

South West Indian Ocean region

ACCOF-17

Addis-Abeba

Laurent LABBE (Météo France Regional Center for Indian Ocean)

La Réunion - 30/05/2024

Content

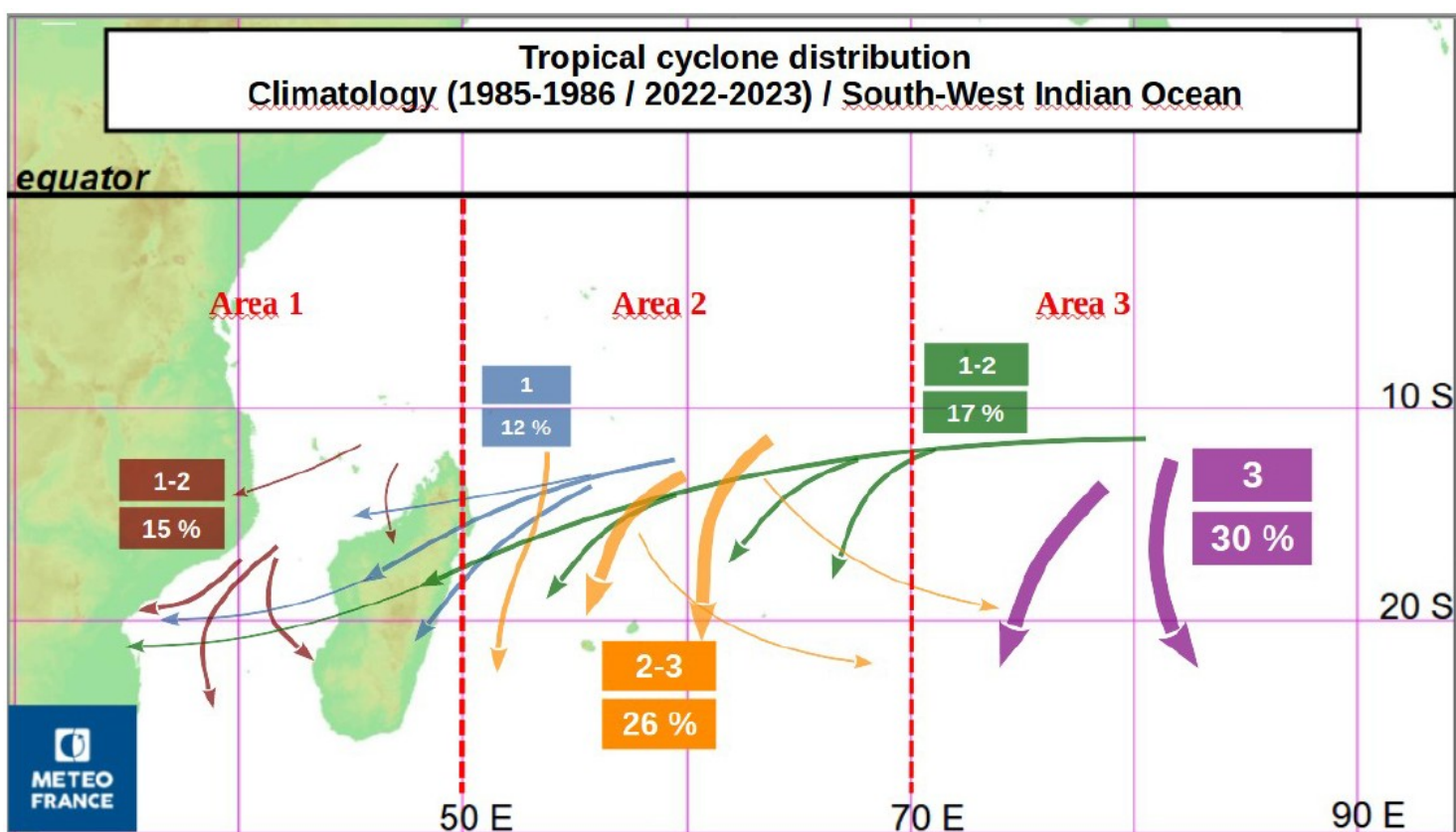
- 1 – Tropical cyclone season summary
- 2 – Verification of 2023/12 forecast for JFM & FMA
- 3 – 2024/05 forecast for JJA & JAS

1 – Tropical cyclone season summary

Recall of the climatology (1985-2023)

- Average : 10 named systems / 5 TC
- Season : 15 Nov – 30 Apr

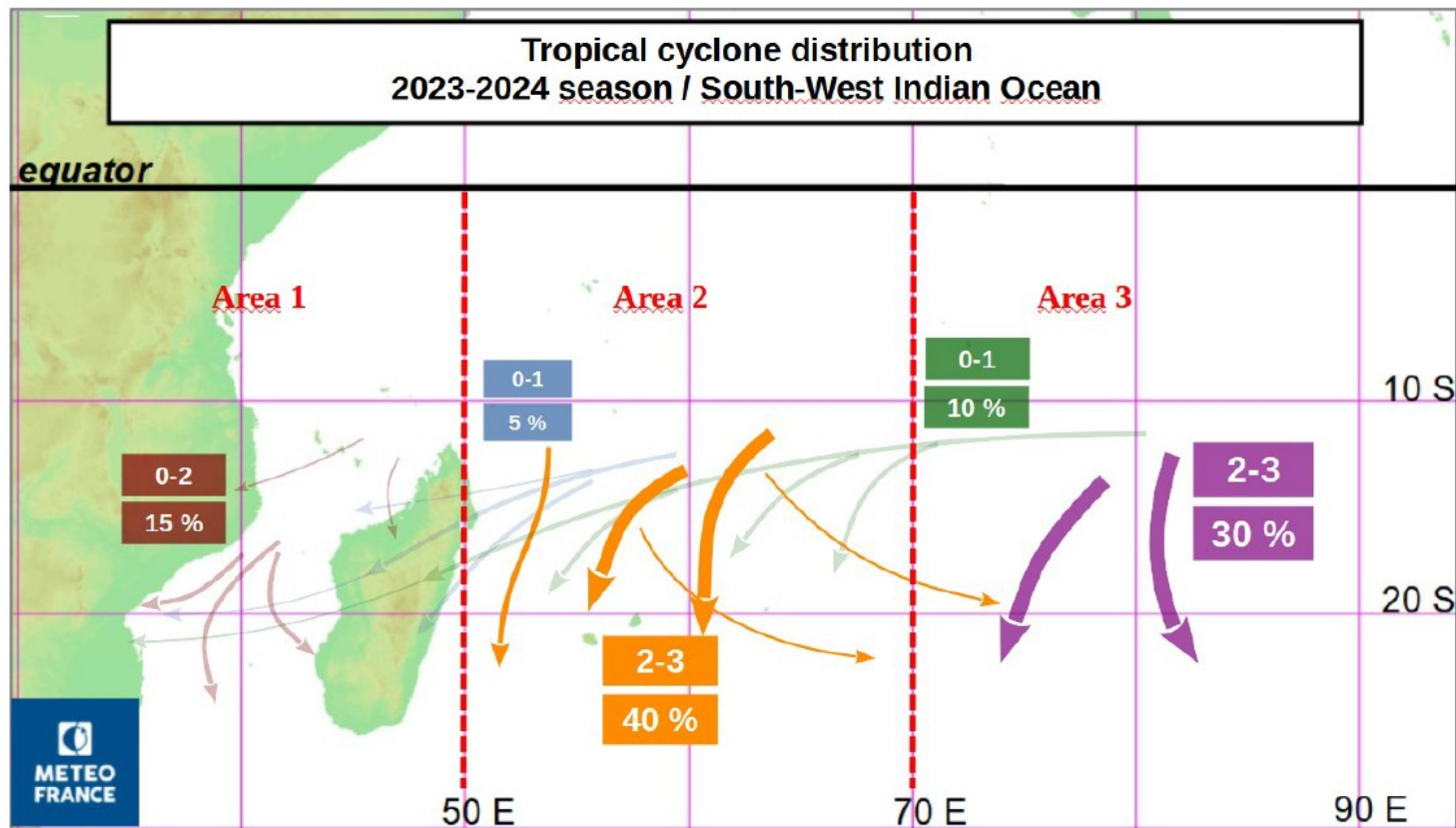
RSMC – La Réunion portal : http://www.meteo.fr/temps/domtom/La_Reunion/webcmrs9.0/



1 – Tropical cyclone season summary

Recall of the forecast made in october 2023 (SWIOCOF-TC MiniForum)

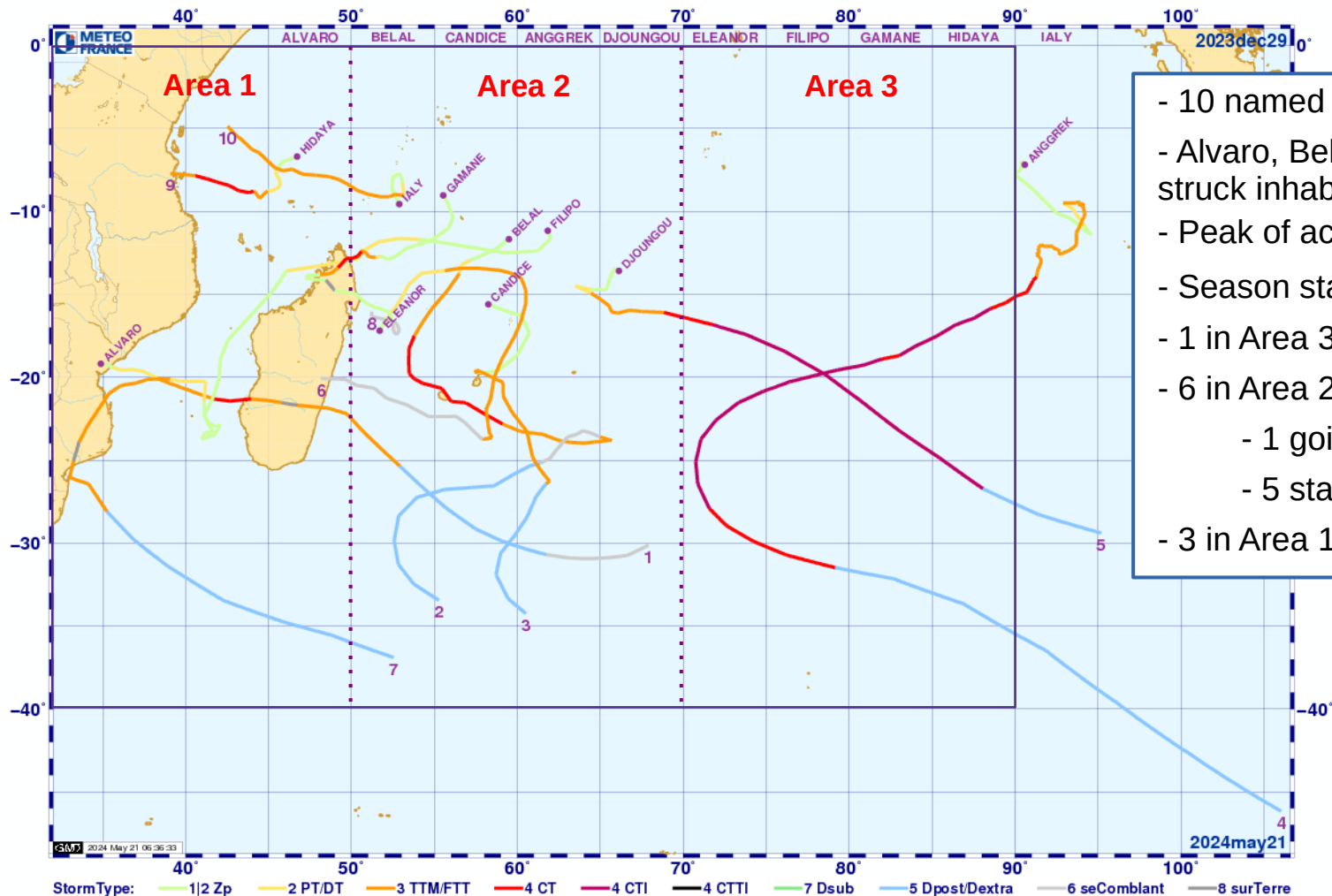
- Below normal TC season (5 – 8 named systems)
- [Nov – Jan] : Reduced TC activity, late onset of TC activity
- [Jan – Apr] : TC activity mainly in central part of the basin with poleward tracks



1 – Tropical cyclone season summary

TC analysis from RSMC - La Réunion

bestrack 2023–2024



- 10 named systems ☒ (5-8 fcst)
- Alvaro, Belal, Filippo, Gamane, Hiday, Ialy struck inhabited lands
- Peak of activity in Jan-Fev and May ①
- Season starts late december ✓
- 1 in Area 3 (10%) ☒ (30 % fcst)
- 6 in Area 2 (60%) ✓ (Area of maximum activity)
 - 1 going to Area 1 (10%) ✓ (5 % fcst)
 - 5 staying in Area 2 (50%) ✓ (40 % fcst)
- 3 in Area 1 (30%) ☒ (15 % fcst)

2 – JFM & FMA 2024 forecast verification

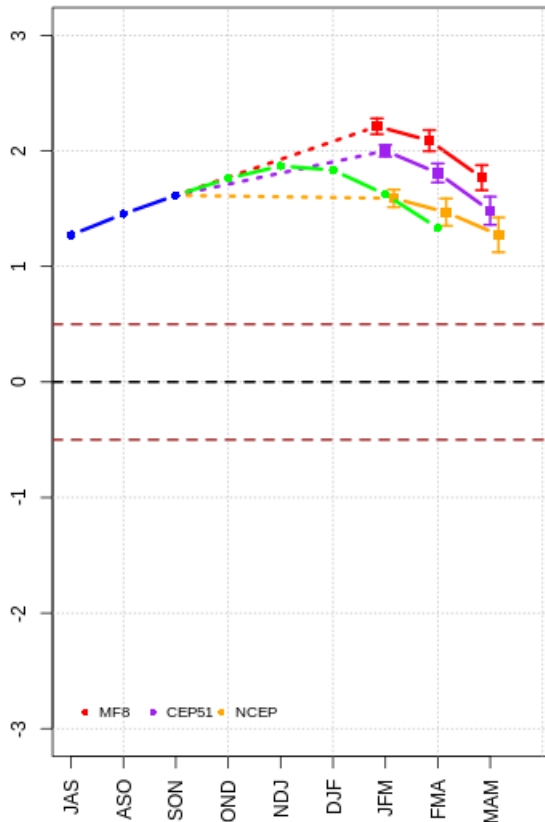
In this section we present the verification of the forecast issued in november 2023 for the next quarter (DJF 2023)

- First we recall the forecast produced at that time : It consist in the mixing of the statistical adaptation from 3 GCM (ECMWF, MF, NCEP)
- Then this forecast is compared to the corresponding verification data (Reference dataset for the region created from ERA5 reanalysis). The RPSS score issued from this comparison is also presented ;

2 – JFM & FMA 2024 forecast verification

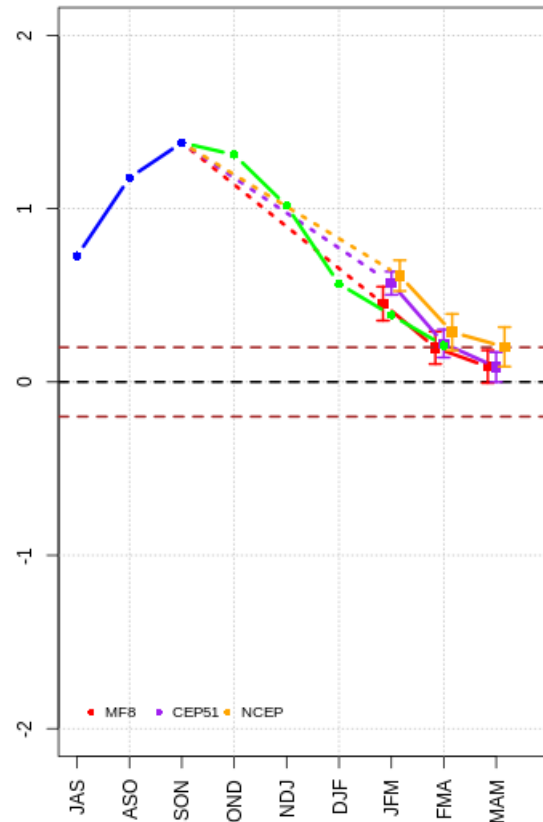
November 2023 forecast and verification of oceanic indices

Forecast: NINO3.4 - 2023-12



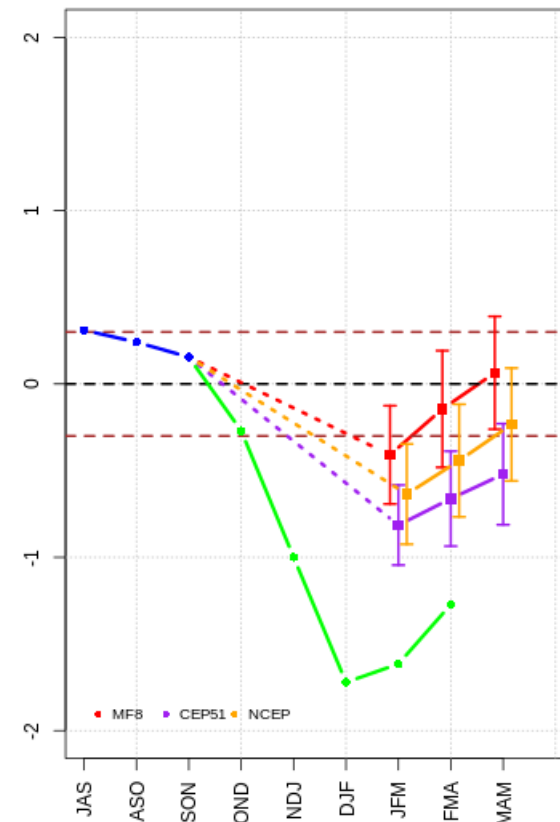
ENSO extremum of positive phase correctly predicted – slightly overestimated

Forecast: IOD - 2023-12



IOD decreasing positive phase correctly predicted

Forecast: SIOD - 2023-12



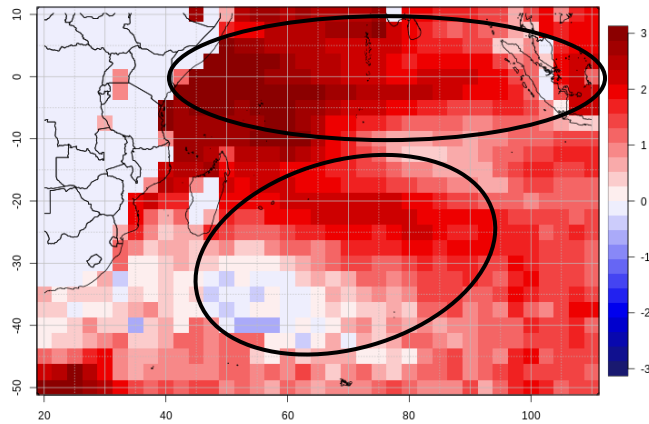
SIOD negative phase **largely underestimated**

2 – JFM & FMA 2024 forecast verification

December 2023 forecast for **JFM** and verification of GCM parameters

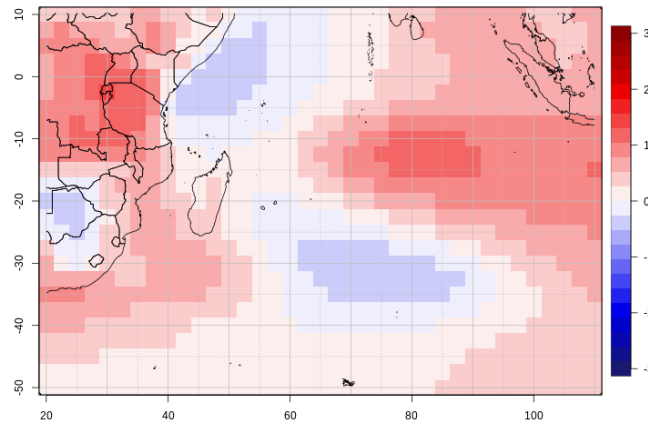
MME Forecast for : SST, MsIP, Wind 850hPa

Forecast Mix GCM SSTglobal - JFM2024-It1



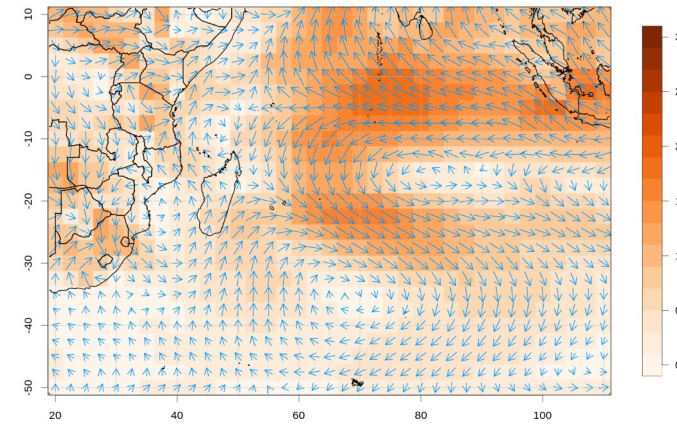
CEP51.MF8.NCEP

Forecast Mix GCM PMERglobal - JFM2024-It1



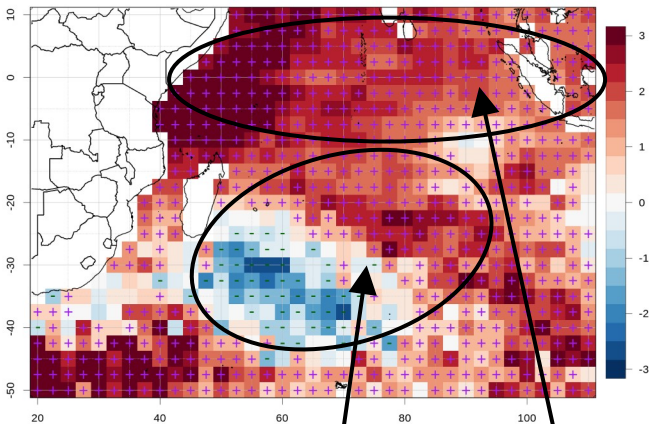
CEP51.MF8.NCEP

Forecast Mix GCM U850global - JFM2024-It1



CEP51.MF8.NCEP

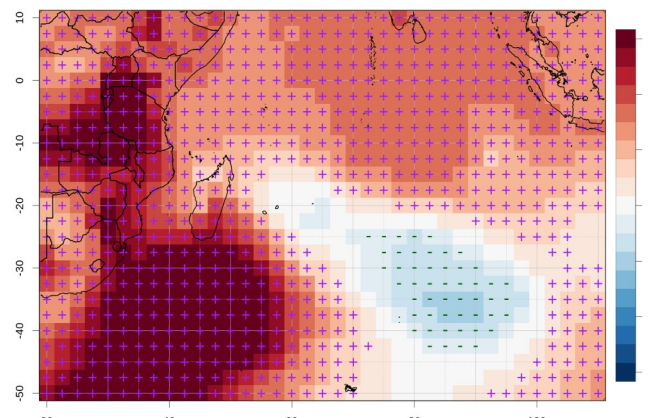
ERA5 SST Std. Anom. : JFM 2024



Ref: 1993-2016

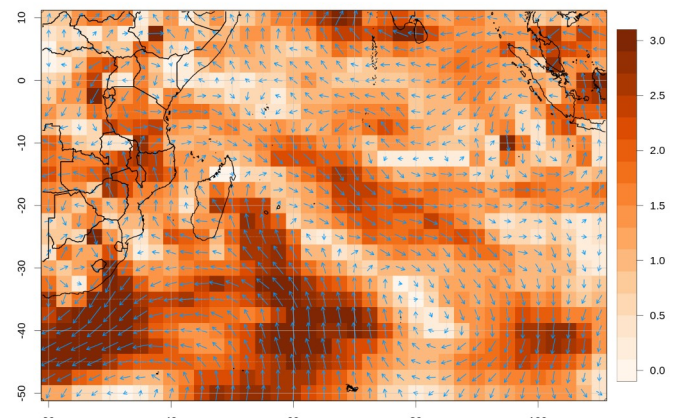
SIOD

ERA5 PMER Std. Anom. : JFM 2024



Ref: 1993-2016

ERA5 850hPa Wind anomaly : JFM



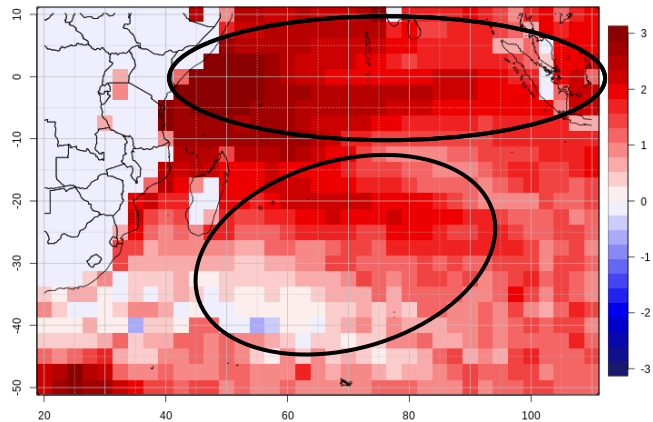
Ref: 1993-2016

2 – JFM & FMA 2024 forecast verification

December 2023 forecast for **FMA** and verification of GCM parameters

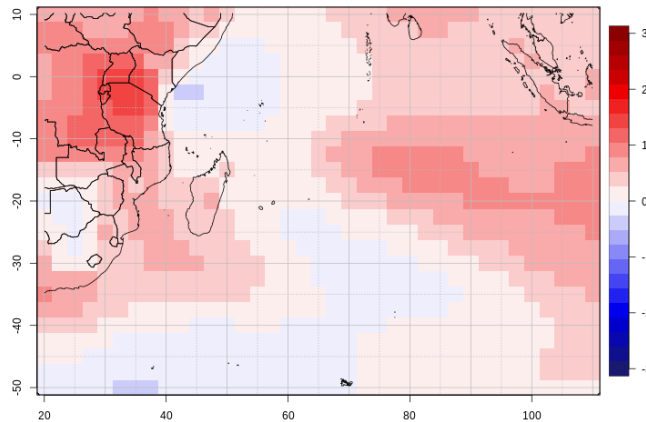
MME Forecast for : SST, MsIP, Wind 850hPa

Forecast Mix GCM SSTglobal - FMA2024-It2



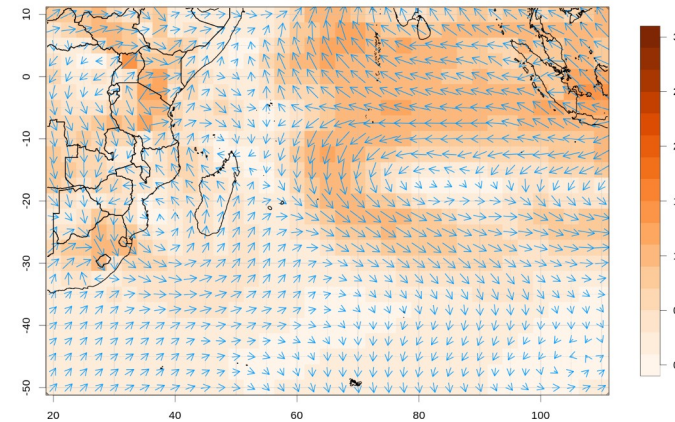
CEP51.MF8.NCEP

Forecast Mix GCM PMERglobal - FMA2024-It2



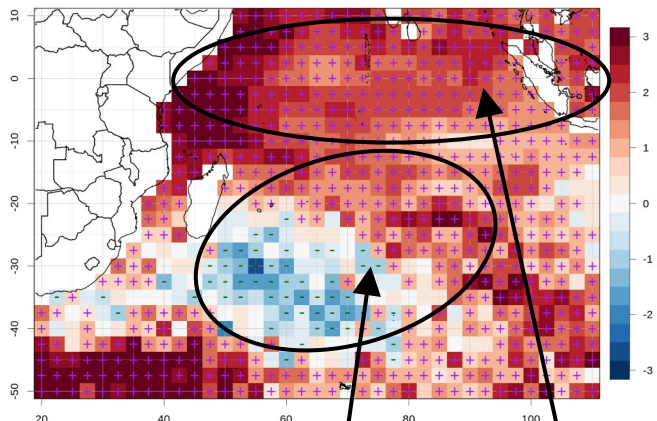
CEP51.MF8.NCEP

Forecast Mix GCM U850global - FMA2024-It2



CEP51.MF8.NCEP

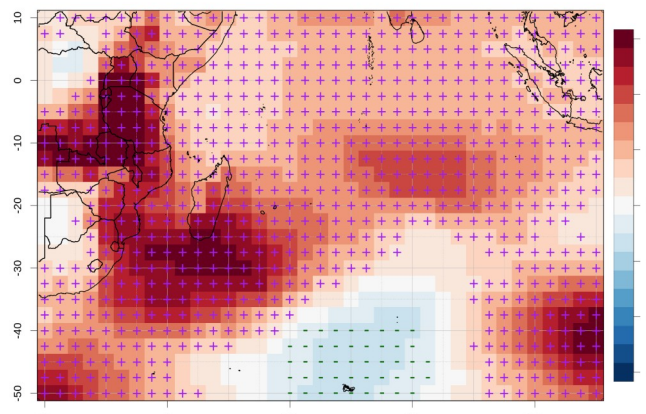
ERA5 SST Std. Anom. : FMA 2024



Ref: 1993-2016

SIOD

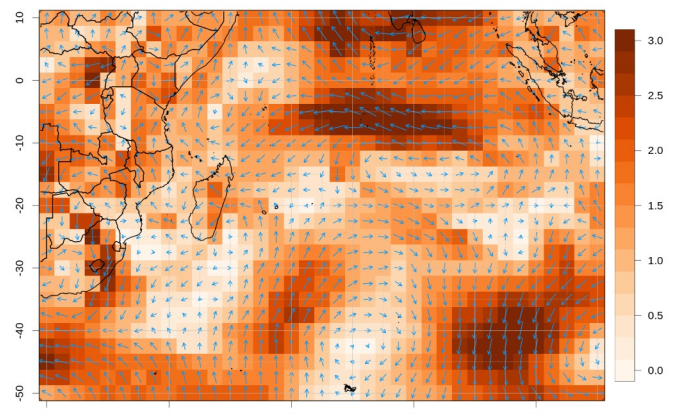
ERA5 PMER Std. Anom. : FMA 2024



Ref: 1993-2016

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ERA5 850hPa Wind anomaly : FMA

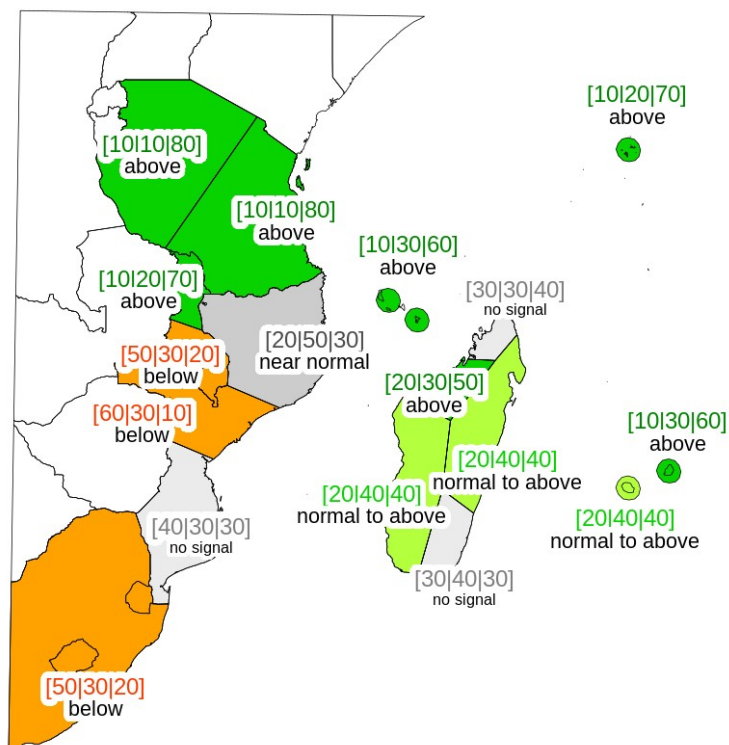


Ref: 1993-2016

2 – JFM & FMA 2024 forecast verification

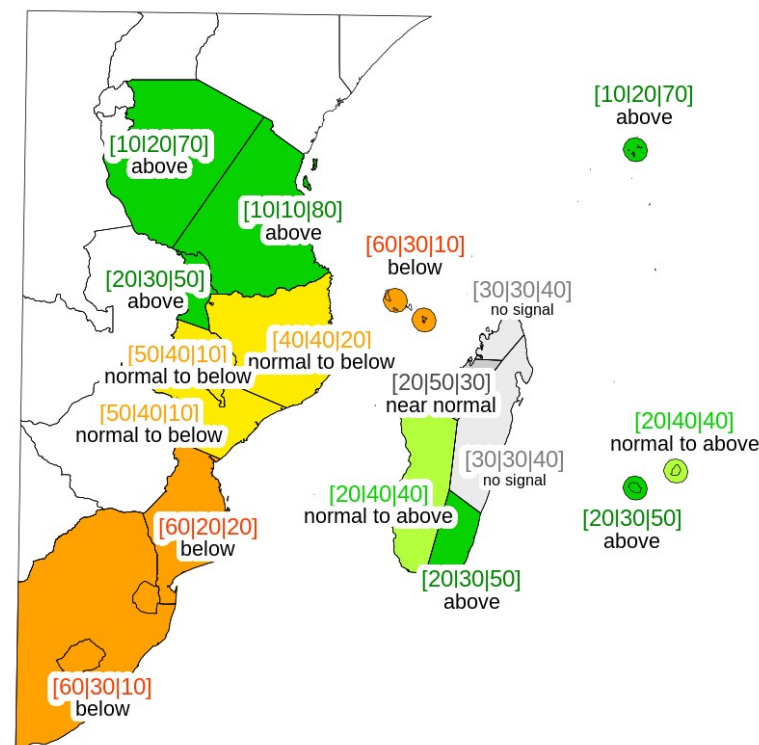
Objective Rainfall forecast issued in December 2023

Rainfall Seasonal forecast - JFM 2024 - It 1



CEP51.MF8.NCEP

Rainfall Seasonal forecast - FMA 2024 - It 2



CEP51.MF8.NCEP

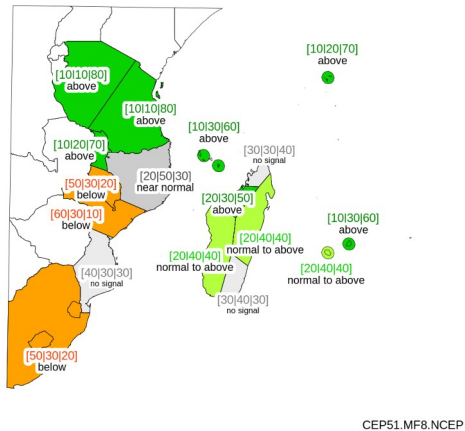
Forecast based on :

Statistical adaptation of GCM output at regional scale using *Seafords* tool

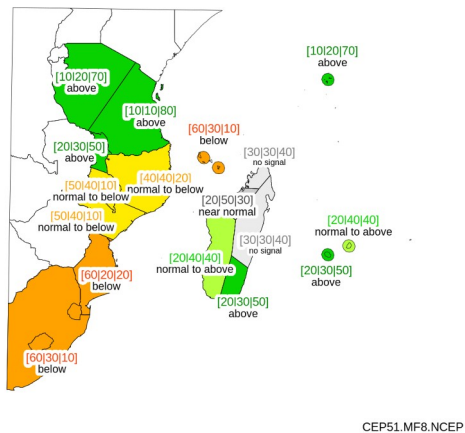
2 – JFM & FMA 2024 forecast verification

Rainfall Forecast

Rainfall Seasonal forecast - JFM 2024 - It 1

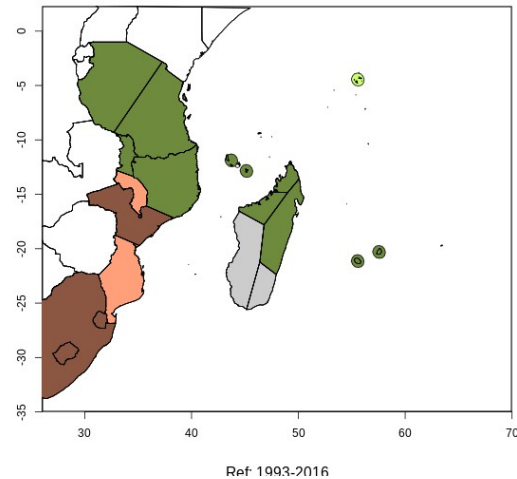


Rainfall Seasonal forecast - FMA 2024 - It 2

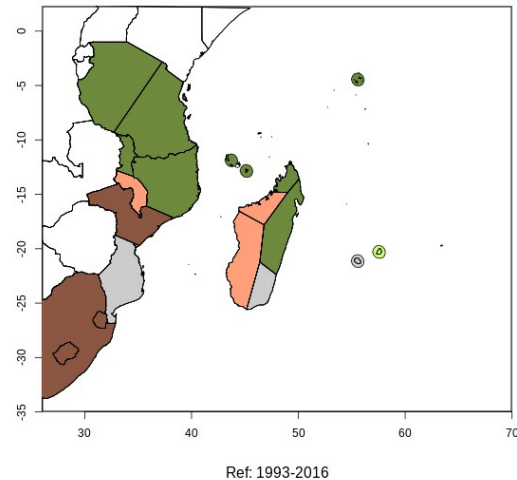


Observed anomalies (verification Dataset ERA5)

RR quintile class: JFM 2024

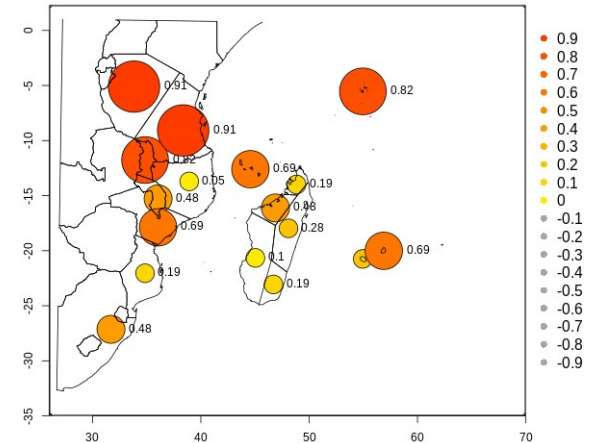


RR quintile class: FMA 2024

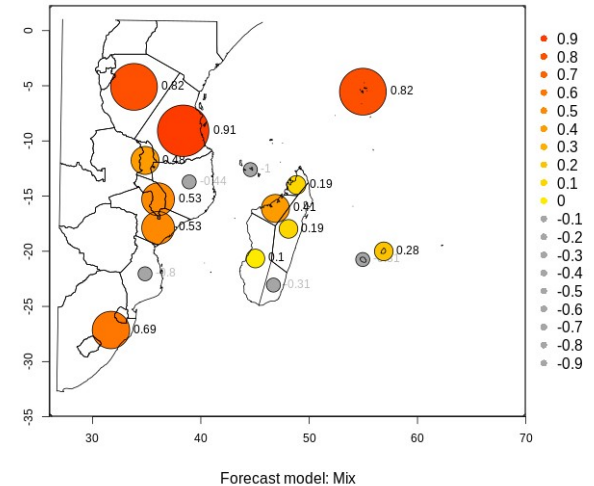


RPSS score

Score RPSS: RR JFM-2024 It1



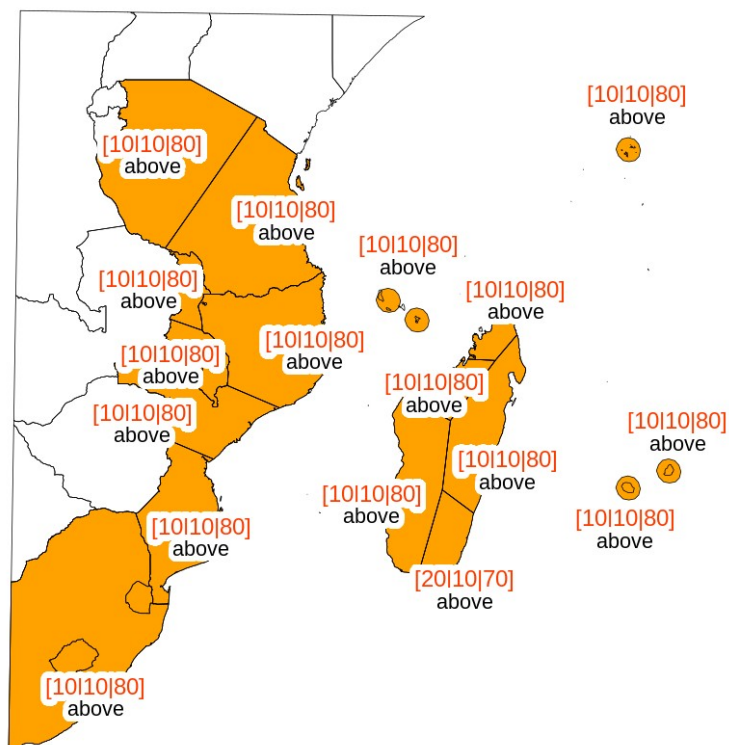
Score RPSS: RR FMA-2024 It2



2 – JFM & FMA 2024 forecast verification

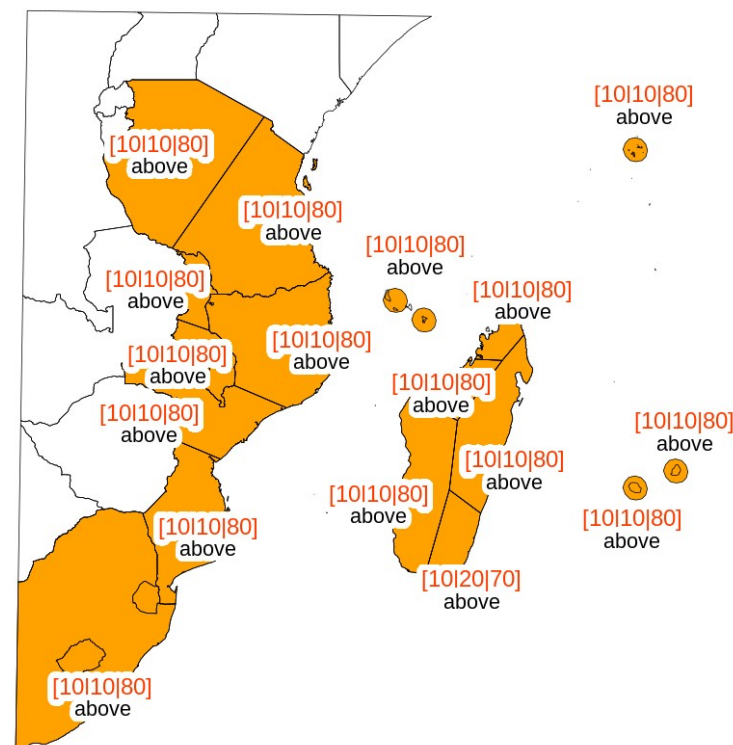
Objective Temperature forecast issued in December 2023

Temperature Seasonal forecast - JFM 2024 - It 1



CEP51.MF8.NCEP

Temperature Seasonal forecast - FMA 2024 - It 2



CEP51.MF8.NCEP

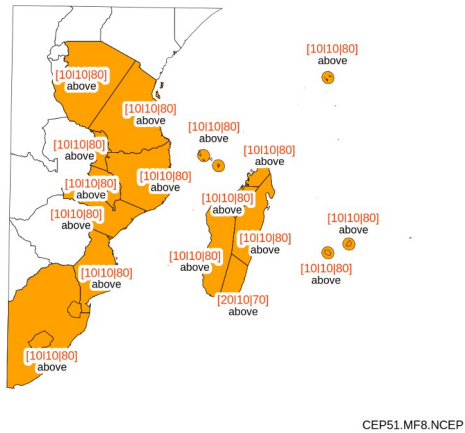
Forecast based on :

Statistical adaptation of GCM output at regional scale using *Seafords* tool

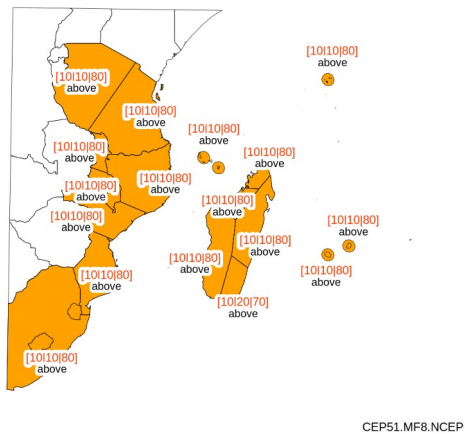
2 – JFM & FMA 2024 forecast verification

T2m Forecast

Temperature Seasonal forecast - JFM 2024 - It 1

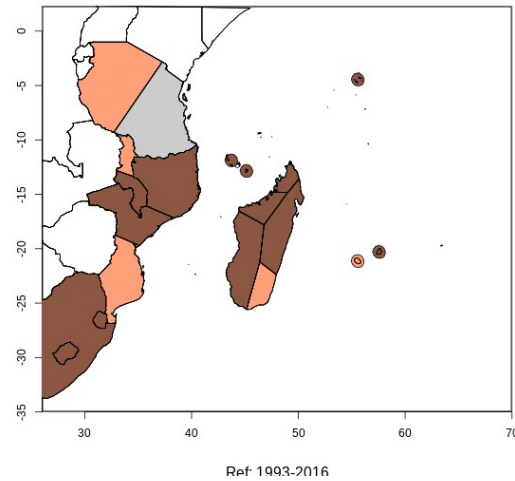


Temperature Seasonal forecast - FMA 2024 - It 2

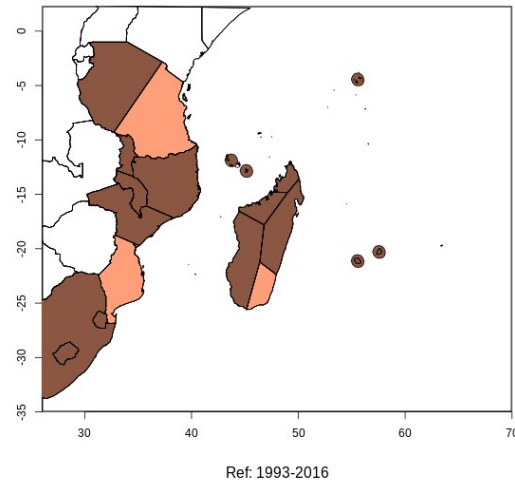


Observed anomalies (verification Dataset ERA5)

T2M quintile class: JFM 2024

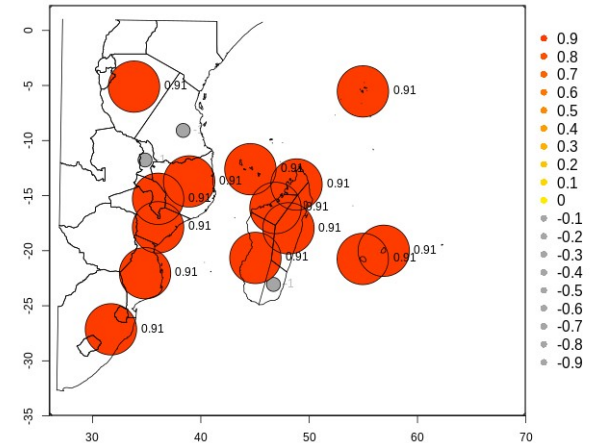


T2M quintile class: FMA 2024

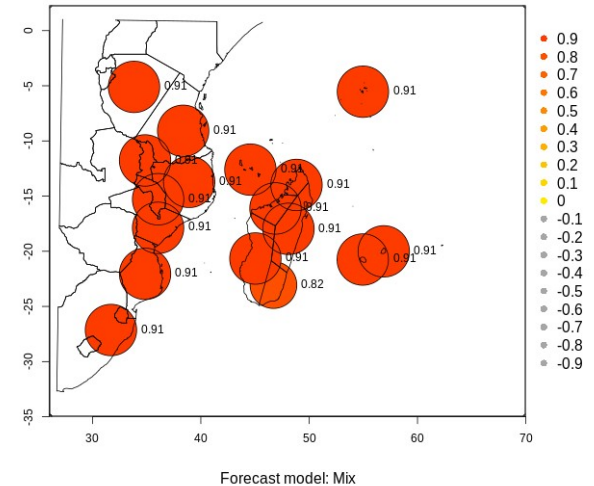


RPSS score

Score RPSS: T2M JFM-2024 It1



Score RPSS: T2M FMA-2024 It2



3 - Objective forecast (JJA & JAS 2024)

In this section we present the objective forecasts from start month : May 2024, for leadtimes 1 (JJA) and 2 (JAS)

- First the current and predicted state of climate indices are displayed
- Second the expected Large scale situation over the region is discussed from the GCM forecasts
- Then the forecast produced with the SEAFORDS tool is showed for each leadtime
 - It is a synthesis of statistical adaptation of 3 GCM (ECMWF, MF, NCEP)
 - The « No signal » result mans that no specific scenario can be determined. It is generally associated with low score for the model or a too large dispersion of the members.
 - The confidence index of the large-scale parameters provided by the GCMs as inputs for the statistical model, are displayed. They consist of correlation score computed over the Hindcast period

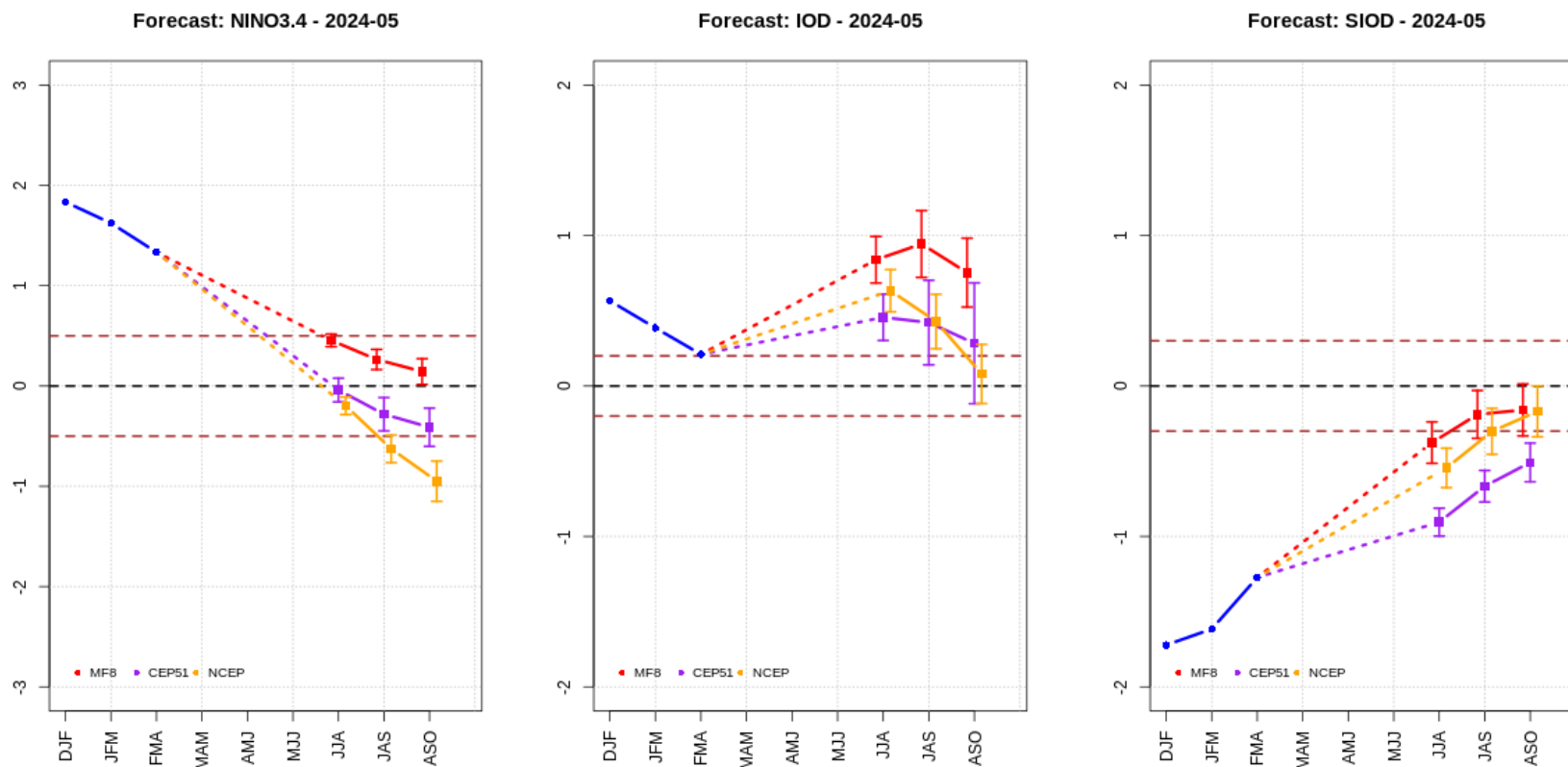
3 - Objective forecast (JJA & JAS 2024)

Large scale drivers context :

ENSO : Decreasing El Nino phase, expected to be near neutral

IOD : Decreasing positive phase – expected to be slightly positive

SIOD : Decreasing negative phase – expected to be still slightly negative

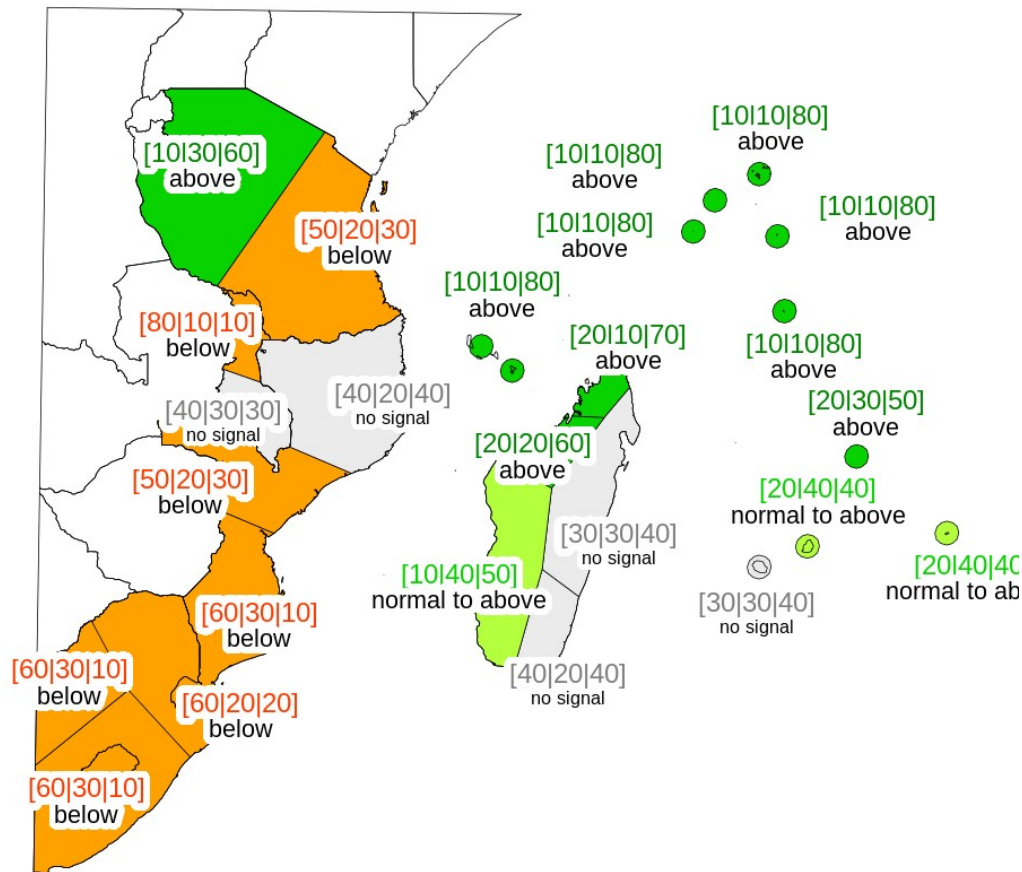


Drivers IOD and SIOD have contradictory influences over the SWIO basin. IOD+ with SIOD- is quite an unseen situation : climatology (composites) cannot give some hint on what can be expected

3 - Objective forecast (JJA & JAS 2024)

Rainfall Seasonal forecast - JJA 2024 - It 1

Objective Rainfall forecast issued in May 2024

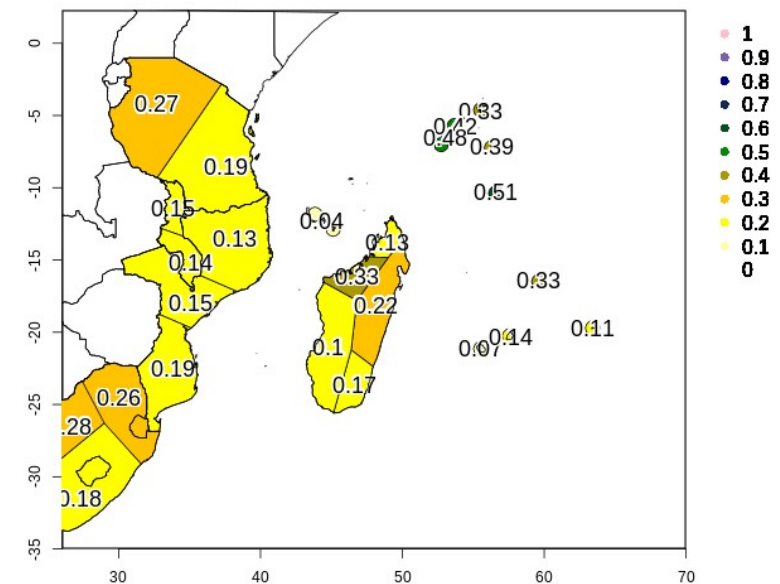


Forecast based on :

Statistical adaptation of GCM output at regional scale

>>> MME (MF + ECMWF + NCEP)

Confidence index: (CEP51.MF8.NCEP) RR JJA It 1



CEP51.MF8.NCEP

3 - Objective forecast (JJA & JAS 2024)

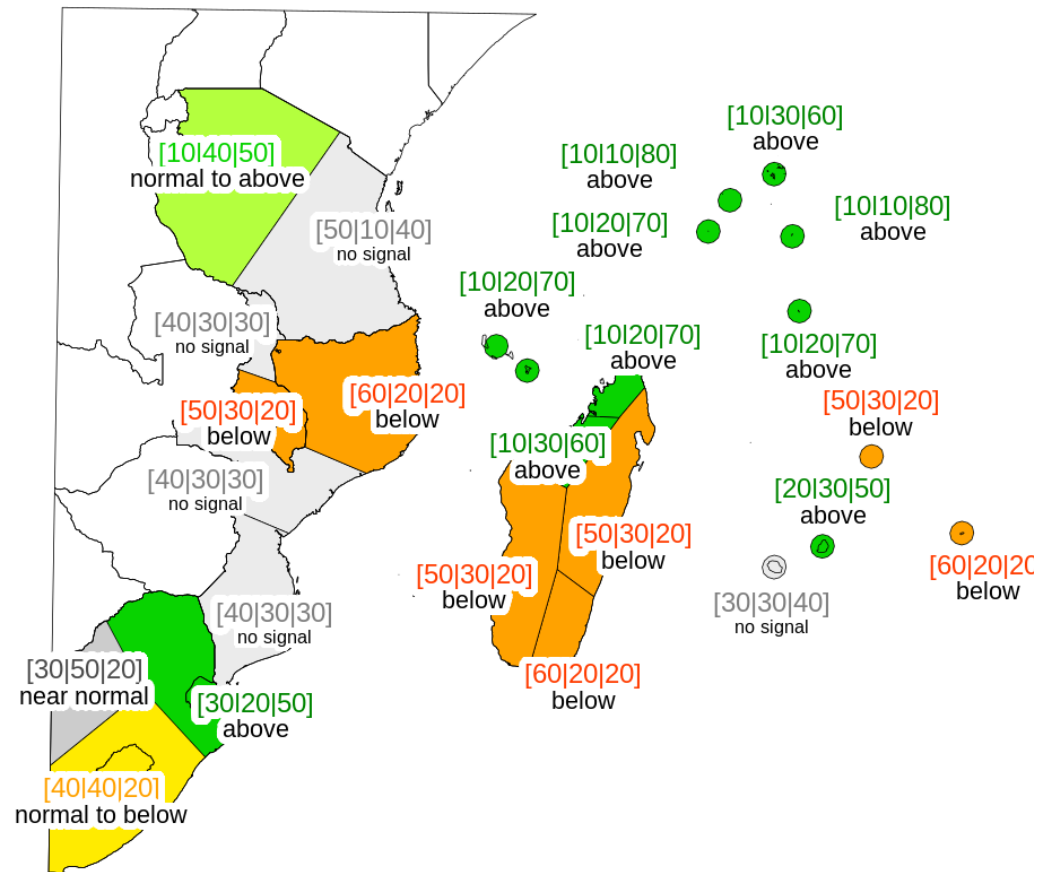
Rainfall Seasonal forecast - JAS 2024 - It 2

Objective Rainfall forecast issued in May 2024

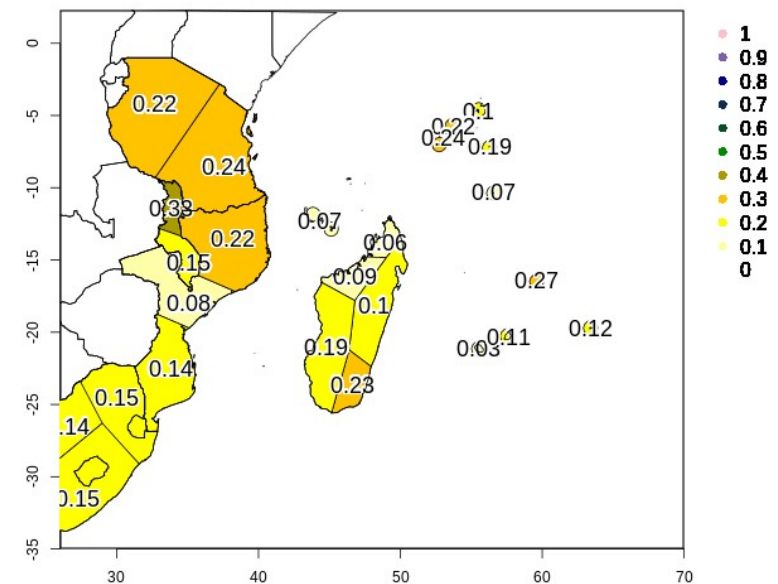
Forecast based on :

Statistical adaptation of GCM output at regional scale

>>> MME (MF + ECMWF + NCEP)



Confidence index: (CEP51.MF8.NCEP) RR JAS It 2



CEP51.MF8.NCEP

3 - Objective forecast (JJA & JAS 2024)

Assessment of a confidence level associated to rainfall forecast :

Hindcast (24 years) for 3 GCM (NCEP, ECMWF, MF8) ran over the SWIO region for **JJA** (lt1) season.

- > Production of 24 rainfall forecasts.
- > Verification of the forecasts by comparison with de reference dataset (ERA5)

JJA Global statistics for the region (25 zones):

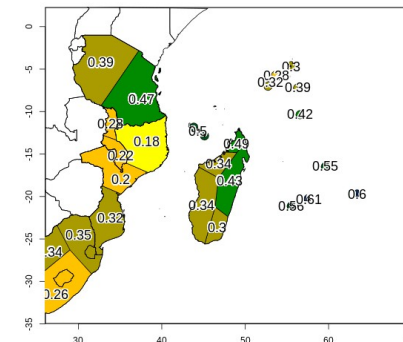
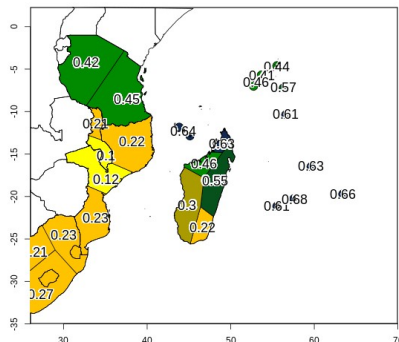
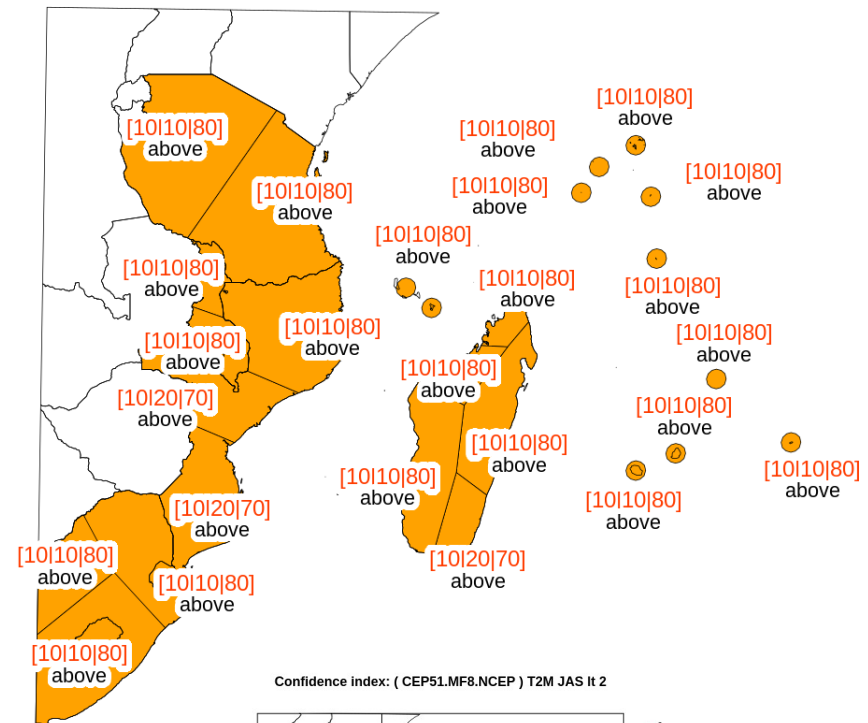
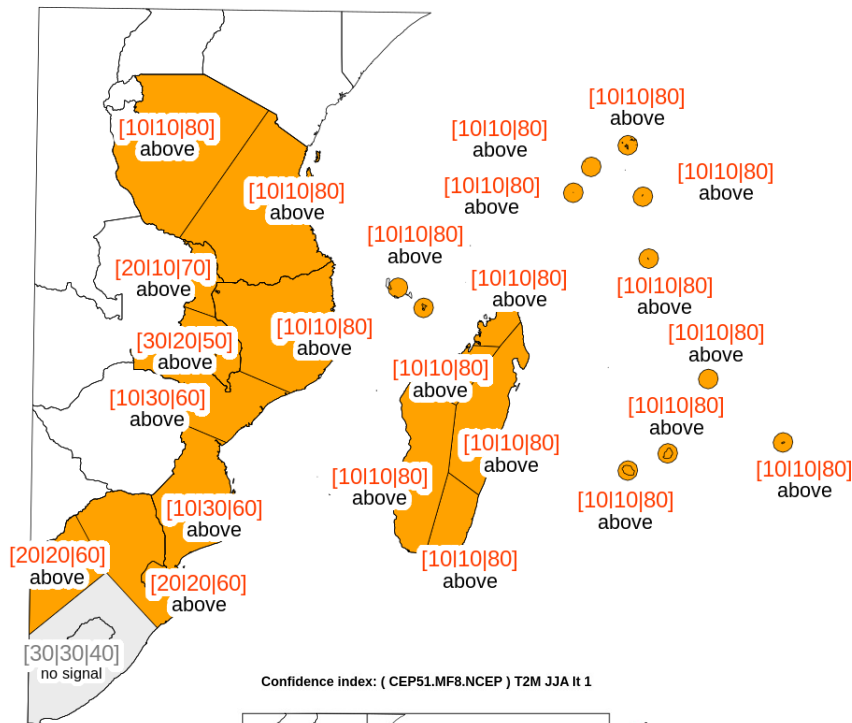
	FCST	OBS	
- Nb positive anomalies (Normal to above normal / Above normal) :	196	131	67 %
- Nb negative anomalies (Normal to below normal / Below normal) :	227	135	59 %
- Nb missed Above normal cases : 64 / 199 = 32 %			
- Nb missed Below normal cases : 71 / 202 = 35 %			

3 - Objective forecast (JJA & JAS 2024)

Objective Temperature forecast issued in May 2024 for It1 and It2

Temperature Seasonal forecast - JJA 2024 - It 1

Temperature Seasonal forecast - JAS 2024 - It 2



A satellite image of the Indian Ocean. On the left, the eastern coast of Africa is visible. In the center, the island of Madagascar is shown. A large, bright, swirling cloud system, likely a cyclone or hurricane, is centered over Madagascar. The surrounding ocean shows various cloud patterns and textures.

Thank you for your attention

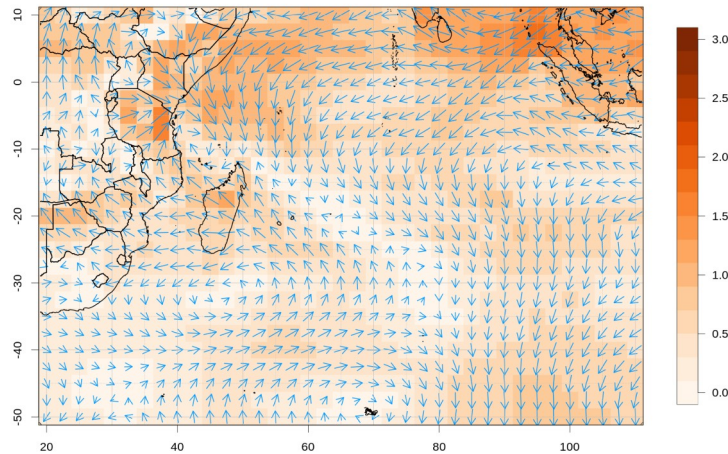
Follow us on : http://regionalclimate-change.sc/swiocofo_data_portal/

3 - Objective forecast (JJA & JAS 2024)

Large scale synthesis maps from MF, ECMWF, NCEP GCMs: Base may 2024 - **JJA**

Wind 850

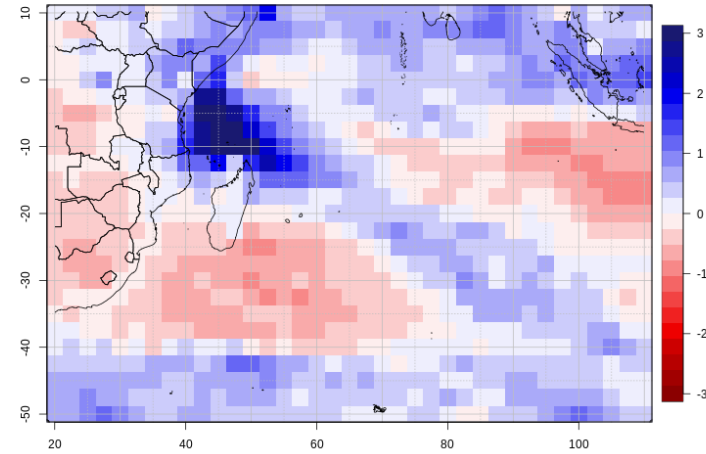
Forecast Mix GCM U850global - JJA2024-It1



CEP51.MF8.NCEP

Rainfall

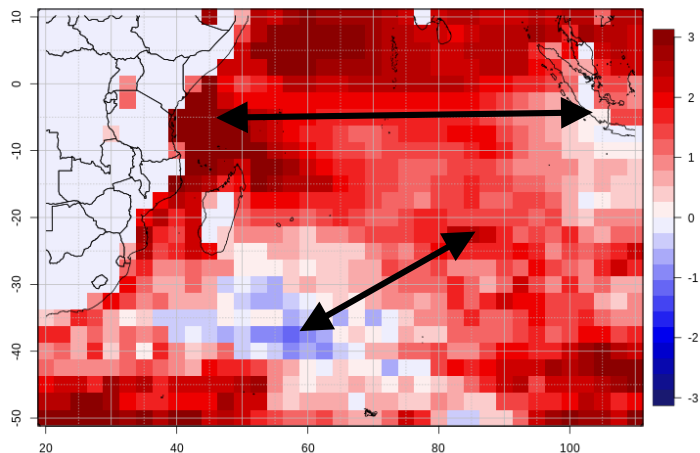
Forecast Mix GCM PRECglobal - JJA2024-It1



CEP51.MF8.NCEP

SST

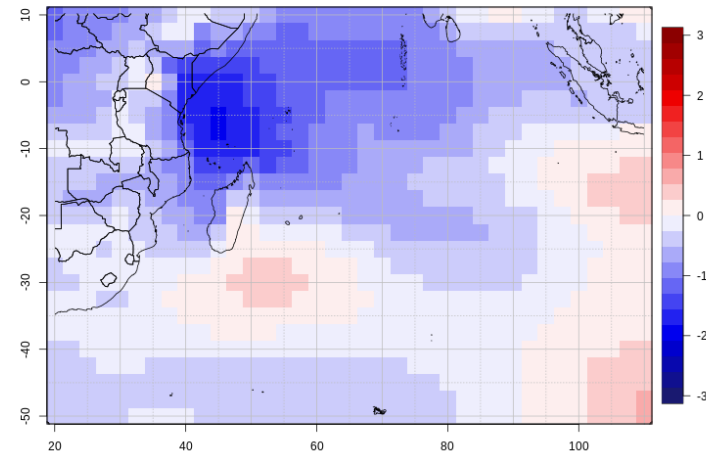
Forecast Mix GCM SSTglobal - JJA2024-It1



CEP51.MF8.NCEP

MSLP

Forecast Mix GCM PMERGglobal - JJA2024-It1



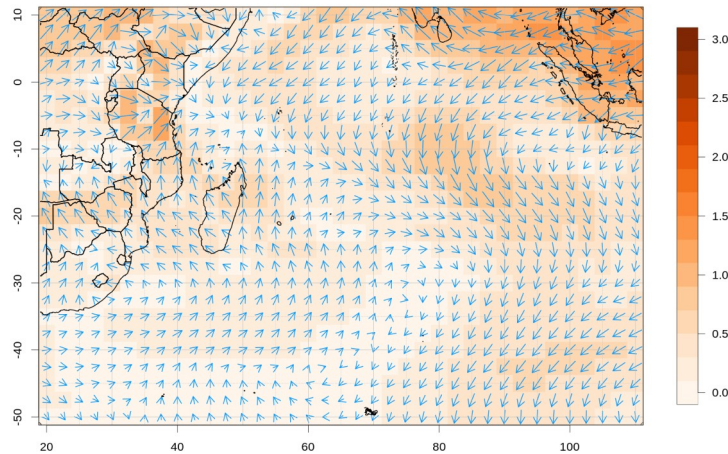
CEP51.MF8.NCEP

3 - Objective forecast (JJA & JAS 2024)

Large scale synthesis maps from MF, ECMWF, NCEP GCMs: Base may 2024 - **JAS**

Wind 850

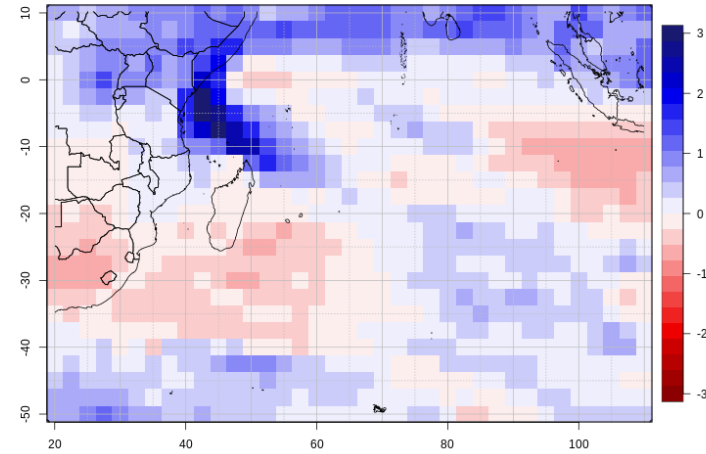
Forecast Mix GCM U850global - JAS2024-It2



CEP51.MF8.NCEP

Rainfall

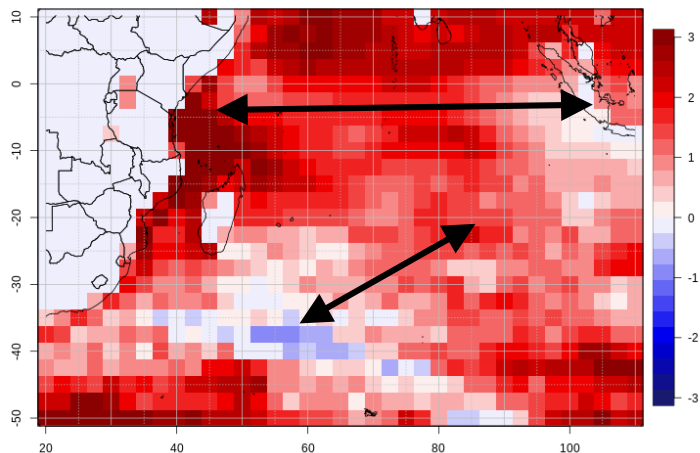
Forecast Mix GCM PRECglobal - JAS2024-It2



CEP51.MF8.NCEP

SST

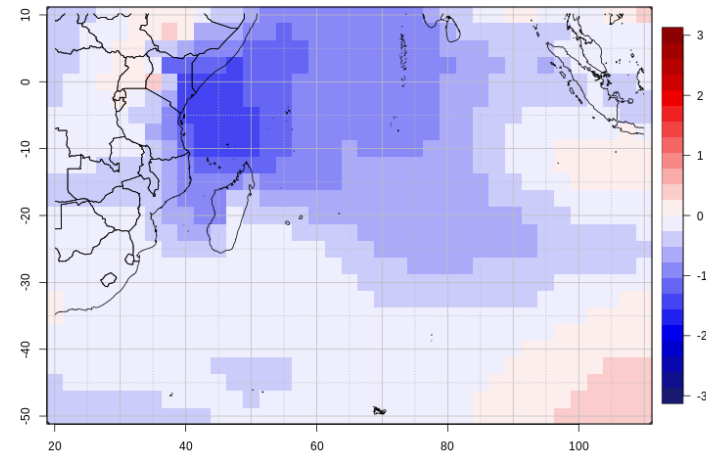
Forecast Mix GCM SSTglobal - JAS2024-It2



CEP51.MF8.NCEP

MSLP

Forecast Mix GCM PMERglobal - JAS2024-It2



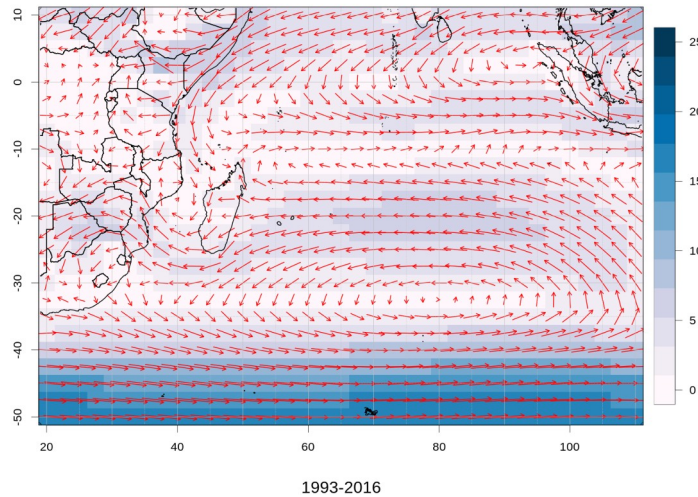
CEP51.MF8.NCEP

3 - Objective forecast (JJA & JAS 2024)

Large scale ERA5 climatology maps - JFM

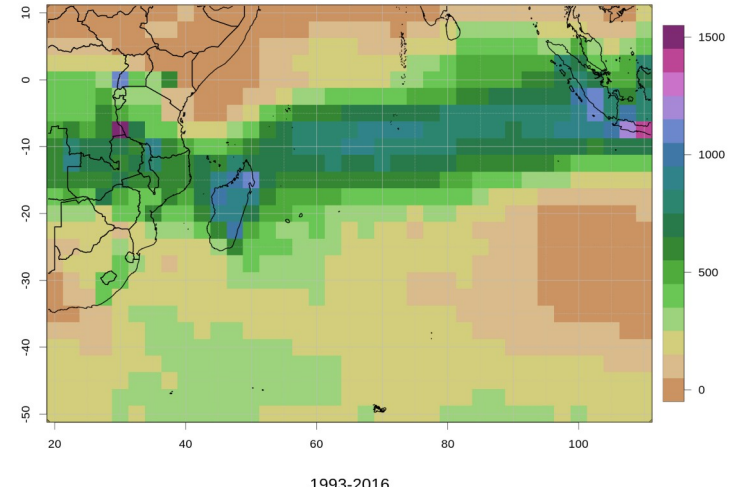
Wind 850

ERA5 Wind 850 Avg. : JFM



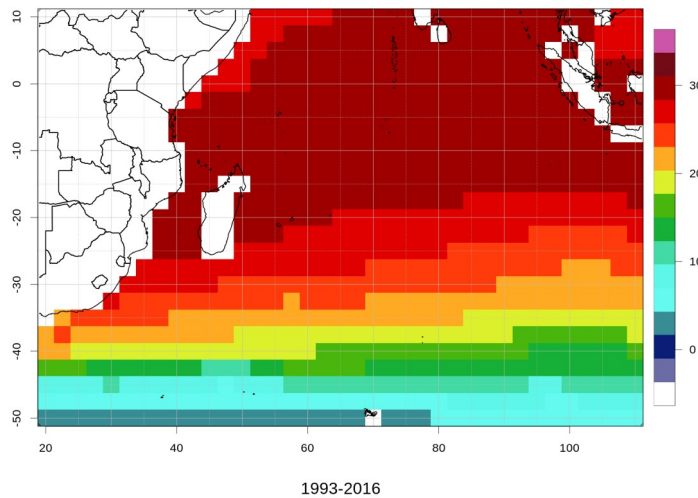
Rainfall

ERA5 PREC Avg. : JFM



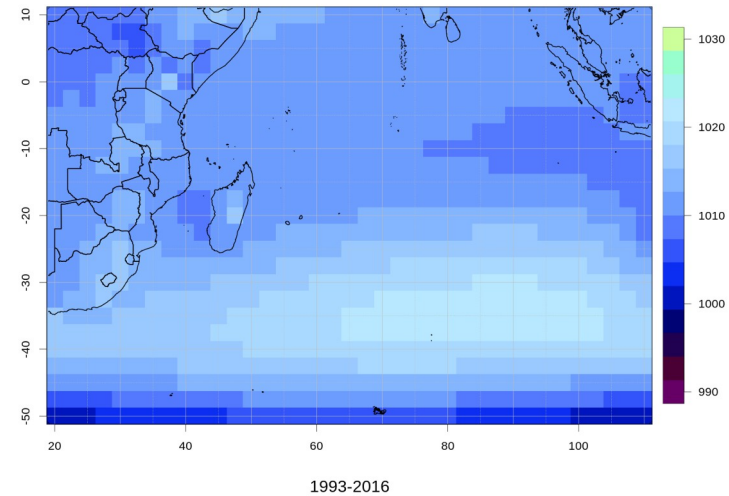
SST

ERA5 SST Avg. : JFM



MSLP

ERA5 PMER Avg. : JFM

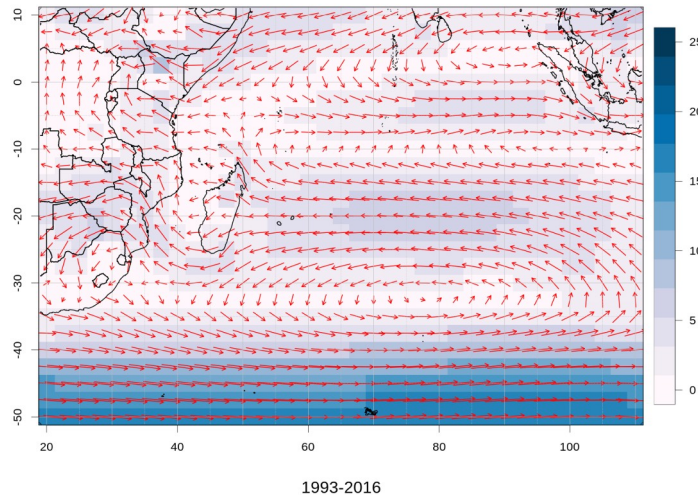


3 - Objective forecast (JJA & JAS 2024)

Large scale ERA5 climatology maps - FMA

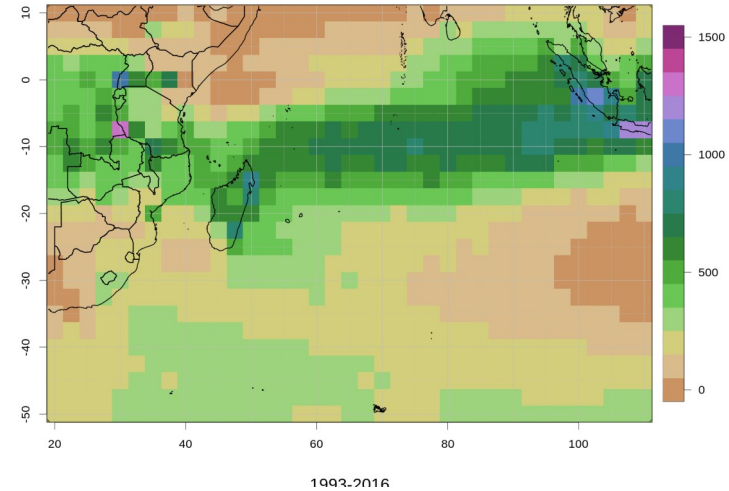
Wind 850

ERA5 Wind 850 Avg. : FMA



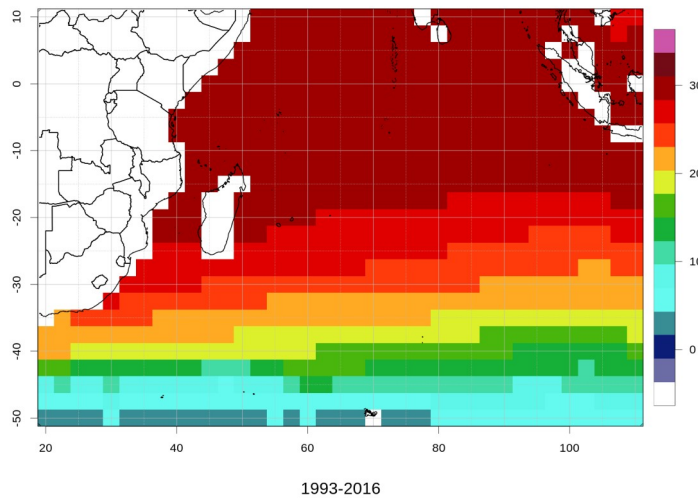
Rainfall

ERA5 PREC Avg. : FMA



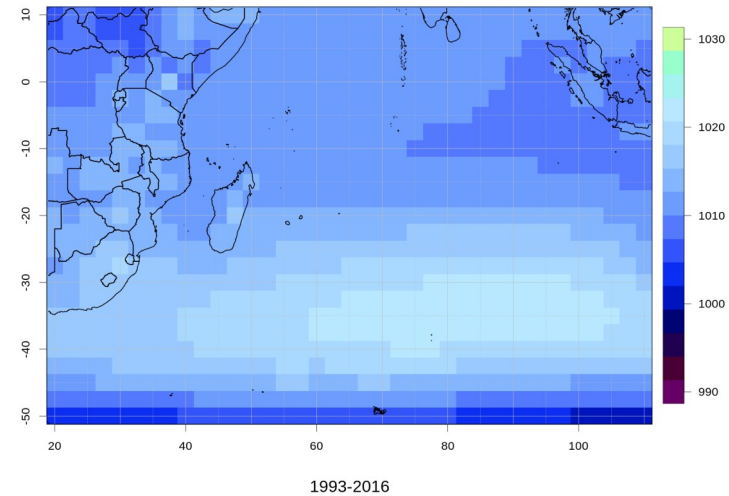
SST

ERA5 SST Avg. : FMA



MSLP

ERA5 PMER Avg. : FMA

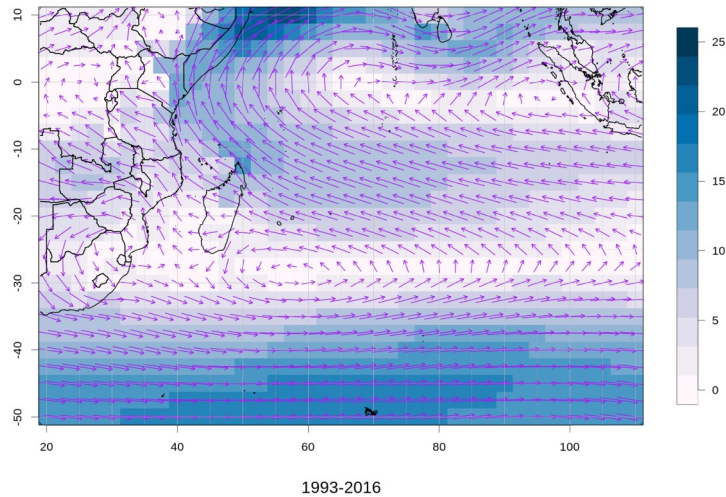


3 - Objective forecast (JJA & JAS 2024)

Large scale ERA5 climatology maps - JJA

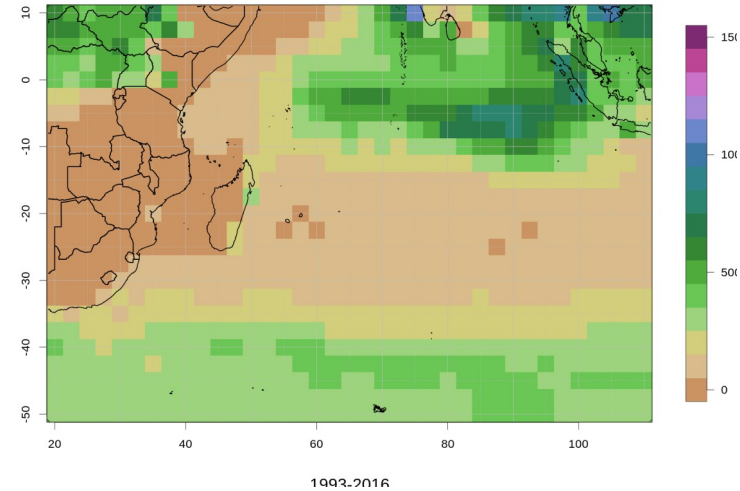
Wind 850

ERA5 Wind 850 Avg. : JJA



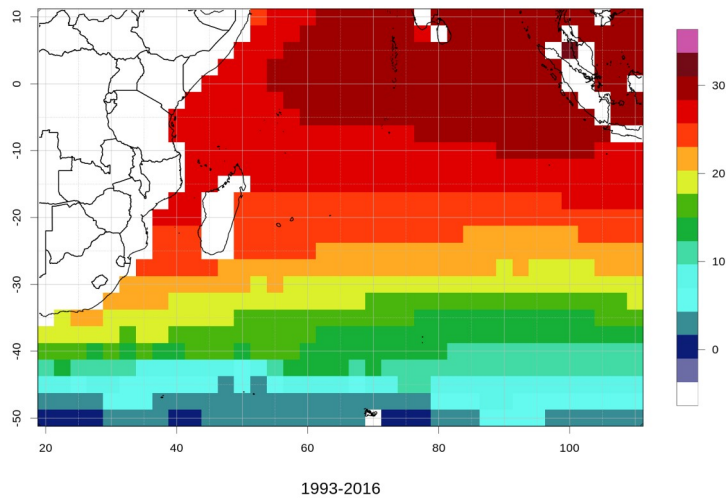
Rainfall

ERA5 PREC Avg. : JJA



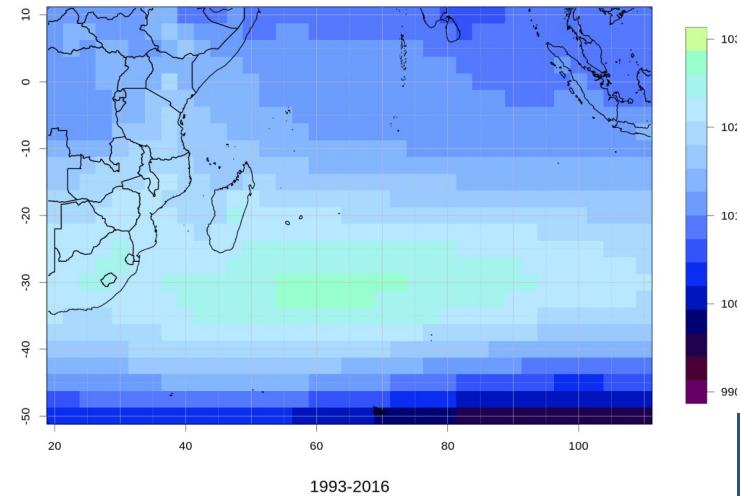
SST

ERA5 SST Avg. : JJA



MSLP

ERA5 PMER Avg. : JJA

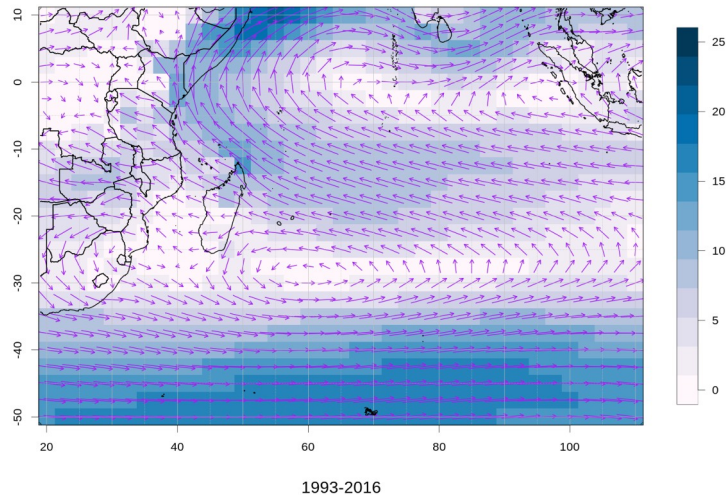


3 - Objective forecast (JJA & JAS 2024)

Large scale ERA5 climatology maps - JAS

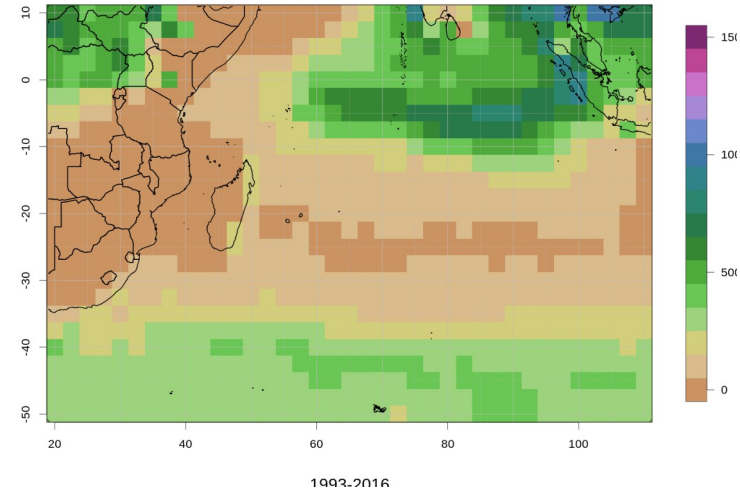
Wind 850

ERA5 Wind 850 Avg. : JAS



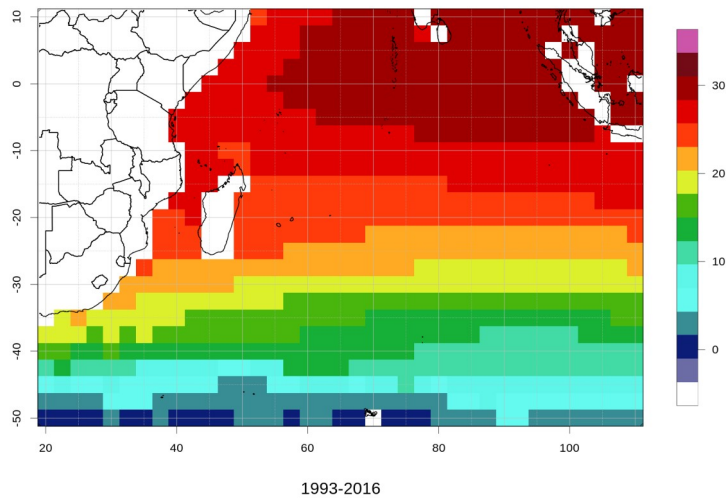
Rainfall

ERA5 PREC Avg. : JAS



SST

ERA5 SST Avg. : JAS



MSLP

ERA5 PMER Avg. : JAS

