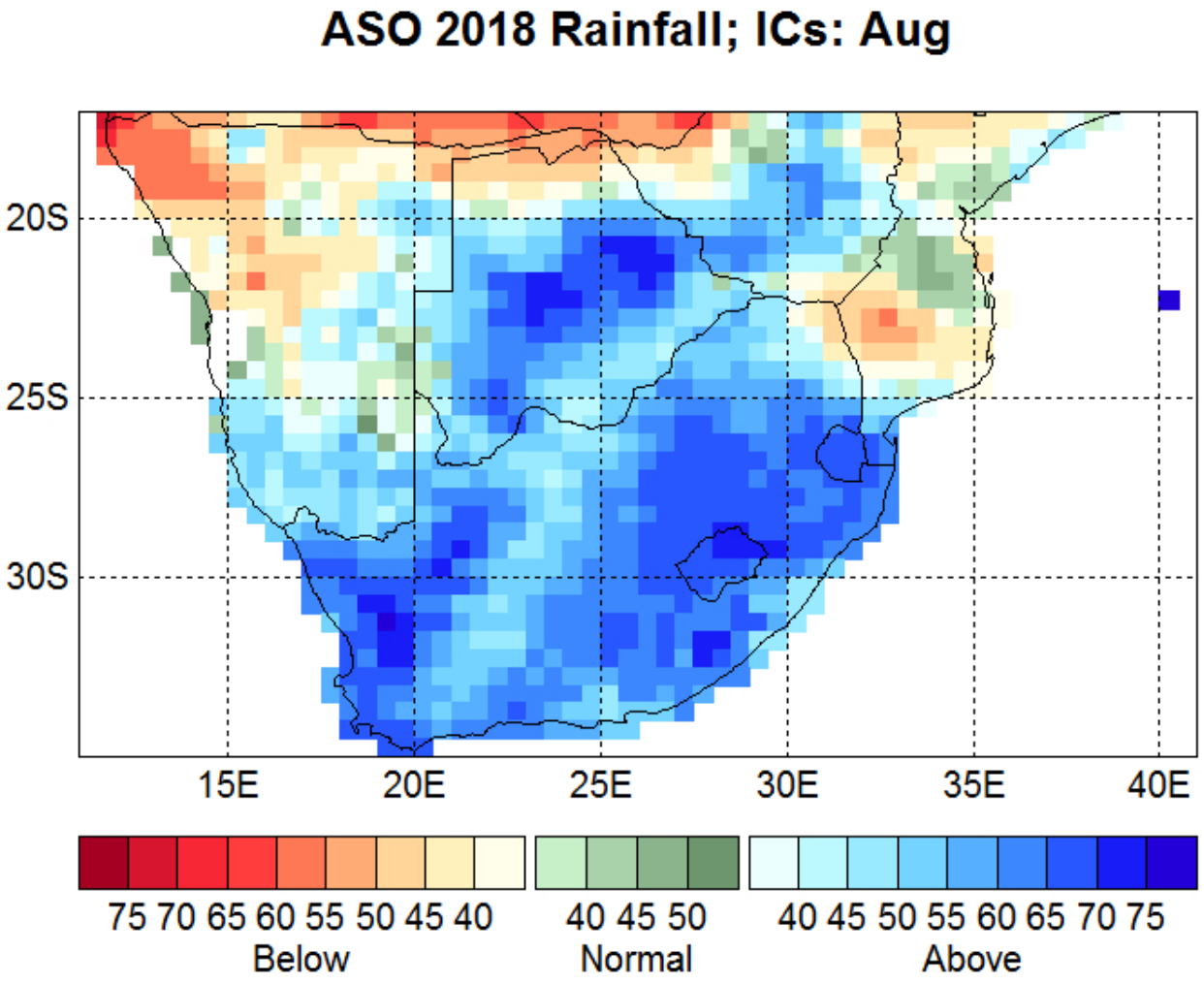
- For the official seasonal forecast for South Africa, visit the South African Weather Service website at http://www.weathersa.co.za/home/seasonal

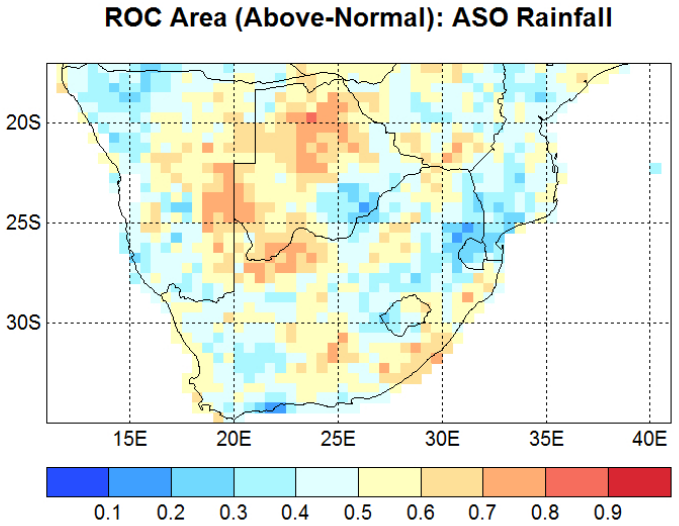
South African Weather Service
ISO 9001 Certified Organisation

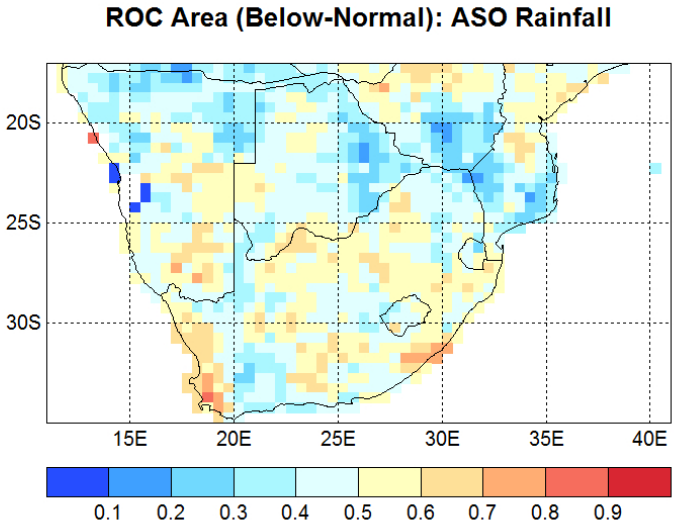
Southern Africa Forecasts

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°x0.5°) 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.


ASO 2018 Rainfall; ICs: Aug
20S
25S
30S
15E
20E
25E
30E
35E
40E
75 70 65 60 55 50 45 40
Below
40 45 50
Normal
40 45 50 55 60 65 70 75
Above


ROC Area (Above-Normal): ASO Rainfall
20S
25S
30S
15E
20E
25E
30E
35E
40E
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9


ROC Area (Below-Normal): ASO Rainfall
20S
25S
30S
15E
20E
25E
30E
35E
40E
0.1
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0.3
0.4
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0.8
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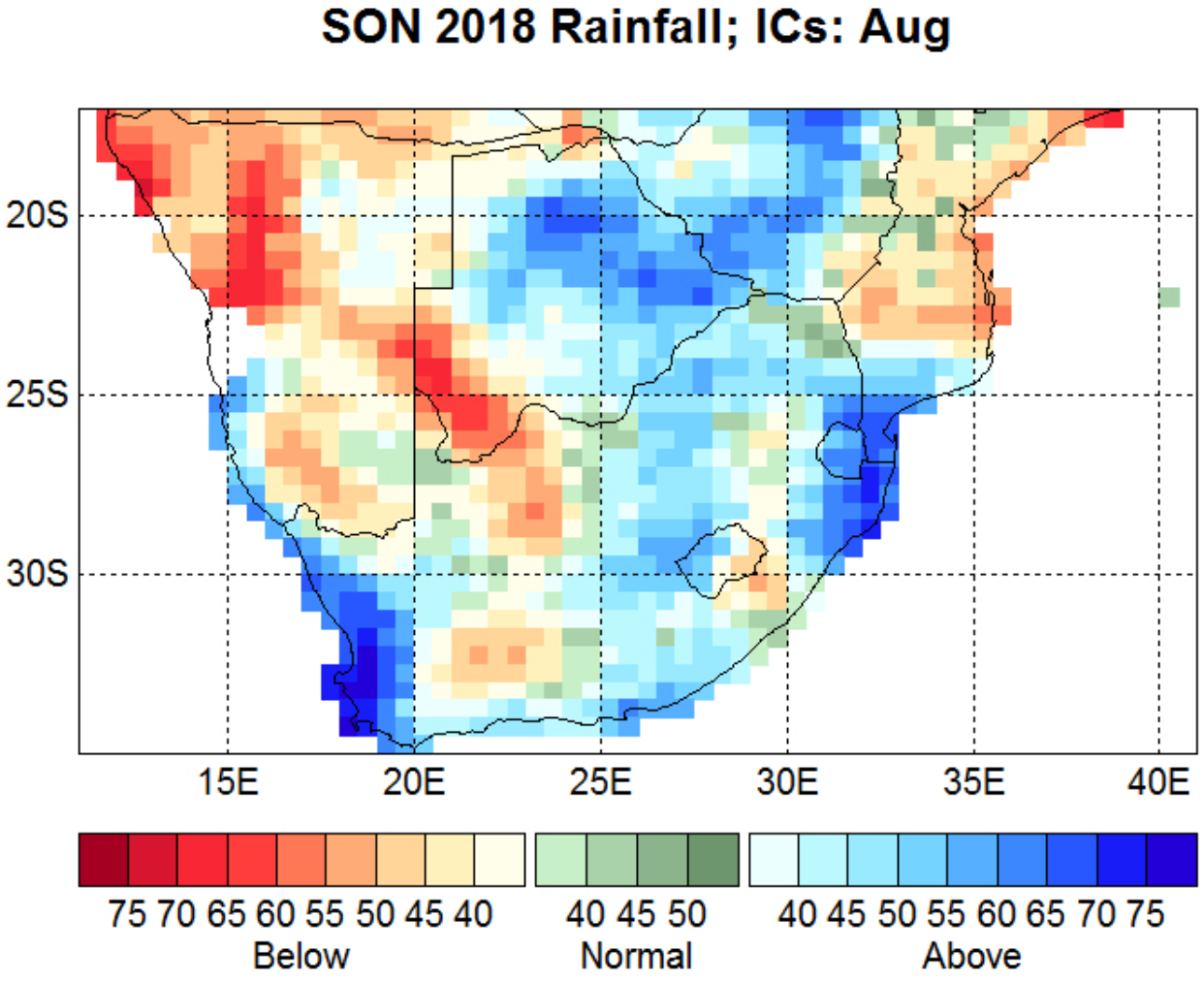
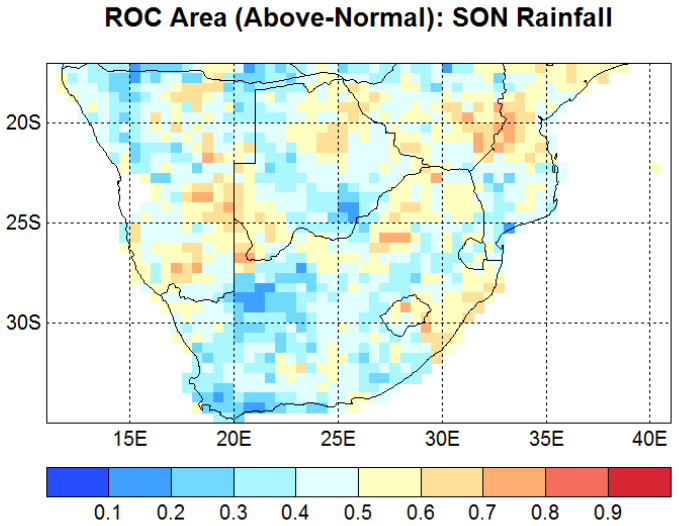
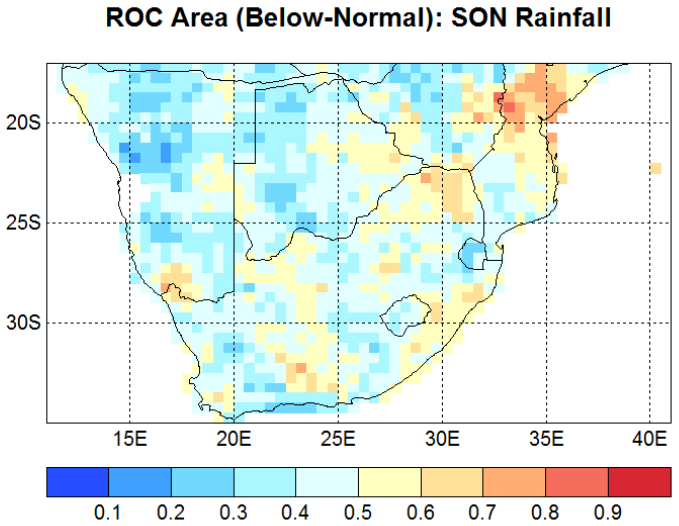
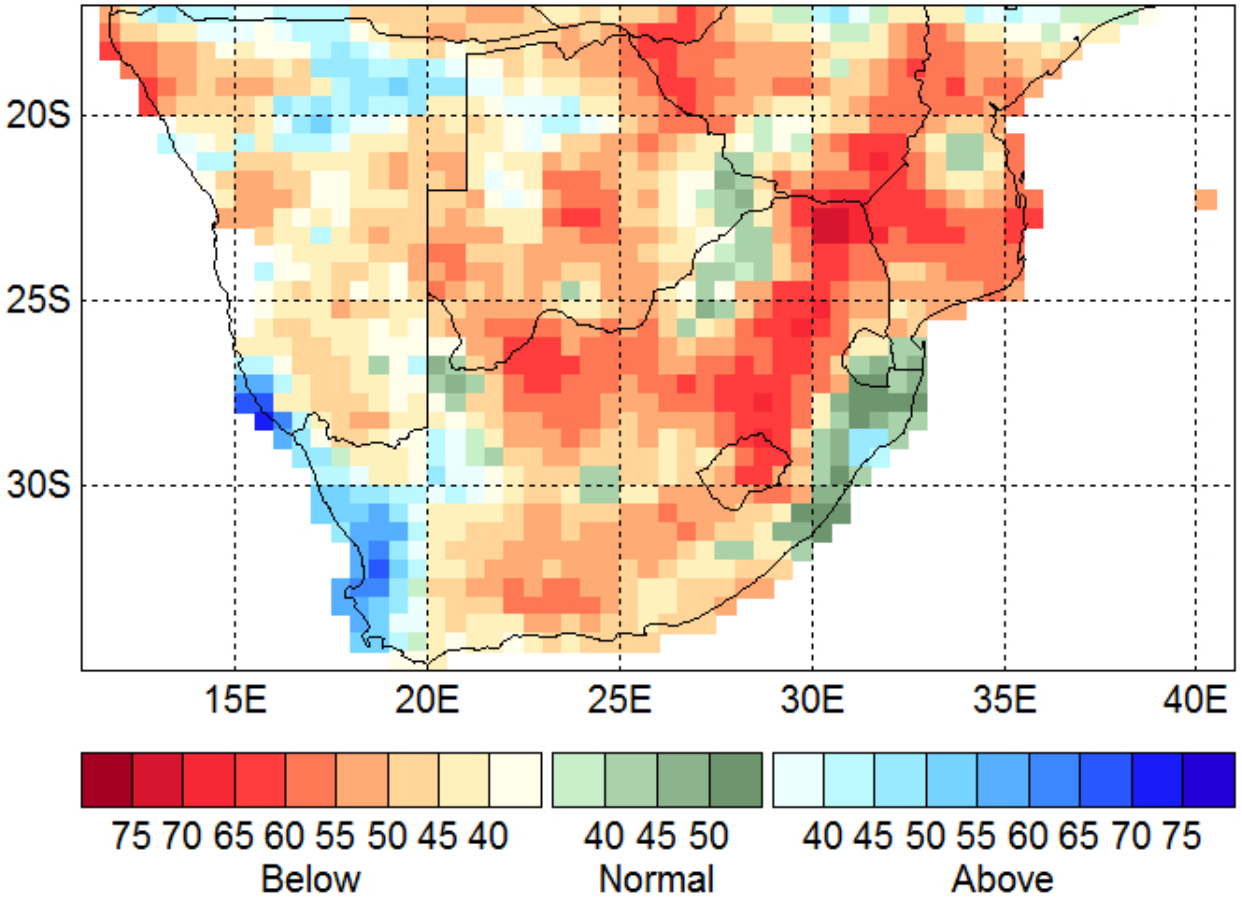

SON 2018 Rainfall; ICs: Aug
20S
25S
30S
15E
20E
25E
30E
35E
40E
75 70 65 60 55 50 45 40
Below
40 45 50
Normal
40 45 50 55 60 65 70 75
Above

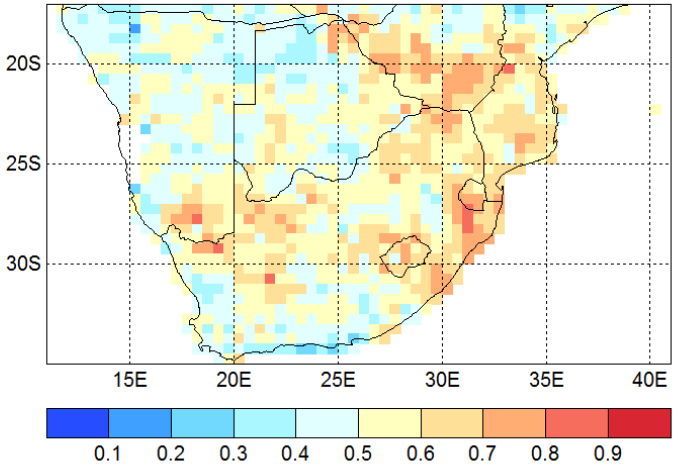

ROC Area (Above-Normal): SON Rainfall
20S
25S
30S
15E
20E
25E
30E
35E
40E
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9


ROC Area (Below-Normal): SON Rainfall
20S
25S
30S
15E
20E
25E
30E
35E
40E
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

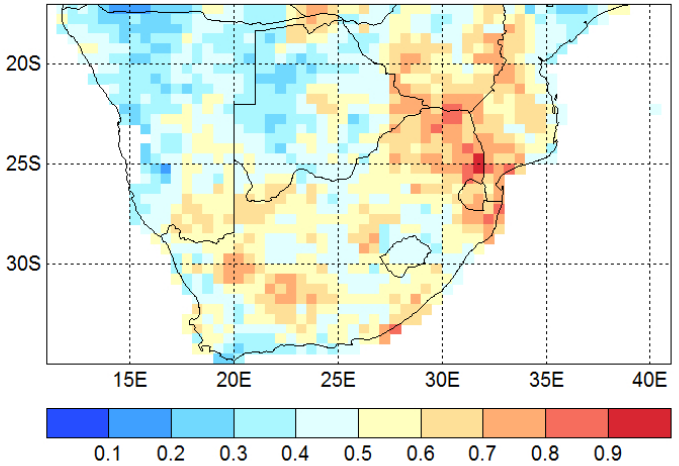
OND 2018 Rainfall; ICs: Aug

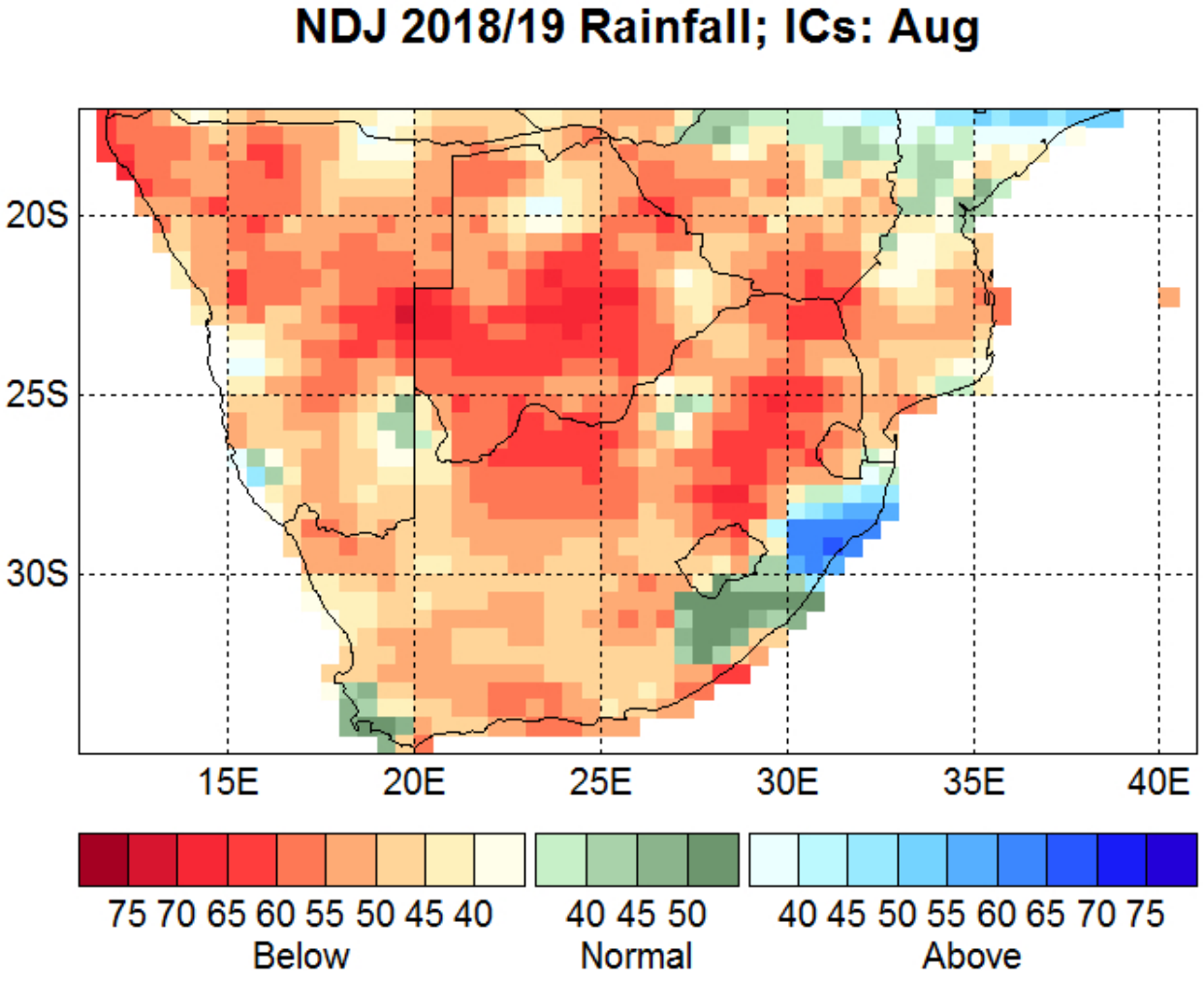


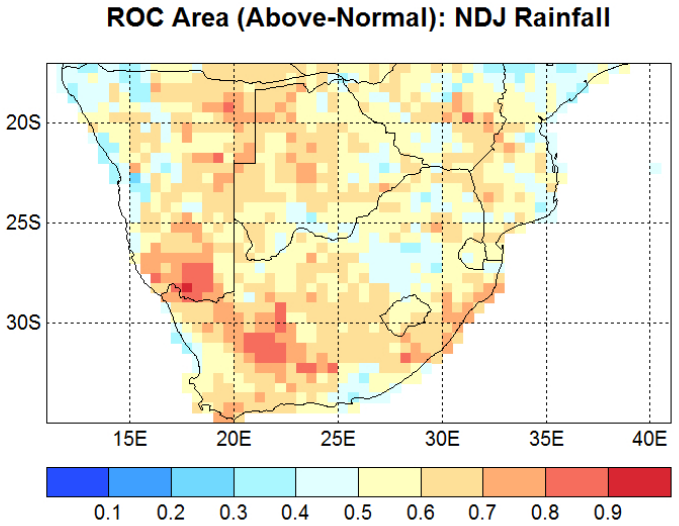
ROC Area (Above-Normal): OND Rainfall



ROC Area (Below-Normal): OND Rainfall




NDJ 2018/19 Rainfall; ICs: Aug
20S
25S
30S
15E
20E
25E
30E
35E
40E
75 70 65 60 55 50 45 40
Below
40 45 50
Normal
40 45 50 55 60 65 70 75
Above


ROC Area (Above-Normal): NDJ Rainfall
20S
25S
30S
15E
20E
25E
30E
35E
40E
0.1
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0.4
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0.6
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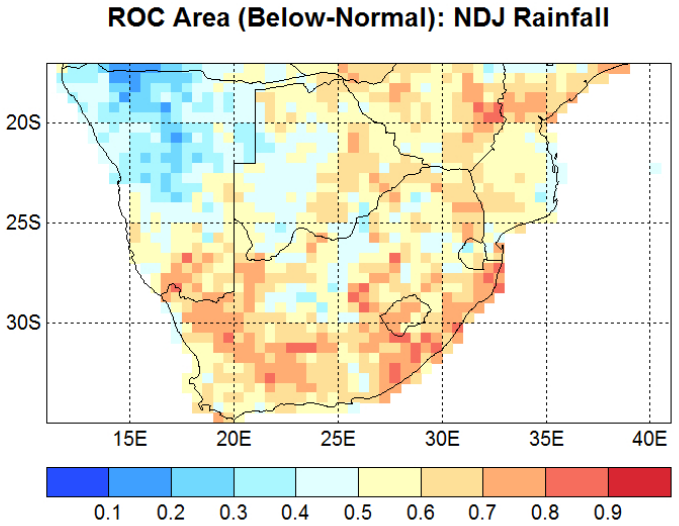
ROC Area (Below-Normal): NDJ Rainfall
20S
25S
30S
15E
20E
25E
30E
35E
40E
0.1
0.2
0.3
0.4
0.5
0.6
0.7
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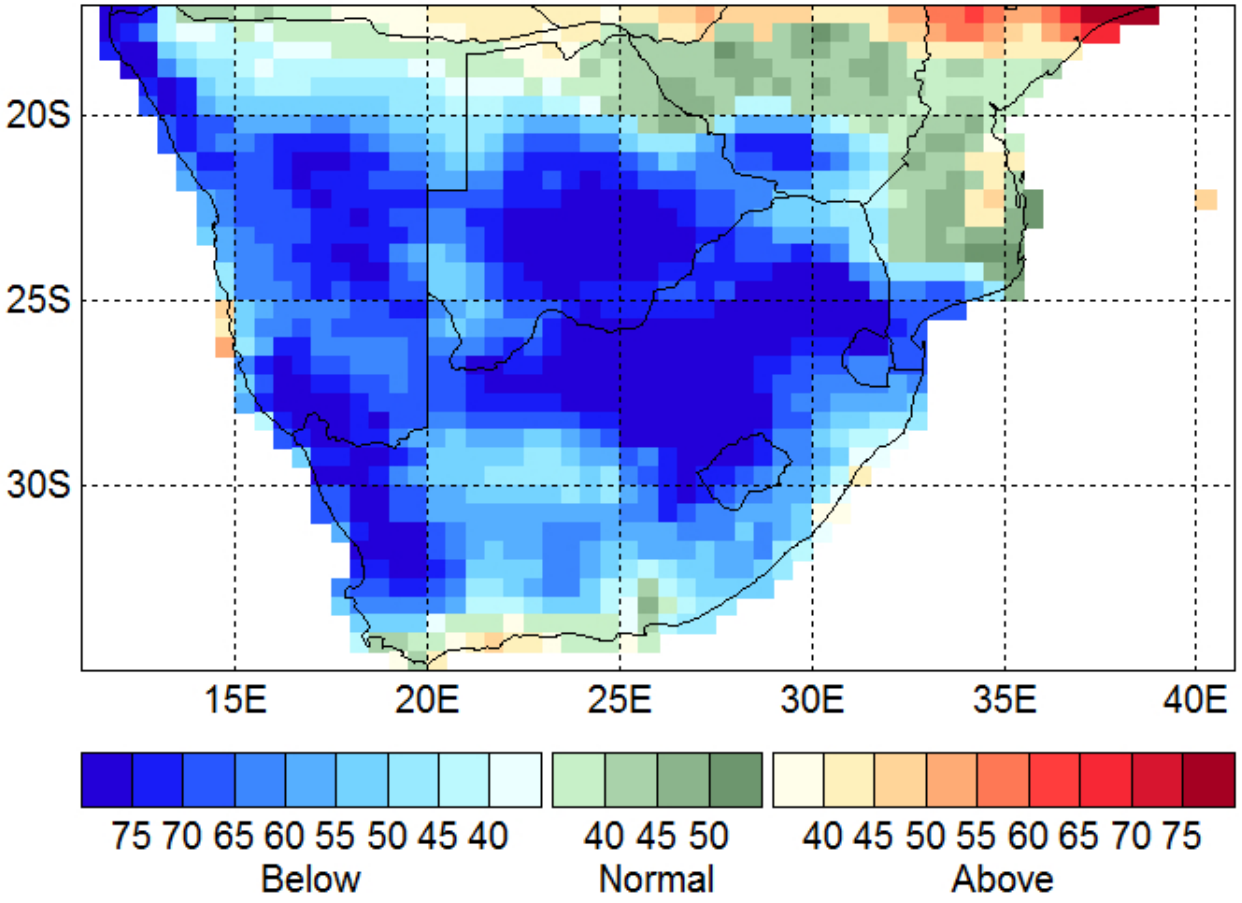
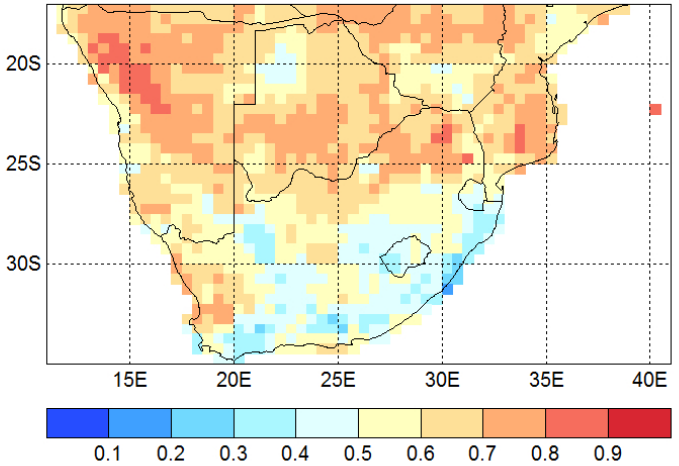
0.9

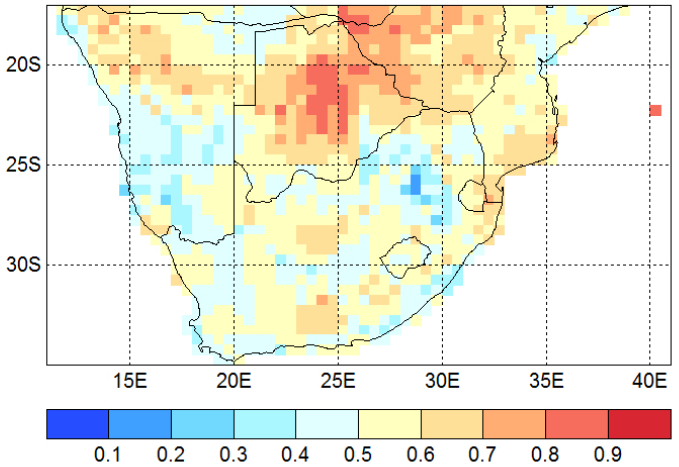
ASO 2018 Max Temp: ICs: Aug



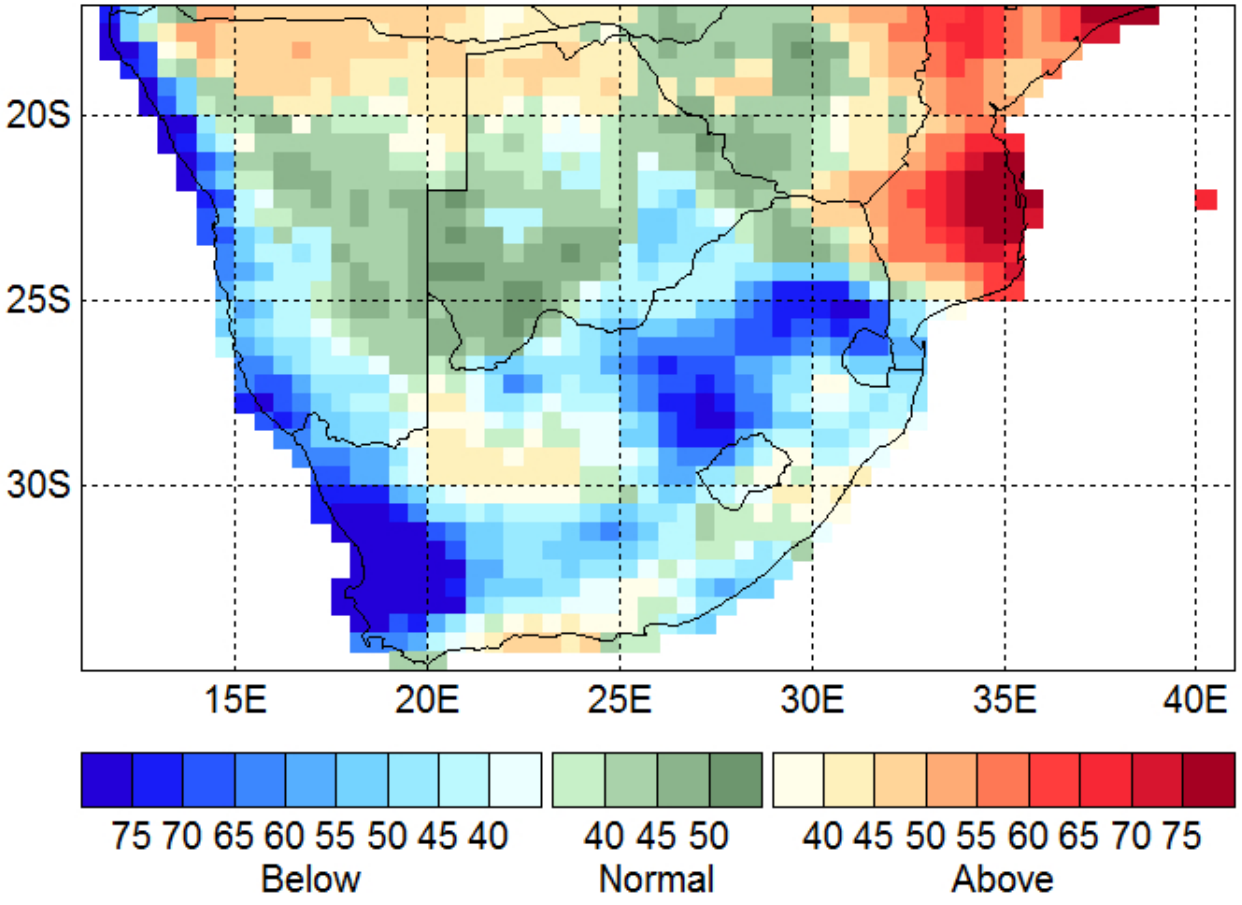
ROC Area (Above-Normal): ASO Max Temp



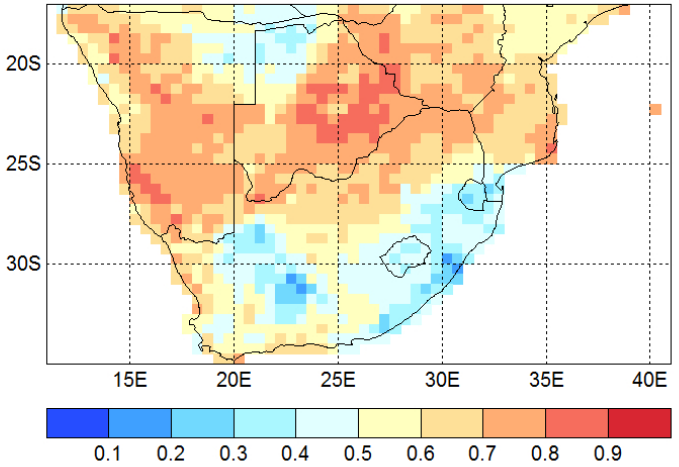
ROC Area (Below-Normal): ASO Max Temp



SON 2018 Max Temp; ICs: Aug



ROC Area (Above-Normal): SON Max Temp



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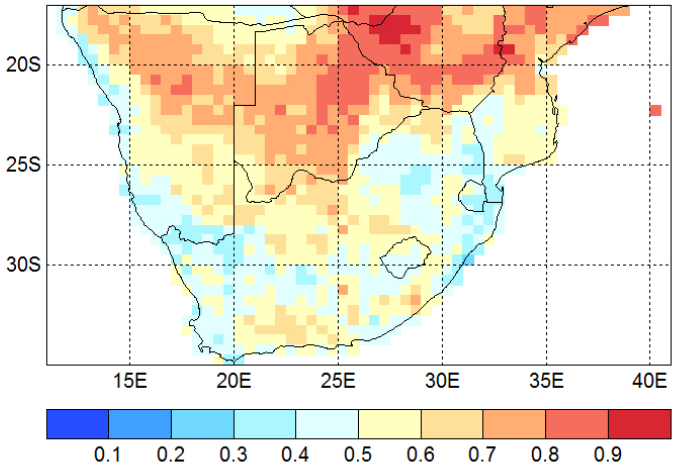
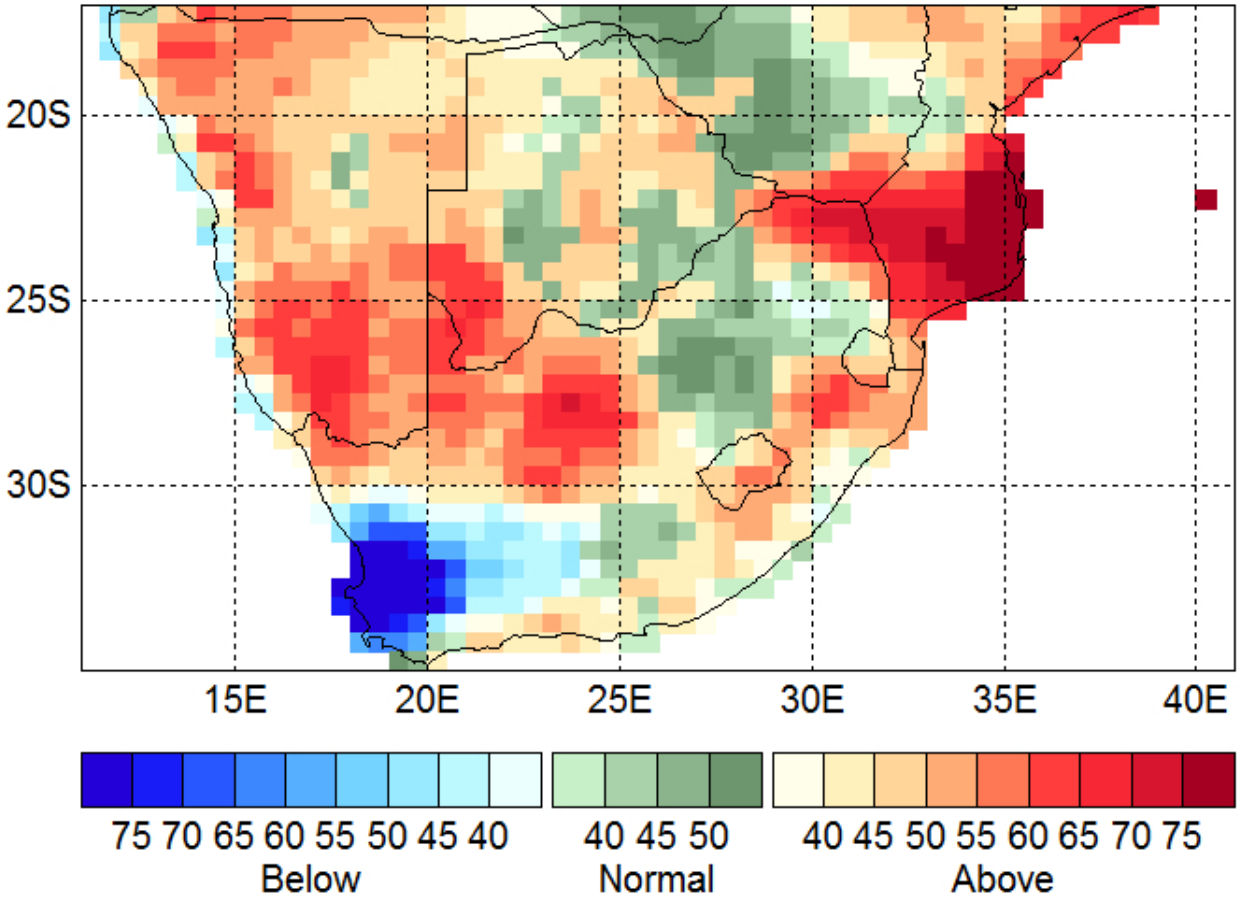
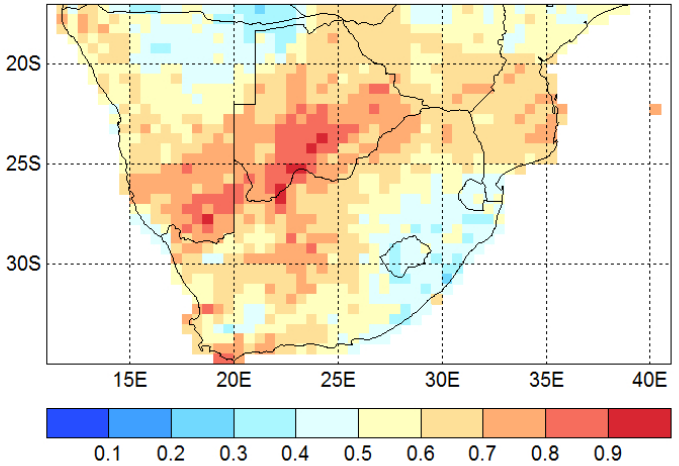


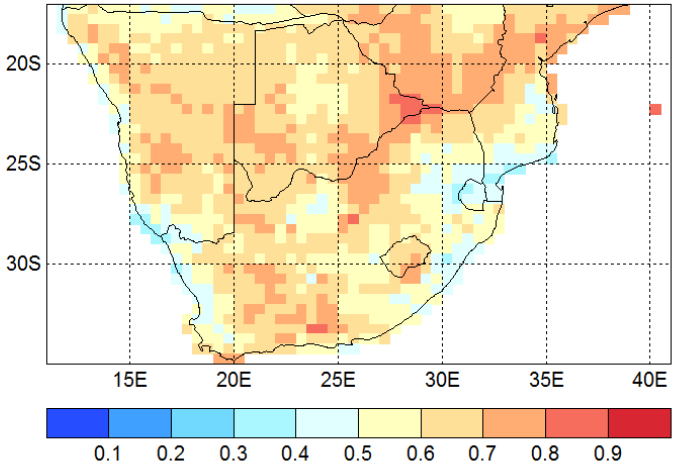
OND 2018 Max Temp; ICs: Aug

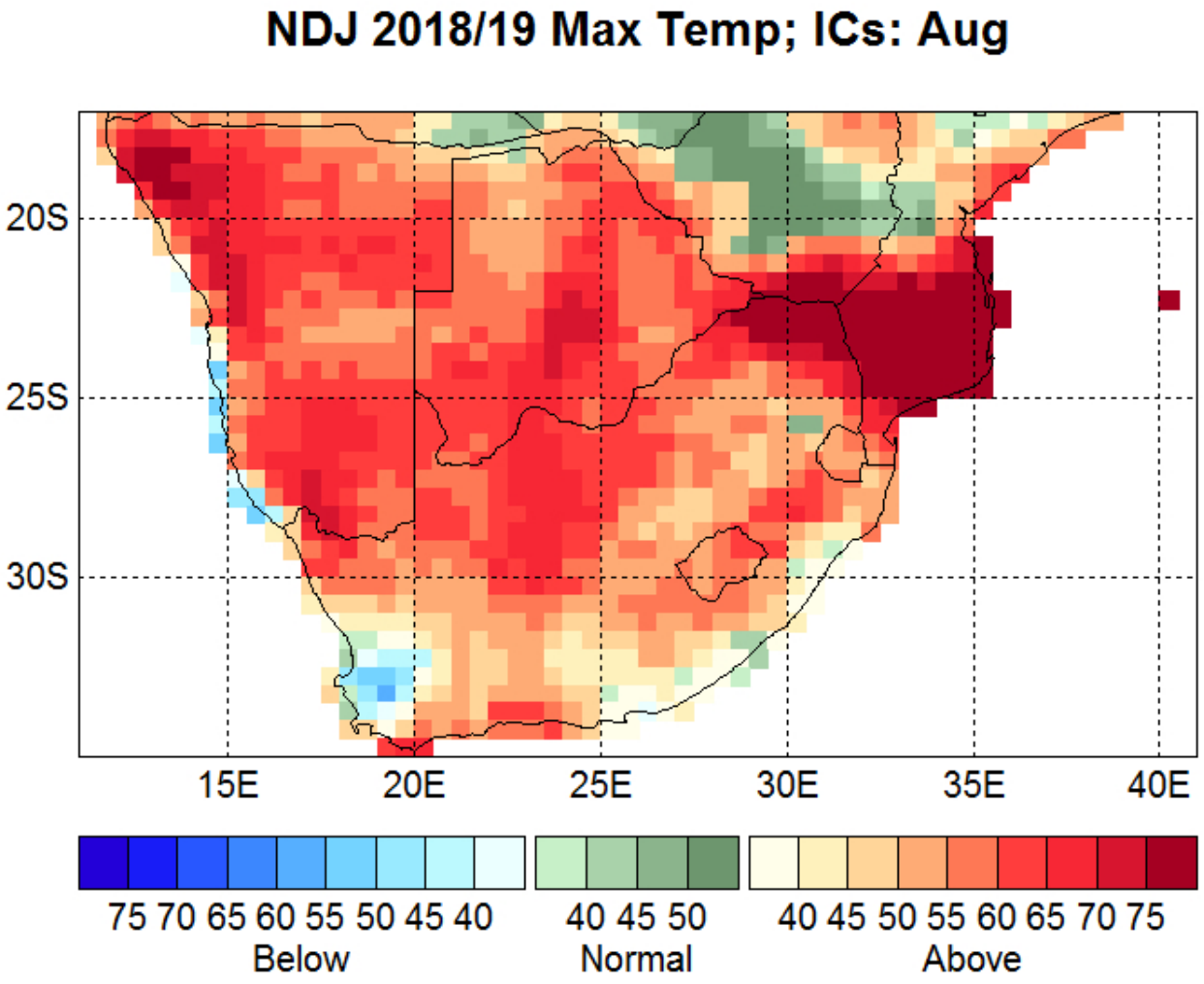


ROC Area (Above-Normal): OND Max Temp



ROC Area (Below-Normal): OND Max Temp




NDJ 2018/19 Max Temp; ICs: Aug
20S
25S
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25E
30E
35E
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75 70 65 60 55 50 45 40
Below
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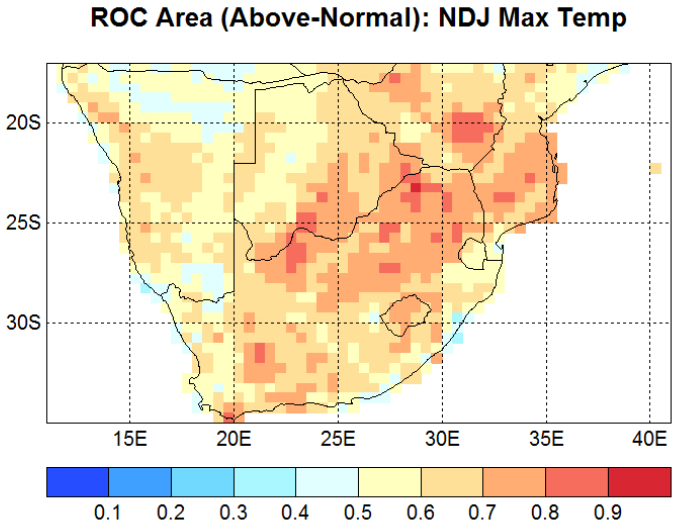
Normal
40 45 50 55 60 65 70 75
Above


ROC Area (Above-Normal): NDJ Max Temp
20S
25S
30S
15E
20E
25E
30E
35E
40E
0.1
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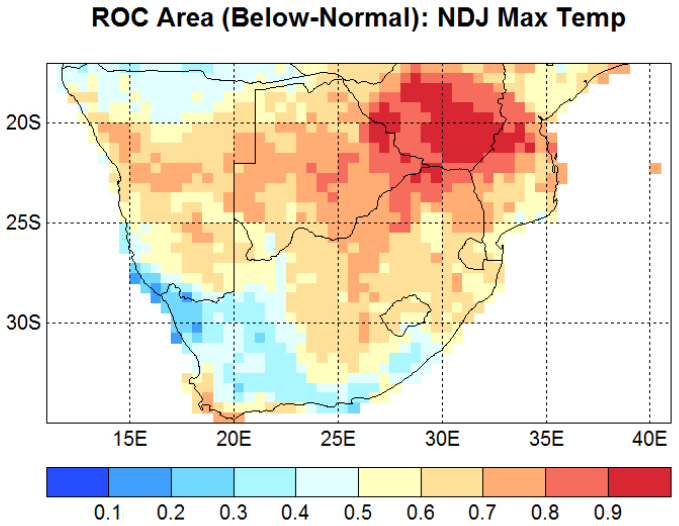
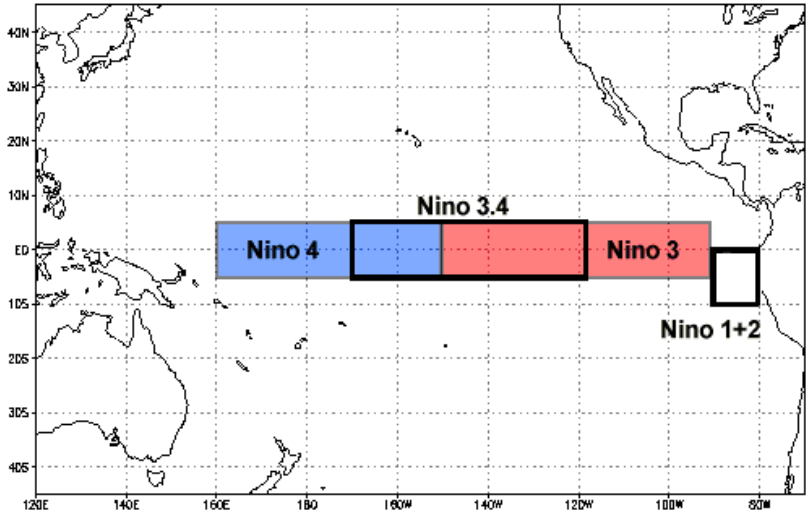
0.6
0.7
0.8
0.9


ROC Area (Below-Normal): NDJ Max Temp
20S
25S
30S
15E
20E
25E
30E
35E
40E
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9

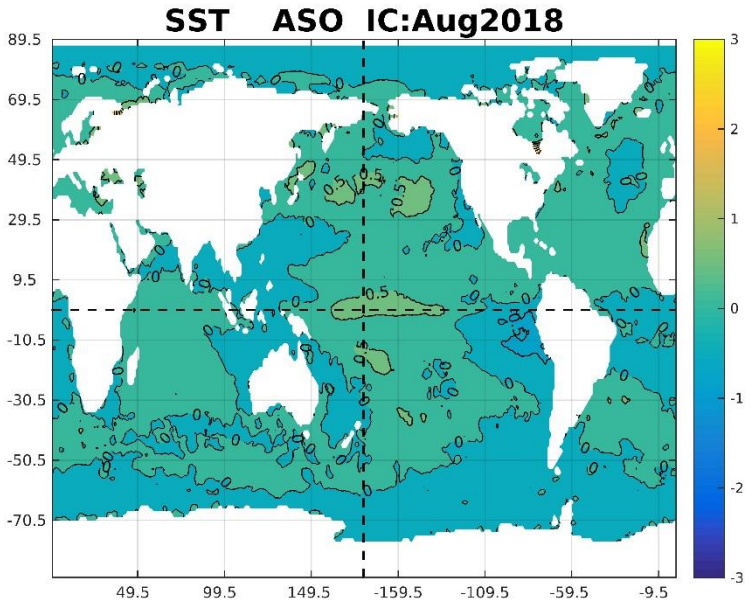
Global SST and ENSO Forecasts

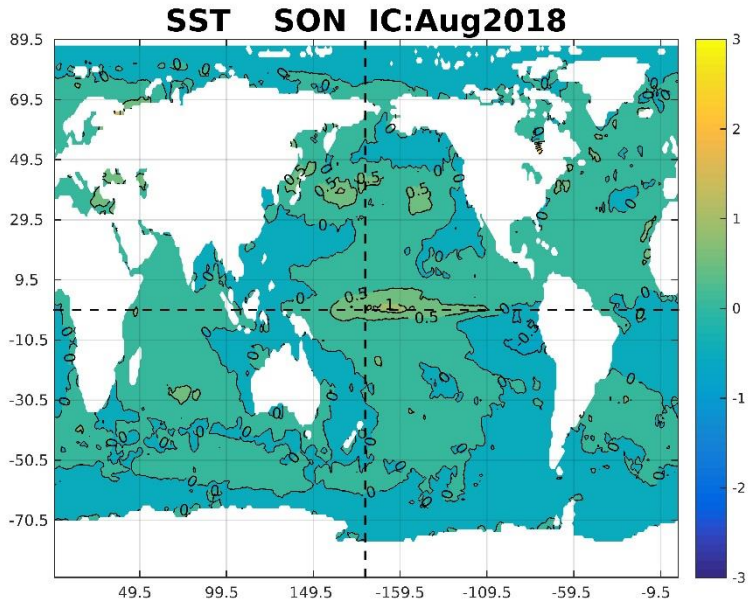
Prediction Method

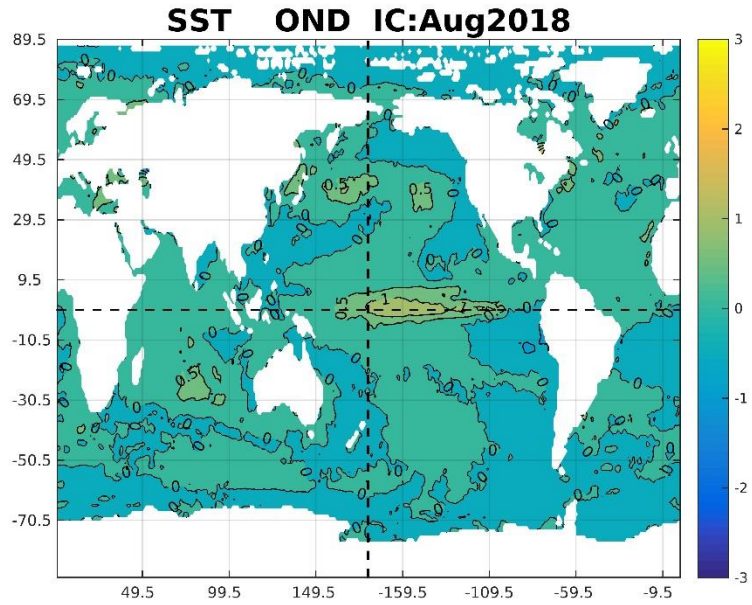
- Forecasts for global sea-surface temperature (SST) fields are obtained through a combination of NMME models and a linear statistical model that uses antecedent SST as predictor (Landman et al. 2011). Forecasts for the Niño3.4 area (see insert) are derived from the global forecasts.
- Three-month Niño3.4 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

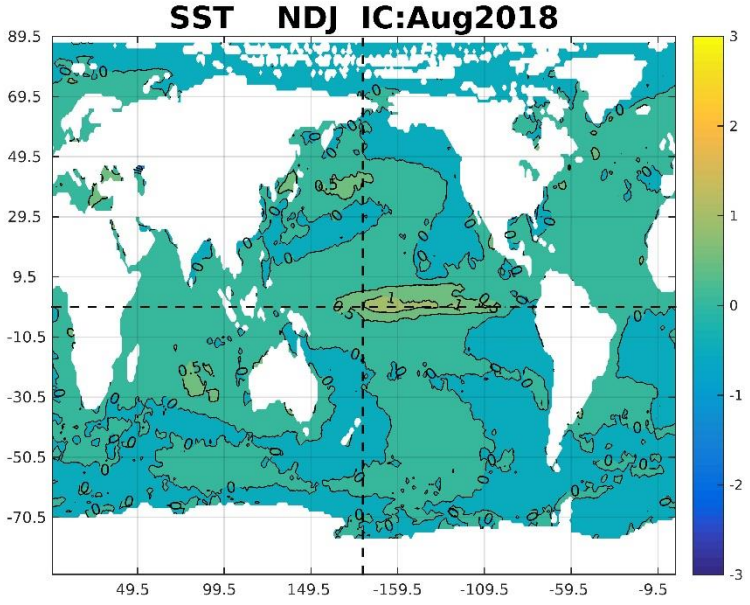


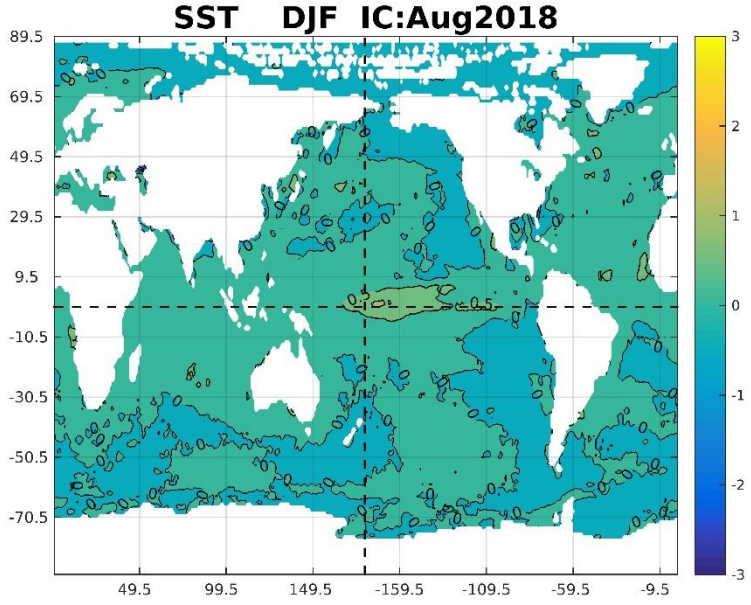
SST anomalies

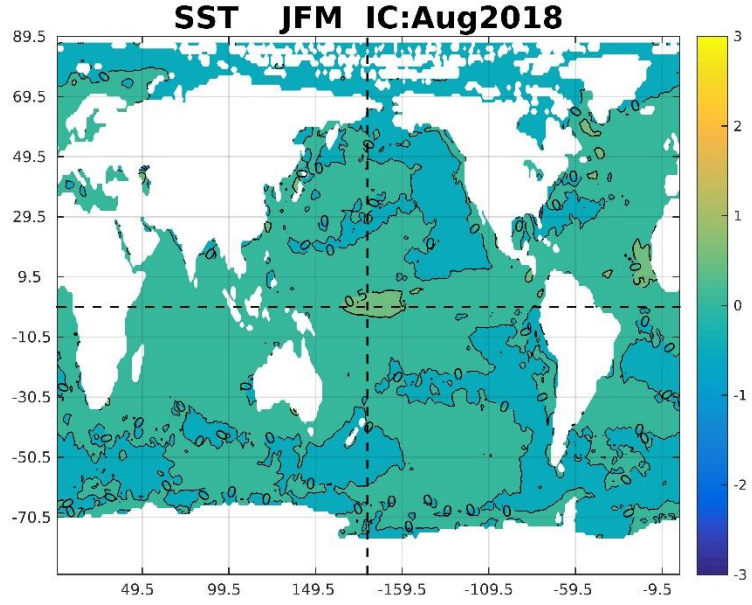


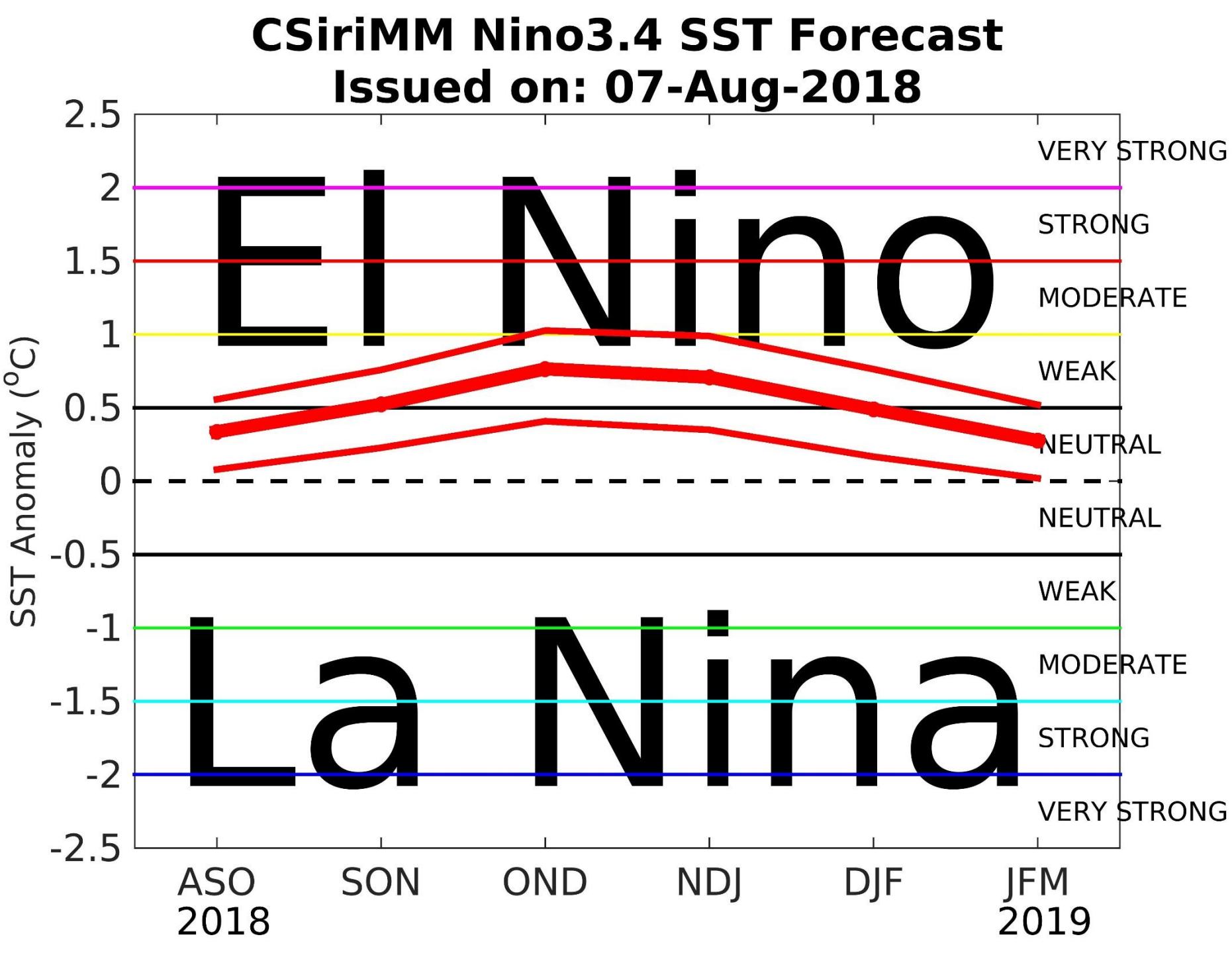











CSiriMM Nino3.4 SST Forecast
Issued on: 07-Aug-2018
SST Anomaly (°C)
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
El Nino
La Nina
VERY STRONG
STRONG
MODERATE
WEAK
NEUTRAL
NEUTRAL
WEAK
MODERATE
STRONG
VERY STRONG
ASO
2018
SON
OND
NDJ
DJF
JFM
2019

References

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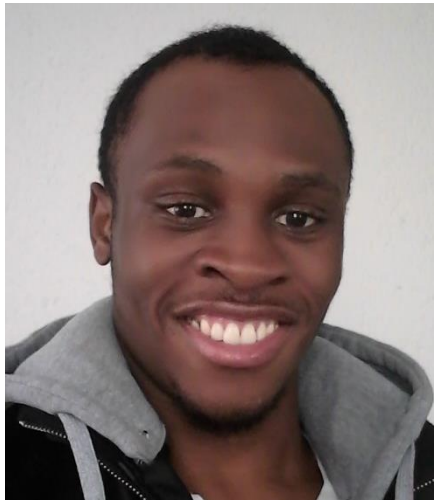
Financial support from...

- 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