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DE LA METEOROLOGIE AU DEVELOPPEMENT



AFRICAN CENTRE OF METEOROLOGICAL  
APPLICATIONS FOR DEVELOPMENT

Institution Africaine parrainée par la CEA et l'OMM

African Institution under the aegis of UNECA and WMO



African Centre of  
Meteorological  
Applications for  
Development  
1985-2019



AFRICAN CENTRE OF  
METEOROLOGICAL APPLICATIONS FOR DEVELOPMENT  
African Institution under the aegis of UNECA and WMO

## ELABORATION NOTE TECHNIQUE DE LA PREVISION CLIMATIQUE SAISONNIER JFM-FMA 2021 JAN 2021

	Name	Position
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<https://acmad.net/rcc/>



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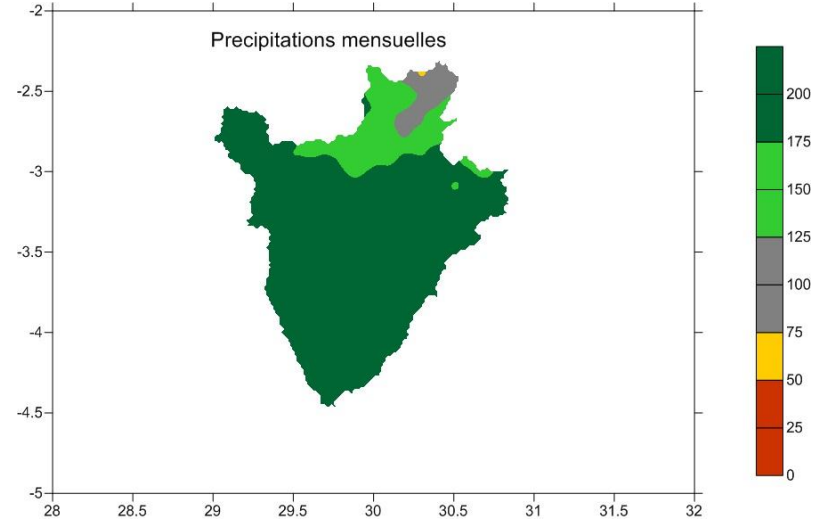
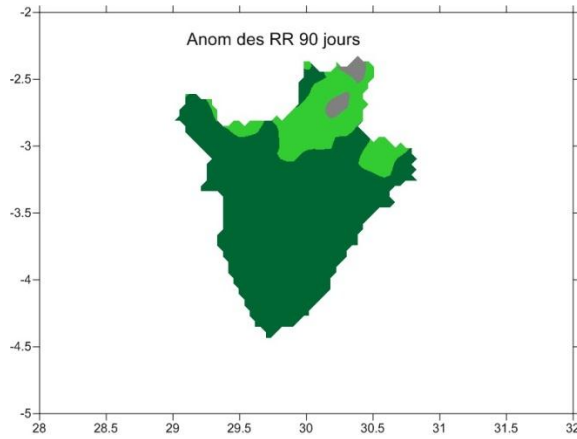
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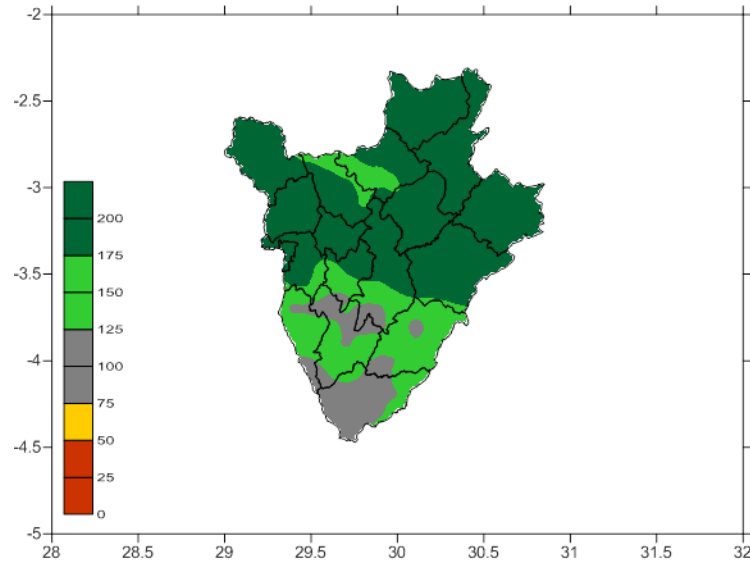
## **I. ANALYSE DE LA PREVISION PAR VARIABILITE ET TENDANCE CLIMATIQUE**



# METHODE DE PREVISION PAR PERSISTENCE



## PRECIPITATION EN POURCENTAGE DE 7 DERNIERJOURS JAN 2021





- Les trois cartes montrent comment les précipitations ont été au cours de 7, 30 et 90 derniers jours lesquelles, lesquelles les précipitations ont été normale à excédentaires sur l'ensemble du pays à l'exception de la carte du 29 Octobre à 4 Novembre où des déficits pluviométrique ont été observés sur la partie centrale Est du pays



**ANALYSE DE TENDANCE ET VARIABILITE AVEC ANOMALIES DE  
PRECIPITATION AVEC STATION (Locale)**

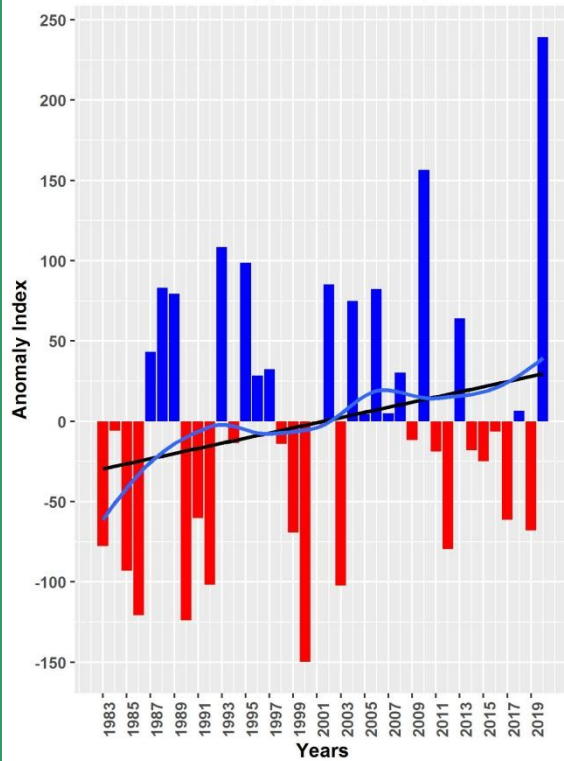
**NOV-DEC-JAN**



## BURUNDI: BUGABIRA

### BUGABIRA

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1988	127.6
1989	126.3
1993	135.9
1995	132.7
2002	128.2
2006	127.3
2010	151.9
2020	179.3

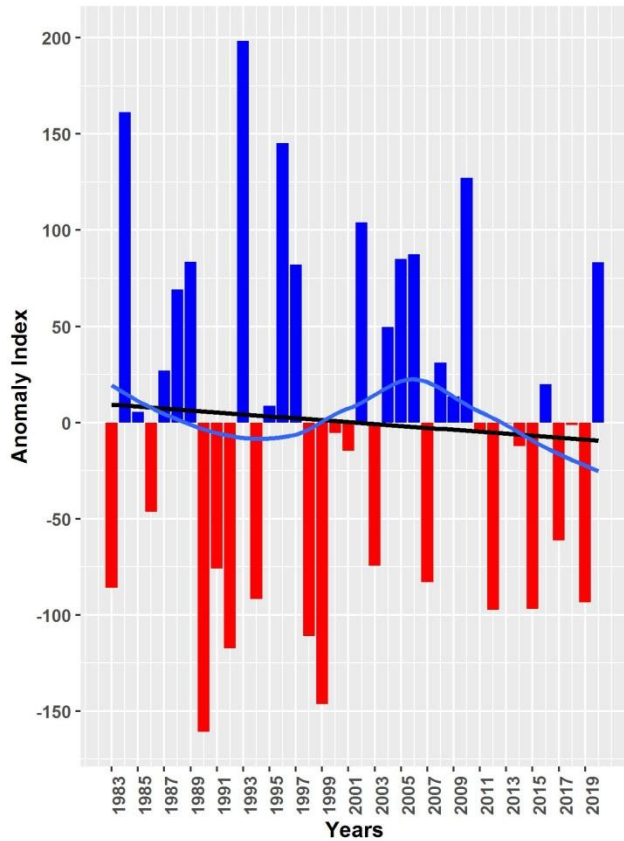
Dry_Year	Percentage
1983	74.2
1985	69.2
1986	60
1990	59
1992	66.3
2000	50.4
2003	66.1
2012	73.7



## BURUNDI: BUGARAMA-Commune

BUGARAMA-Commune

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1984	139
1993	148
1996	135.1
2002	125.2
2010	130.8

Dry_Year	Percentage
1990	61.1
1992	71.6
1998	73.1
1999	64.6

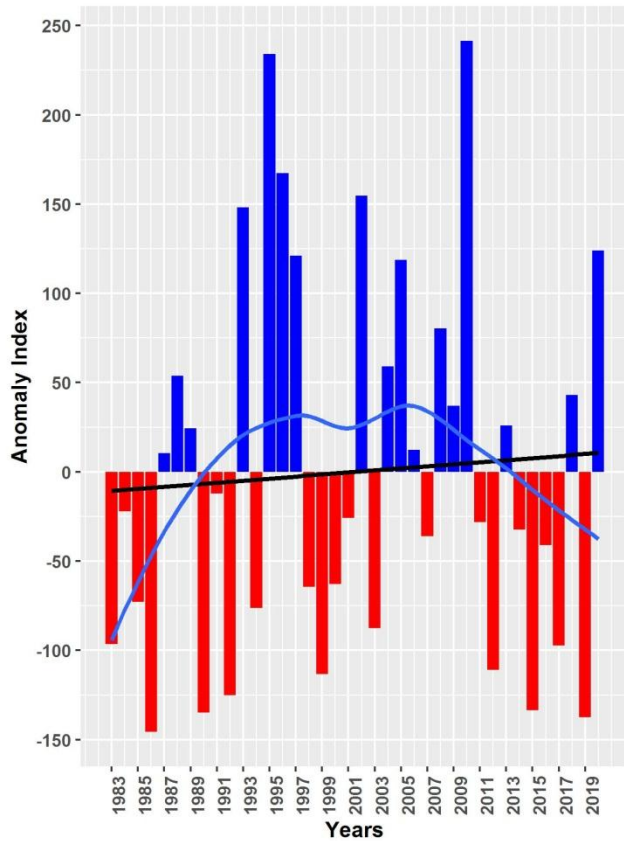




## BURUNDI: BUHORO

### BUHORO

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1993	134.4
1995	154.4
1996	138.8
1997	128.2
2002	135.9
2005	127.6
2010	156.1
2020	128.8

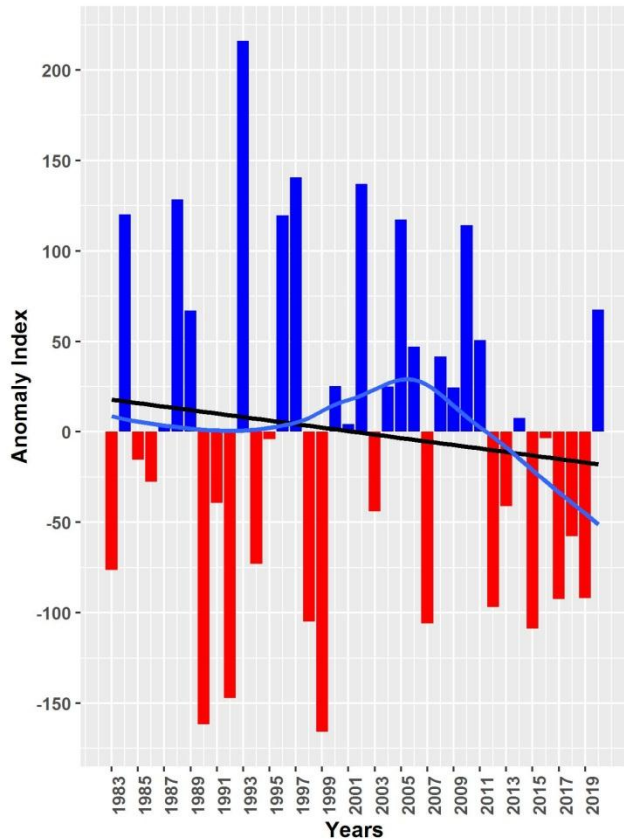
Dry_Year	Percentage
1986	66.2
1990	68.7
1992	70.9
1999	73.7
2012	74.2
2015	69
2019	68.1



## BURUNDI: BUJUMBURA-AERO

### BUJUMBURA-AERO

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1984	128.2
1988	130.1
1993	150.7
1996	128.1
1997	133
2002	132.2
2005	127.5
2010	126.8

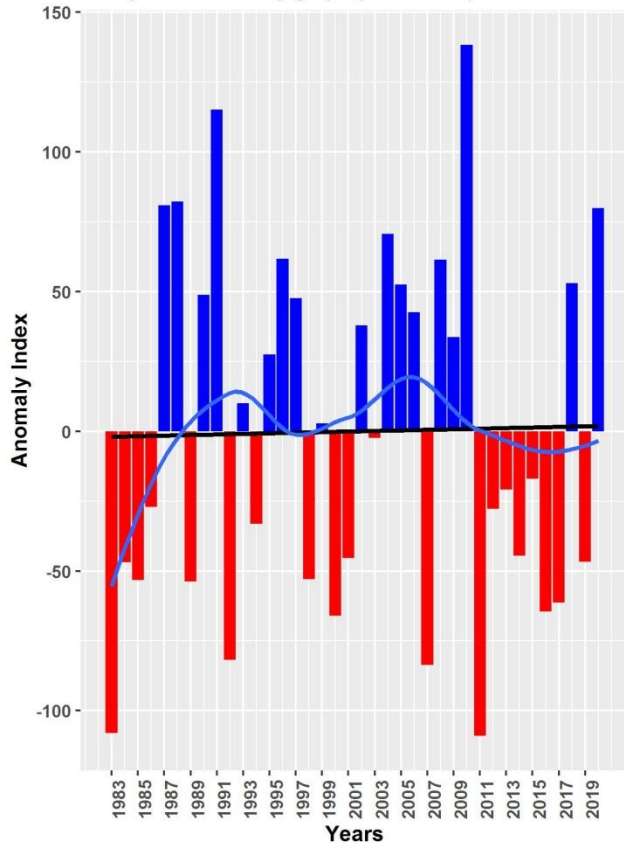
Dry_Year	Percentage
1990	62.1
1992	65.5
1999	61.1
2015	74.5



## BURUNDI: BURASIRA-S\_minaire

### BURASIRA-S\_minaire

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1987	135.1
1988	135.7
1991	150
1996	126.8
2004	130.7
2008	126.7
2010	160.1
2020	134.6

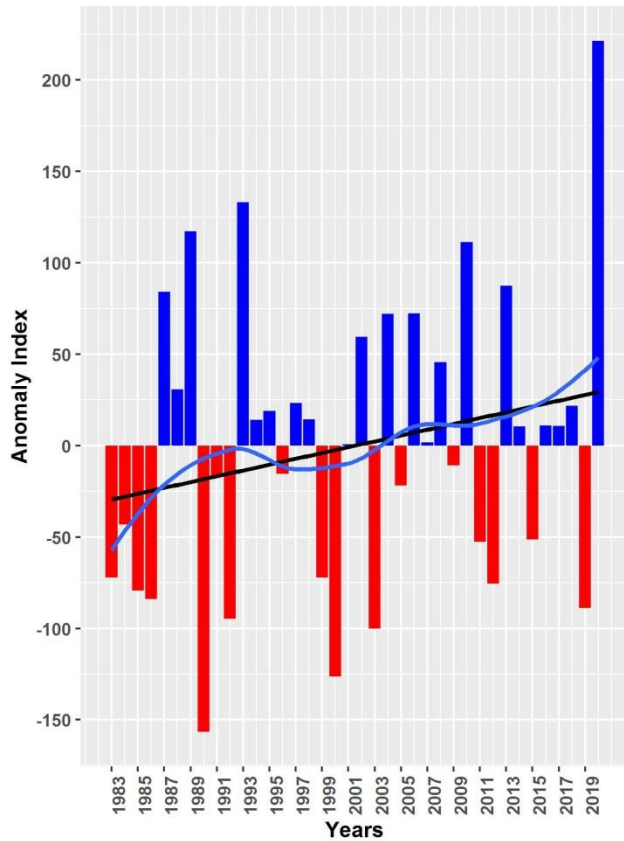
Dry_Year	Percentage
1983	53.1
1992	64.4
2000	71.3
2007	63.7
2011	52.7
2016	72
2017	73.3



## BURUNDI: BUSONI

### BUSONI

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1987	126.2
1989	136.6
1993	141.5
2010	134.7
2013	127.3
2020	169.1

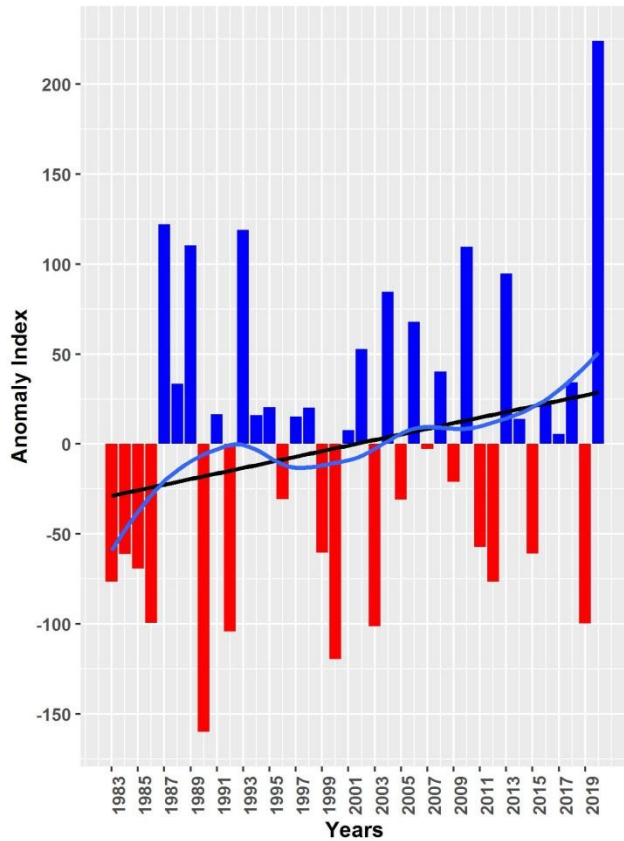
Dry_Year	Percentage
1986	73.8
1990	51.2
1992	70.4
2000	60.6
2003	68.7
2019	72.3



## BURUNDI: BWAMBARANGWE

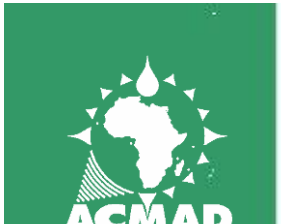
### BWAMBARANGWE

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1987	138.4
1989	134.7
1993	137.5
2004	126.7
2010	134.5
2013	129.9
2020	170.6

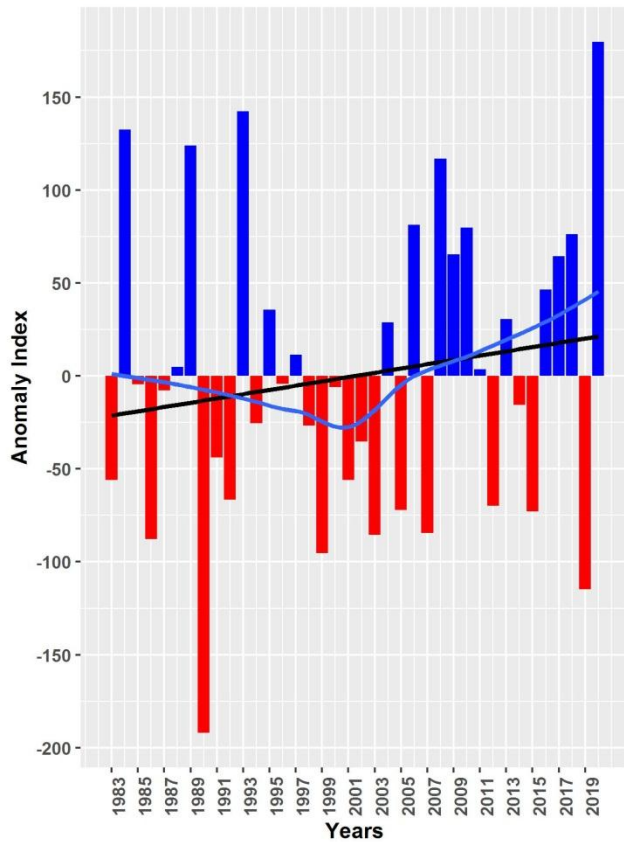
Dry_Year	Percentage
1986	68.7
1990	49.6
1992	67.2
2000	62.4
2003	68.1
2019	68.6



## BURUNDI: CANKUZO-PROJET

### CANKUZO-PROJET

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1984	132.8
1989	130.7
1993	135.3
2008	129
2020	144.5

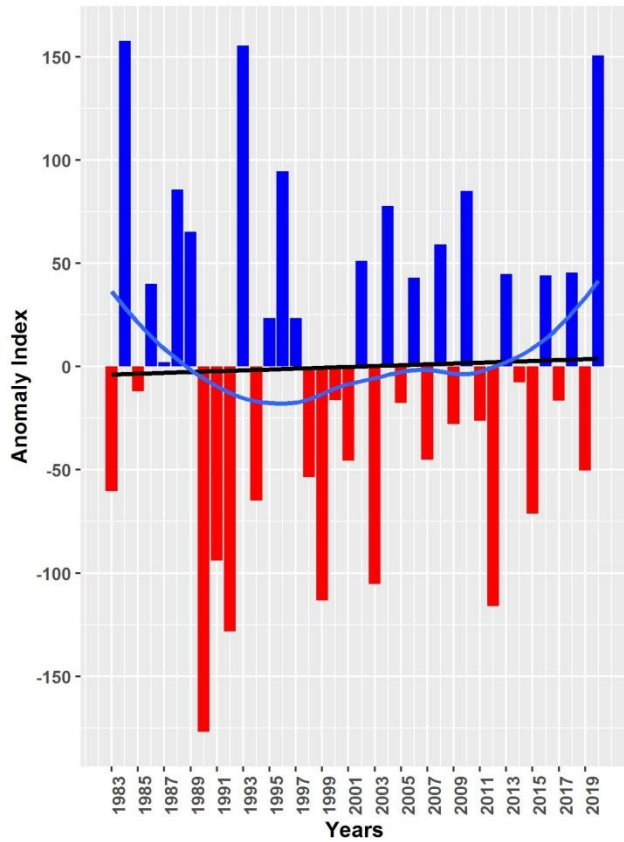
Dry_Year	Percentage
1990	52.4
2019	71.6



## BURUNDI: GIHETA

### GIHETA

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1984	138.4
1993	137.8
2020	136.6

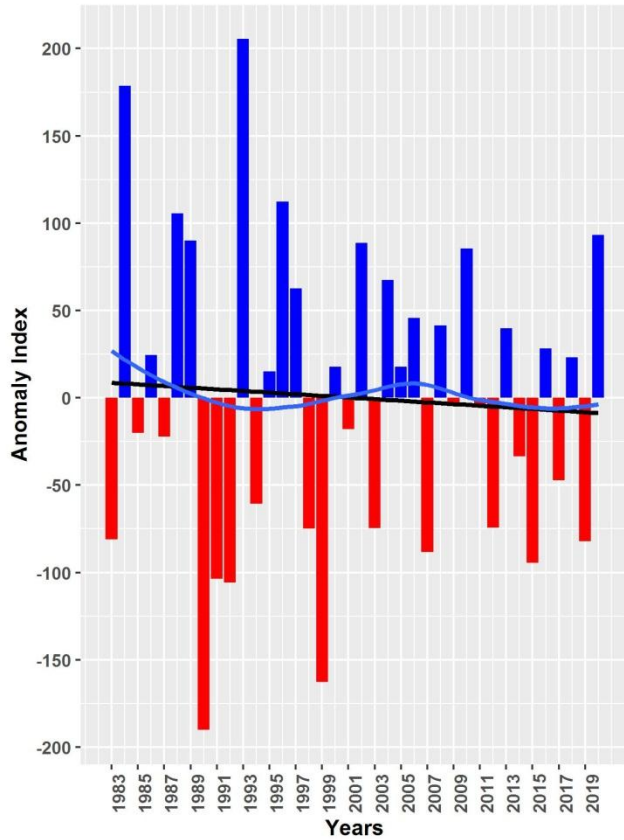
Dry_Year	Percentage
1990	57
1992	68.8
1999	72.5
2003	74.4
2012	71.8



## BURUNDI: GISOZI

### GISOZI

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1984	140.8
1993	147
1996	125.7

Dry_Year	Percentage
1990	56.5
1999	62.8

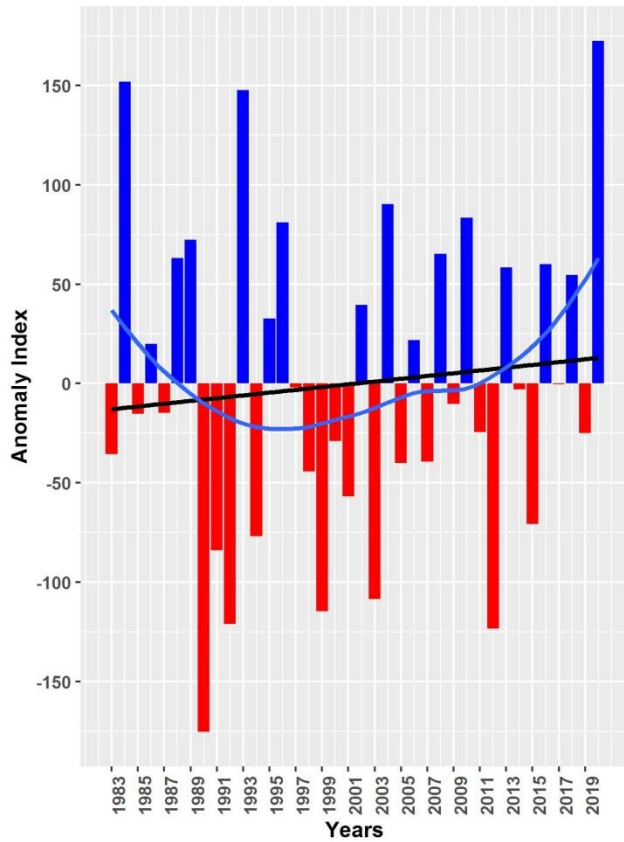




## BURUNDI: GITEGA\_Zege

GITEGA\_Zege

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1984	137
1993	135.9
2020	142

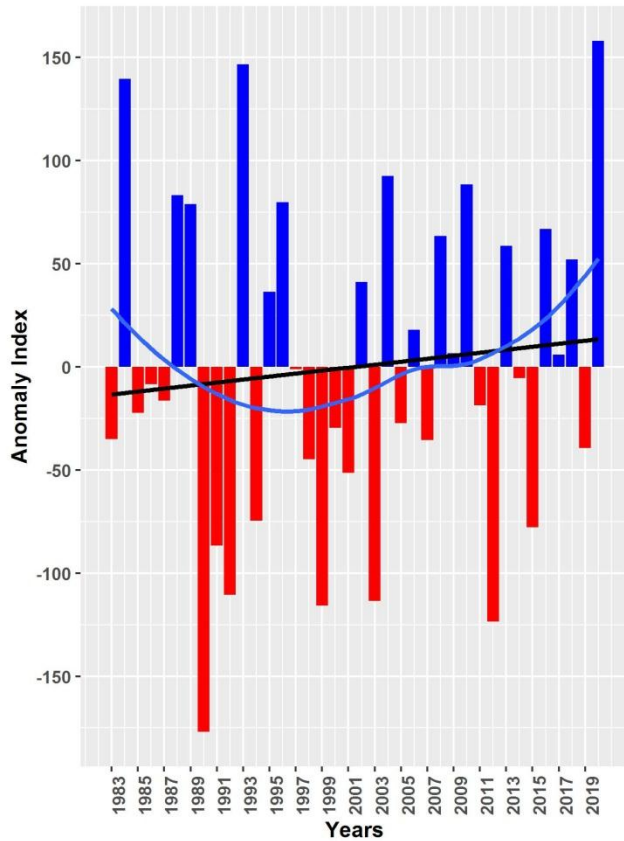
Dry_Year	Percentage
1990	57.3
1992	70.5
1999	72
2003	73.6
2012	69.9



## BURUNDI: GITEGA-Aerodrome

GITEGA-Aerodrome

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1984	133.8
1993	135.5
2020	138.2

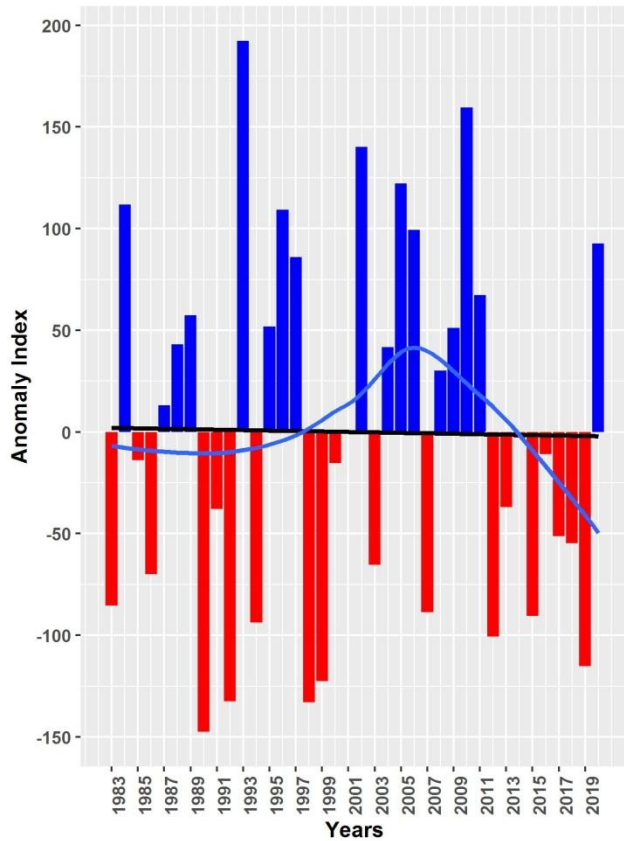
Dry_Year	Percentage
1990	57.2
1992	73.2
1999	72
2003	72.5
2012	70.1



## BURUNDI: IMBO-Sems

### IMBO-Sems

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1984	127.4
1993	147.2
1996	126.8
2002	134.3
2005	129.9
2010	139.1

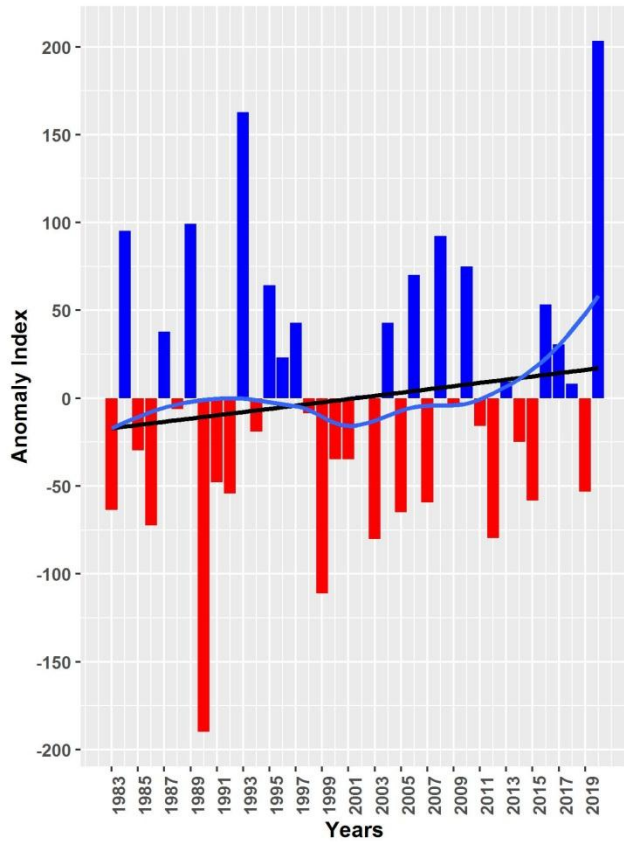
Dry_Year	Percentage
1990	63.8
1992	67.5
1998	67.4
1999	69.9
2019	71.8



## BURUNDI: KARUZI

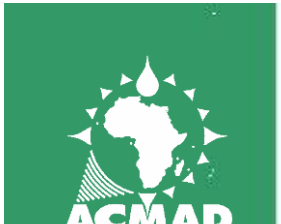
### KARUZI

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1993	141
2020	151.2

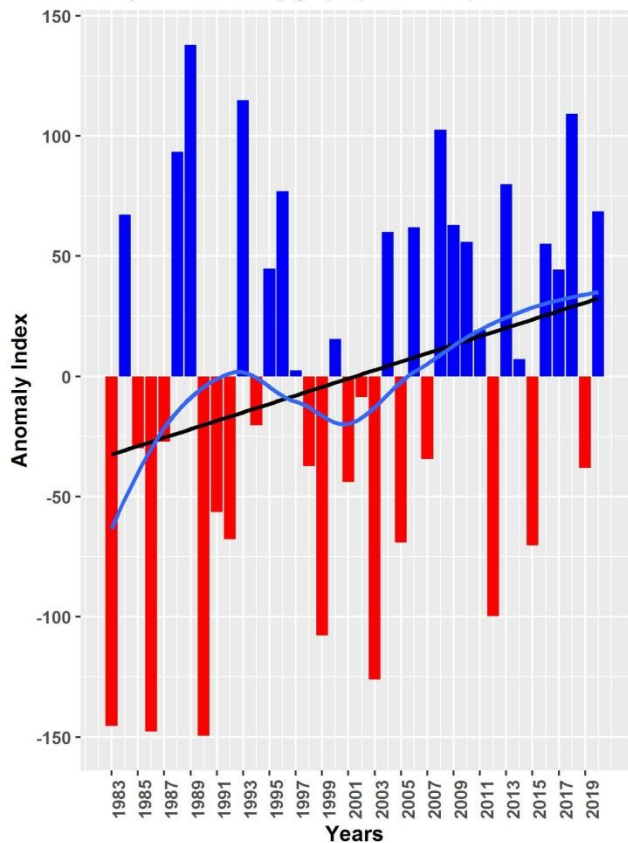
Dry_Year	Percentage
1990	52.2
1999	72



## BURUNDI: KINYINYA

### KINYINYA

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1989	132.8
1993	127.3
2018	126

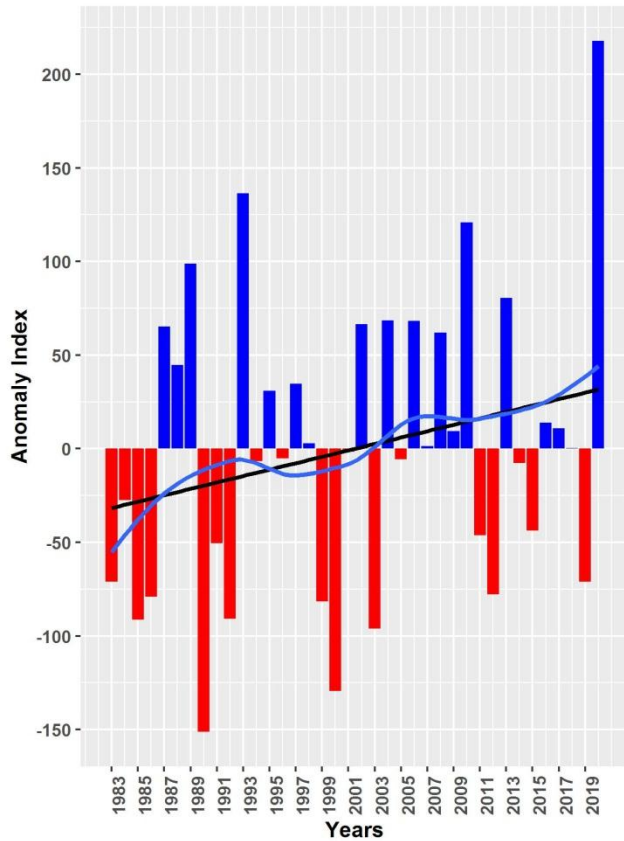
Dry_Year	Percentage
1983	65.4
1986	64.9
1990	64.4
1999	74.4
2003	70



## BURUNDI: KIRUNDO-Projet

KIRUNDO-Projet

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1989	130.6
1993	142.1
2010	137.3
2020	167.3

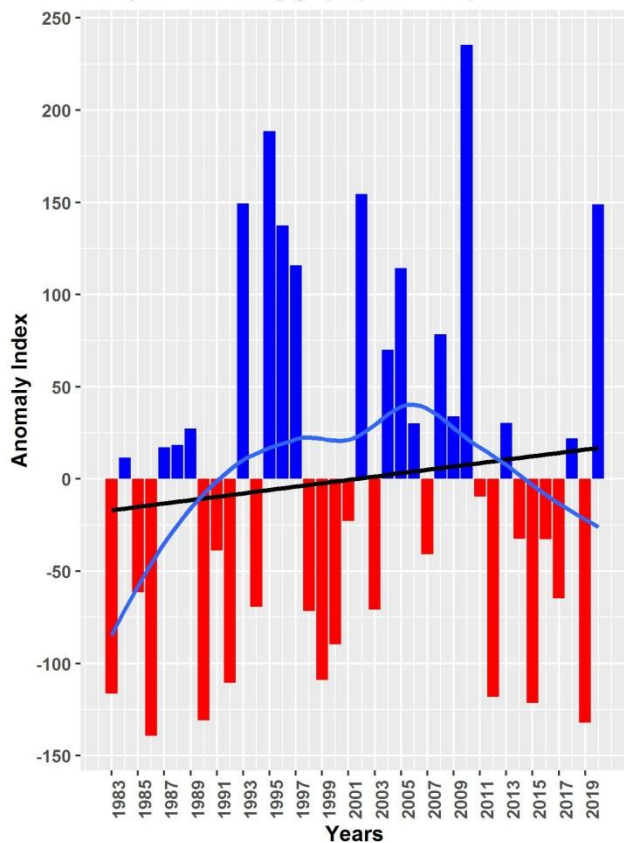
Dry_Year	Percentage
1985	71.8
1990	53.3
1992	72
1999	74.8
2000	60
2003	70.4



## BURUNDI: MABAYI

### MABAYI

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1993	135.8
1995	145.2
1996	133
1997	127.8
2002	137.1
2005	127.4
2010	156.5
2020	135.7

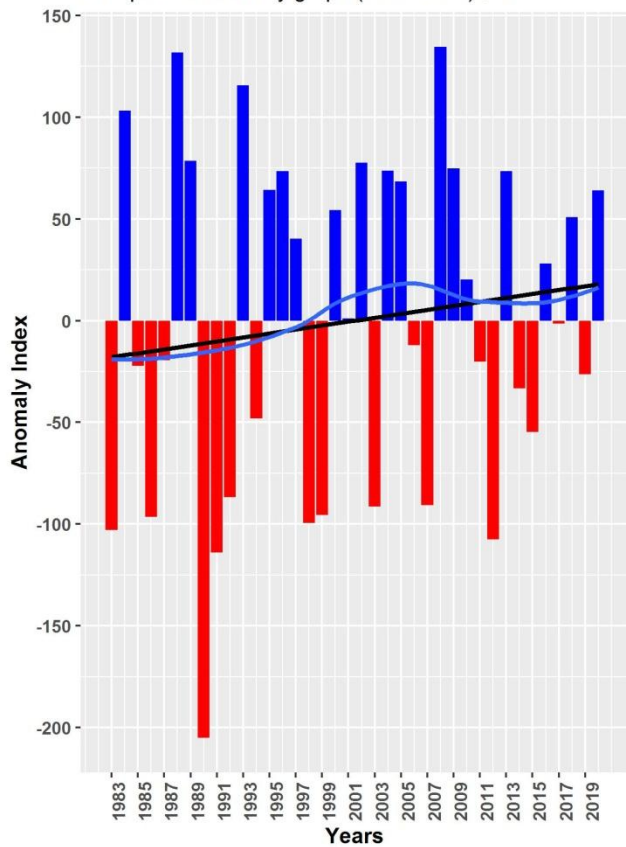
Dry_Year	Percentage
1983	72.1
1986	66.6
1990	68.6
1992	73.5
1999	73.9
2012	71.6
2015	70.8
2019	68.3



## BURUNDI: MAKAMBA

### MAKAMBA

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1988	127.7
2008	128.3

Dry_Year	Percentage
1990	56.9

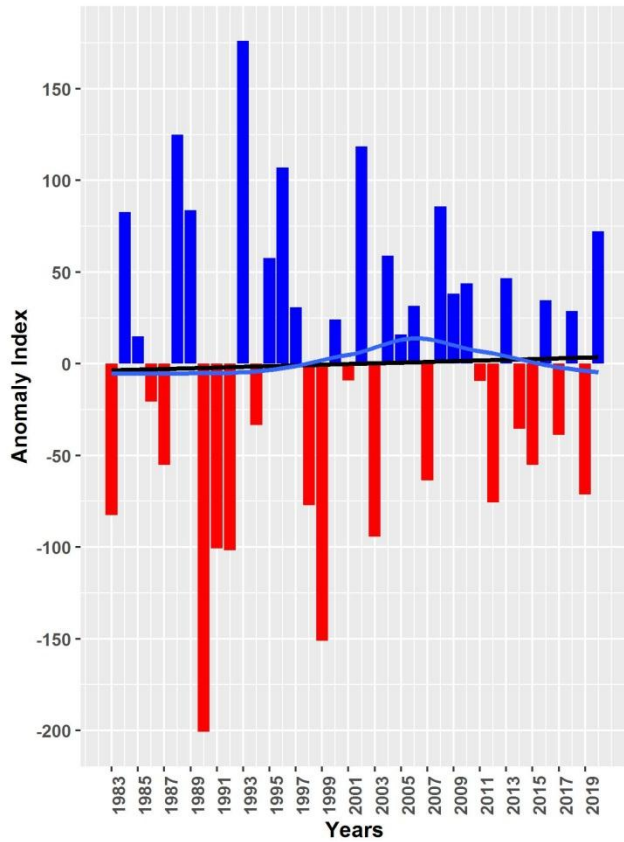




## BURUNDI: MATANA-Lyceee

MATANA-Lyceee

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1988	127
1993	138.1
2002	125.6

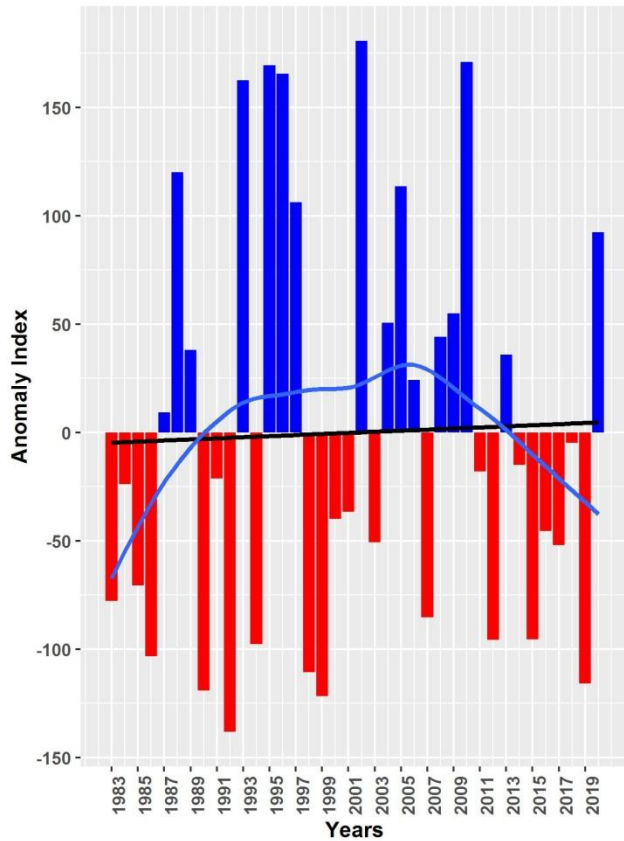
Dry_Year	Percentage
1990	56.6
1999	67.3



## BURUNDI: MPARAMBO

### MPARAMBO

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1988	128.3
1993	138.2
1995	139.8
1996	139
2002	142.5
2005	126.7
2010	140.2

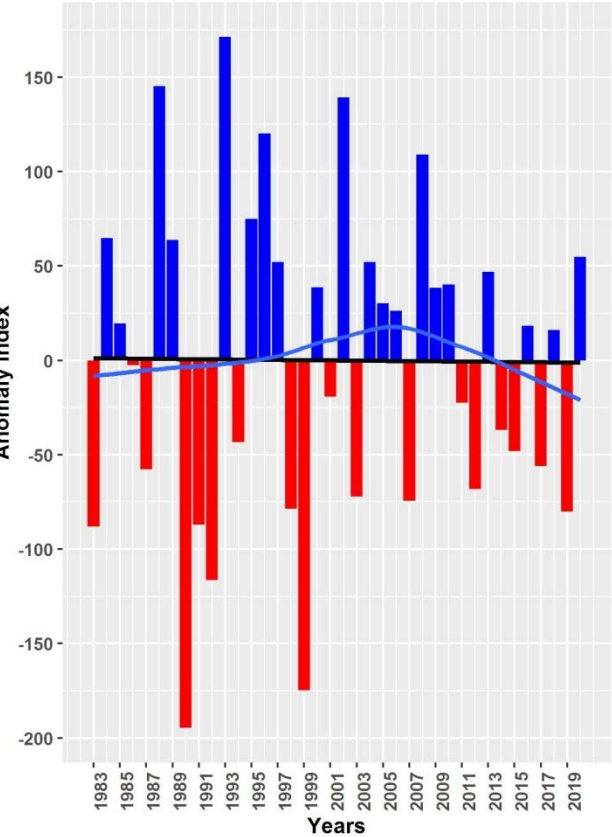
Dry_Year	Percentage
1990	72
1992	67.5
1998	74
1999	71.4
2019	72.8



# BURUNDI: MPOTA-Tora

## MPOTA-Tora

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1988	130.9
1993	136.5
1996	125.6
2002	129.7

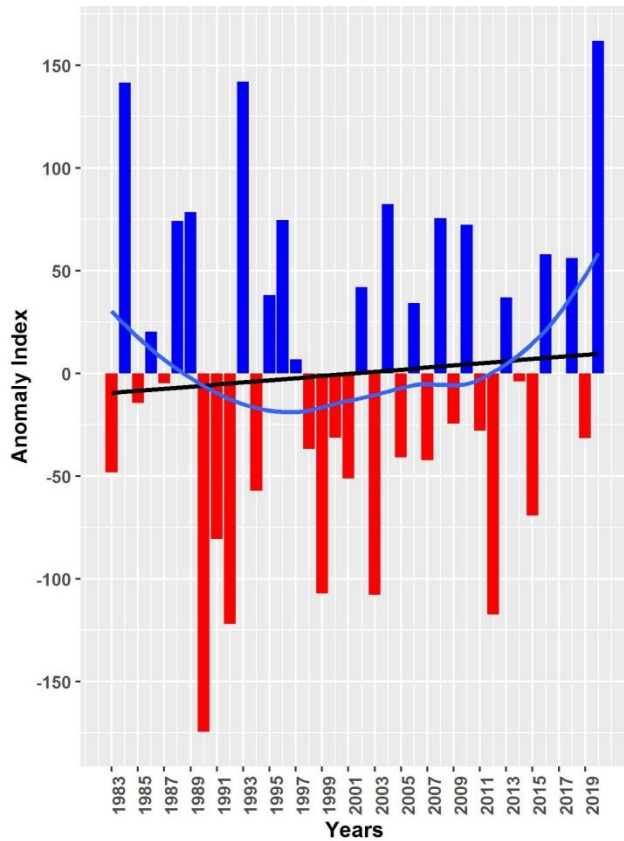
Dry_Year	Percentage
1990	58.5
1999	62.7



## BURUNDI: MUGERA-Paroisse

MUGERA-Paroisse

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1984	134.5
1993	134.7
2020	139.5

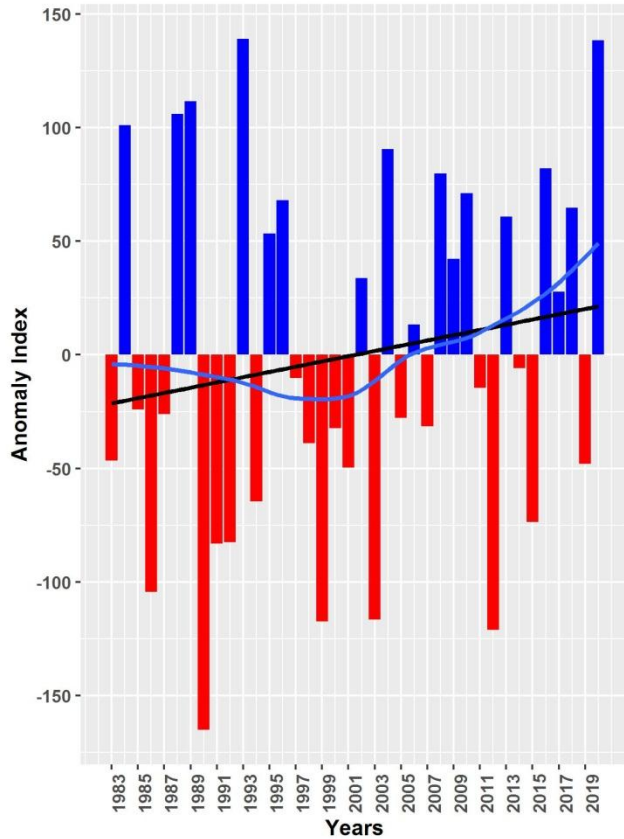
Dry_Year	Percentage
1990	57.3
1992	70.2
1999	73.8
2003	73.7
2012	71.3



## BURUNDI: MURIZA

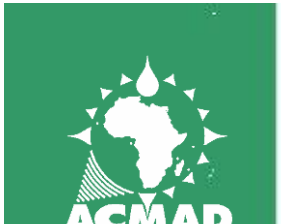
### MURIZA

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1988	125.3
1989	126.6
1993	133.2
2020	133

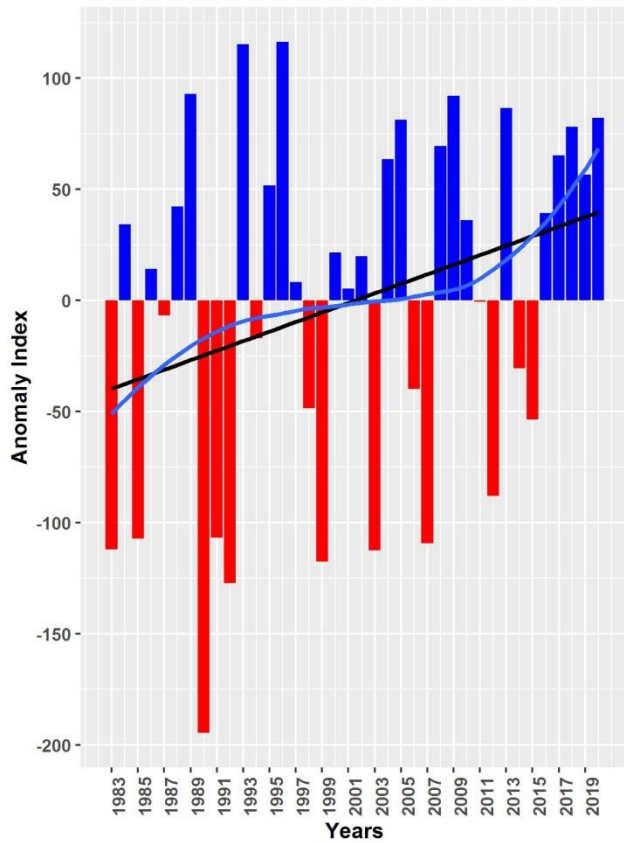
Dry_Year	Percentage
1990	60.6
1999	72
2003	72.2
2012	71.1



## BURUNDI: MUSASA

### MUSASA

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1993	125.3
1996	125.6

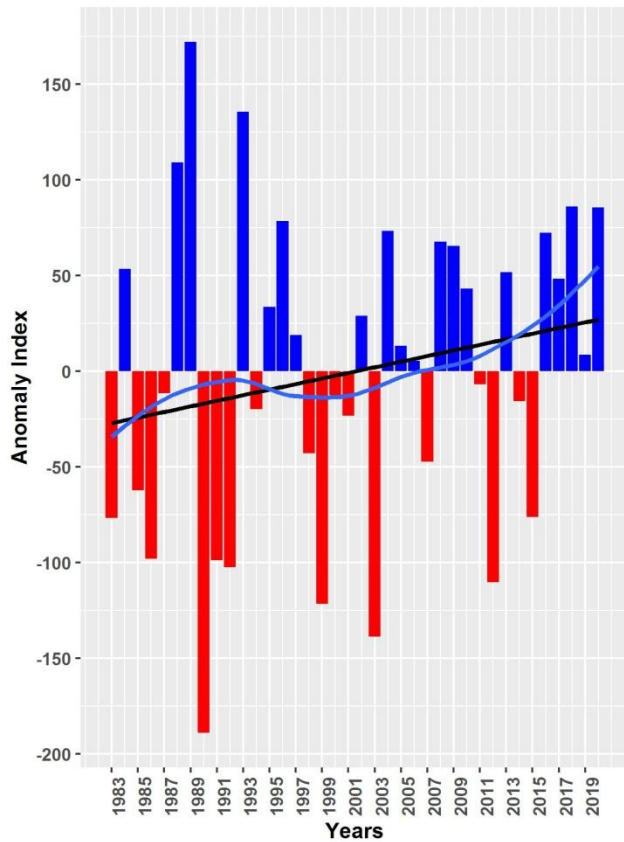
Dry_Year	Percentage
1990	57.3
1992	72.1
1999	74.2



## BURUNDI: MUSONGATI

### MUSONGATI

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1989	139.3
1993	130.9

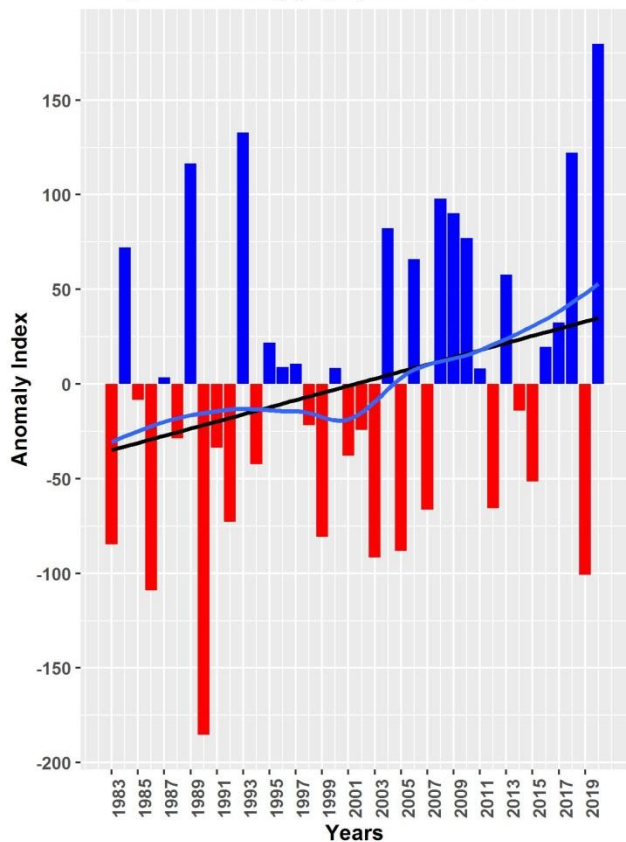
Dry_Year	Percentage
1990	56.9
1999	72.3
2003	68.4
2012	74.9



## BURUNDI: MUYAGA

### MUYAGA

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1989	129.8
1993	134
2008	125
2018	131.2
2020	145.9

Dry_Year	Percentage
1986	72.2
1990	52.6
2019	74.3

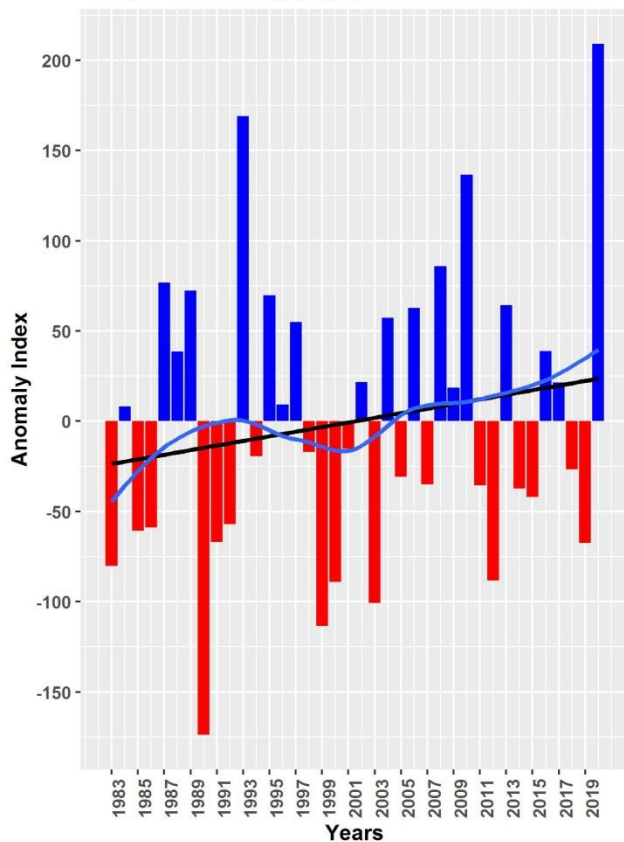




## BURUNDI: MUYINGA

### MUYINGA

Precipitation anomaly graph (1983-2020) JFM



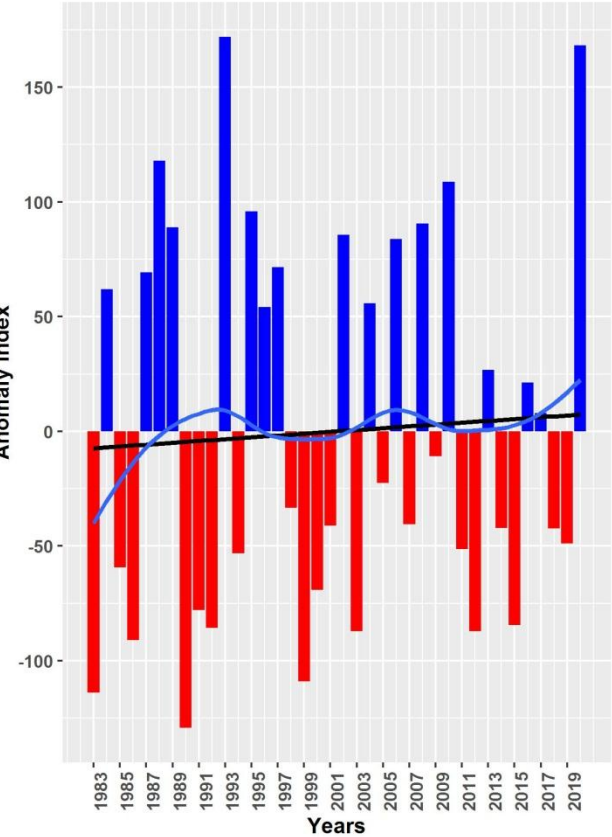
Wet_Year	Percentage
1993	145.9
2010	137.1
2020	156.8

Dry_Year	Percentage
1990	52.8
1999	69.2
2003	72.6



# BURUNDI: NGOZI

NGOZI  
Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1988	130.6
1993	144.6
2010	128.2
2020	143.7

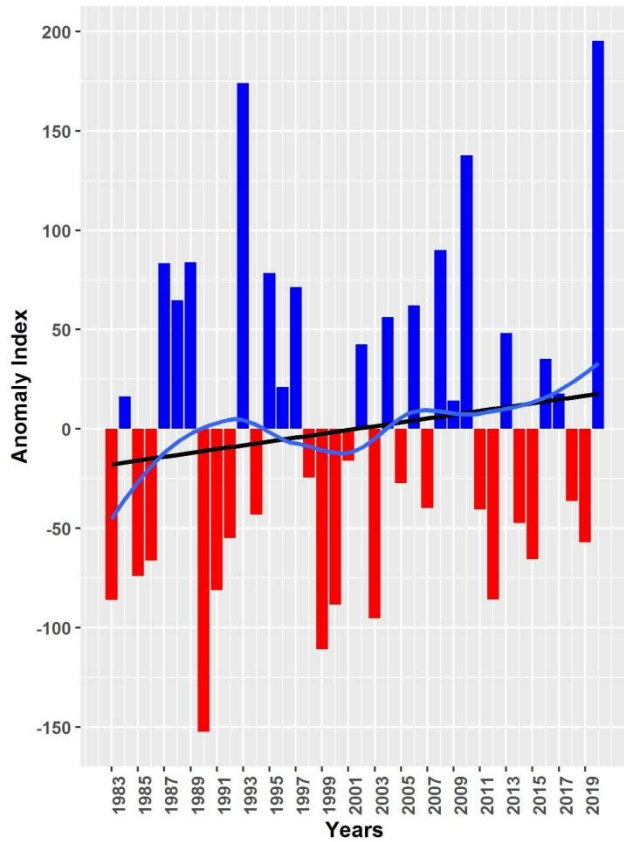
Dry_Year	Percentage
1983	70.4
1990	66.4
1999	71.7



## BURUNDI: NYAMUSWAGA

### NYAMUSWAGA

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1993	146.6
2010	136.9
2020	152.3

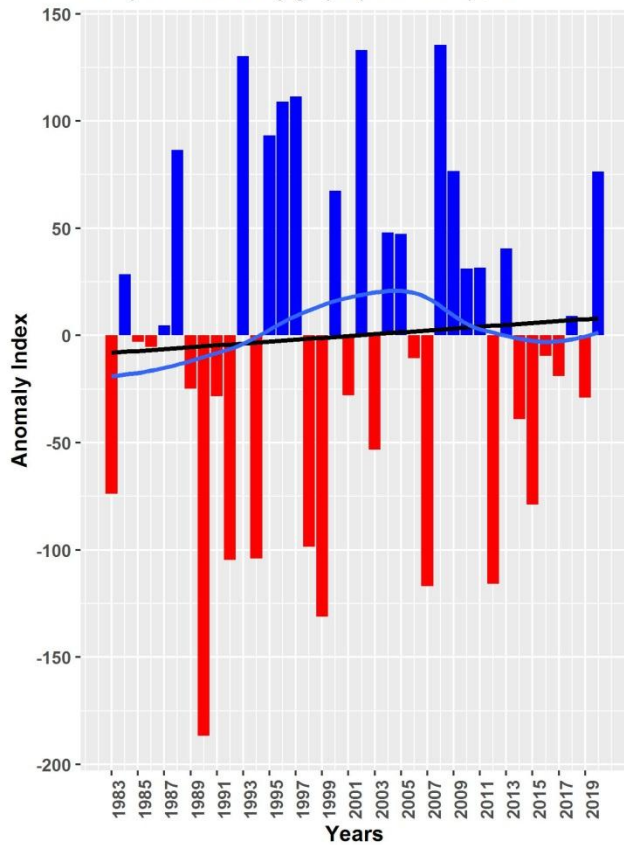
Dry_Year	Percentage
1990	59.2
1999	70.3
2003	74.5



## BURUNDI: NYANZA LAC-Projet

### NYANZA LAC-Projet

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1993	125.4
2002	125.9
2008	126.4

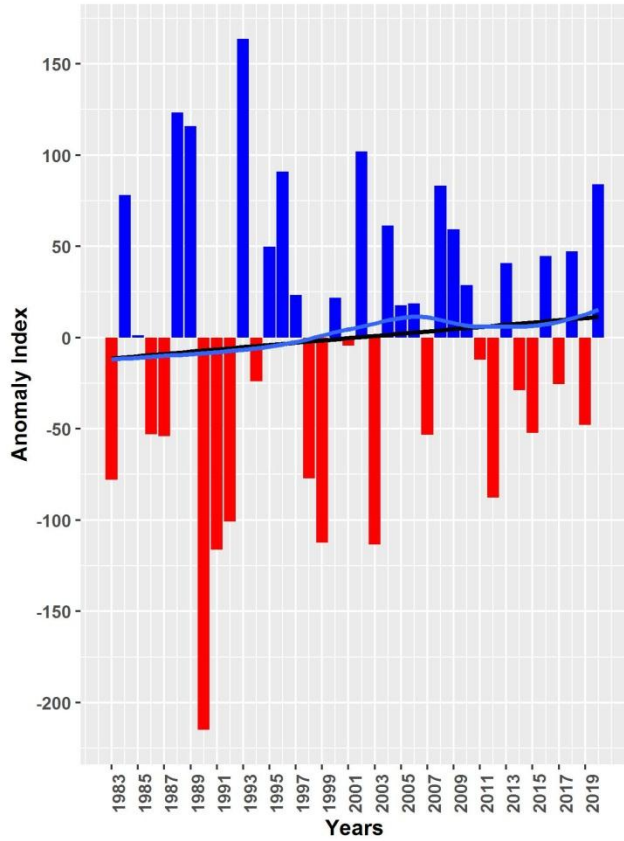
Dry_Year	Percentage
1990	63.6
1999	74.4



## BURUNDI: RUVYIRONZA

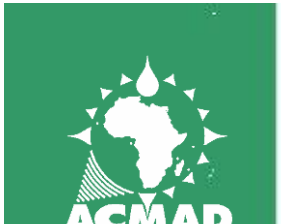
### RUVYIRONZA

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1988	126.6
1993	135.3

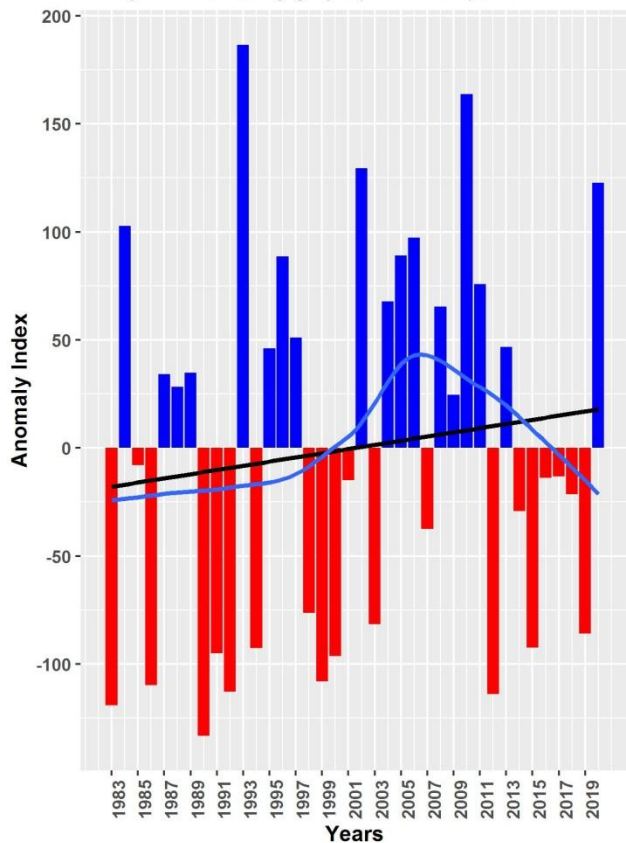
Dry_Year	Percentage
1990	53.7
1991	75



## BURUNDI: RWEGURA

### RWEGURA

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1984	126
1993	147.3
2002	132.8
2010	141.5
2020	131.1

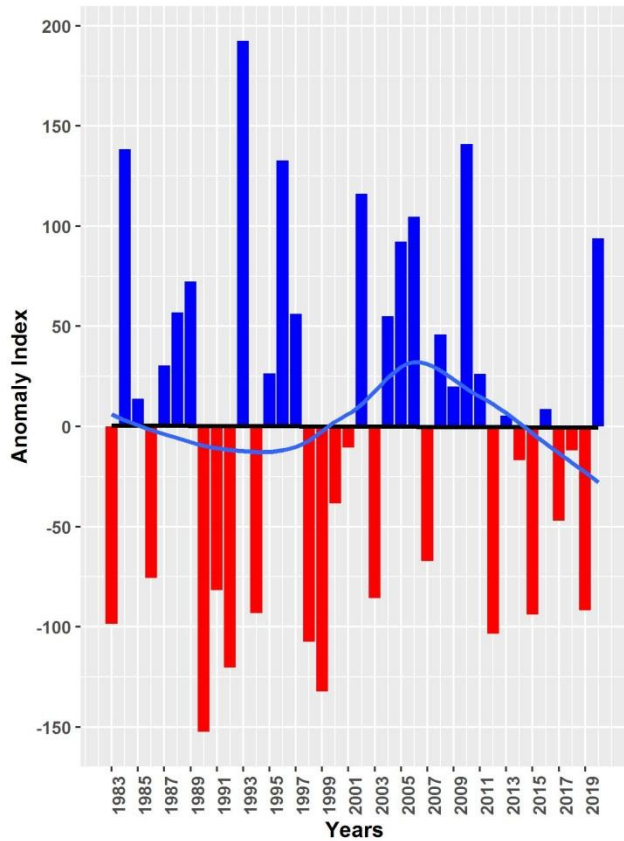
Dry_Year	Percentage
1983	69.8
1986	72.2
1990	66.2
1992	71.4
1999	72.6
2012	71.1



## BURUNDI: TEZA-Nyabigondo

TEZA-Nyabigondo

Precipitation anomaly graph (1983-2020) JFM



Wet_Year	Percentage
1984	134
1993	147.3
1996	132.6
2002	128.6
2006	125.7
2010	134.6

Dry_Year	Percentage
1990	62.5
1992	70.4
1998	73.6
1999	67.5
2012	74.5



- Les produits sur l'analyse des tendances et variabilités climatiques avec les stations et villes locales montrent les variations des précipitations interannuelles sont interdépendantes d'une année à l'autre avec des tendances normales à légèrement en hausse sur l'ensemble des stations et villes du pays





## METHODE DE VARAIBILTE ET TENDANCE SST

# Weekly Sea Surface Temperature Anomaly

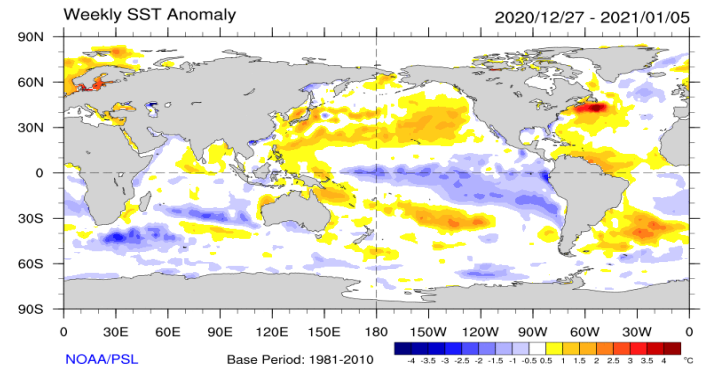
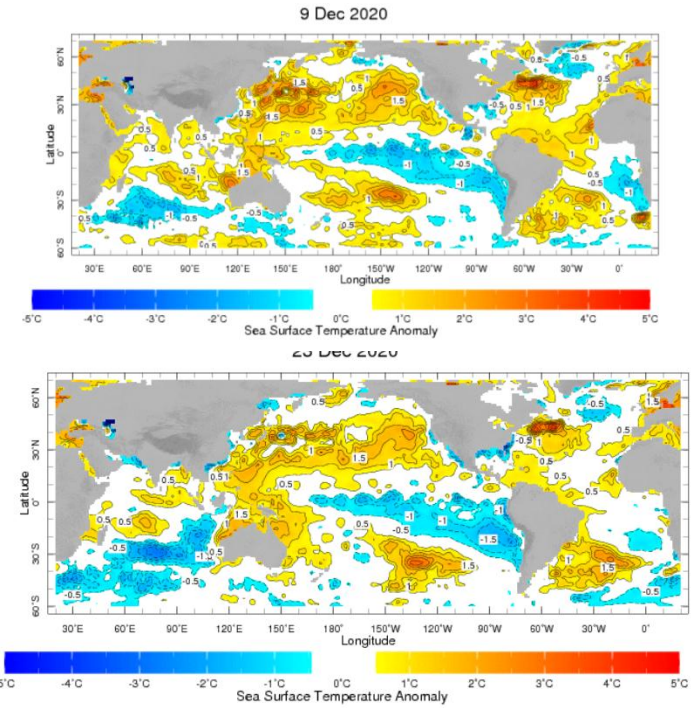
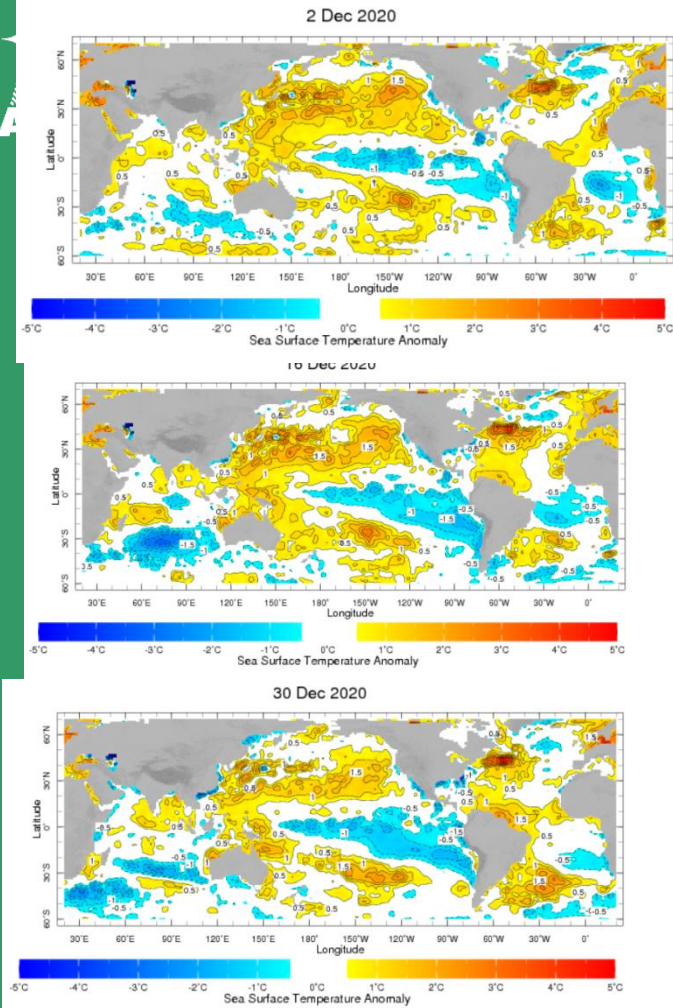


Figure 2: a, b, c  
[http://iridl.ldeo.columbia.edu/maproom/Global/Ocean\\_Temp/Weekly\\_Anomaly.html?](http://iridl.ldeo.columbia.edu/maproom/Global/Ocean_Temp/Weekly_Anomaly.html?)

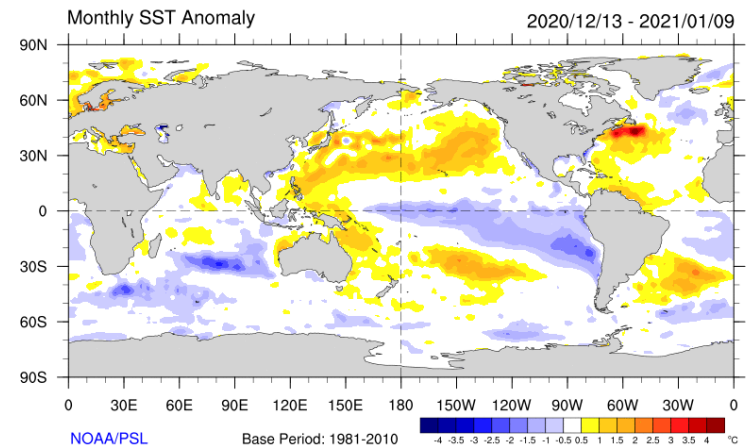
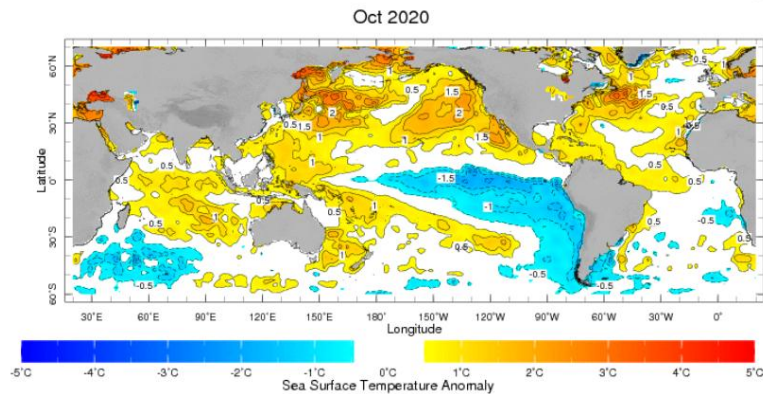
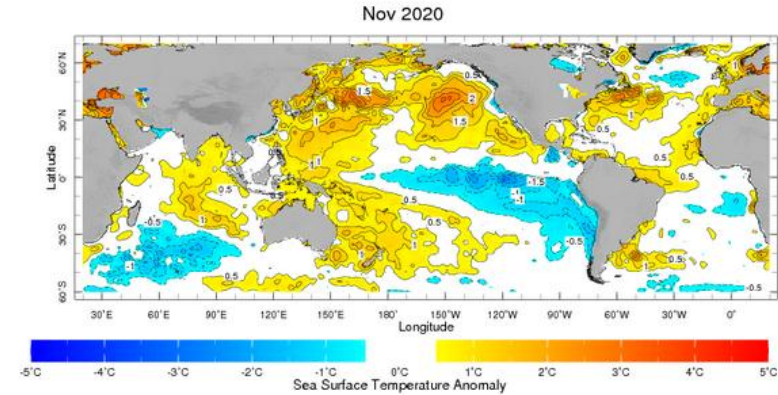
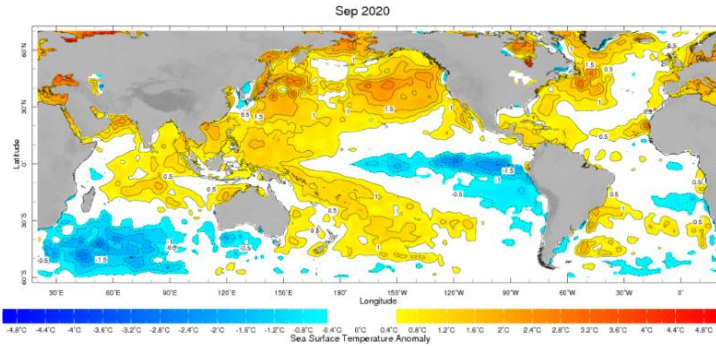
During the  
 Ocean. Ne  
 Guinea.



# L'ANALISES SUR LES ANOMALIES DE SSTs HEBDOMADAIRE

- Durant les deux dernières semaines de Septembre et les semaines du mois d'Octobre 2020, les anomalies de TSM dans le bassin de pacifique equatorial ont dans les conditions froides à modérées avec la phase de La niña faible.
- Sur le bassin de l'Atlantique Equatorial et Tropical Sud les anomalies de TSM dans l'ensemble dominées par des conditions neutre à froides.
- Dans le bassin subtropical de l'Océan les conditions chaudes avec légèrement les phases neutres à chaudes ont été observés Durant les deux dernières semaines de Septembre et l'ensemble des semaines du mois d'octobre.

# ANALISE MENSUELLE DE SST OBSERVEE



[http://www.emc.ncep.noaa.gov/research/cmb/sst\\_analysis/images/archive/monthly\\_anomaly/](http://www.emc.ncep.noaa.gov/research/cmb/sst_analysis/images/archive/monthly_anomaly/)  
[http://iridl.ldeo.columbia.edu/maproom/Global/Ocean\\_Temp/Anomaly.html](http://iridl.ldeo.columbia.edu/maproom/Global/Ocean_Temp/Anomaly.html)

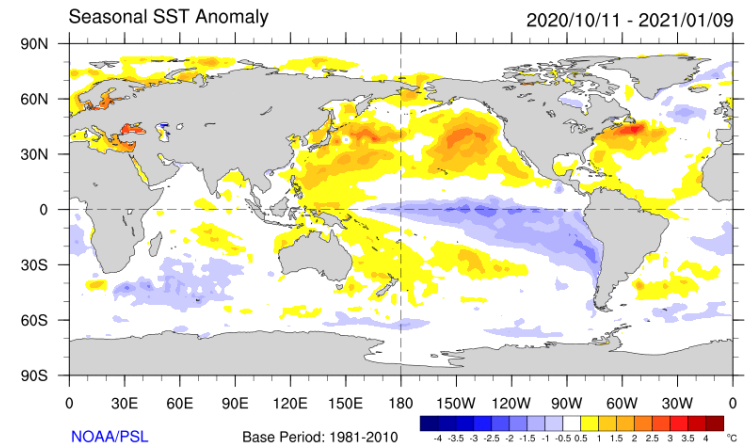
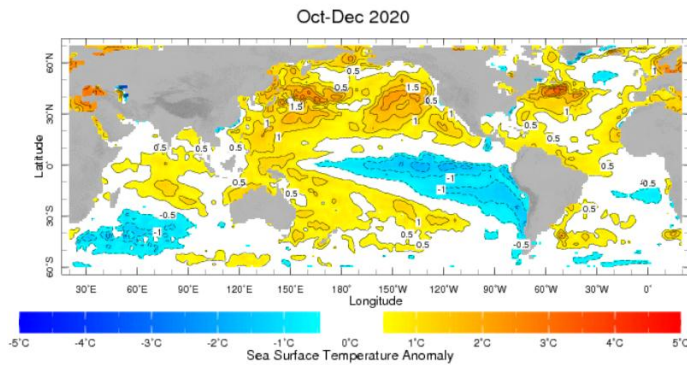
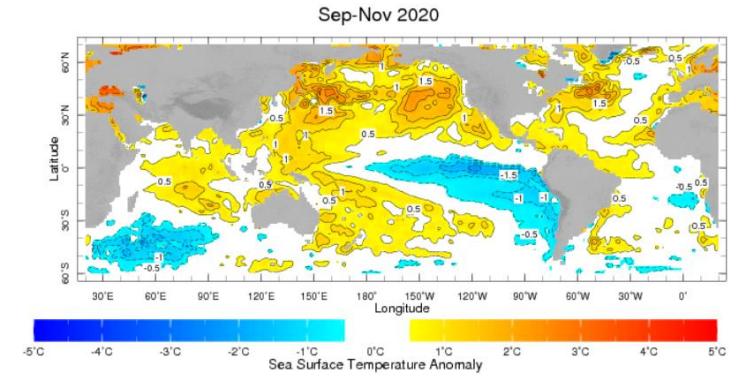
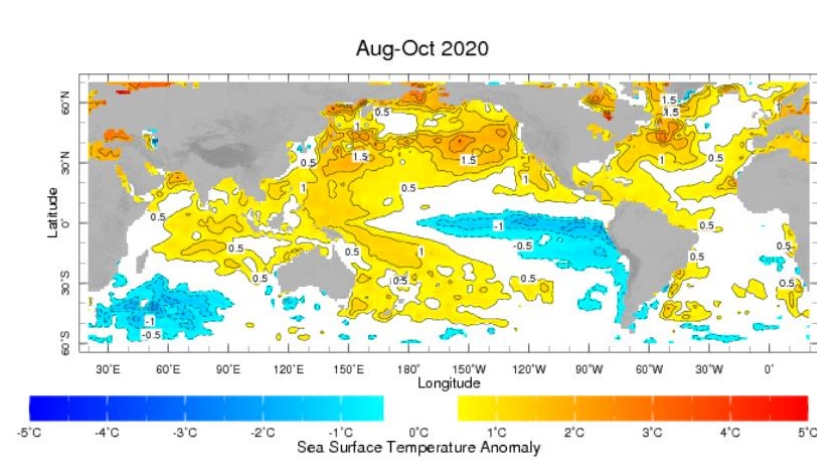
<https://www.esrl.noaa.gov/psd/map/clim/sst.shtml>



- les analyses de TSM mensuelles Durant les mois de Juillet en Août les conditions de TSM sur la région du pacifique équatoriale ont de la phase neutre à froide et de Septembre en Octobre étaient en condition froide modérée.
- Sur le bassin de l'Atlantique Equatorial de Juillet en Octobre une persistance des conditions neutre à chaude ont été observé.
- Des conditions neutre à chaudes de TSM ont occupé la majeure partie du bassin Tropicale Sud de l'Atlantique.
- Dans la région subtropicale de l'Océan Indien les TSM ont été dominées par des conditions chaudes et neutre sur la partie costale du Continent.



# ANALISES DES ANOMALIES DES SSTs SAISONNIERE



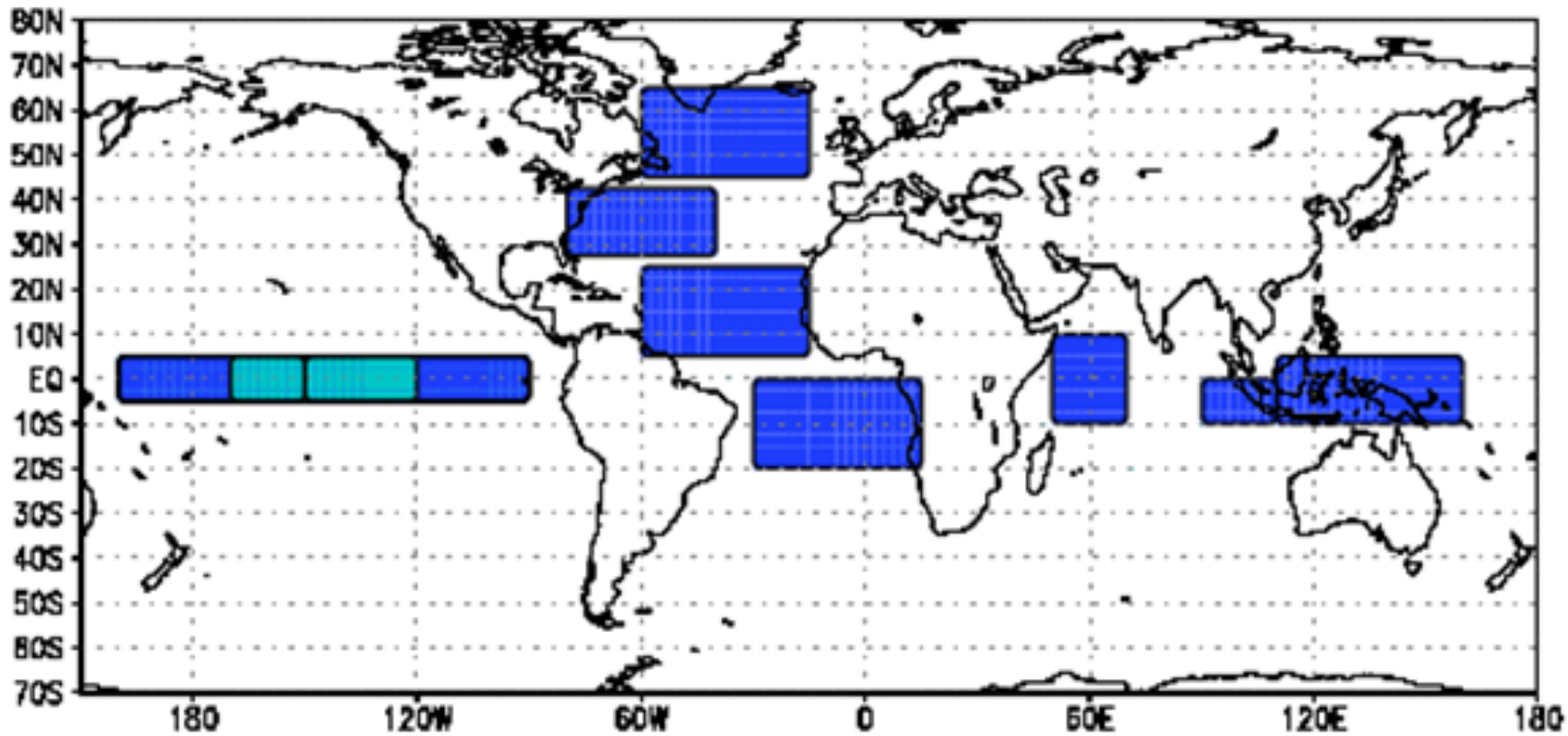
<https://www.esrl.noaa.gov/psd/map/clim/sst.shtml>

[http://ma.mcc.columbia.edu/maproom/Global/Ocean\\_Temp/Seasonal.html](http://ma.mcc.columbia.edu/maproom/Global/Ocean_Temp/Seasonal.html)

[http://www.emc.ncep.noaa.gov/research/cmb/sst\\_analysis/images/archive/monthly\\_anomaly/](http://www.emc.ncep.noaa.gov/research/cmb/sst_analysis/images/archive/monthly_anomaly/)

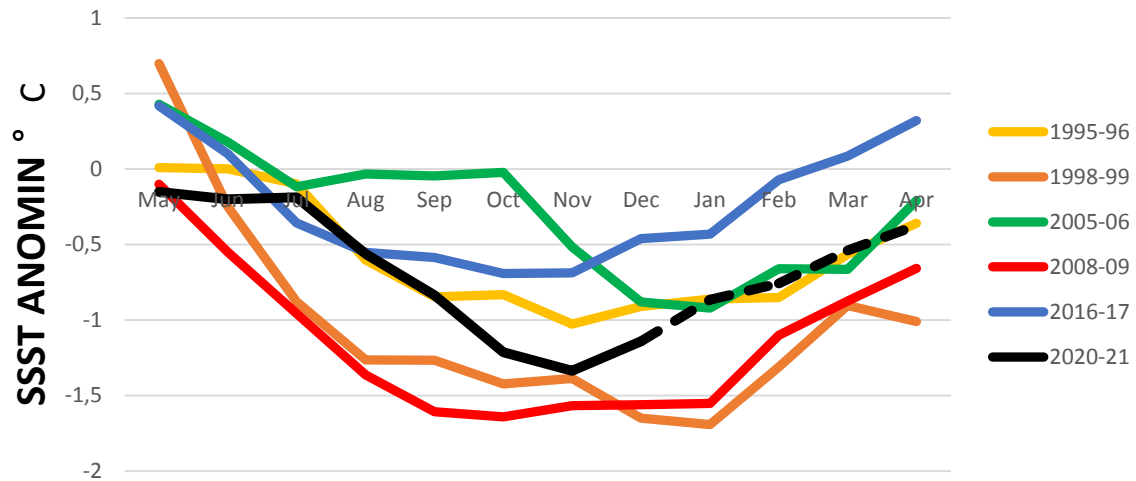


- A l'échelle saisonnière les TSM durant les saisons de Mai-Juin-Juillet et Juin-Juillet-Août dans les conditions neutres à froides et les saisons de Juillet en Octobre ces conditions ont évoluées froides faible à modérées.
- Sur le bassin de l'Atlantique Equatorial de Juillet en Octobre une persistance des conditions neutre ont été observé.
- Des conditions neutre à chaudes de TSM ont occupé la majeure partie du bassin Tropical Sud de l'Atlantique.
- Dans la région subtropicale de l'Océan Indien les TSM ont été dominées par des conditions chaudes et neutre sur la partie costale du Continent.

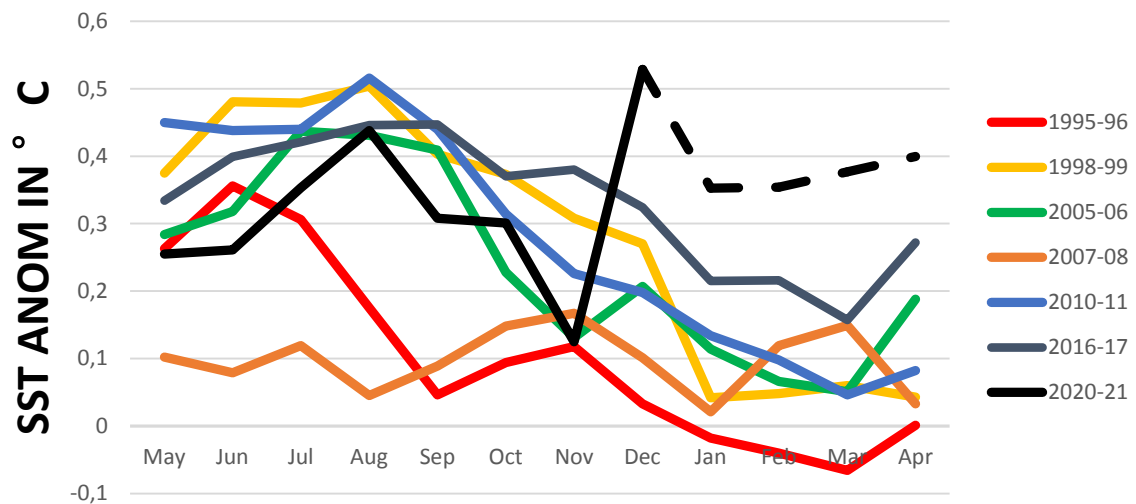




# NINO 3.4 SST ANOM BOX

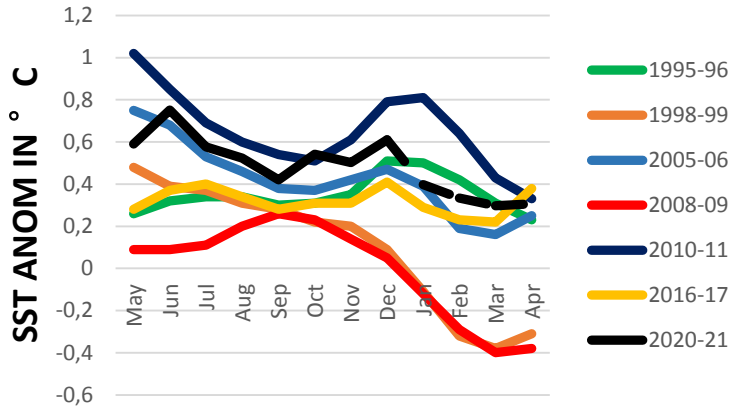


# AMO SST ANOM BOX

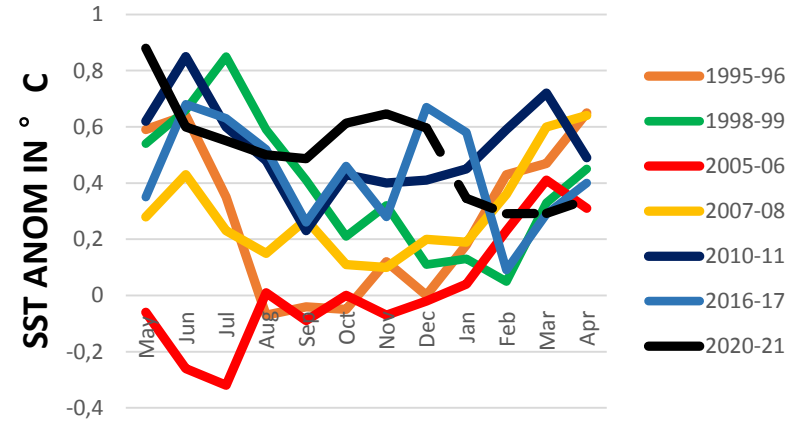




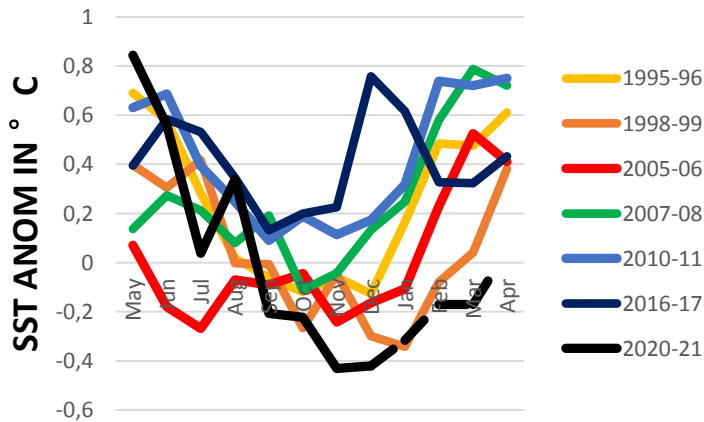
## TNA SST ANOM BOX



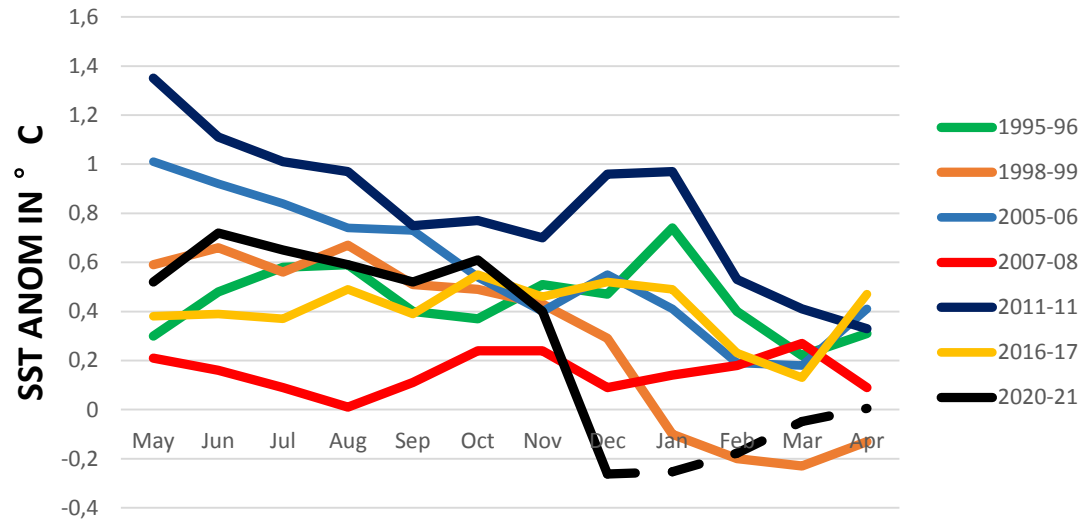
## NAT SST ANOM BOX



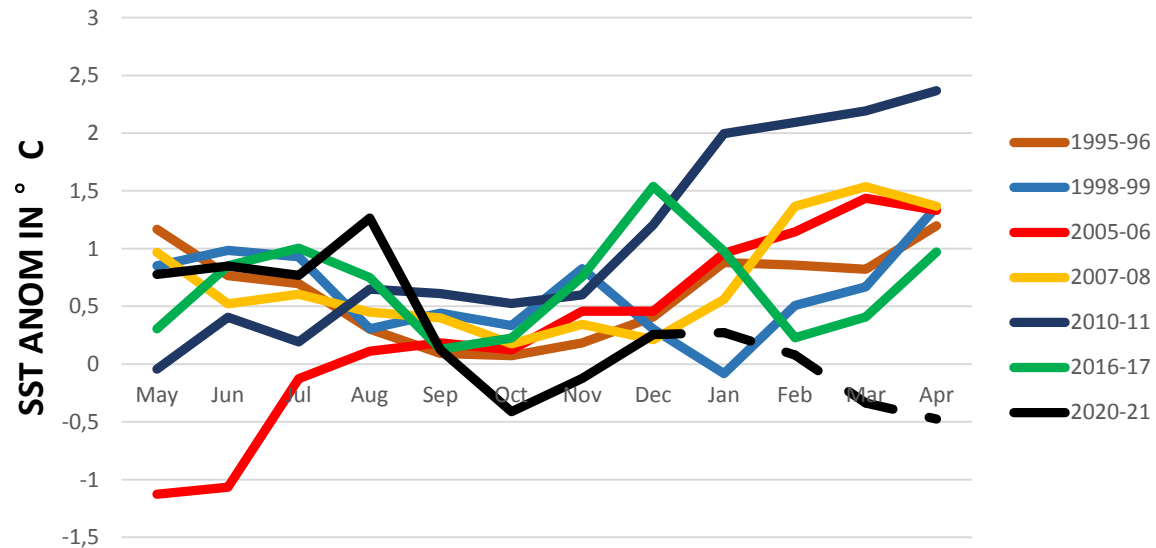
## SAT SST ANOM BOW



### TSA SST ANOM BOX

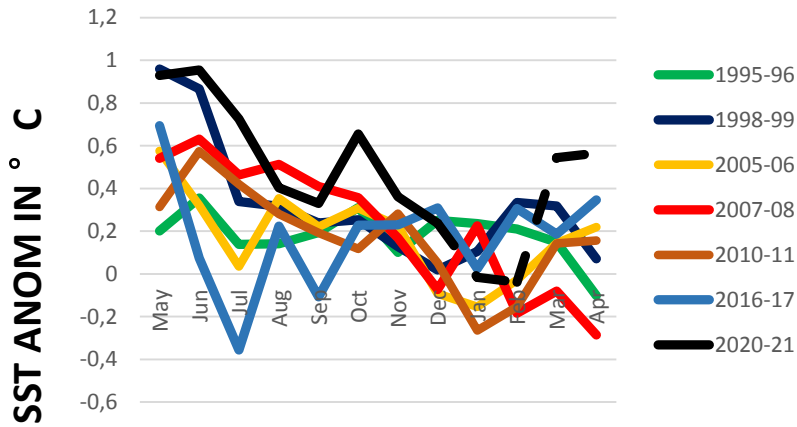


### BENGUELA SST ANOM BOX

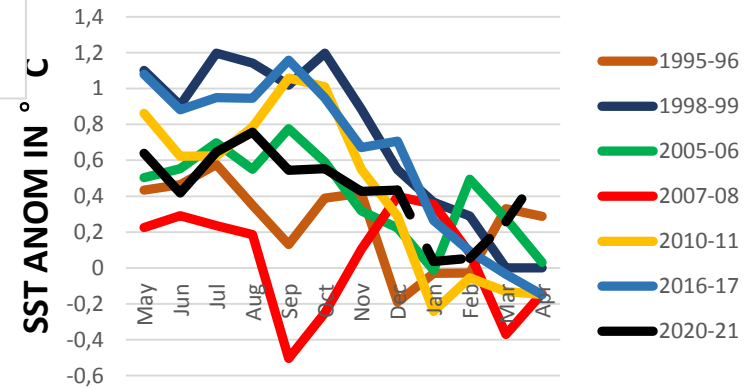




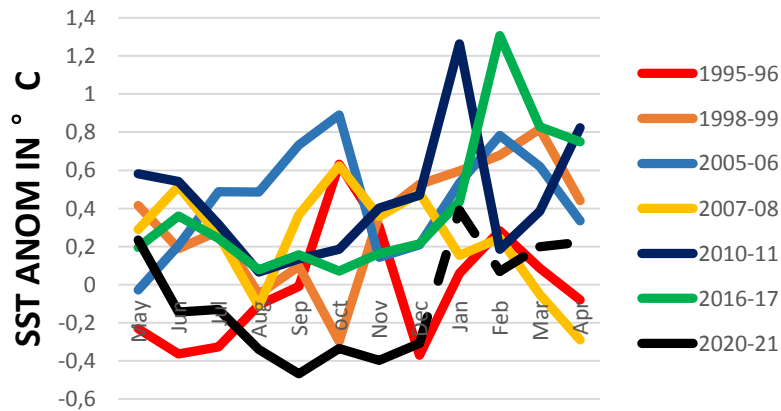
### WTIO SST ANOM BOX



### SETIO SST ANOM BOX



### SWIO SST ANOM BOX





- Les analyses de TSM des sous bassins océaniques en comparaison avec les années analogues montrent que dans la région du Pacifique équatorial l'évolution de l'année en cours est similaire par rapport à toutes les années analogues avec les conditions de la phase de La Niña faible à modérée.
- Sur le bassin de l'Atlantique tropical nord et équatorial les TSMs évoluent avec les années 1988, 1995, 1998 et 2007 dans des conditions neutres à chaudes.
- Des conditions neutres à chaudes de TSM sont presque les mêmes avec 1988, 1995, 1998, 2007 au cours de la période de Novembre à Janvier dans le bassin Tropical Sud de l'Atlantique et le bassin de Benguela.
- Dans la région subtropicale de l'Océan Indien les TSM ont été dominées par des conditions chaudes et neutres avec l'ensemble des années analogues.

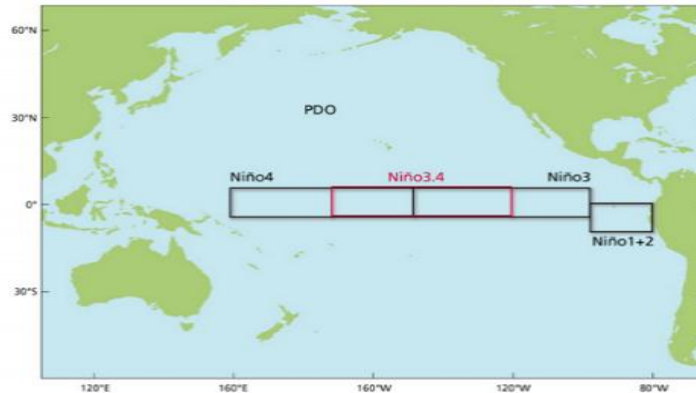


# TELECONNECTIONS INDICES

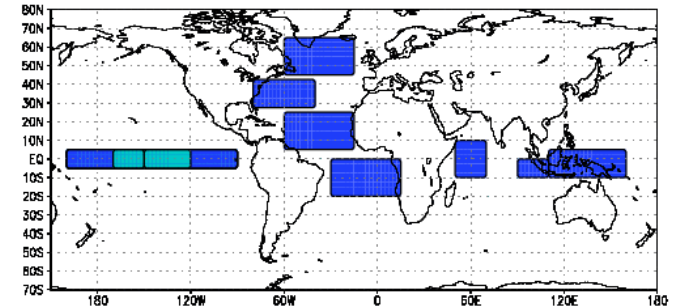
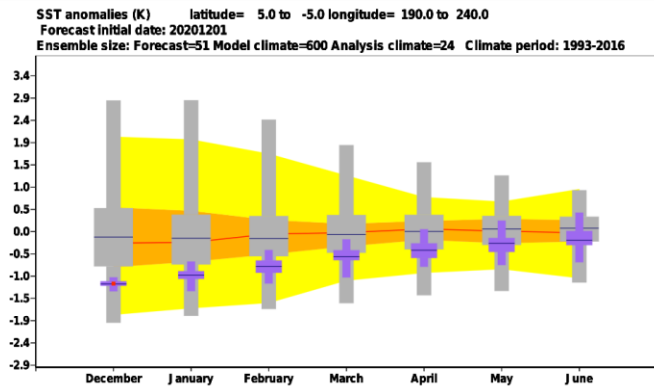
## PACIFIC BASIN: NINO3.4

## OOPC Observed SST timeseries

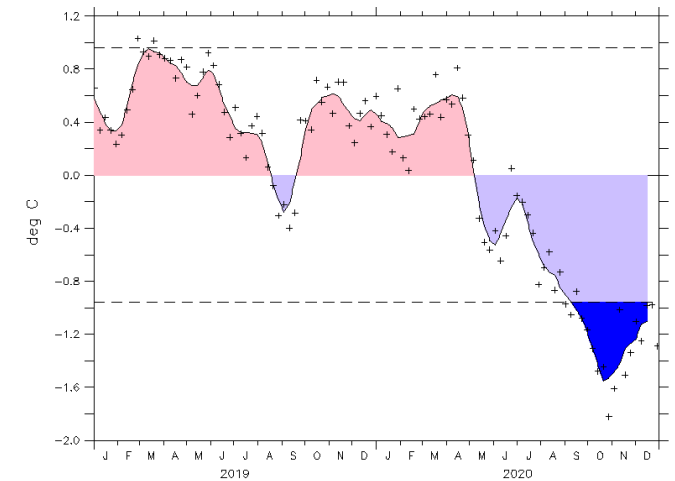
(a)



(c)



(b)



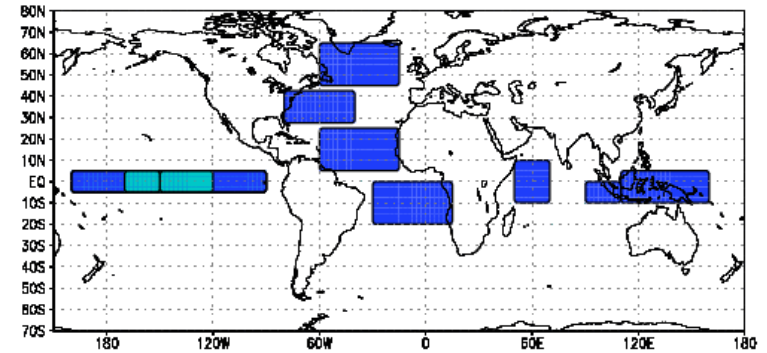
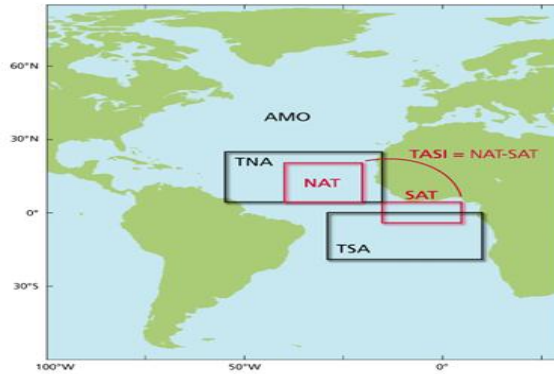
Below average SST prevailed in the Equatorial Pacific from September to December 2020. These conditions is expected to persist during coming three months.

**Figure** (a) Pacific Ocean basin showing NINO3.4 region (b) Observed SST time series from the Ocean Observations Panel for Climate (c) SSTA model forecast

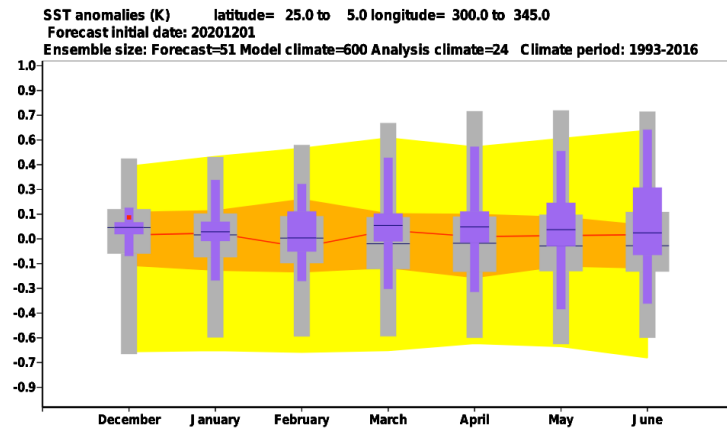
# ATLANTIC BASIN INDEX

## TROPICAL NORTH ATLANTIC: TNA

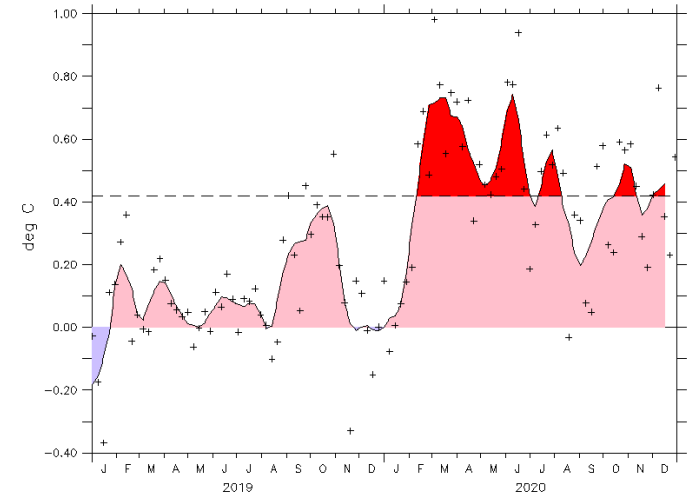
(a)



(c)



(b)

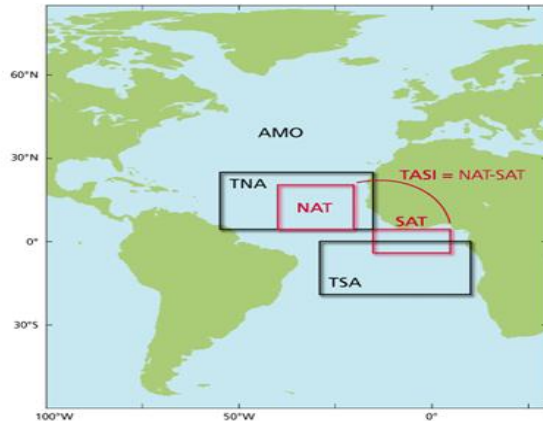


**Figure :** (a) Atlantic Ocean basin showing TNA region (b) Observed TNA SST time series from the Ocean Observations Panel for Climate (c) TNA SSTA model forecast

In Tropical North Atlantic near to above average SSTs prevailed During December 2020. This condition is expected to persist during the coming months.

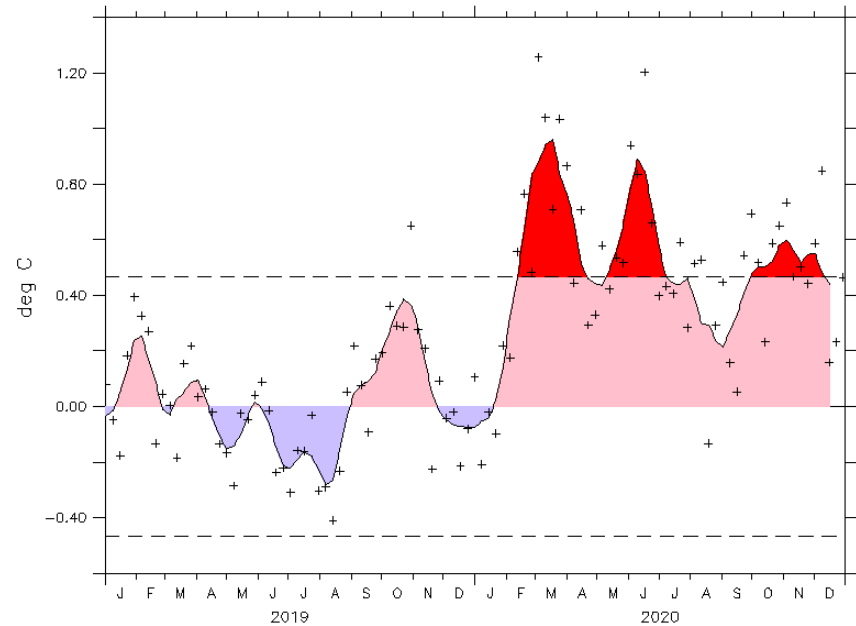
# ATLANTIC BASIN INDEX

(a)



## NORTH ATLANTIC TROPICAL: NAT

(b)



**Figure:** (a) Atlantic Ocean basin showing NAT region (b) Observed NAT SST time series from the Ocean Observations Panel for Climate

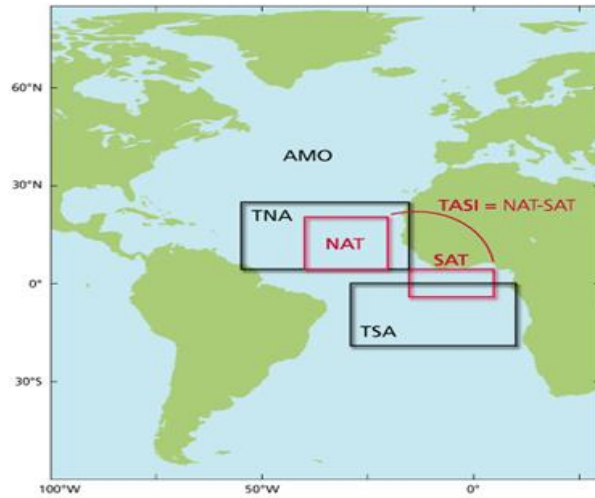
In North Atlantic Tropical, above average SSTs prevailed from September to December



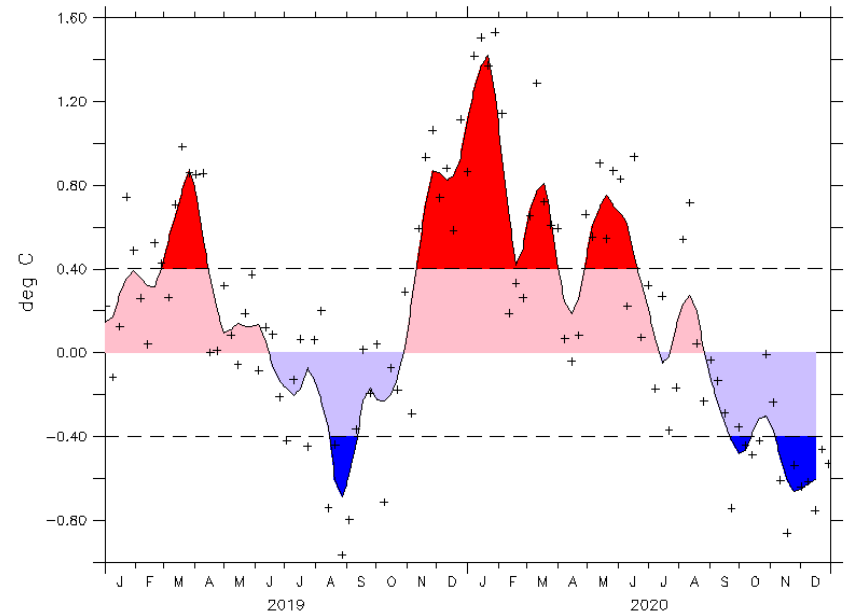
# ATLANTIC BASIN INDEX

(a)

## SOUTH ATLANTIC TROPICAL : SAT



(b)



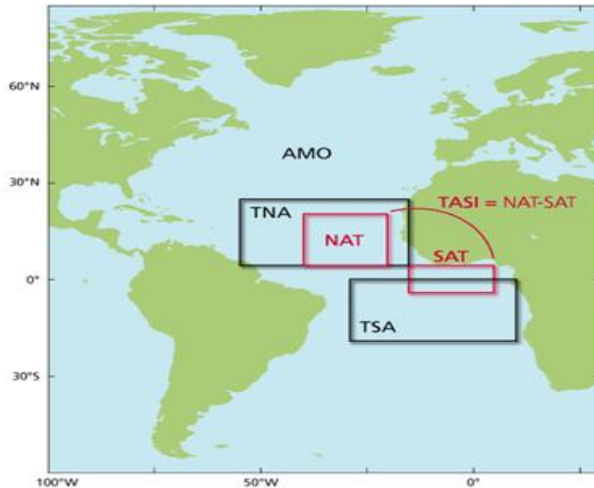
**Figure:** (a) Atlantic Ocean basin showing SAT region (b) Observed SAT SST time series from the Ocean Observations Panel for Climate

Over South Tropical Atlantic was below average from November to December 2020. Persistence of these conditions are very likely during coming months of 2020.

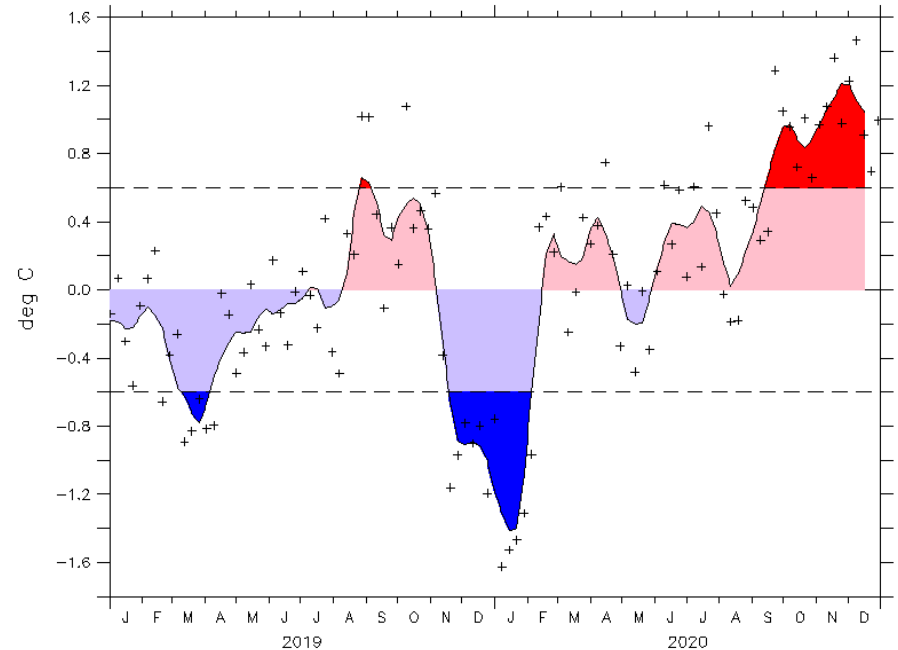
# ATLANTIC BASIN INDEX

## Tropical Atlantic SST index: TASI

(a)



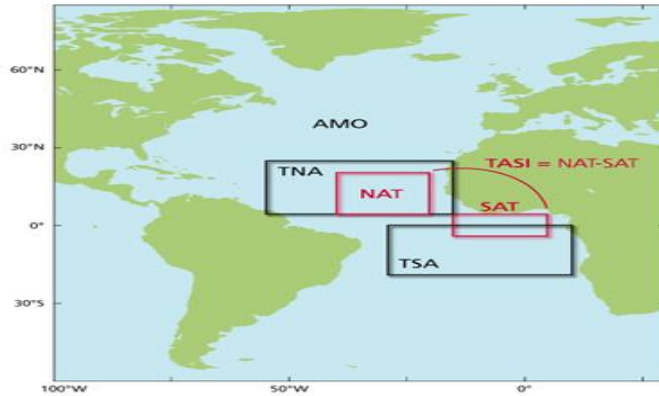
(b)



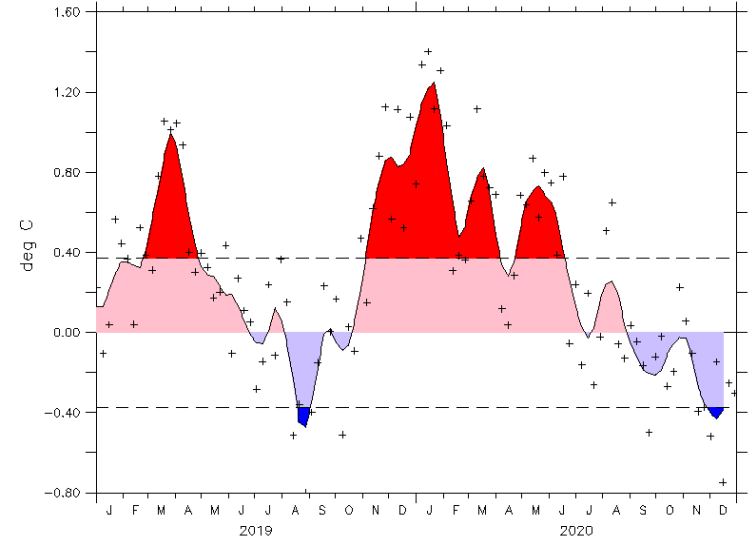
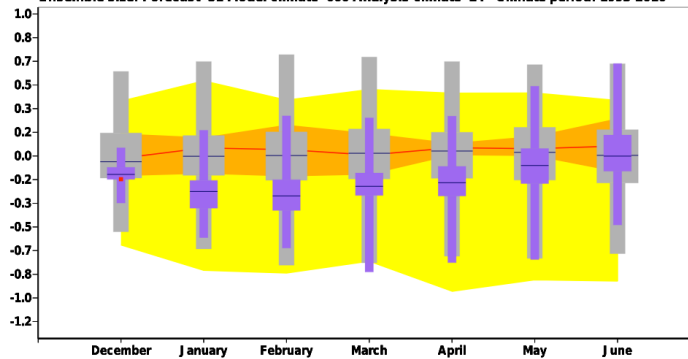
**Figure:** (a) Atlantic Ocean basin showing TASI region (b) Observed TASI SST time series from the Ocean Observations Panel for Climate.

Above average SSTs prevailed in Tropical Atlantic South Index during August to December 2020.

# (a) Tropical South Atlantic: TSA



SST anomalies (K) latitude= 0.0 to -20.0 longitude= 330.0 to 15.0  
 Forecast initial date: 20201201  
 Ensemble size: Forecast=51 Model climate=600 Analysis climate=24 Climate period: 1993-2016



(b)

(c)

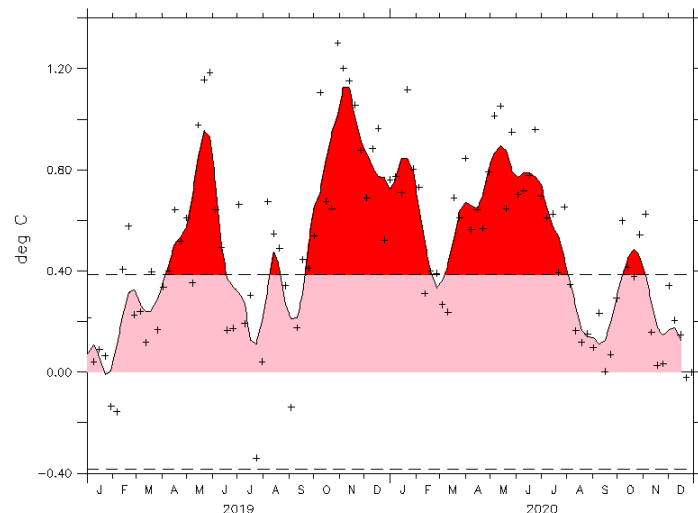
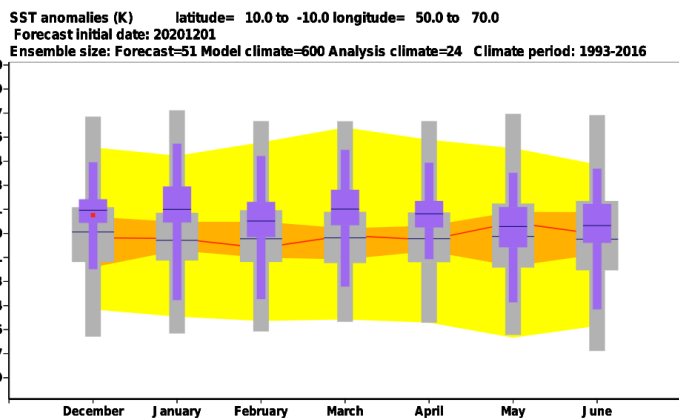
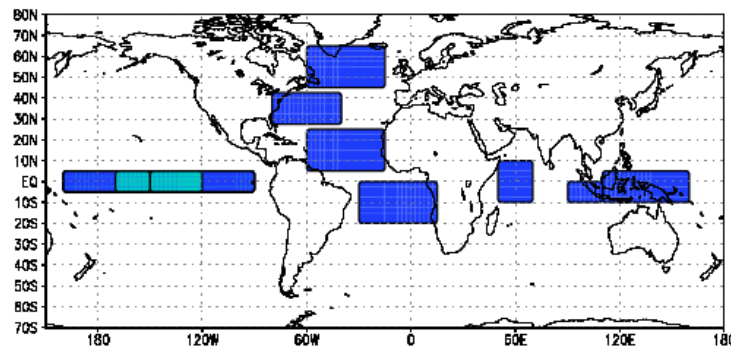
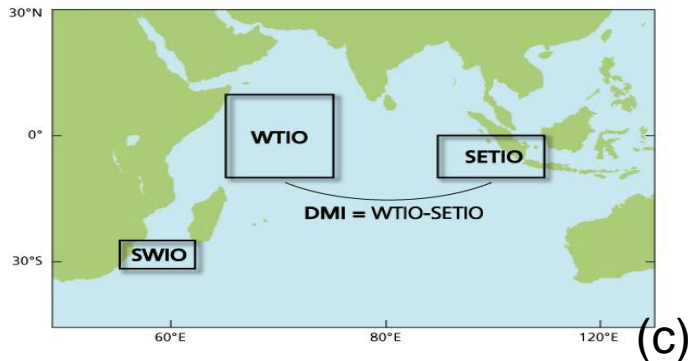
**Figure S21:** (a) Atlantic Ocean basin showing TSA region (b) Observed TSA SST time series from the Ocean Observations Panel for Climate (c) TSA SSTA model forecast.

Near to near to below average SSTs prevailed in Tropical South Atlantic during August to December 2020. The persistence of these conditions are very likely during the three month

# INDIAN BASIN INDEX



## (a) Western Tropical Indian Ocean (WTIO) SST index

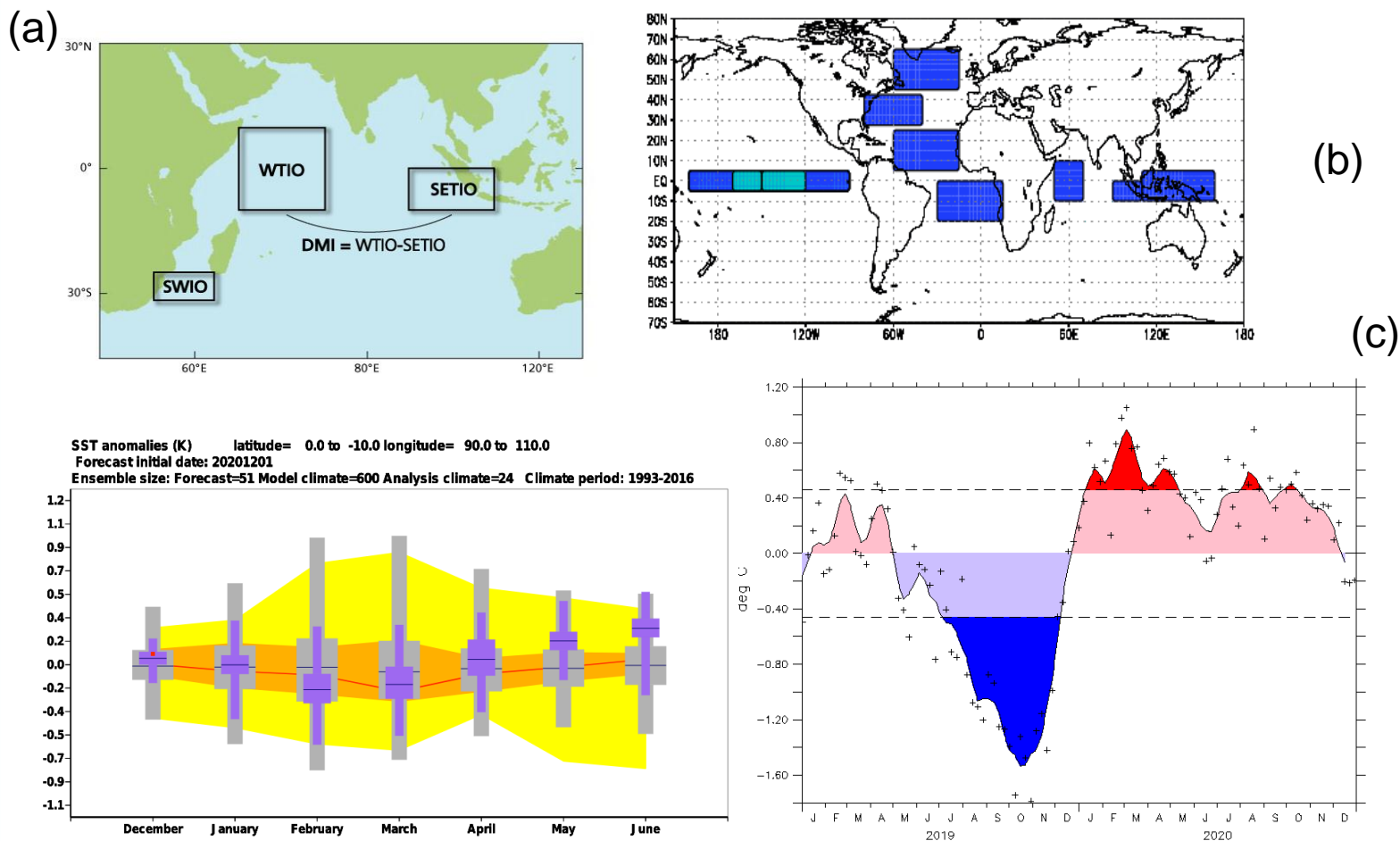


**Figure:** (a) Indian Ocean basin showing WTIO region (b) Observed WTIO SSTA time series from the Ocean Observations Panel for Climate (c) WTIO SSTA model forecast.

Above average SSTs prevailed in Western Tropical Indian Ocean during past few months. Near to above average is expected during coming two months.

# INDIAN BASIN INDEX

## Southeastern Tropical Indian Ocean (SETIO) SST index



**Figure:** (a) Indian Ocean basin showing SETIO region (b) Observed SETIO SSTA time series (c) SETIO SSTA model forecast.

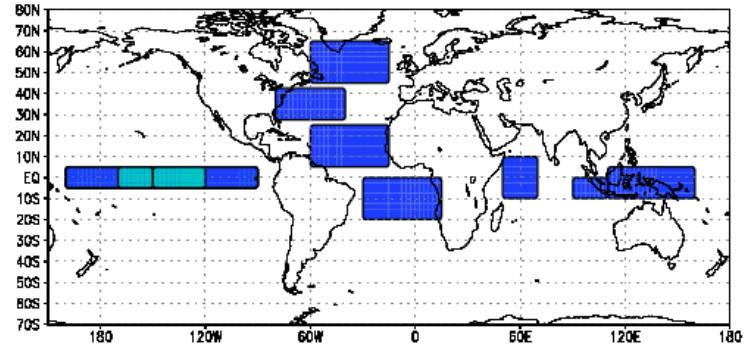
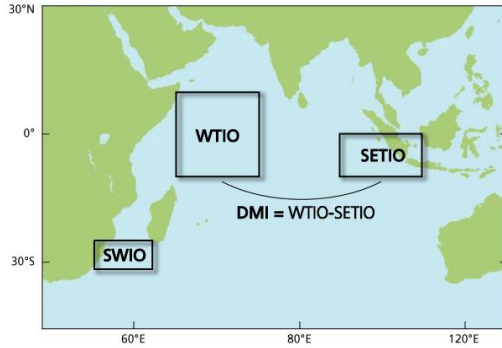
Near to above average SSTs prevailed in Eastern Tropical Indian Ocean during December 2020. This condition are expected to persist in the coming months.



# INDIAN BASIN INDEX

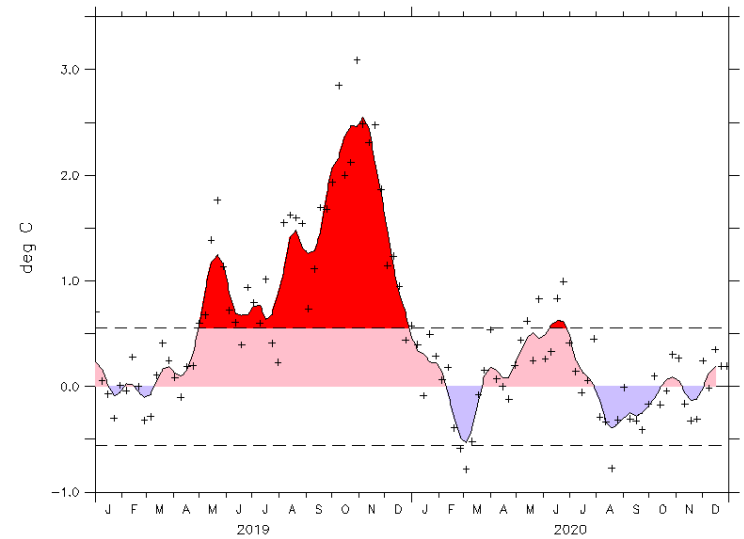
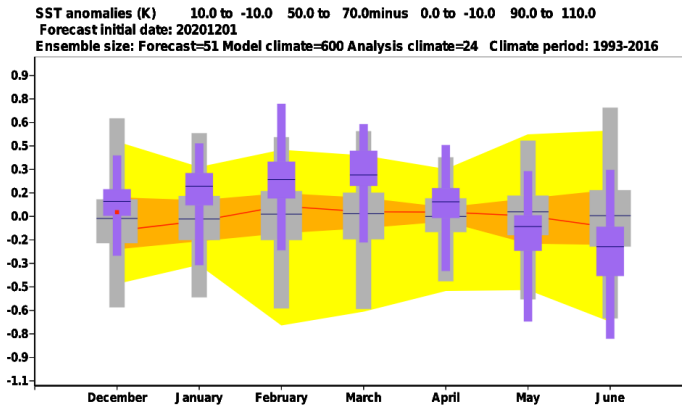
## Dipole Mode Index (DMI)

(a)



(b)

(c)

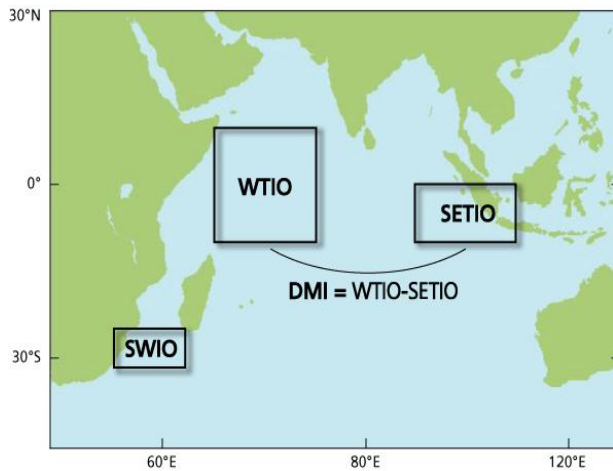


**Figure:** (a) Indian Ocean basin illustrating DMI location (b) Observed DMI time series (c) DMI related SSTA model forecast.

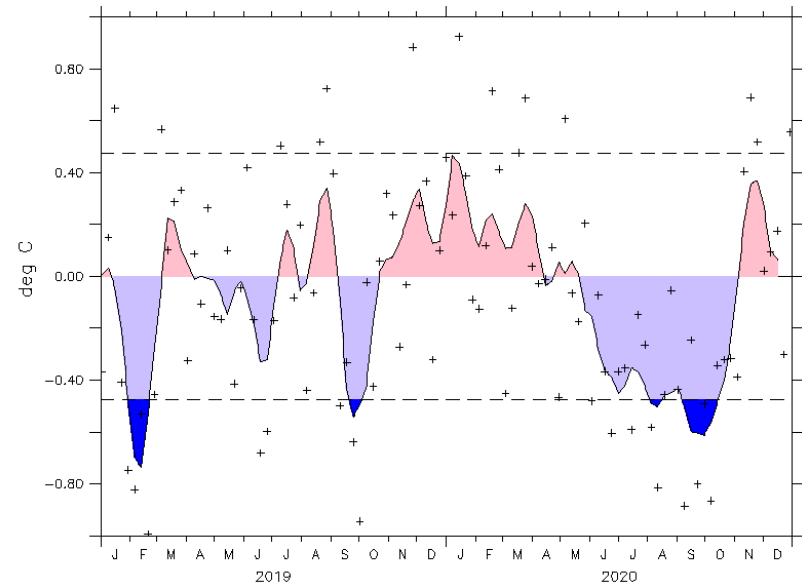
# INDIAN BASIN INDEX

## South Western Indian Ocean (SWIO) SST index

(a)



(b)



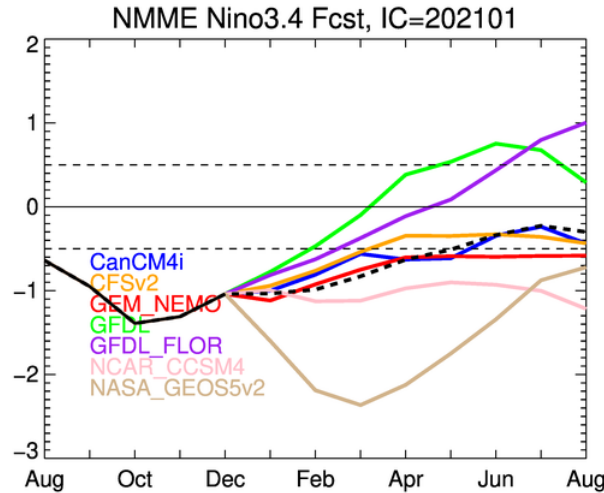
**Figure :** (a) Indian Ocean basin showing SWIO region (b) Observed SWIO time series.

[http://ioc-goos-oopc.org/state\\_of\\_the\\_ocean/sur/ind/swio.php](http://ioc-goos-oopc.org/state_of_the_ocean/sur/ind/swio.php)

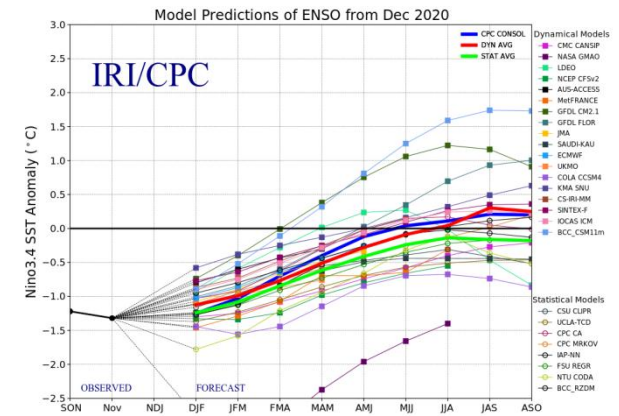


# GRAPHIQUES DES PREVISIONS DE LA REGION ENSO (NINO3.4)

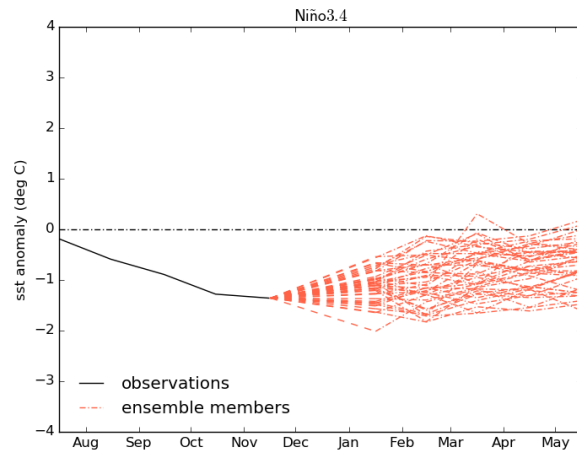
(a)



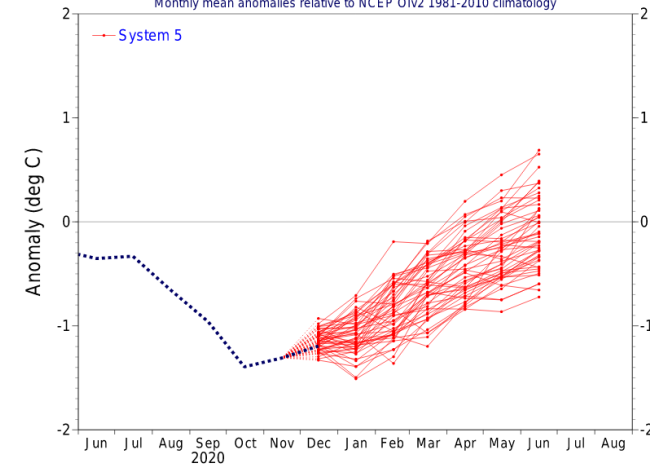
(b)



(c)



NINO3.4 SST anomaly plume  
ECMWF forecast from 1 Dec 2020  
Monthly mean anomalies relative to NCEP OIv2 1981-2010 climatology



Les 4 figures issue des différents modèles les prévisions de TSM de la région Pacifique Equatoriale dans la phase négative jusqu'en Avril de l'année prochaine





**OTHERS FEATURES (MSLP, WINDS ANOMALIES...) CHARACTERISING REGIONAL WET AND DRY YEARS (Add Skill and consistence Maps from WML LC and Copernicus)**

**MSLP, WINDS 10M, 850, 700 AND 200 HPA, STREAM FONCTION, VP 850 AND 200, TPW, Z500 ANOMALIES, ITD, MJO AND OTHER TROPICAL WAVES ... (See Meteo France, North Cololana state university)**

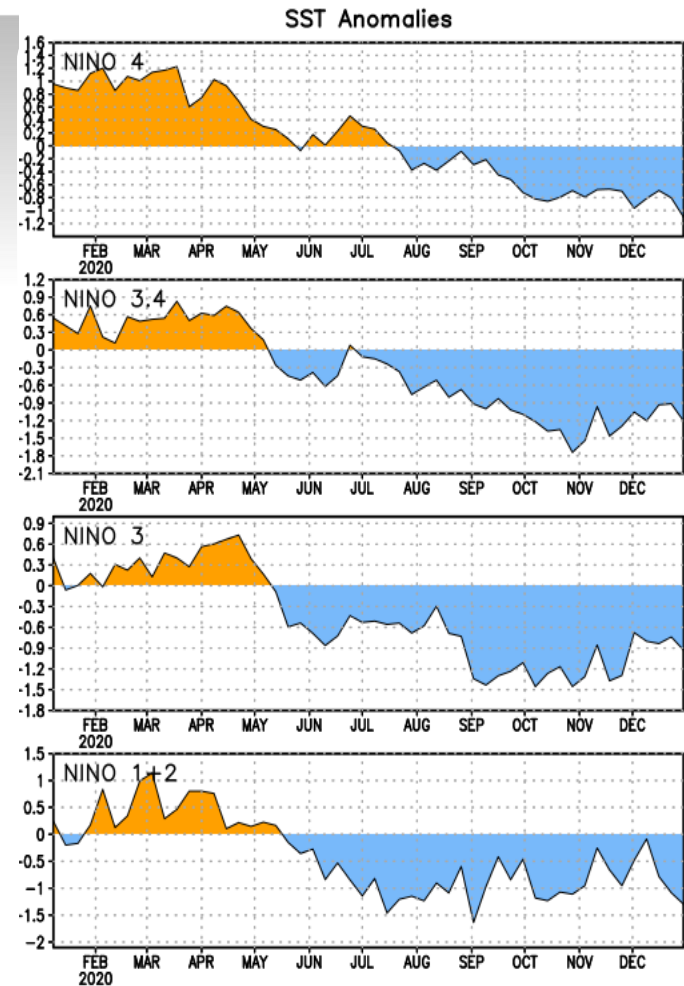
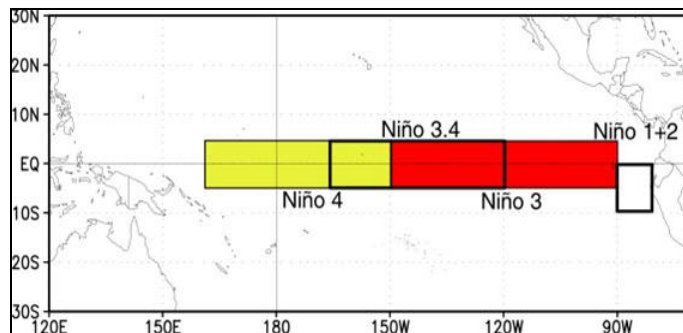
**Drivers and features for the Atlantic tropical Cyclone seasonal variability and predicability( see CSU, and NOAA/NHC web site and products )**

**Drivers and features over Southern Europe and northern Africa (see Meteo France, Copernicus and MedCof web site,**

# Niño Region SST Departures (°C) Recent Evolution

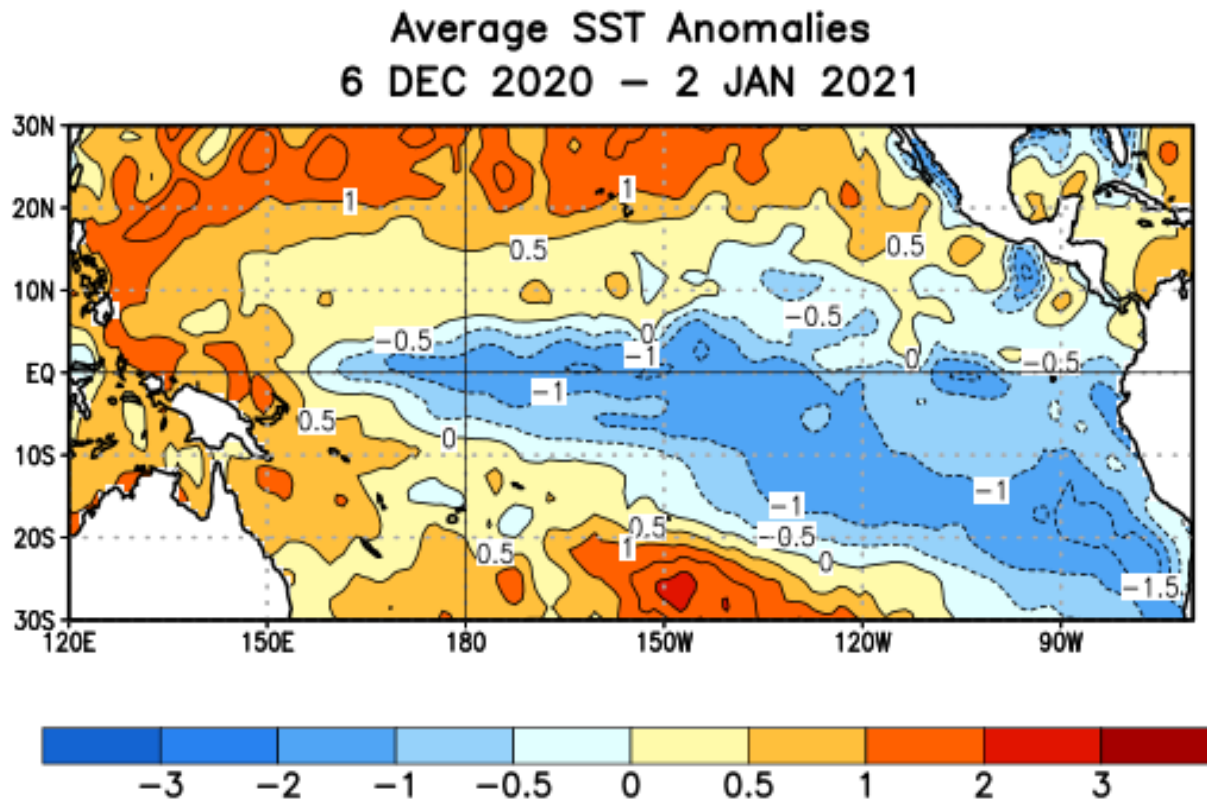
The latest weekly SST departures are:

Niño 4	-1.1°C
Niño 3.4	-1.2°C
Niño 3	-0.9°C
Niño 1+2	-1.3°C



# SST Departures ( $^{\circ}\text{C}$ ) in the Tropical Pacific During the Last Four Weeks

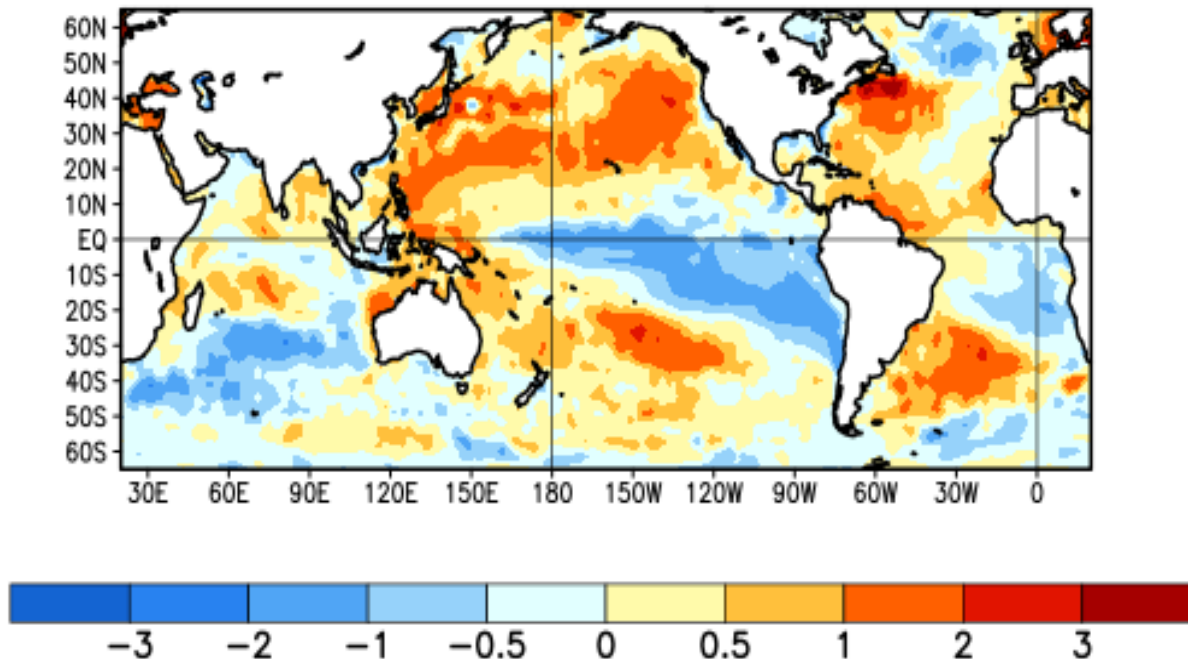
During the last four weeks, equatorial SSTs were below average from west of the Date Line to the eastern Pacific Ocean, and were above average in the far western Pacific Ocean.



# Global SST Departures ( $^{\circ}\text{C}$ ) During the Last Four Weeks

During the last four weeks, equatorial SSTs were above average across the far western Pacific Ocean and the western Atlantic Ocean. SSTs were below average from the west-central to the eastern Pacific Ocean and in the eastern Atlantic Ocean.

Average SST Anomalies  
6 DEC 2020 – 2 JAN 2021

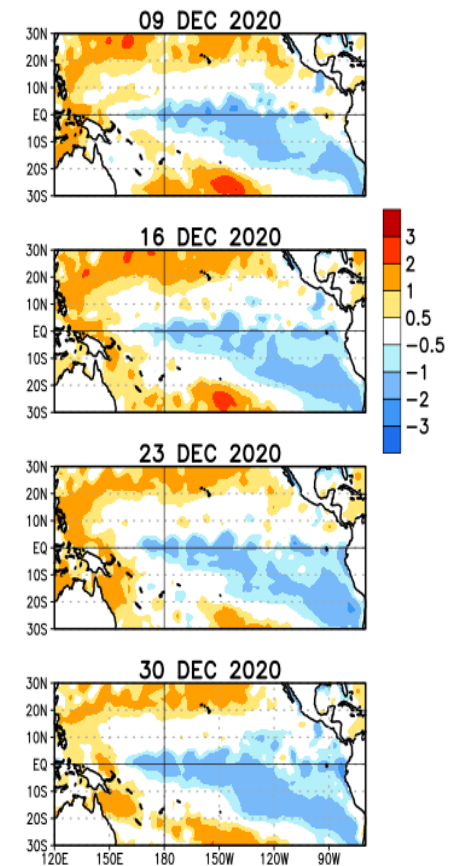




# Weekly SST Departures during the Last Four Weeks

During the last four weeks, below-average SSTs have persisted across the most of the equatorial Pacific Ocean.

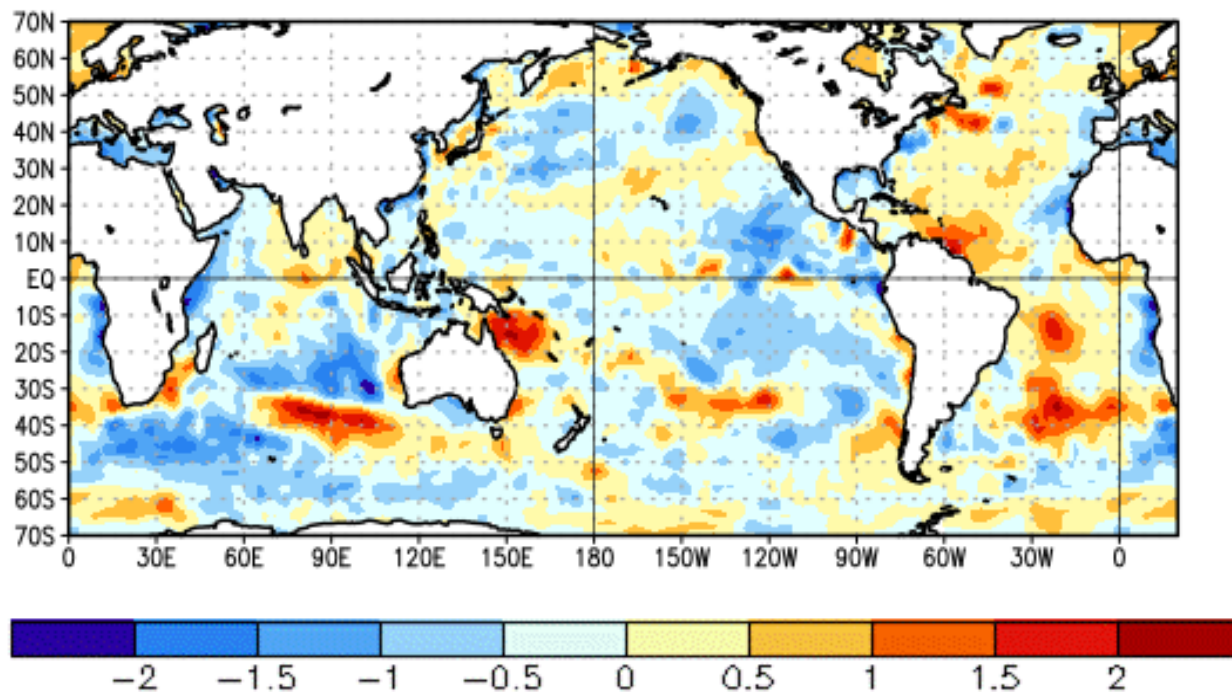
Weekly SST Anomalies (DEG C)



# Change in Weekly SST Departures over the Last Four Weeks

During the last four weeks, the changes in equatorial SST anomalies were mostly negative between 130°W and the coast of South America.

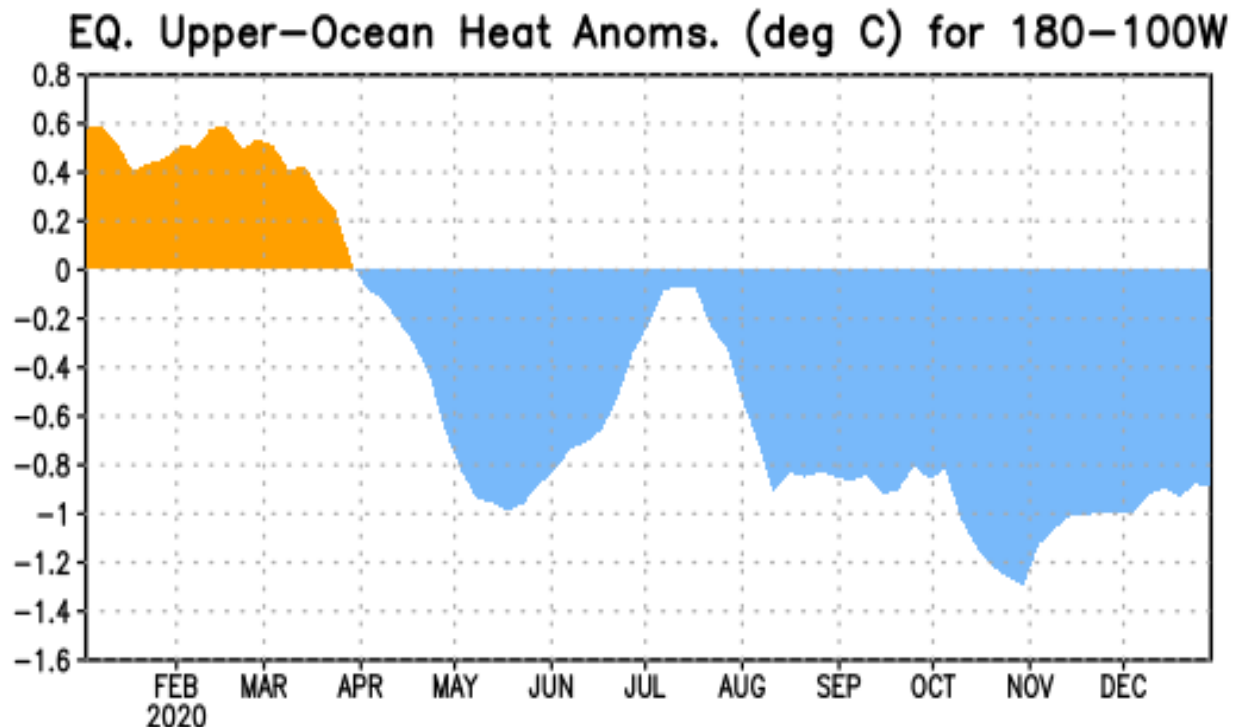
Change in Weekly SST Anoms (°C)  
30DEC2020 minus 02DEC2020





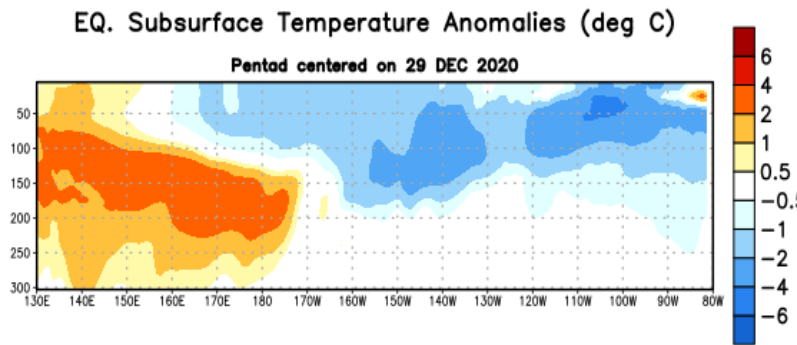
# Central and Eastern Pacific Upper-Ocean (0-300 m) Weekly Average Temperature Anomalies

Subsurface temperature anomalies decreased from March-May 2020, before weakening in June. Starting in mid-July, negative anomalies strengthened and then persisted through early October. Negative anomalies strengthened again in October before slightly weakening in November and December.



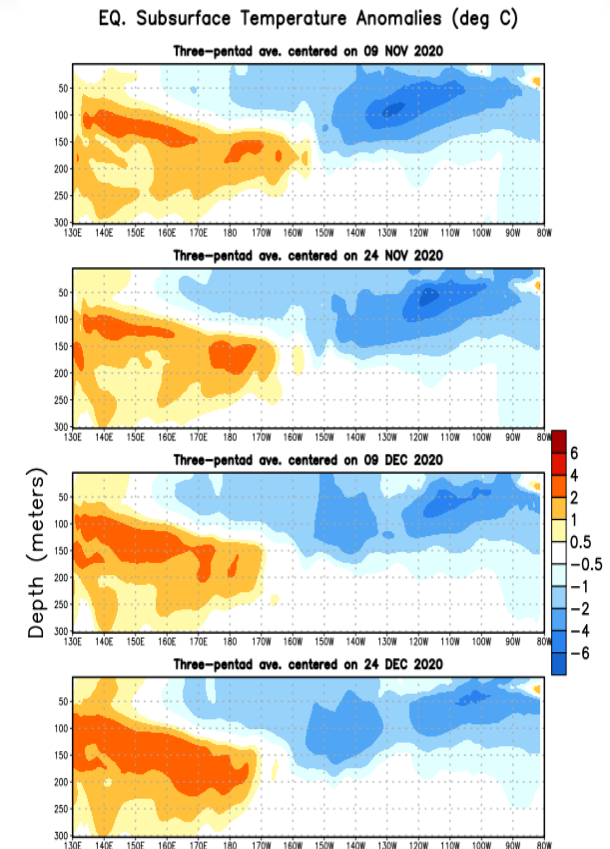
# Sub-Surface Temperature Departures in the Equatorial Pacific

In the last two months, negative subsurface temperature anomalies have persisted from the central to the eastern Pacific Ocean.



Most recent pentad analysis

Meanwhile, positive subsurface temperature anomalies have remained in the western Pacific Ocean and at depth near the Date Line.







# Historical El Niño and La Niña Episodes Based on the ONI computed using ERSST.v5

Recent Pacific warm (red) and cold (blue) periods based on a threshold of +/- 0.5 °C for the Oceanic Niño Index (ONI) [3 month running mean of ERSST.v5 SST anomalies in the Niño 3.4 region (5N-5S, 120-170W)]. For historical purposes, periods of below and above normal SSTs are colored in blue and red when the threshold is met for a minimum of 5 consecutive over-lapping seasons.

The ONI is one measure of the El Niño-Southern Oscillation, and other indices can confirm whether features consistent with a coupled ocean-atmosphere phenomenon accompanied these periods. The complete table going back to DJF 1950 can be found [here](#).

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2008							-0.4	-0.3	-0.3	-0.4		
2009				-0.2	0.1	0.4	0.5	0.5	0.7	1.0	1.3	1.6
2010	1.5	1.3	0.9	0.4	-0.1							
2011						-0.4						
2012				-0.4	-0.2	0.1	0.3	0.3	0.3	0.2	0.0	-0.2
2013	-0.4	-0.3	-0.2	-0.2	-0.3	-0.3	-0.4	-0.4	-0.3	-0.2	-0.2	-0.3
2014	-0.4	-0.4	-0.2	0.1	0.3	0.2	0.1	0.0	0.2	0.4	0.6	0.7
2015	0.6	0.6	0.6	0.8	1.0	1.2	1.5	1.8	2.1	2.4	2.5	2.6
2016	2.5	2.2	1.7	1.0	0.5	0.0	-0.3					
2017	-0.3	-0.1	0.1	0.3	0.4	0.4	0.2	-0.1	-0.4			
2018				-0.4	-0.1	0.1	0.1	0.2	0.4	0.7	0.9	0.8
2019	0.8	0.8	0.8	0.8	0.6	0.5	0.3	0.1	0.1	0.3	0.5	0.5
2020	0.5	0.6	0.5	0.3	0.0	-0.2	-0.4	-0.6	-1.0	-1.2		

# IRI/CPC Pacific Niño

## 3.4 SST Model Outlook

The model averages predict La Niña to continue into the Northern Hemisphere spring 2021.

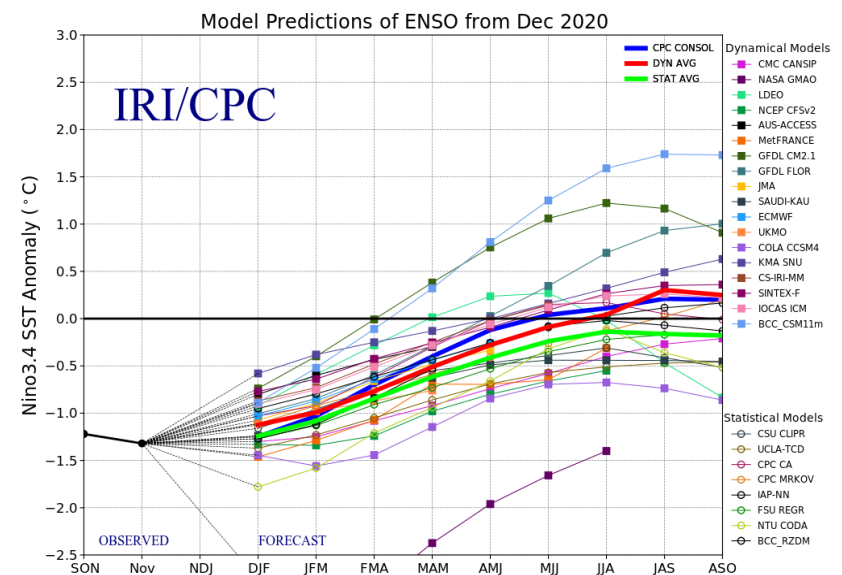


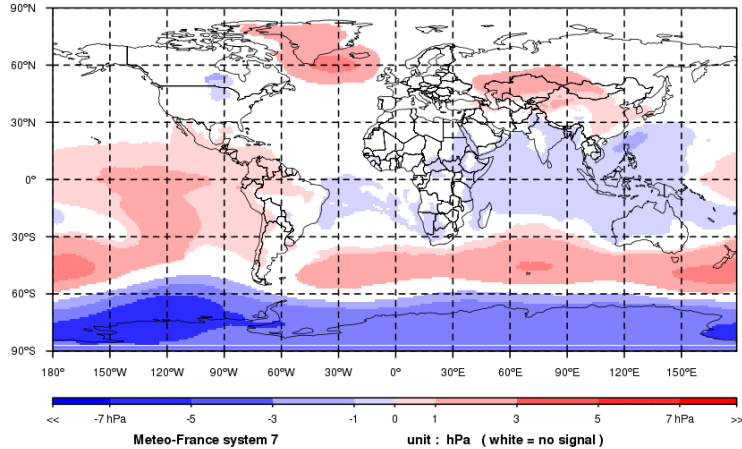
Figure provided by the International Research Institute (IRI) for Climate and Society (updated 19 December 2020).



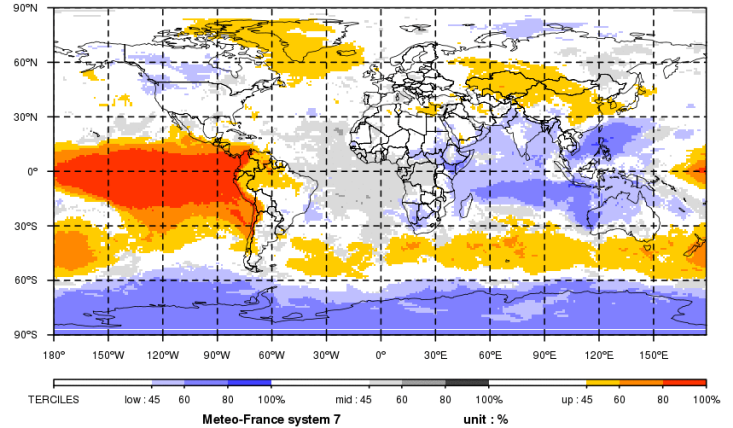
# MSLP\_NOV\_DEC\_FCST\_2020



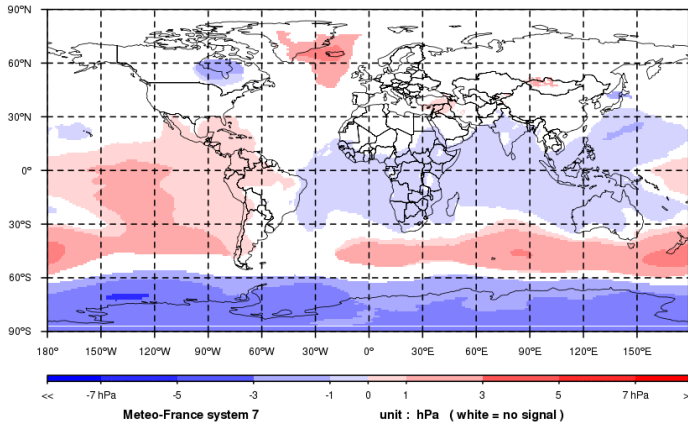
Mean sea level pressure - Forecast  
Ensemble mean anomaly  
For November 2020 (issued October 2020)



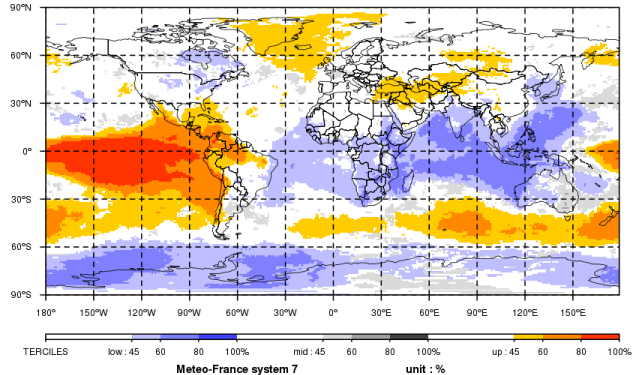
Mean sea level pressure - Forecast  
True tercile summary  
For November 2020 (issued October 2020)



Mean sea level pressure - Forecast  
Ensemble mean anomaly  
For December 2020 (issued October 2020)



Mean sea level pressure - Forecast  
True tercile summary  
For December 2020 (issued October 2020)

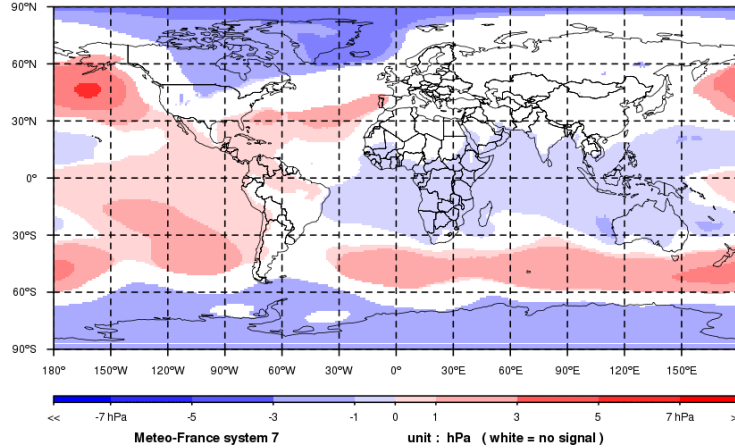




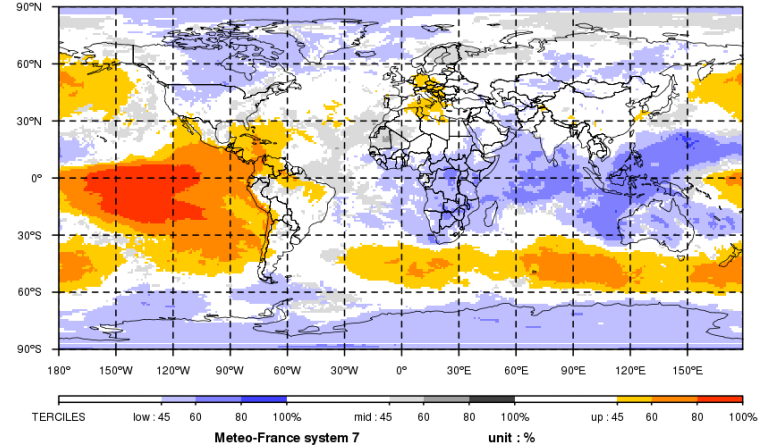
# MSLP\_JAN\_FEB\_FCST\_2020



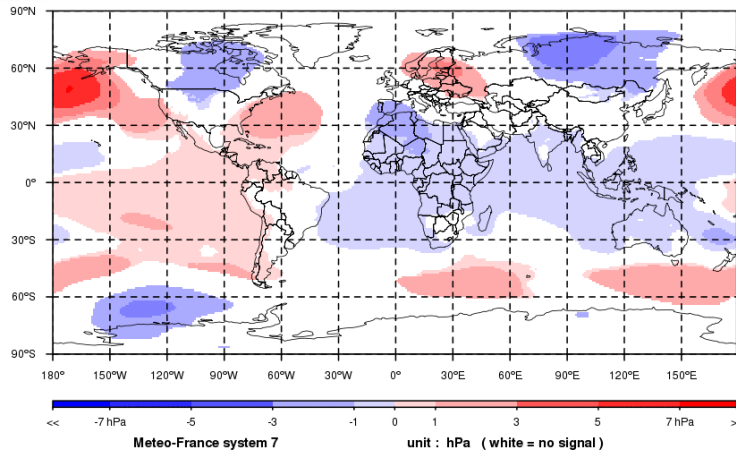
Mean sea level pressure - Forecast  
Ensemble mean anomaly  
For January 2021 (issued October 2020)



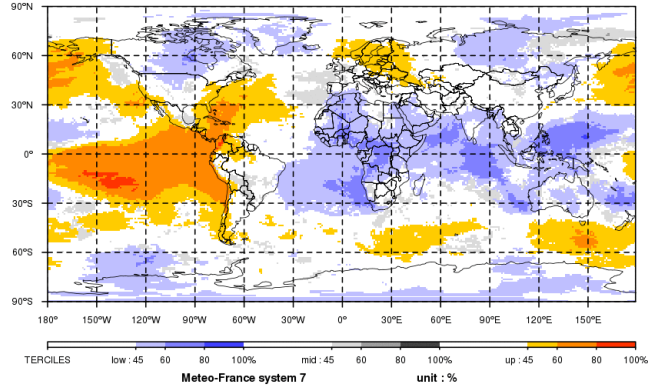
Mean sea level pressure - Forecast  
True tercile summary  
For January 2021 (issued October 2020)



Mean sea level pressure - Forecast  
Ensemble mean anomaly  
For February 2021 (issued October 2020)



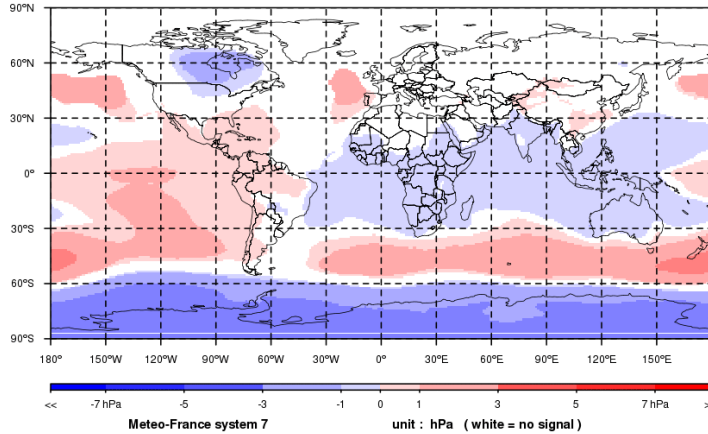
Mean sea level pressure - Forecast  
True tercile summary  
For February 2021 (issued October 2020)



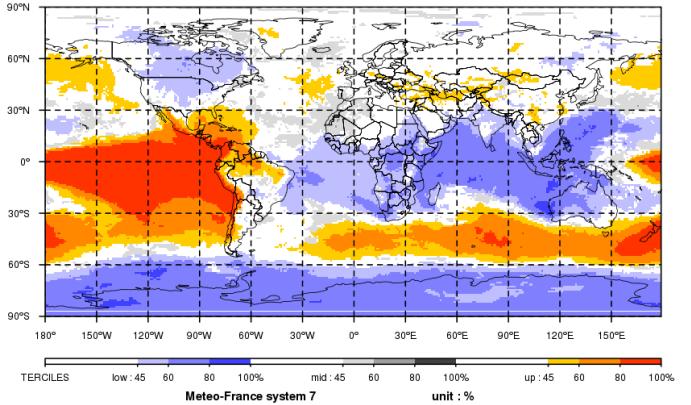
# MSLP\_OND\_NDJ\_2020



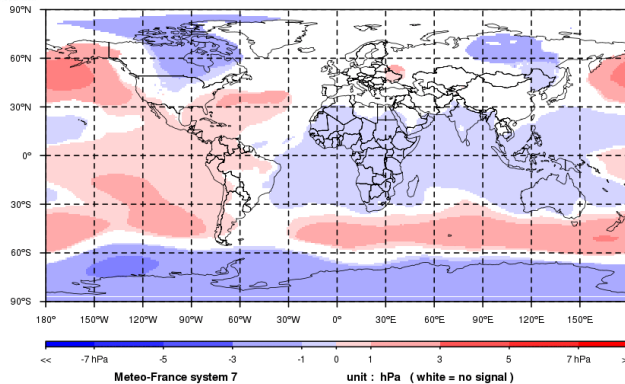
Mean sea level pressure - Forecast  
Ensemble mean anomaly  
for NDJ 2020-2021 (issued October 2020)



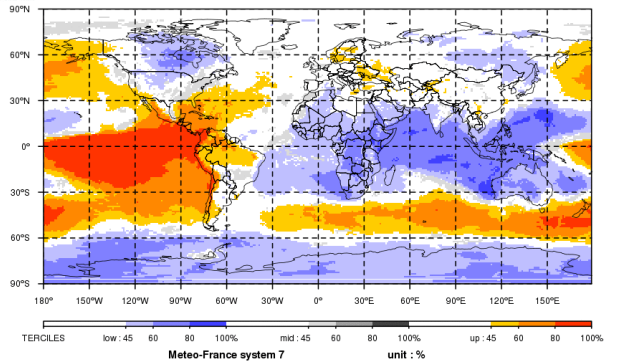
Mean sea level pressure - Forecast  
True tercile summary  
for NDJ 2020-2021 (issued October 2020)



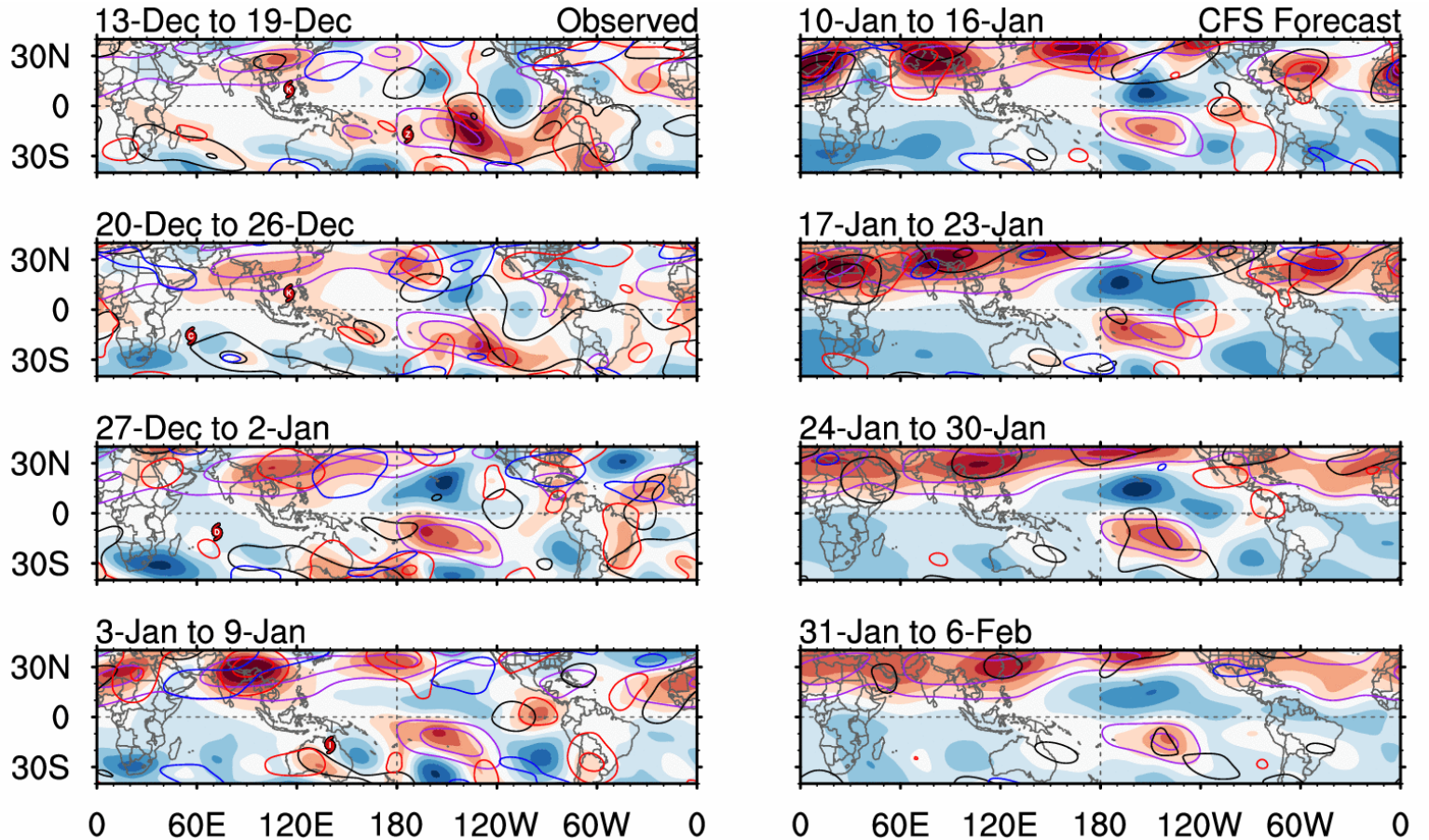
Mean sea level pressure - Forecast  
Ensemble mean anomaly  
for DJF 2020-2021 (issued October 2020)



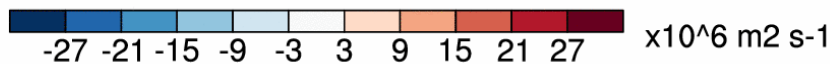
Mean sea level pressure - Forecast  
True tercile summary  
for DJF 2020-2021 (issued October 2020)



# STREAM FUNCTION



ncics.org/mjo



- MJO
- Kelvin x2
- Low
- ER

## 7-day PSI200 with CFS forecasts

Contours at 4, 12  $\times 10^6$   $m^2 s^{-1}$

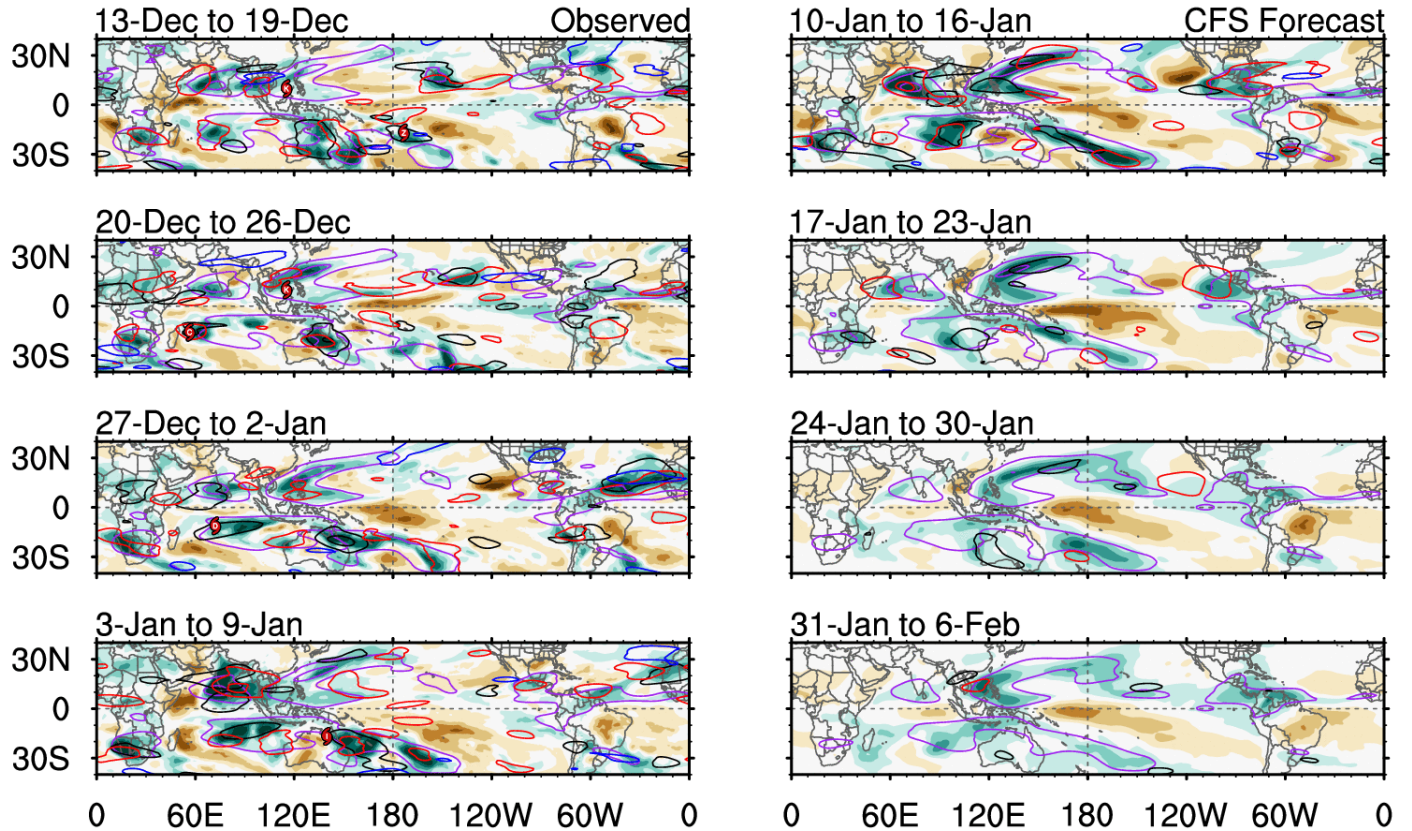
Carl Schreck

carl\_schreck@ncsu.edu

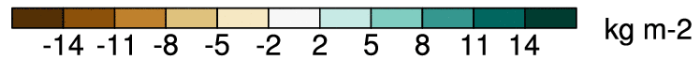
Sun 2021-01-10 11:17 UTC



# OBSERVED AND FORECASTED WATER PRECIPITABLE



ncics.org/mjo



## 7-day PWAT with CFS forecasts

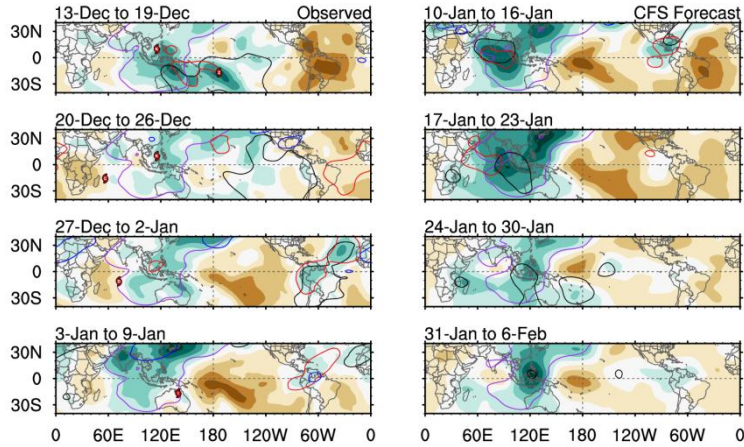
Sun 2021-01-10 11:13 UTC

— MJO      — Kelvin x2  
— Low      — ER

Contours at 3, 9 kg m-2

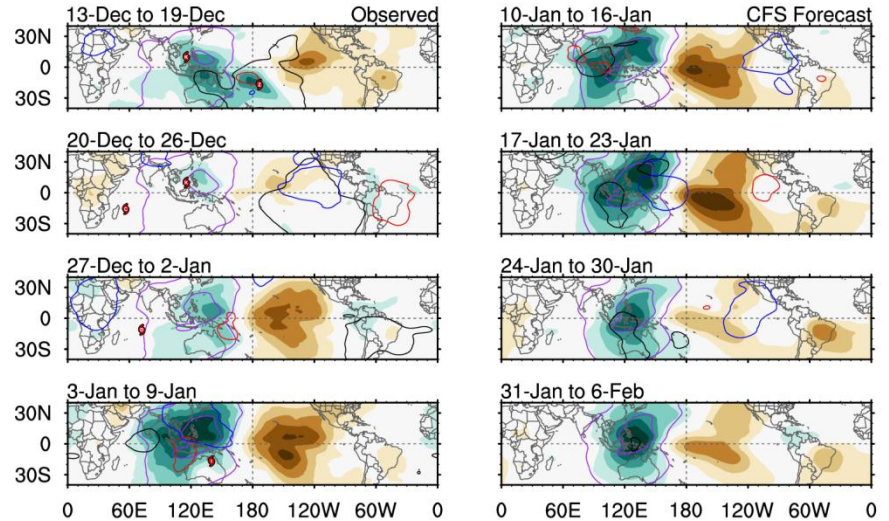
Carl Schreck  
carl\_schreck@ncsu.edu

# VELOCITY POTENTIAL



7-day CHI200 with CFS forecasts

Contours at  $-2, -6 \times 10^6 \text{ m}^2 \text{ s}^{-1}$   
 Carl Schreck  
 carl\_schreck@ncsu.edu



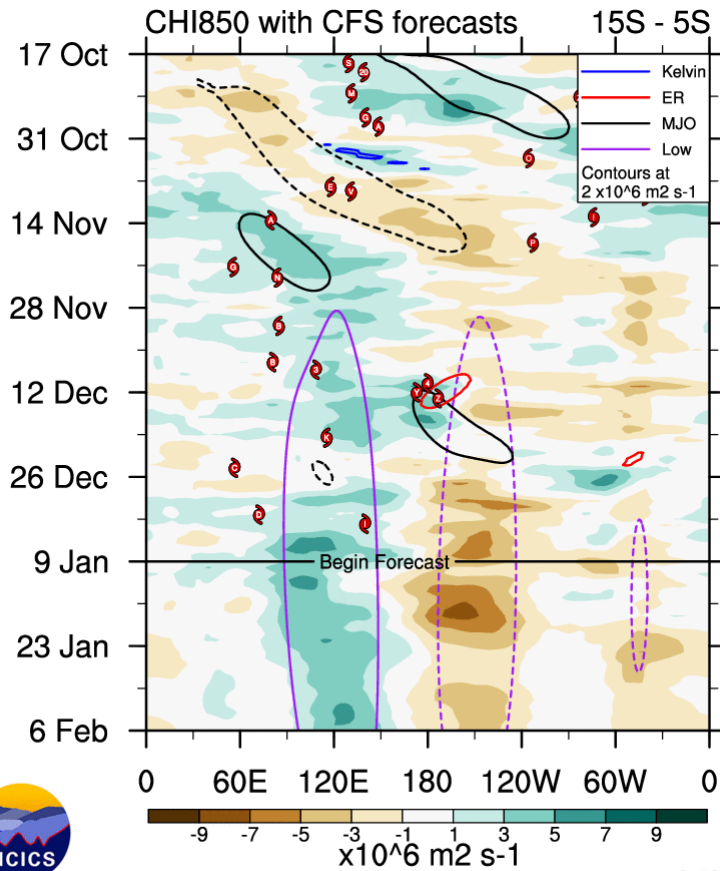
7-day CHI850 with CFS forecasts

Contours at  $1, 3 \times 10^6 \text{ m}^2 \text{ s}^{-1}$   
 Carl Schreck  
 carl\_schreck@ncsu.edu





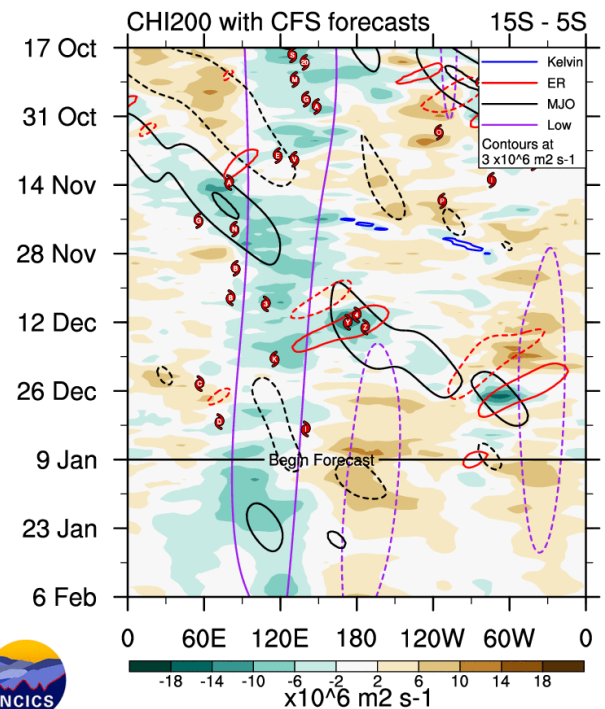
# Hovmöllers Diagram 5S-15S



ncics.org/mjo

Sun 2021-01-10 1111 UTC

Carl Schreck  
carl\_schreck@ncsu.edu



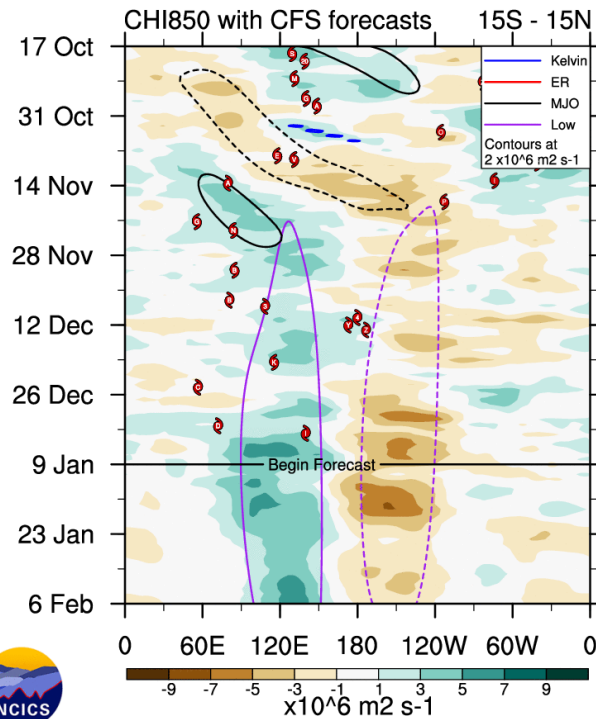
ncics.org/mjo

Sun 2021-01-10 1111 UTC

Carl Schreck  
carl\_schreck@ncsu.edu



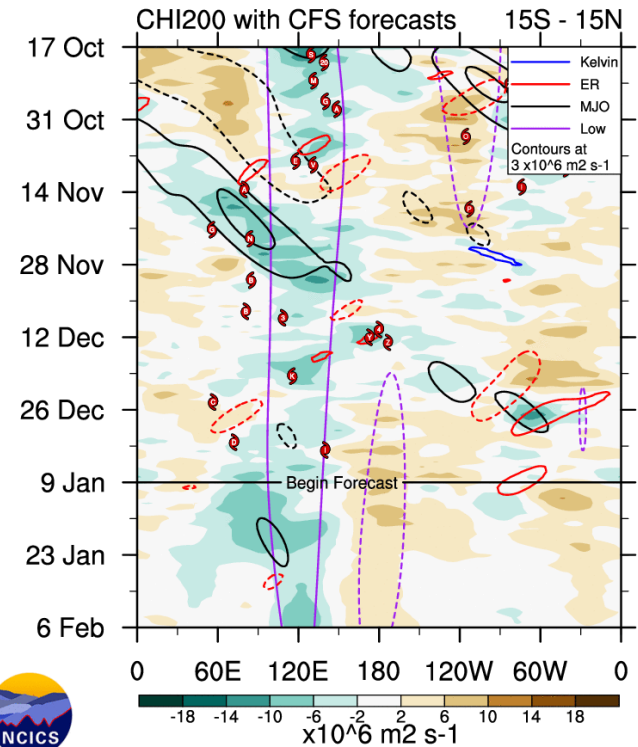
# Hovmöllers Diagram 15N-15S



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Sun 2021-01-10 11:12 UTC

Carl Schreck  
carl\_schreck@ncsu.edu



ncics.org/mjo

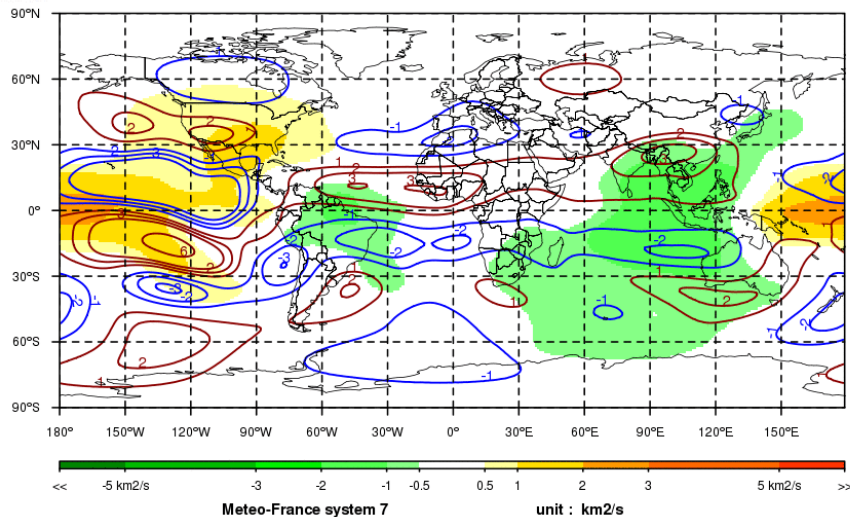
Sun 2021-01-10 11:12 UTC

Carl Schreck  
carl\_schreck@ncsu.edu

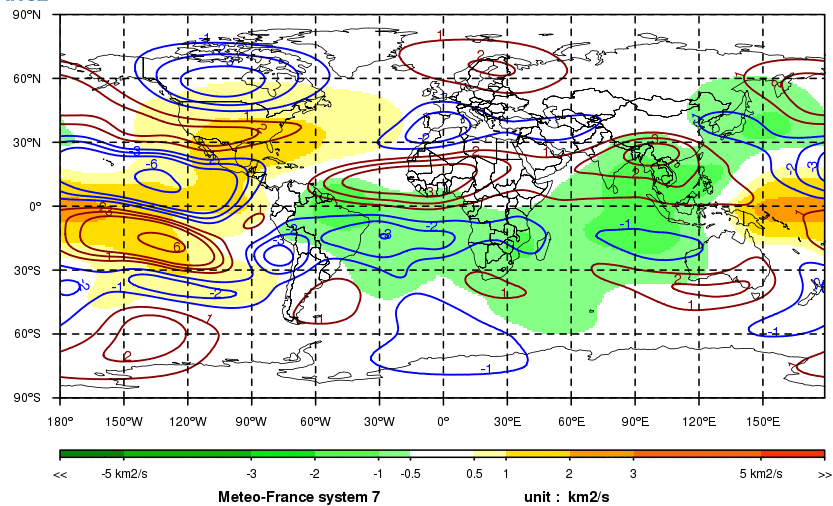
# Hovmöllers Diagram 5N-5S



200hPa velocity potential and 200hPa streamfunction -mz - Forecast  
 Ensemble mean anomaly  
 for NDJ 2020-2021 (issued October 2020)



200hPa velocity potential and 200hPa streamfunction -mz - Forecast  
 Ensemble mean anomaly  
 for DJF 2020-2021 (issued October 2020)





## II. IDENTIFICATION DES ANNES ANALOGUES



Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
1990	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.4	0.4
1991	0.4	0.3	0.2	0.3	0.5	0.6	0.7	0.6	0.6	0.8	1.2	1.5
1992	1.7	1.6	1.5	1.3	1.1	0.7	0.4	0.1	-0.1	-0.2	-0.3	-0.1
1993	0.1	0.3	0.5	0.7	0.7	0.6	0.3	0.3	0.2	0.1	0.0	0.1
1994	0.1	0.1	0.2	0.3	0.4	0.4	0.4	0.4	0.6	0.7	1.0	1.1
1995	1.0	0.7	0.5	0.3	0.1	0.0	-0.2	-0.5	-0.8	-1.0	-1.0	-1.0
1996	-0.9	-0.8	-0.6	-0.4	-0.3	-0.3	-0.3	-0.3	-0.4	-0.4	-0.4	-0.5
1997	-0.5	-0.4	-0.1	0.3	0.8	1.2	1.6	1.9	2.1	2.3	2.4	2.4
1998	2.2	1.9	1.4	1.0	0.5	-0.1	-0.8	-1.1	-1.3	-1.4	-1.5	-1.6
1999	-1.5	-1.3	-1.1	-1.0	-1.0	-1.0	-1.1	-1.1	-1.2	-1.3	-1.5	-1.7
Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2000	-1.7	-1.4	-1.1	-0.8	-0.7	-0.6	-0.6	-0.5	-0.5	-0.6	-0.7	-0.7
2001	-0.7	-0.5	-0.4	-0.3	-0.3	-0.1	-0.1	-0.1	-0.2	-0.3	-0.3	-0.3
2002	-0.1	0.0	0.1	0.2	0.4	0.7	0.8	0.9	1.0	1.2	1.3	1.1
2003	0.9	0.6	0.4	0.0	-0.3	-0.2	0.1	0.2	0.3	0.3	0.4	0.4
2004	0.4	0.3	0.2	0.2	0.2	0.3	0.5	0.6	0.7	0.7	0.7	0.7
2005	0.6	0.6	0.4	0.4	0.3	0.1	-0.1	-0.1	-0.1	-0.3	-0.6	-0.8
2006	-0.8	-0.7	-0.5	-0.3	0.0	0.0	0.1	0.3	0.5	0.7	0.9	0.9
2007	0.7	0.3	0.0	-0.2	-0.3	-0.4	-0.5	-0.8	-1.1	-1.4	-1.5	-1.6
2008	-1.6	-1.4	-1.2	-0.9	-0.8	-0.5	-0.4	-0.3	-0.3	-0.4	-0.6	-0.7
2009	-0.8	-0.7	-0.5	-0.2	0.1	0.4	0.5	0.5	0.7	1.0	1.3	1.6
Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2010	1.5	1.3	0.9	0.4	-0.1	-0.6	-1.0	-1.4	-1.6	-1.7	-1.7	-1.6
2011	-1.4	-1.1	-0.8	-0.6	-0.5	-0.4	-0.5	-0.7	-0.9	-1.1	-1.1	-1.0
2012	-0.8	-0.6	-0.5	-0.4	-0.2	0.1	0.3	0.3	0.3	0.2	0.0	-0.2
2013	-0.4	-0.3	-0.2	-0.2	-0.3	-0.3	-0.4	-0.4	-0.3	-0.2	-0.2	-0.3
2014	-0.4	-0.4	-0.2	0.1	0.3	0.2	0.1	0.0	0.2	0.4	0.6	0.7
2015	0.6	0.6	0.6	0.8	1.0	1.2	1.5	1.8	2.1	2.4	2.5	2.6
2016	2.5	2.2	1.7	1.0	0.5	0.0	-0.3	-0.6	-0.7	-0.7	-0.7	-0.6
2017	-0.3	-0.1	0.1	0.3	0.4	0.4	0.2	-0.1	-0.4	-0.7	-0.9	-1.0
2018	-0.9	-0.8	-0.6	-0.4	-0.1	0.1	0.1	0.2	0.4	0.7	0.9	0.8
2019	0.8	0.8	0.8	0.7	0.6	0.5	0.3	0.1	0.1	0.3	0.5	0.5
Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2020	0.5	0.6	0.5	0.3	0.0	-0.2	-0.4	-0.6				

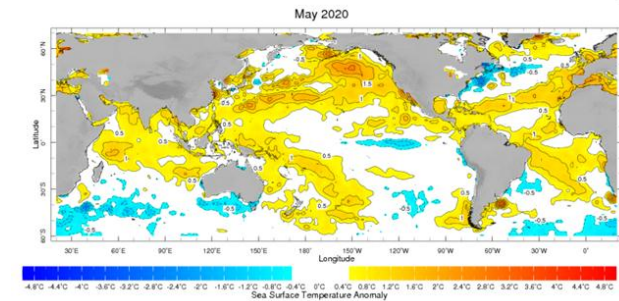
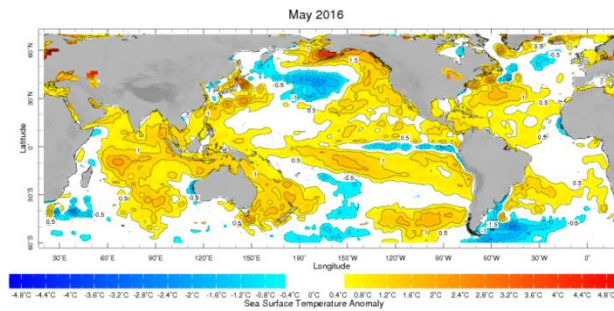
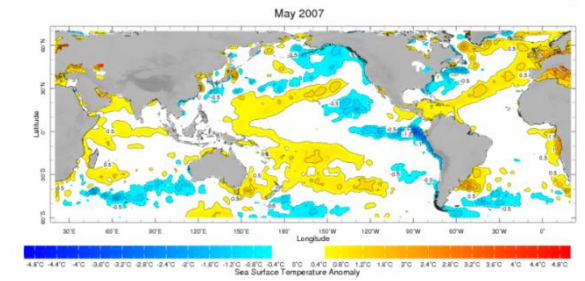
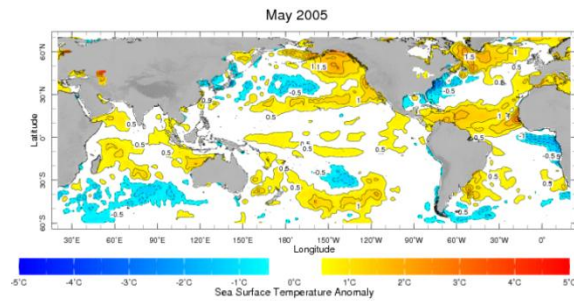
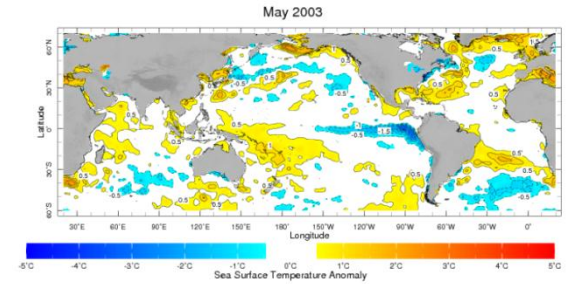
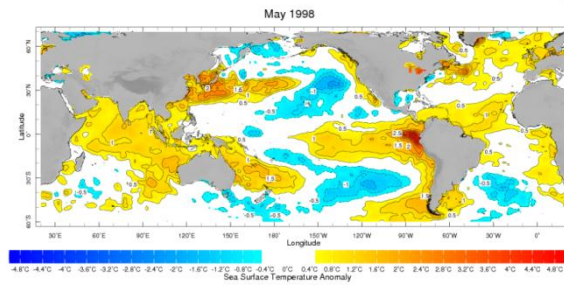
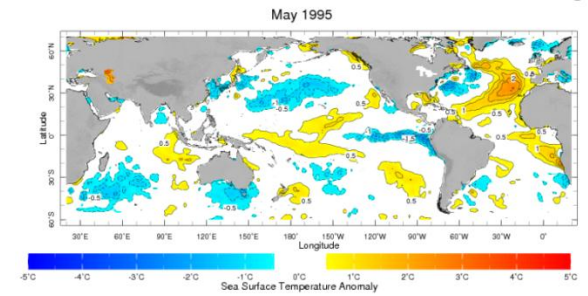
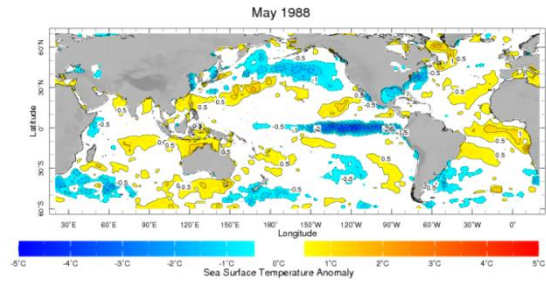
L'évolution de l'année 2020 à 2021 sont simulaire pour la période de Juin 2020 en Août 2021 avec les années 1988-89, 1995-96, 1998-99, 2005-06, 2007-08 et 2016-17



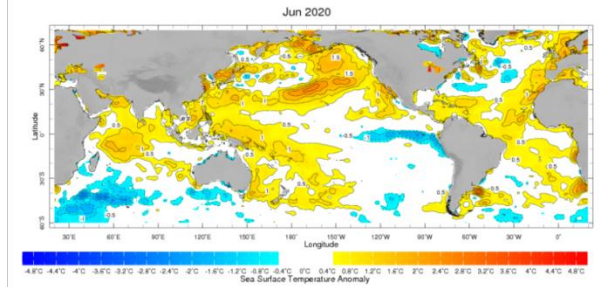
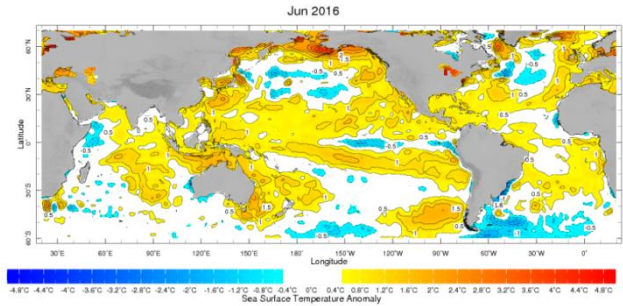
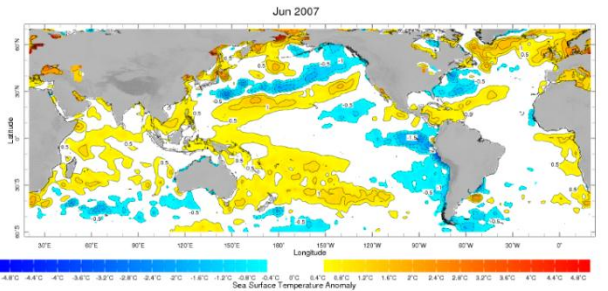
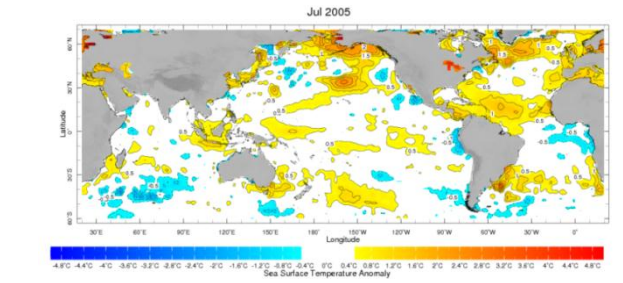
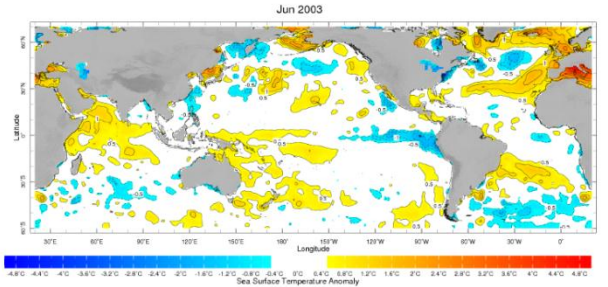
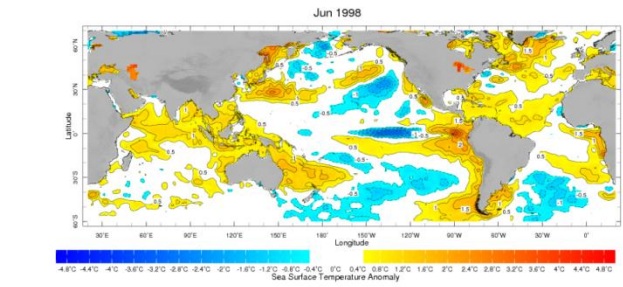
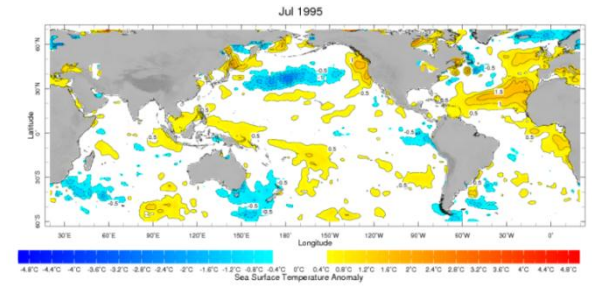
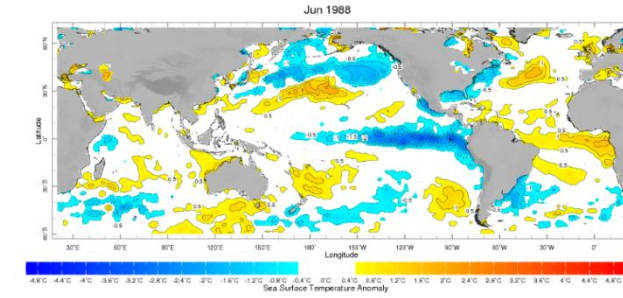
## **Analyse des cartes des anomalies de TSM des bassin océanique (période 6 mois passé et le prochaine 6 mois)**



# SSTA FOR MAY 1988, 1995, 1998, 2003, 2005, 2007, 2016 AND FCST MAY 2020

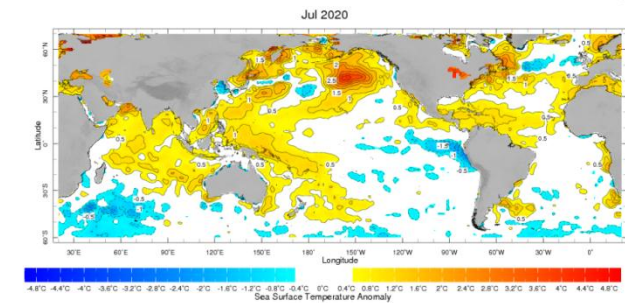
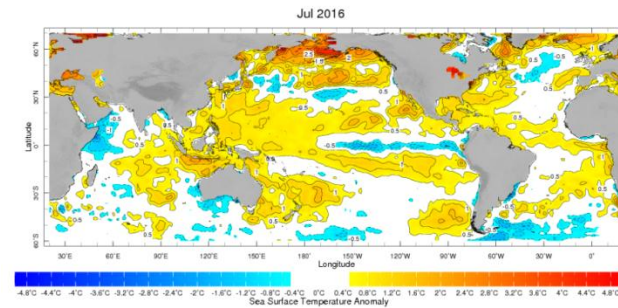
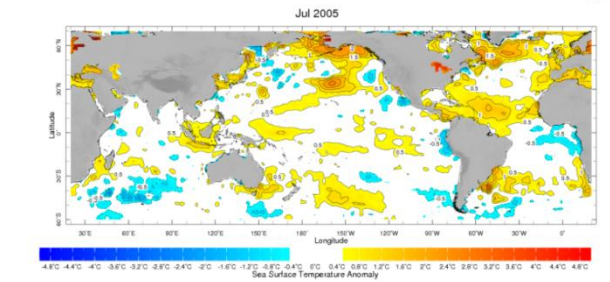
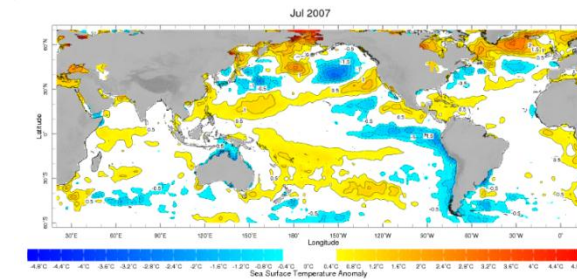
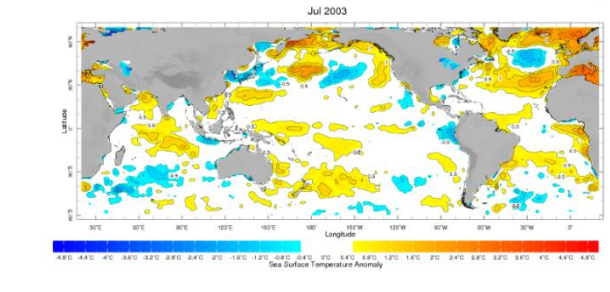
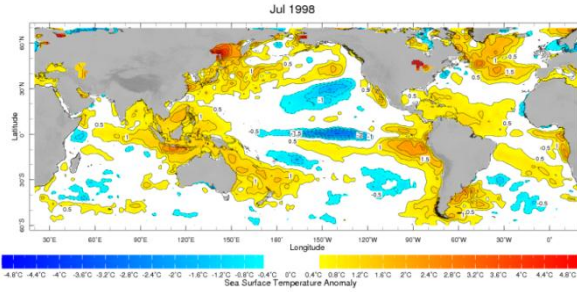
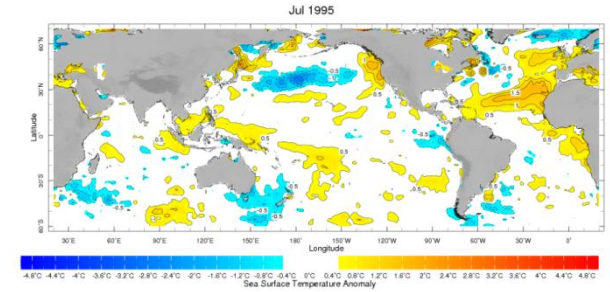
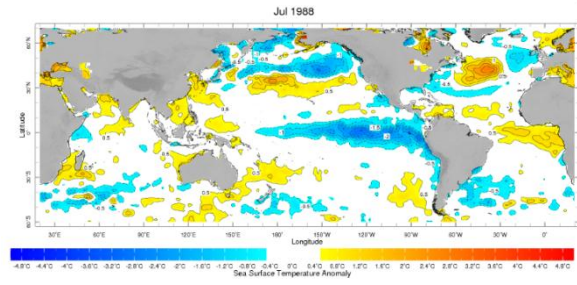


# SSTA FOR JUN 1988, 1995, 1998, 2003, 2005, 2007, 2016 AND FCST JUN 2020



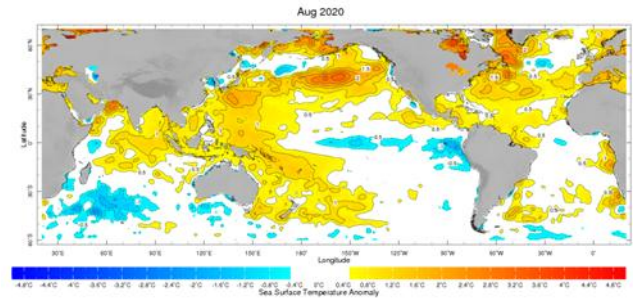
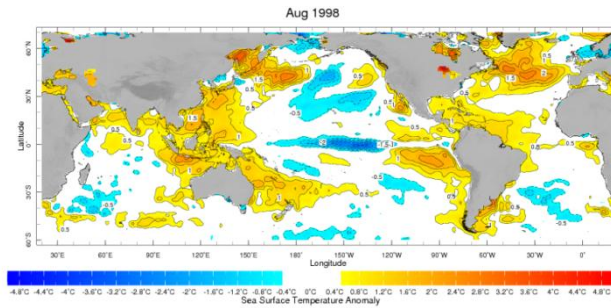
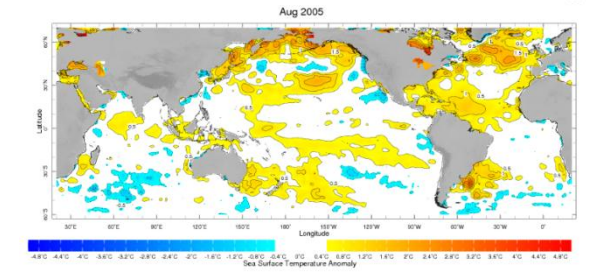
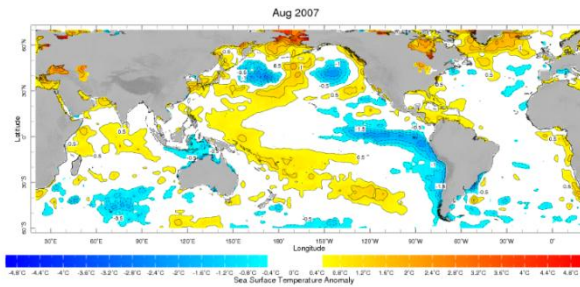
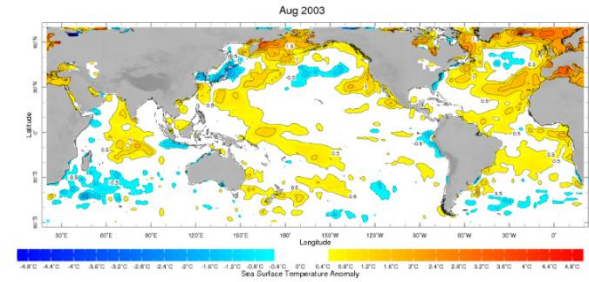
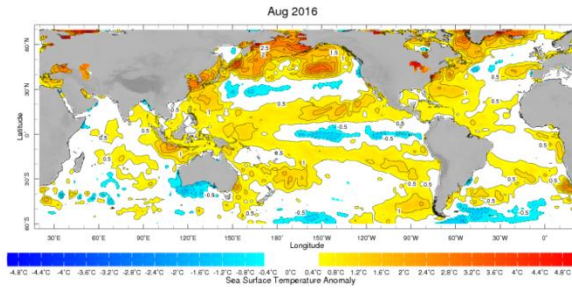
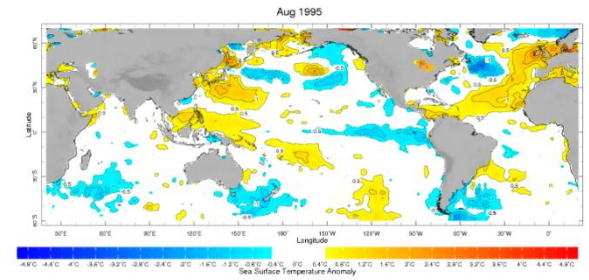
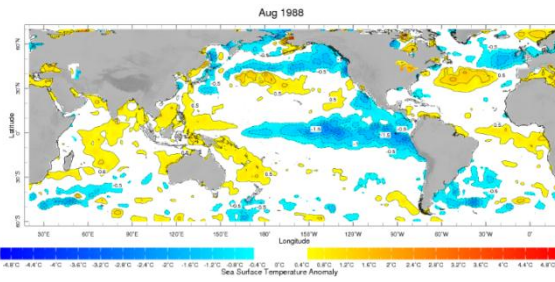


# SSTA FOR JUL 1988, 1995, 1998, 2003, 2005, 2007, 2016 AND FCST JUL 2020

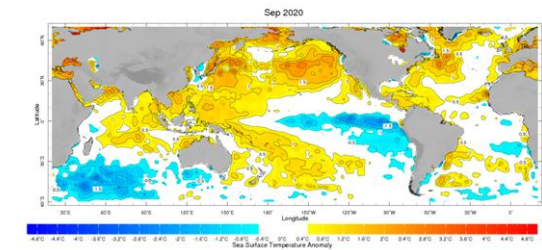
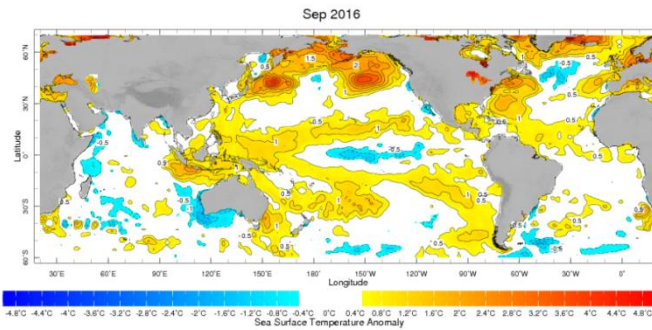
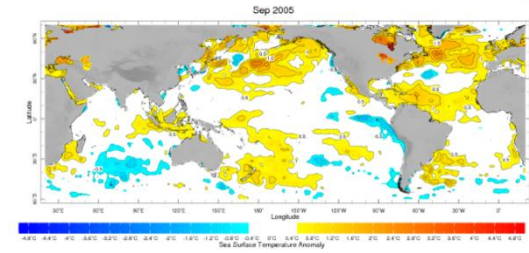
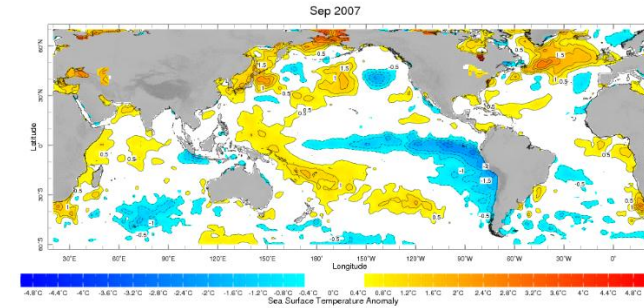
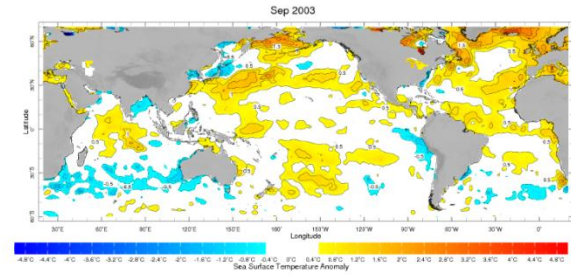
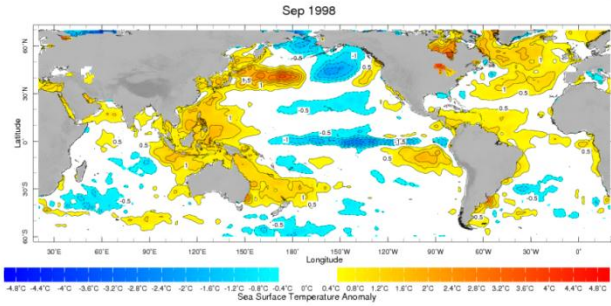
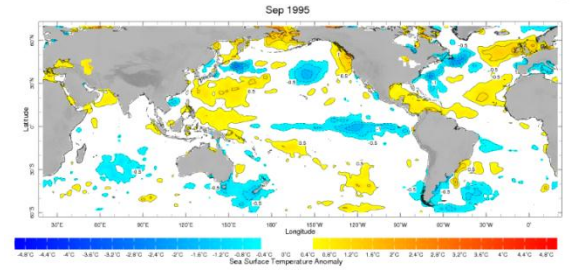
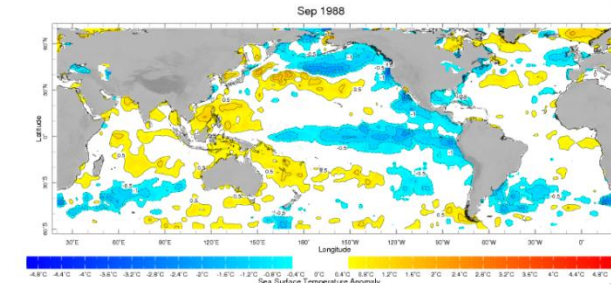




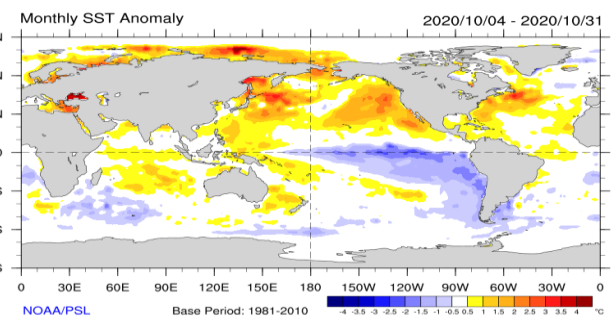
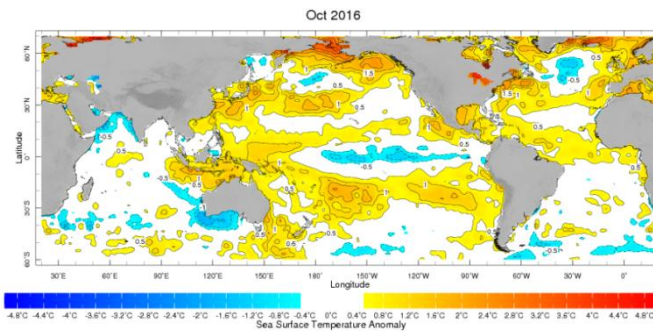
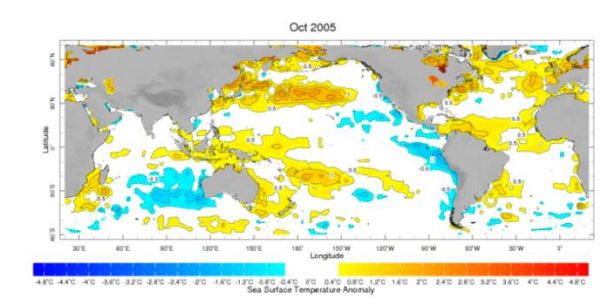
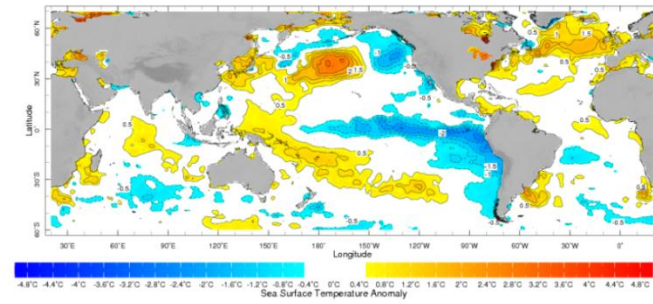
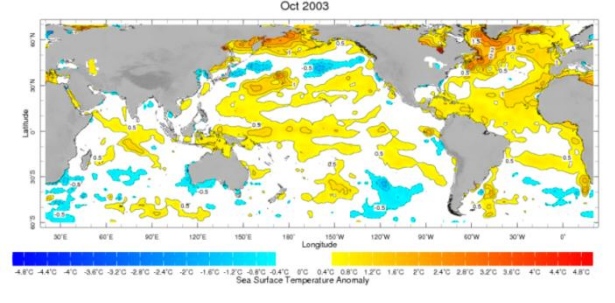
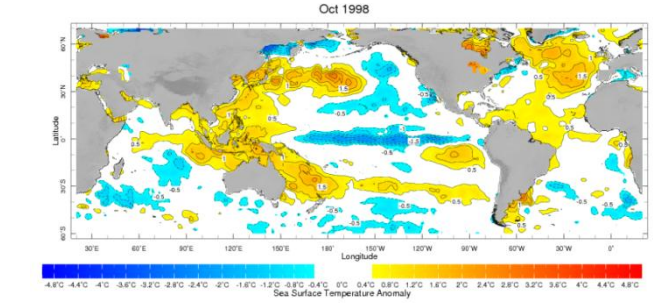
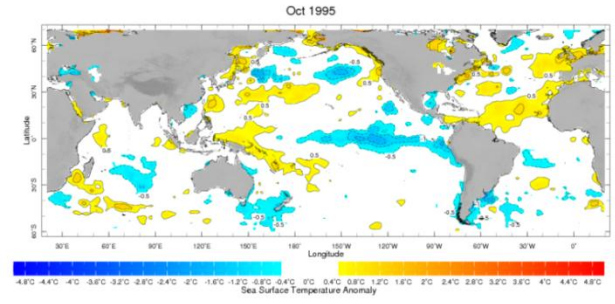
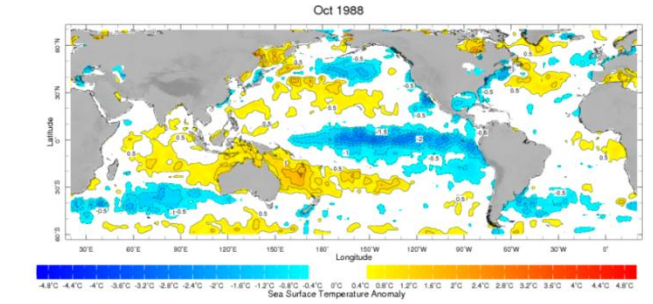
# SSTA FOR AUG 1988, 1995, 1998, 2003, 2005, 2007, 2016 AND FCST AUG 2020



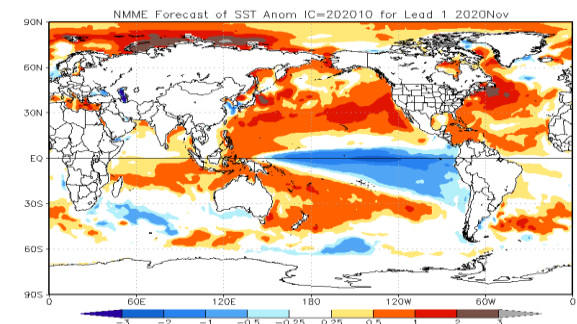
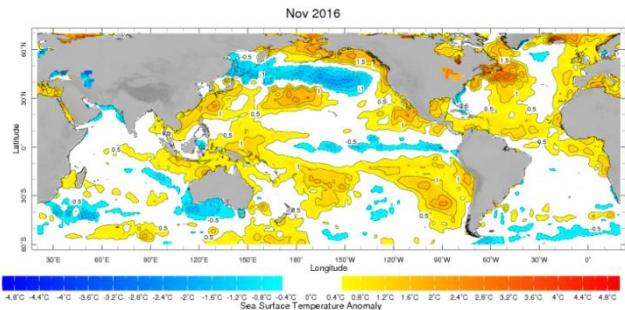
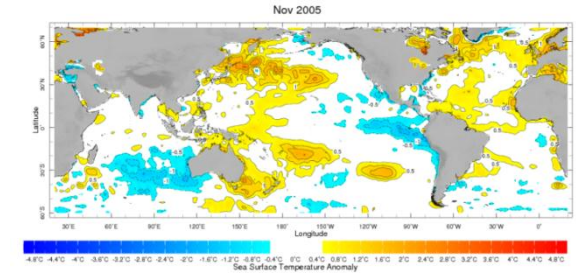
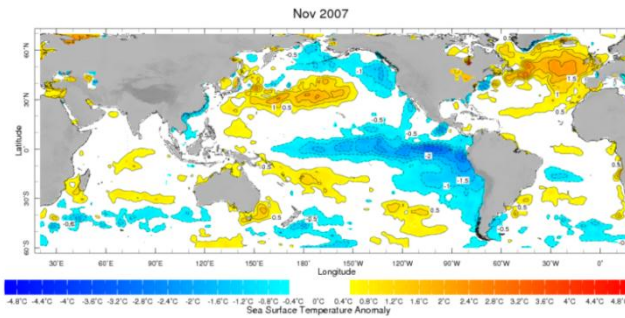
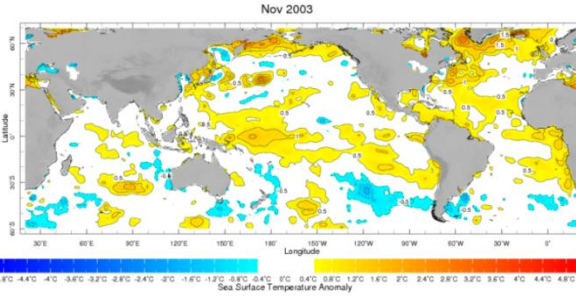
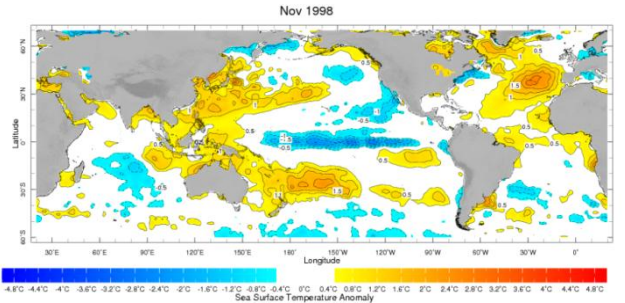
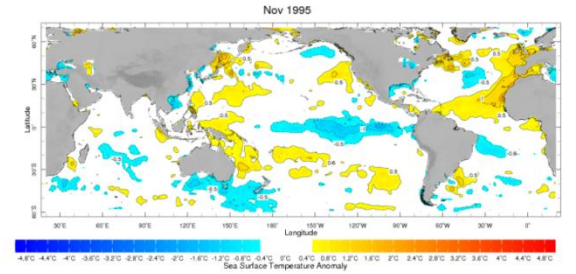
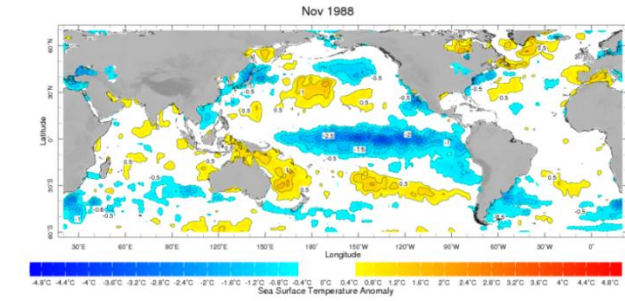
# SSTA FOR SEP 1988, 1995, 1998, 2003, 2005, 2007, 2016 AND FCST SEP 2020



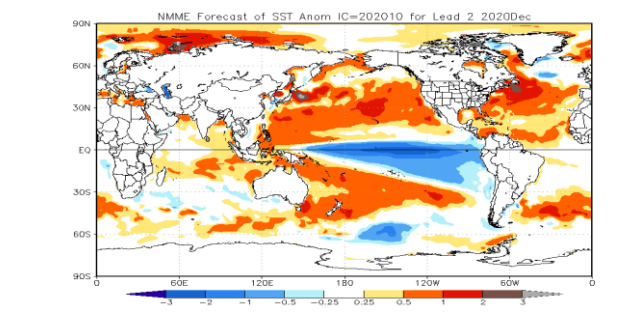
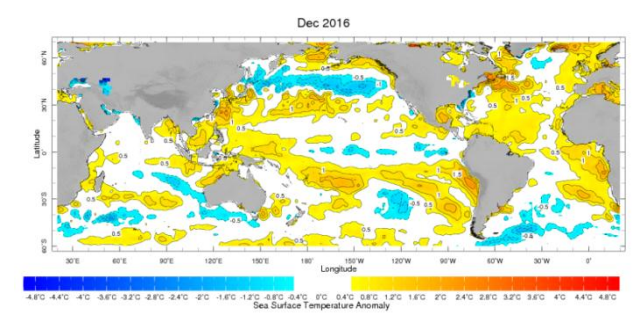
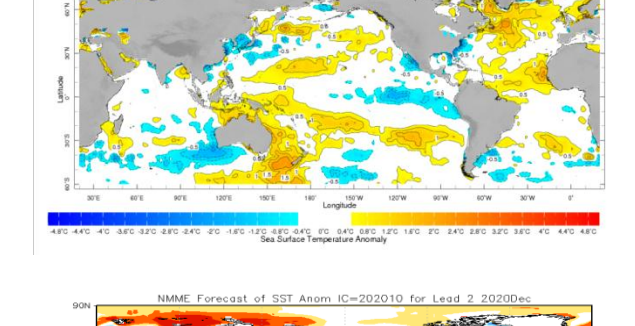
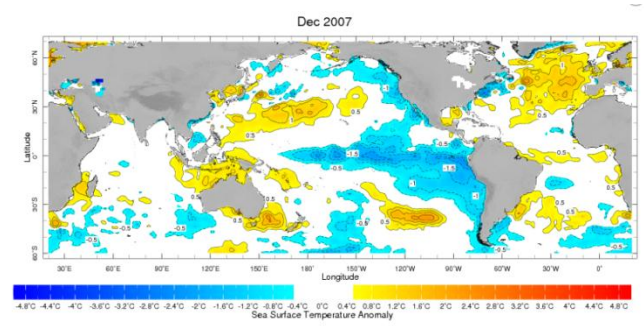
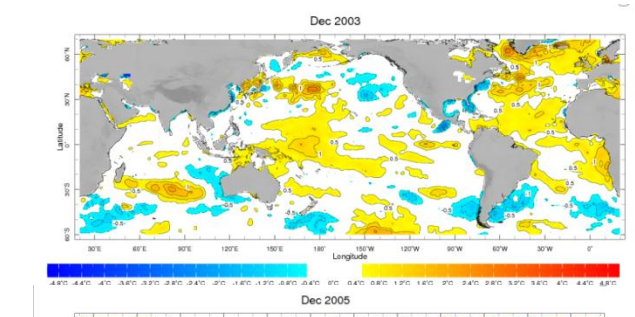
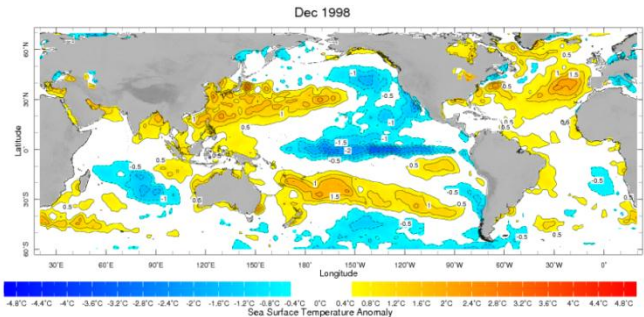
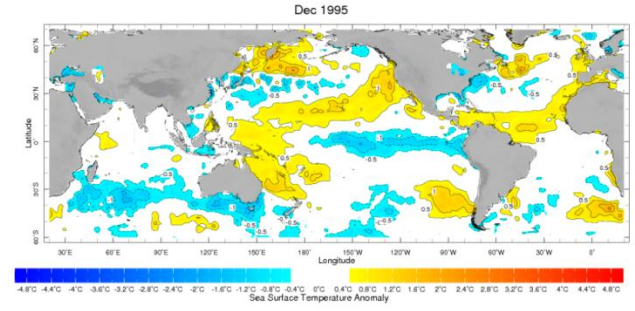
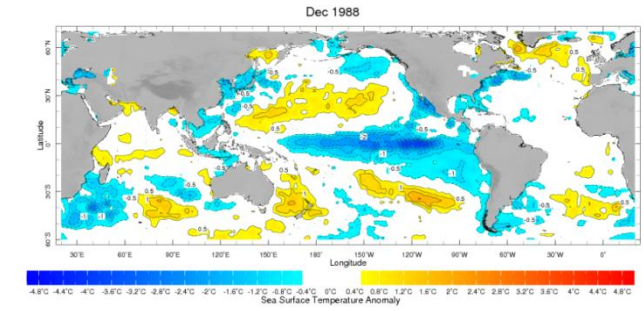
# SSTA FOR OCT 1988, 1995, 1998, 2003, 2005, 2007, 2016 AND FCST OCT 2020



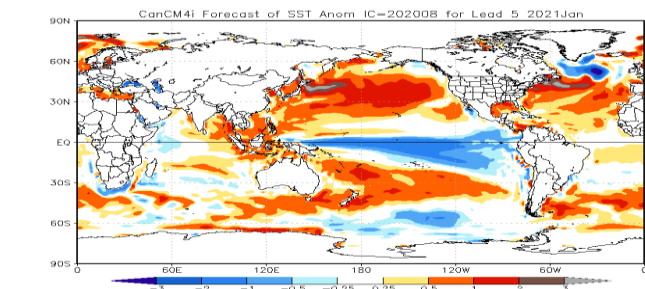
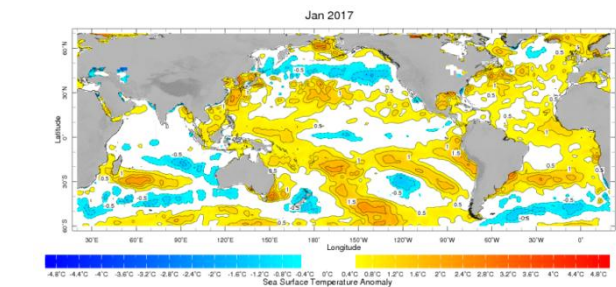
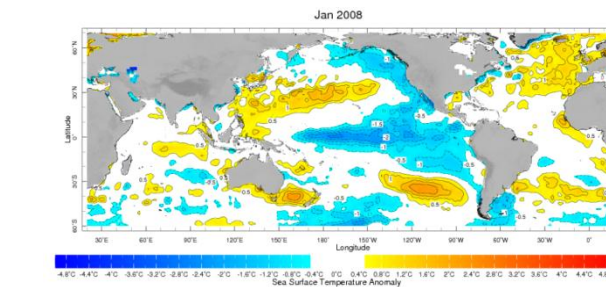
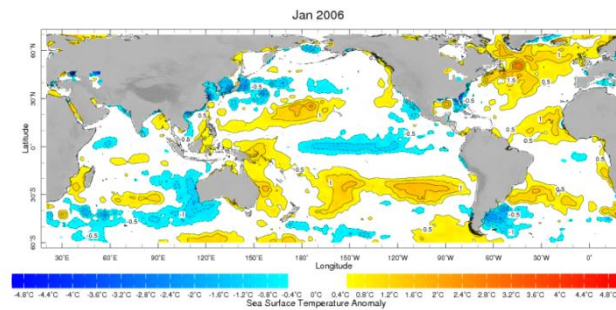
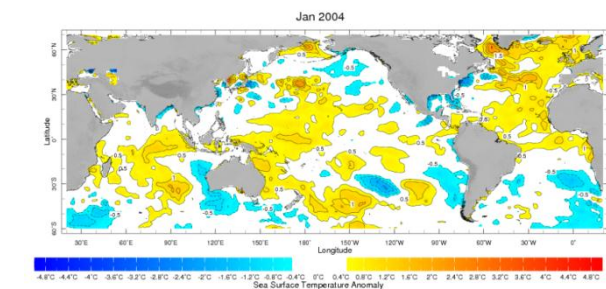
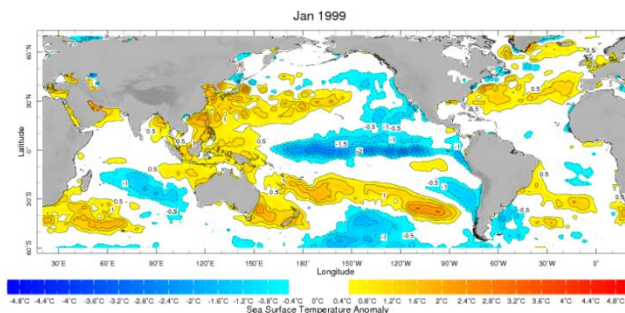
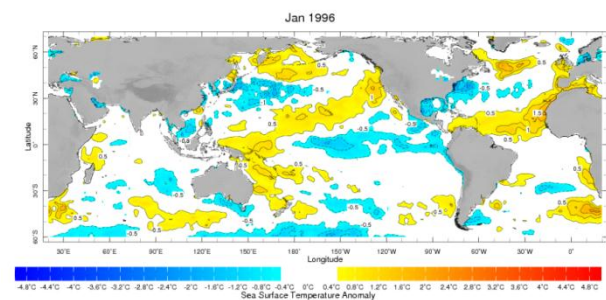
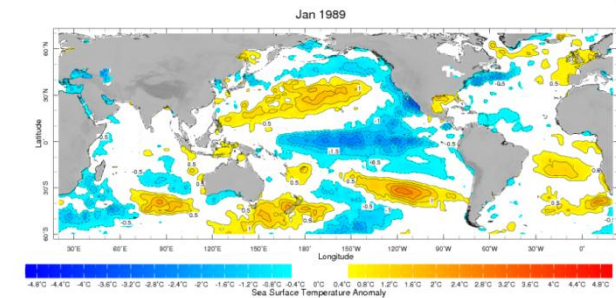
# SSTA FOR NOV 1988, 1995, 1998, 2003, 2005, 2007, 2016 AND FCST NOV 2020



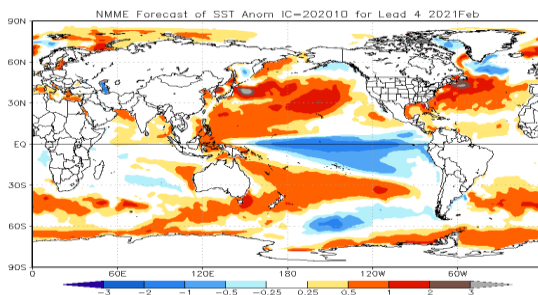
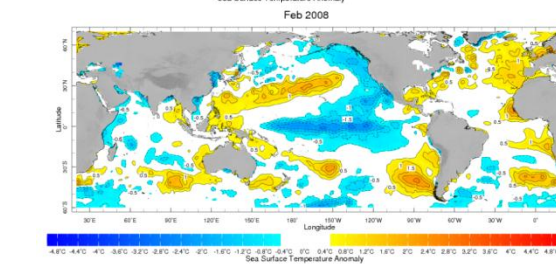
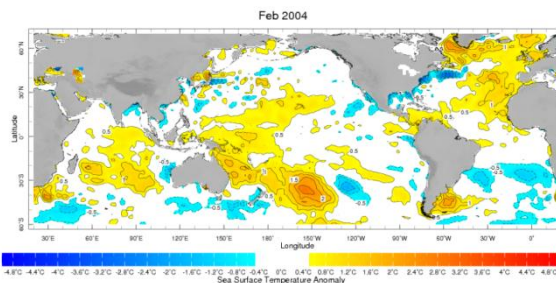
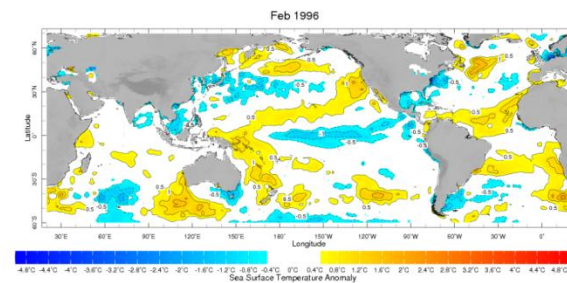
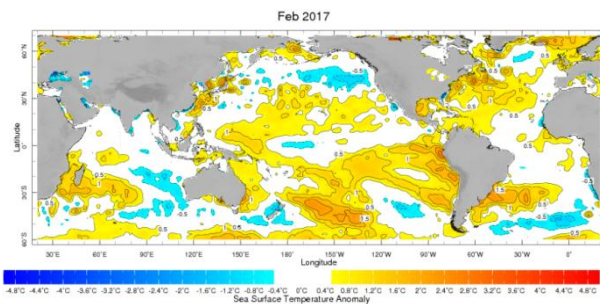
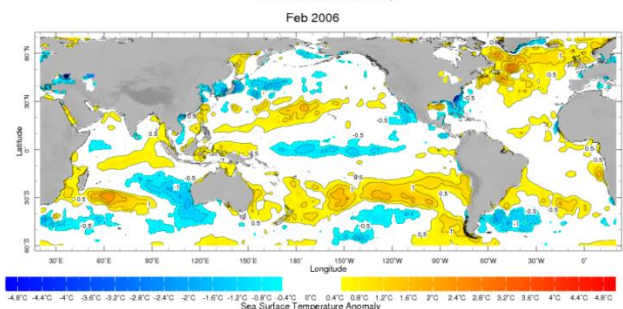
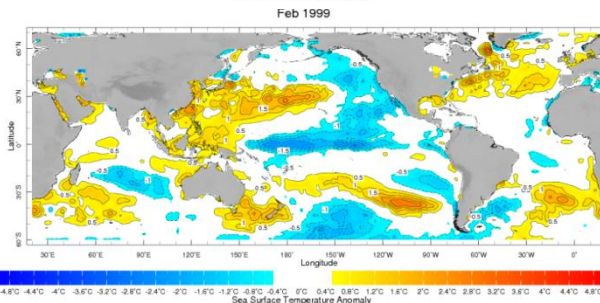
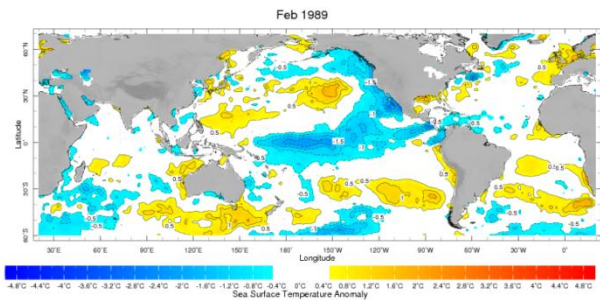
# SSTA FOR DEC 1988, 1995, 1998, 2003, 2005, 2007, 2016 AND FCST DEC 2020



# OBSERVED SSTA FOR JAN 1989, 1996, 1999, 2004, 2006, 2008, 2017 AND JAN 2021 FORECAST



# OBSERVED SSTA FOR FEB 1989, 1996, 1999, 2004, 2006, 2008, 2017 AND FEB 2021 FORECAST

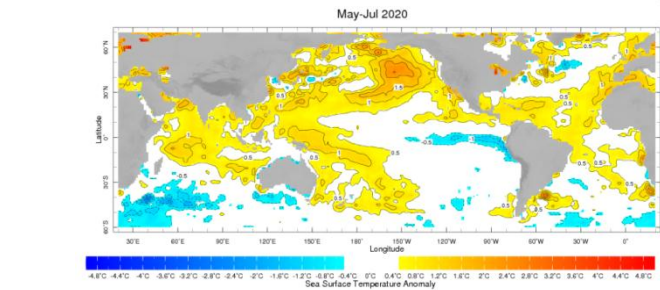
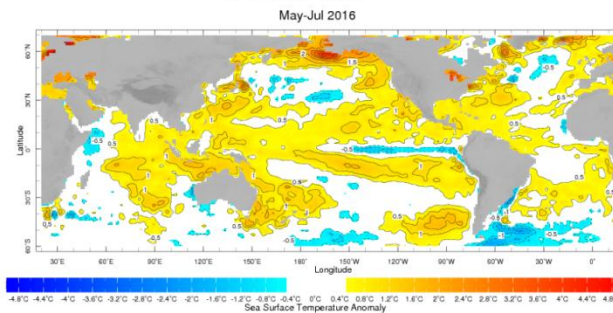
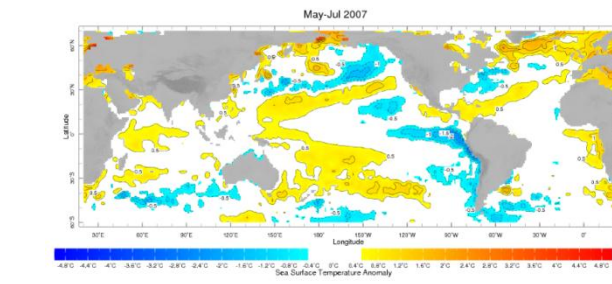
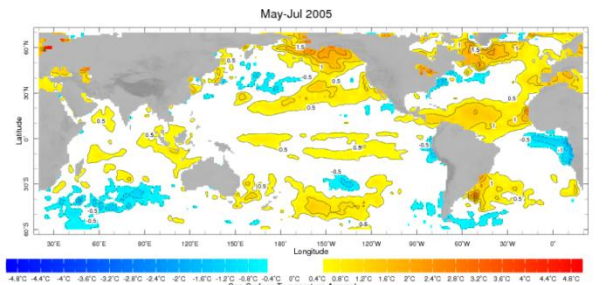
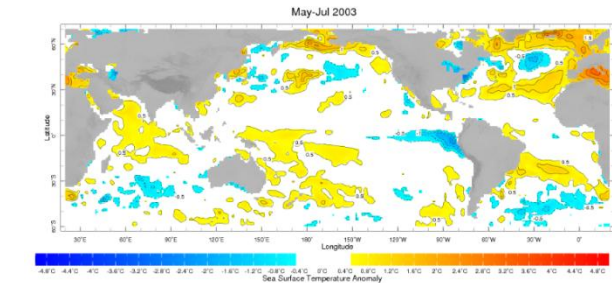
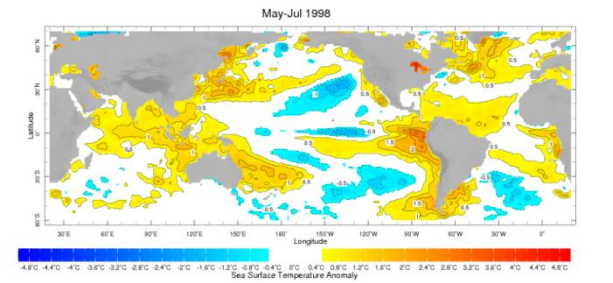
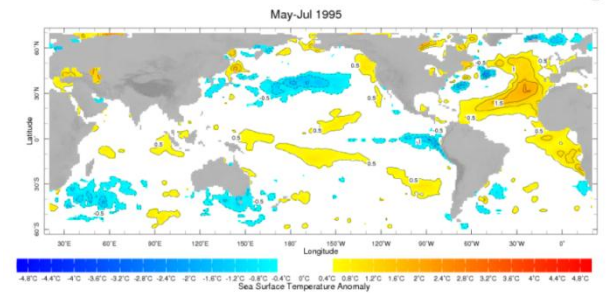
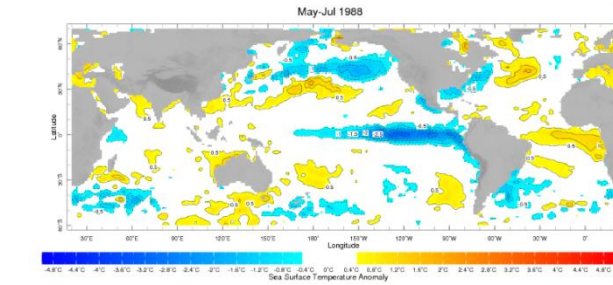




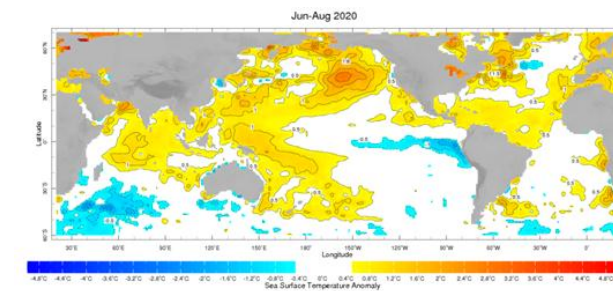
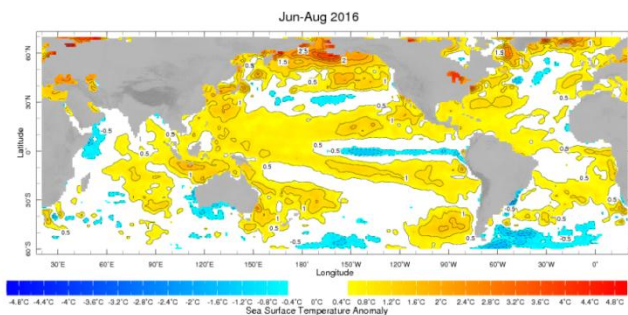
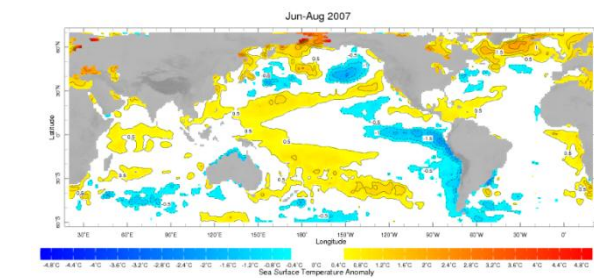
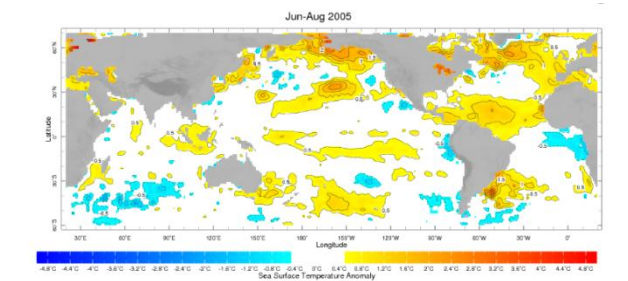
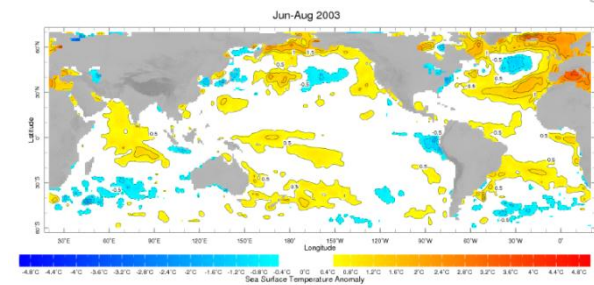
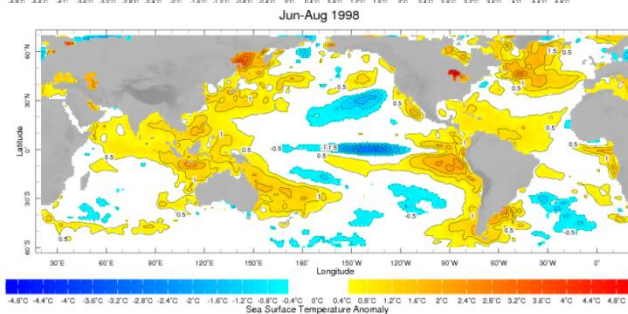
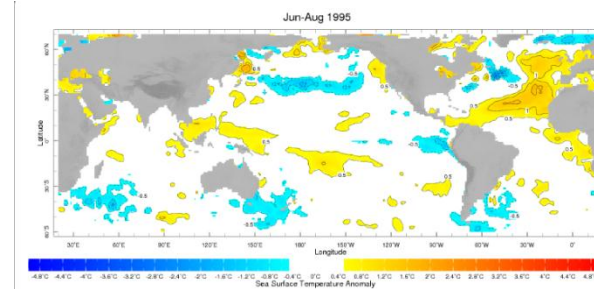
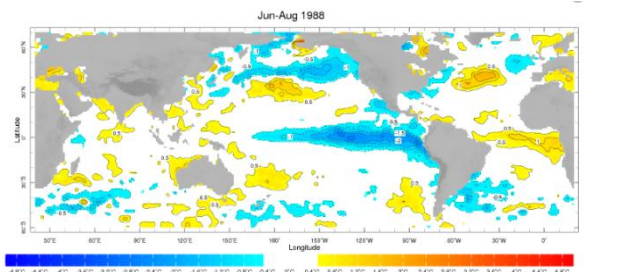


## SEASONAL SST FORECASTS WITH ANALOG YEARS USING IRI AND NMME

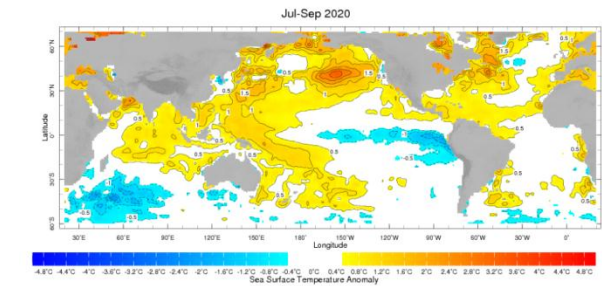
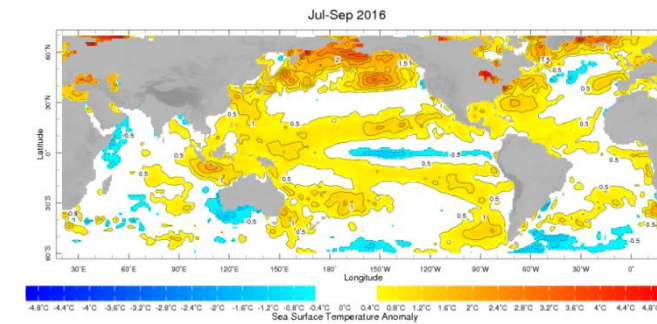
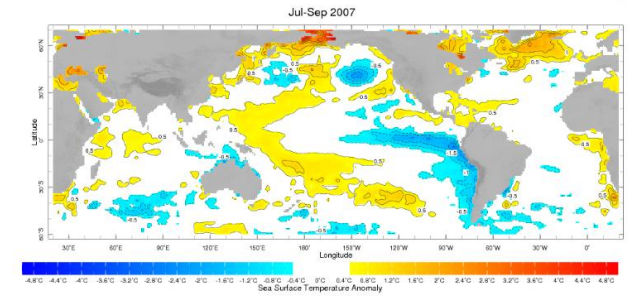
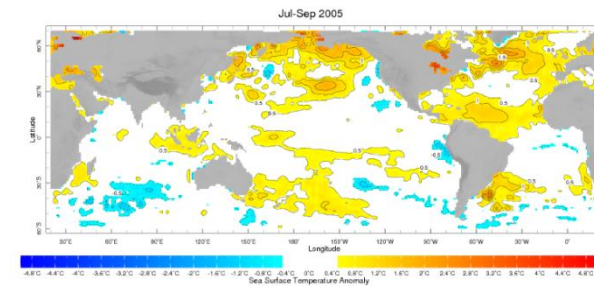
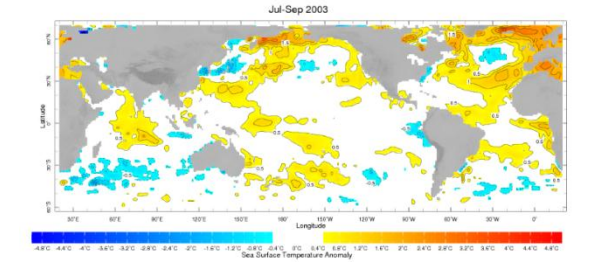
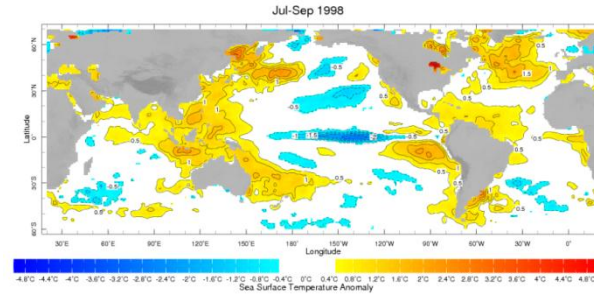
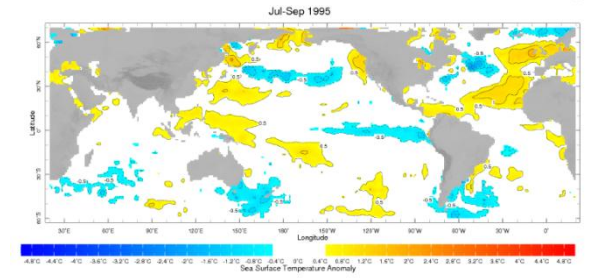
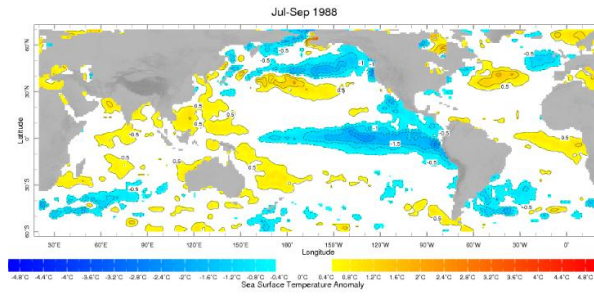
# OBSERVED SSTA FOR MJJ 1988, 1995, 1998, 2003, 2005, 2007, 2016 AND MJJ 2020 FORECAST



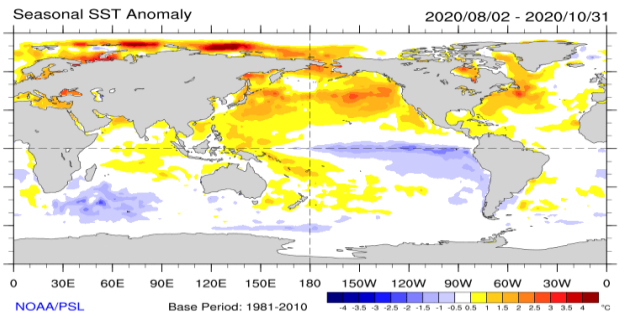
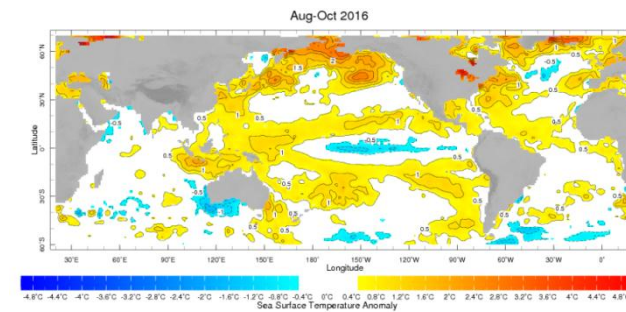
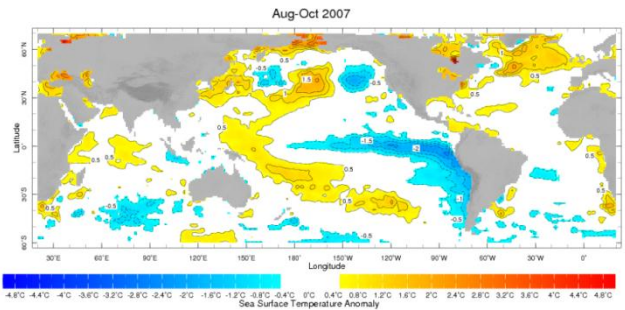
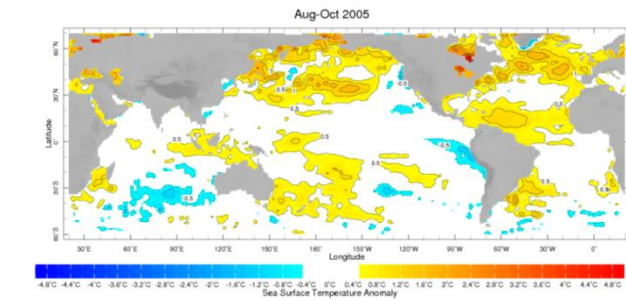
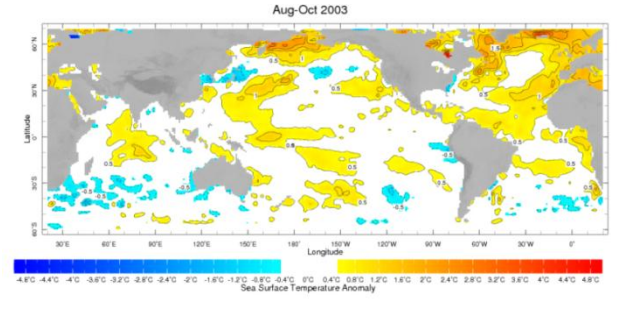
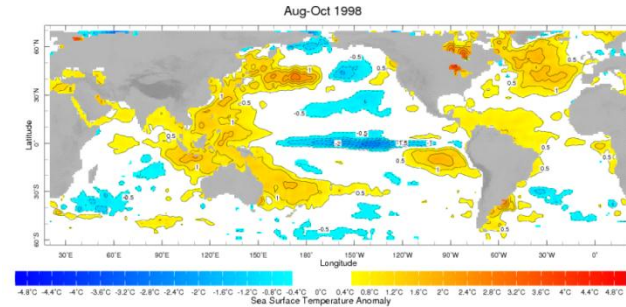
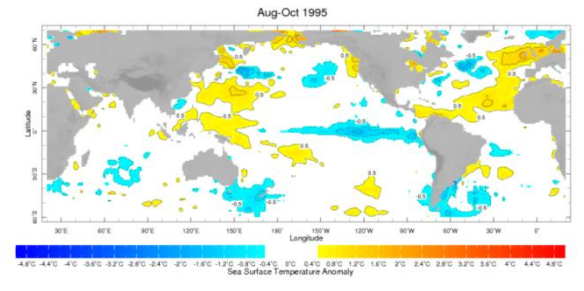
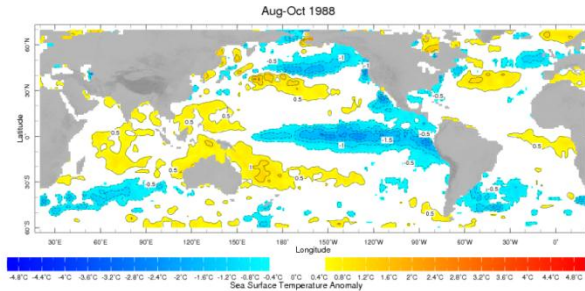
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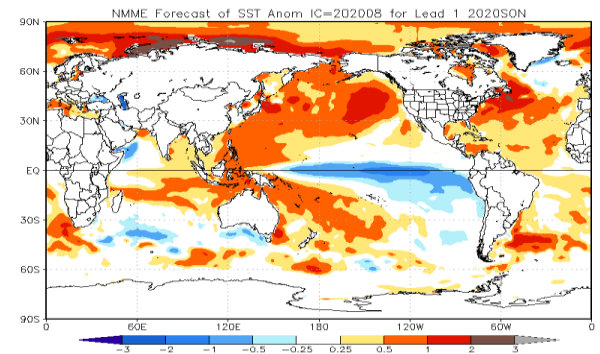
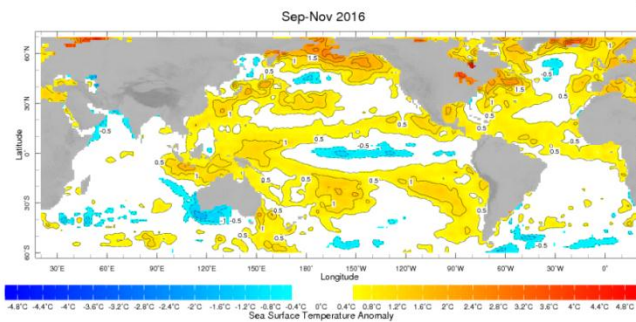
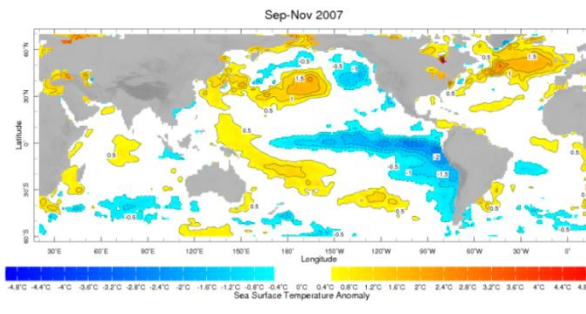
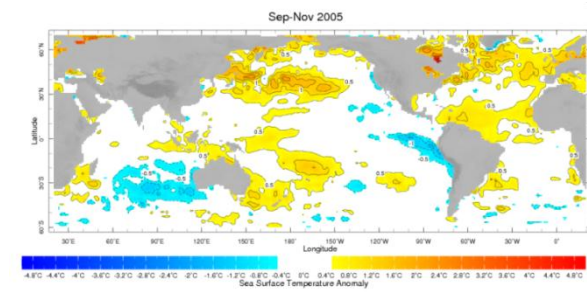
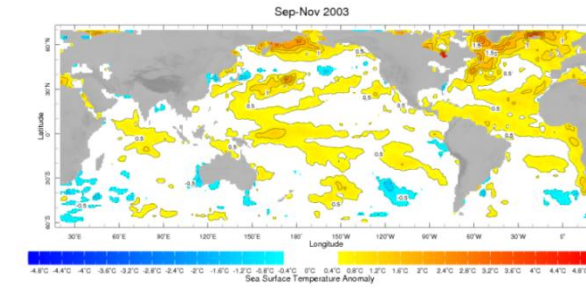
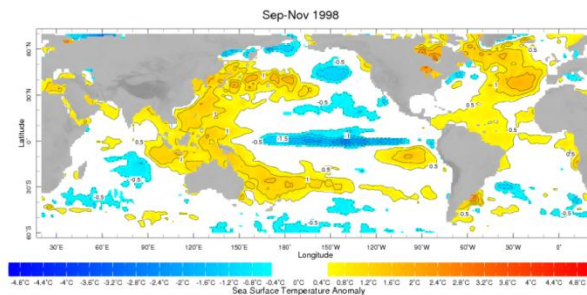
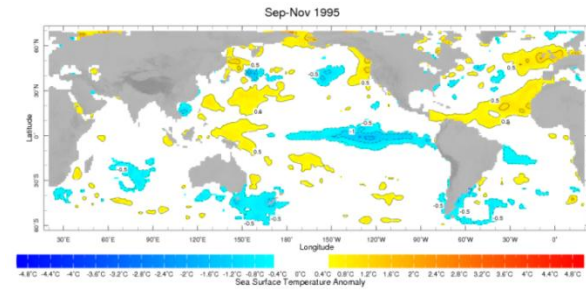
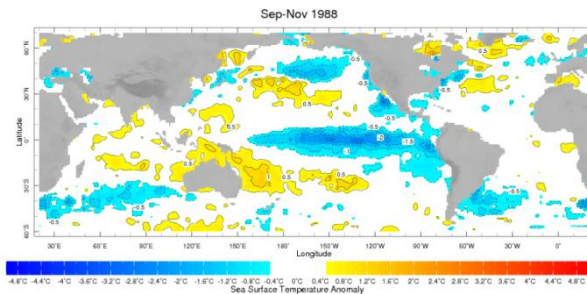
# OBSERVED SSTA FOR JAS 1988, 1995, 1998, 2003, 2005, 2007, 2016 AND JAS 2020 FORECAST



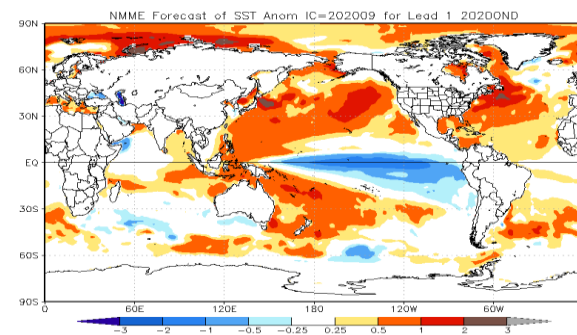
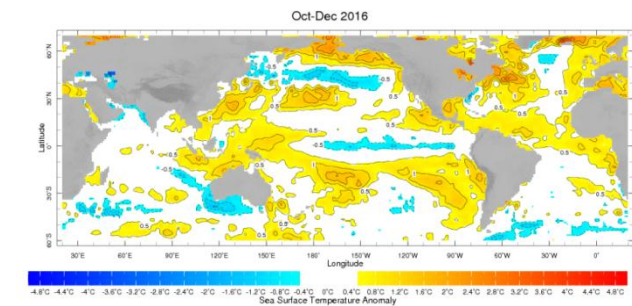
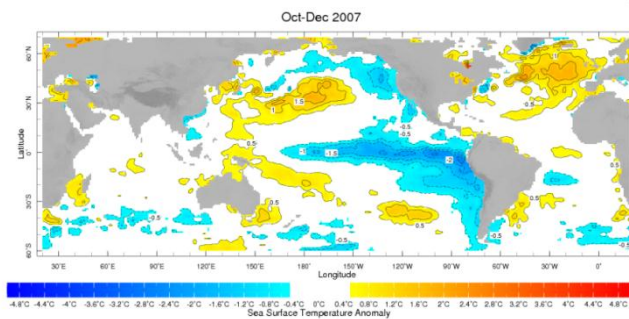
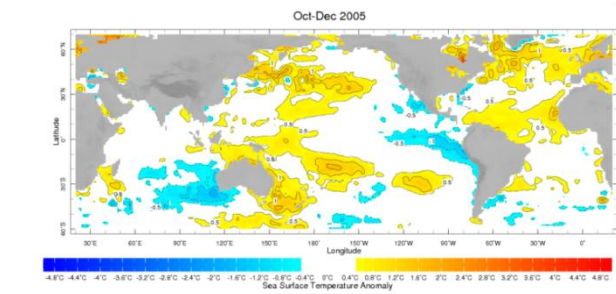
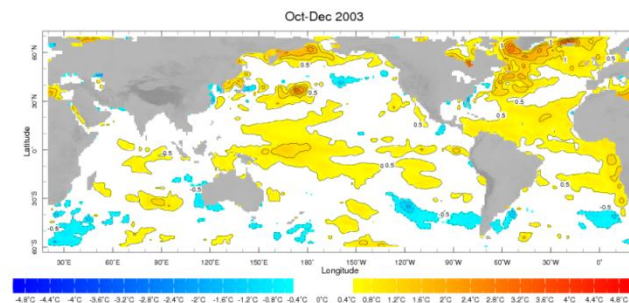
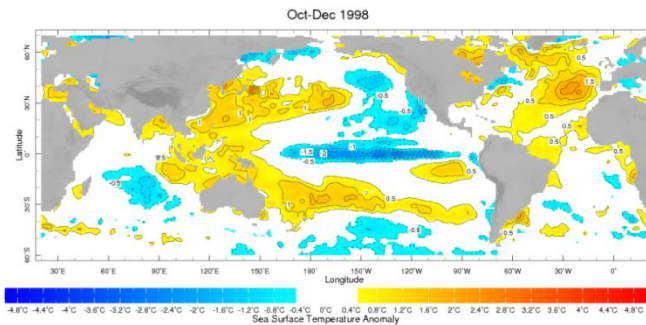
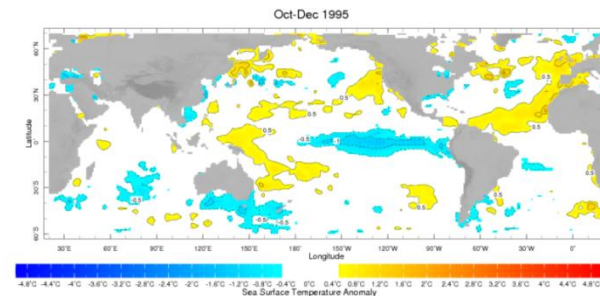
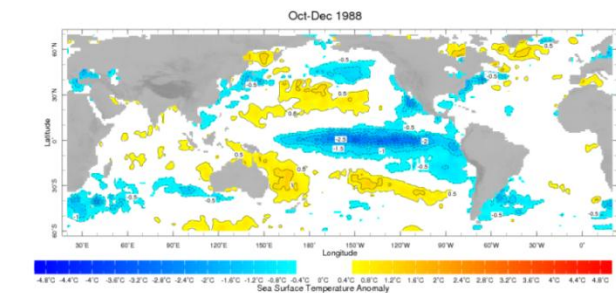
# OBSERVED SSTA FOR 1988, 1995, 1998, 2003, 2005, 2007, 2016 AND ASO 2020 FORECAST



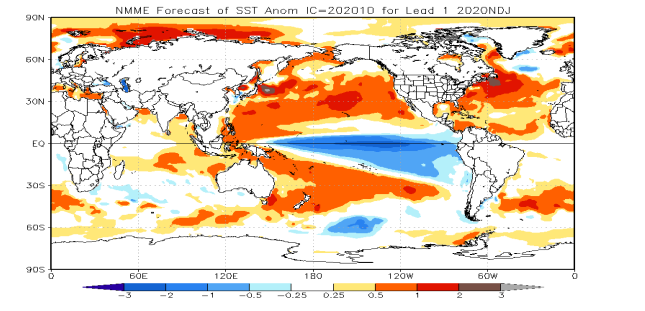
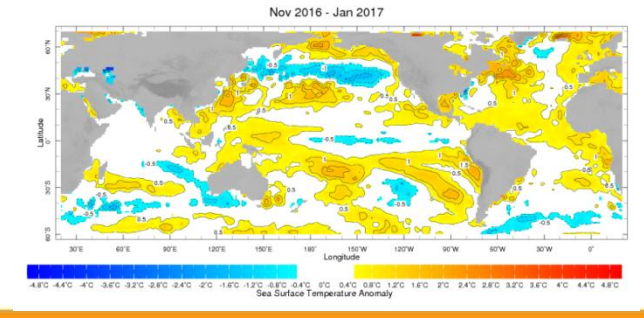
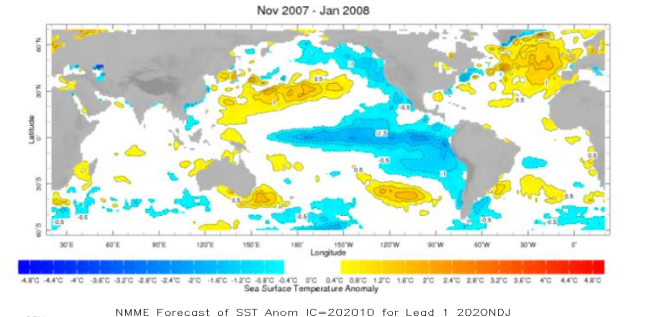
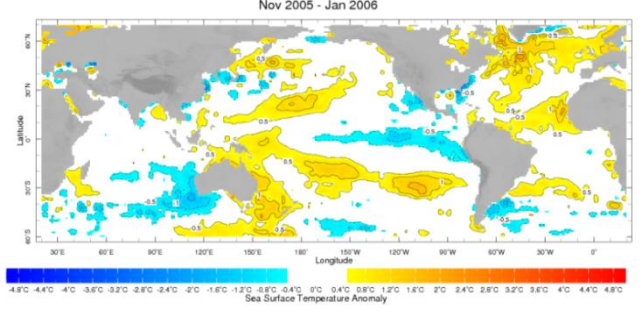
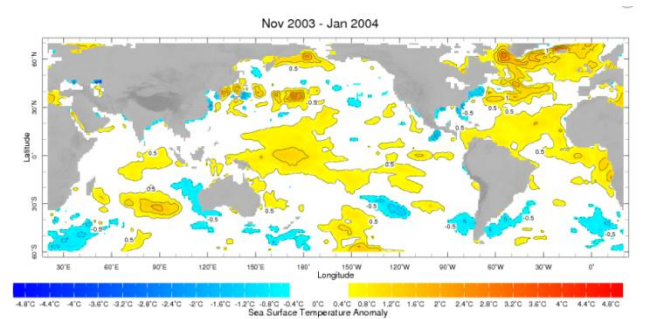
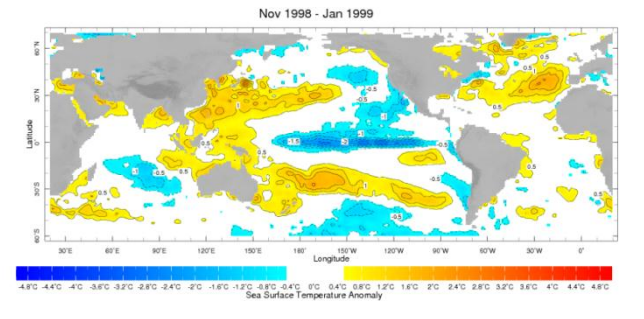
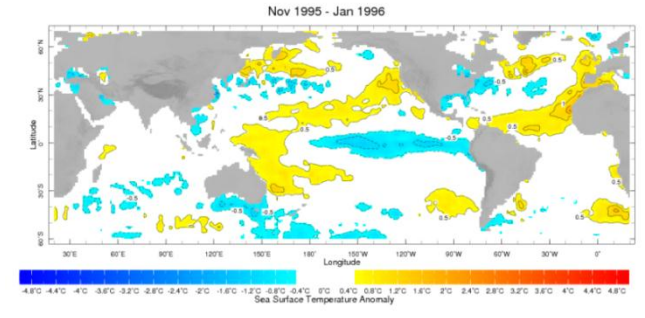
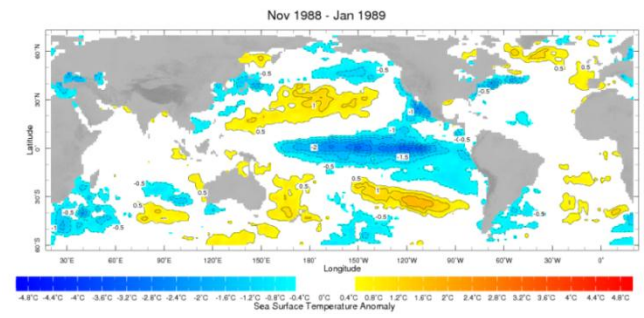
# OBSERVED SSTA FOR SON 1988, 1995, 1998, 2003, 2005, 2007, 2016 AND SON 2020 FORECAST



# OBSERVED SSTA FOR OND 1988, 1995, 1998, 2003, 2005, 2007, 2016 AND OND 2020 FORECAST

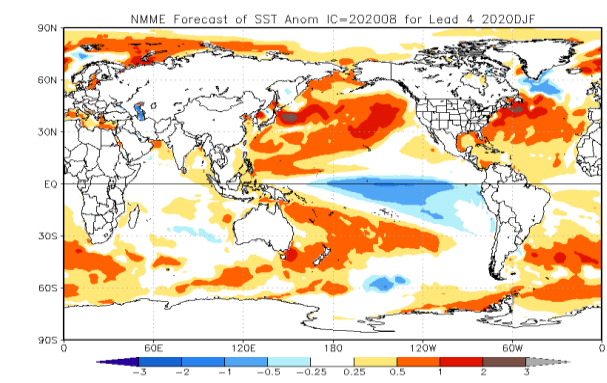
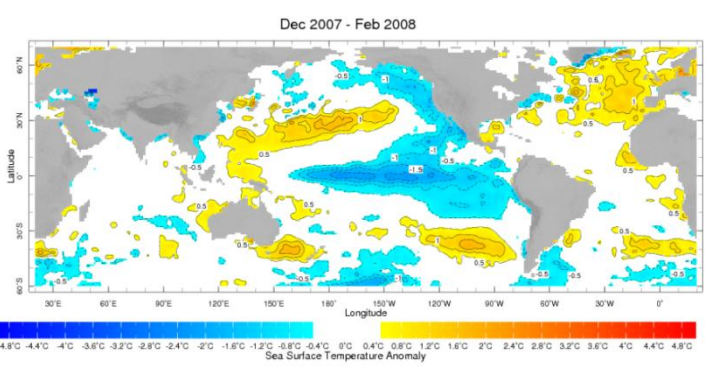
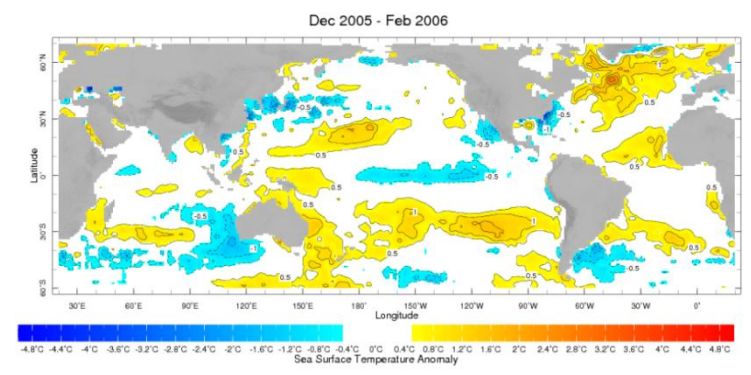
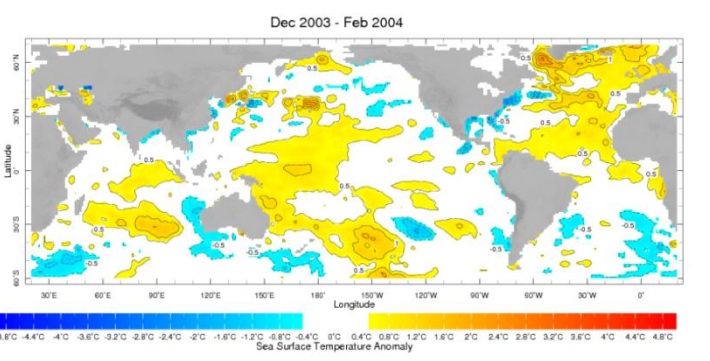
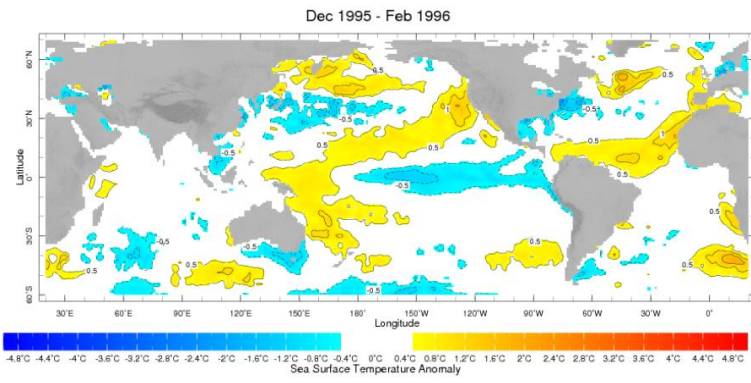
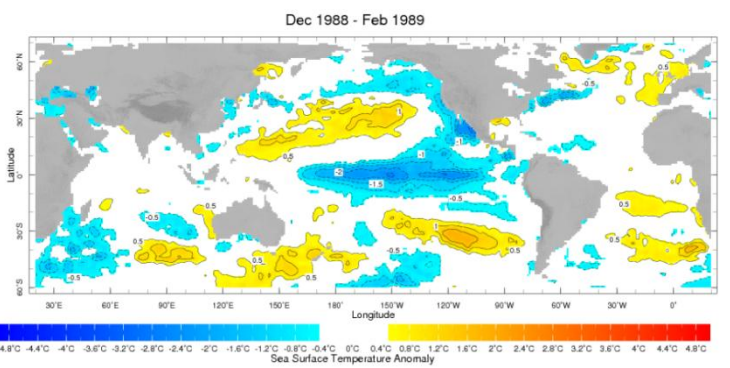


# OBSERVED SSTA FOR NDF 1988-89, 1995-96,1998-99 2003-04, 2005-06, 2007-08, 2016-17 AND NDJ 2020-21 FORECAST





# OBSERVED SSTA FOR DJF 1988-89, 1995-96, 1998-99 2003-04, 2005-06, 2007-08, 2016-17 AND DJF 2020-21 FORECAST



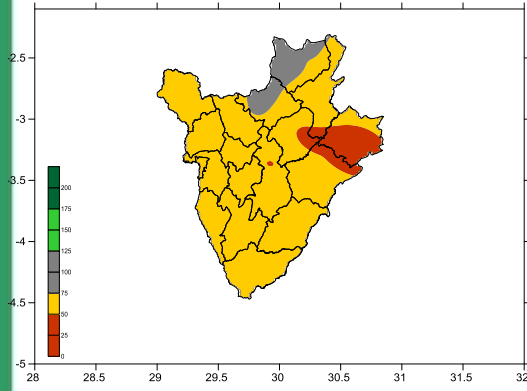
# **PRECIPITATION DES ANNEES ANALOGUES**



# PRECIPITATION EN POURCENTAGE DES ANNEES ANALOGUES POUR LA SAISON NDJ [1988-89, 1995-96, 2005-06, 2007-08 ET 2016-17 ]

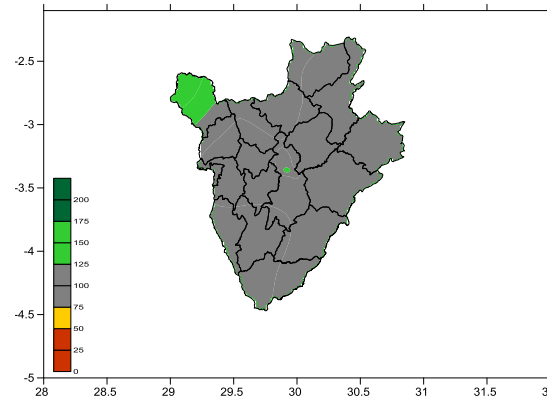
## NDJ 1988-89

BURUNDI NOV-DEC-JAN ANALOG YEAR 1988



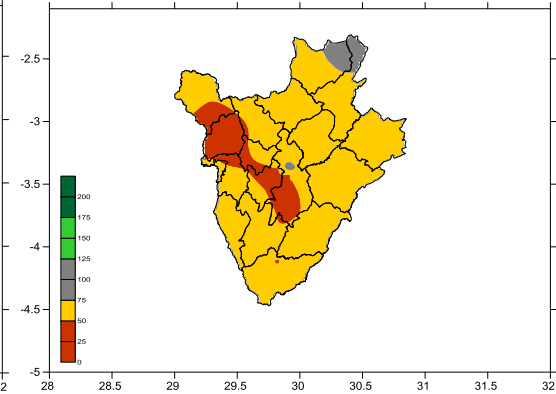
## NDJ 1995-96

BURUNDI NOV-DEC-JAN ANALOG YEAR 1995



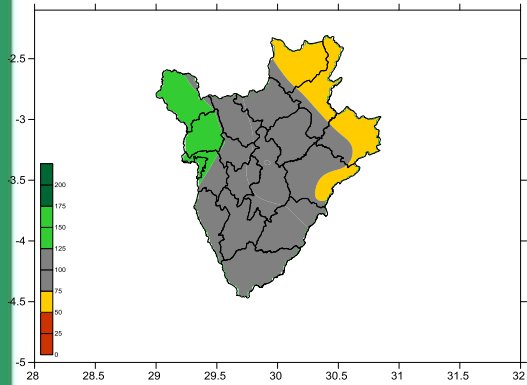
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BURUNDI NOV-DEC-JAN ANALOG YEAR 1998



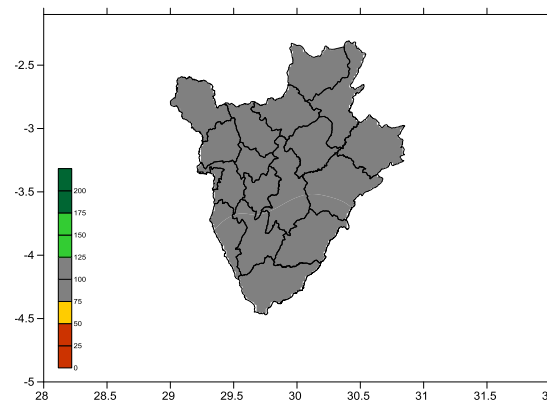
## NDJ 2005-06

BURUNDI NOV-DEC-JAN ANALOG YEAR 2005



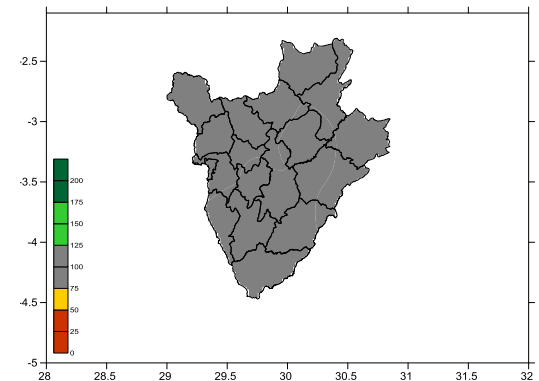
## NDJ 2007-08

BURUNDI NOV-DEC-JAN ANALOG YEAR 2007



## NDJ 2016-17

BURUNDI NOV-DEC-JAN ANALOG YEAR 2016

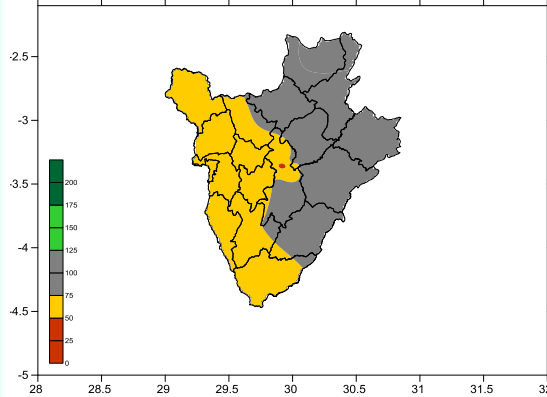




# PRECIPITATION EN POURCENTAGE DES ANNEES ANALOGUES POUR LA SAISON DJF [1988-89, 1995-96, 2005-06, 2007-08 ET 2016-17 ]

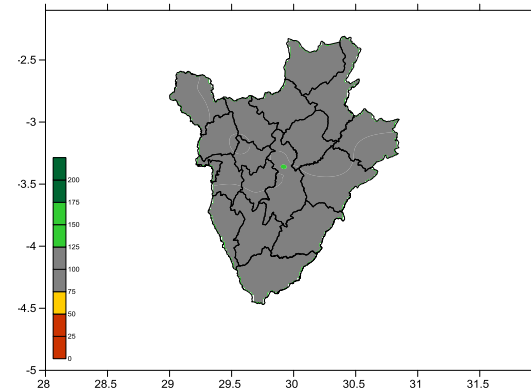
## DJF 1988-89

BURUNDI DEC-JAN-FEB ANALOG YEAR 1988



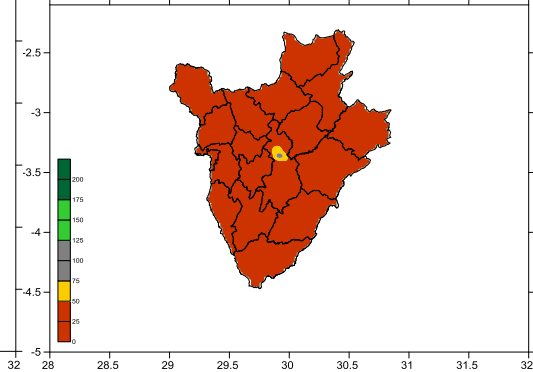
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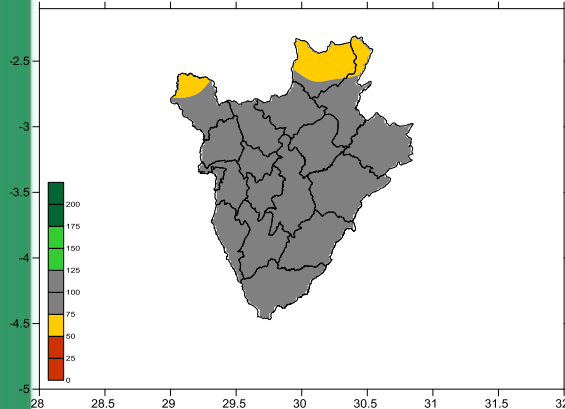
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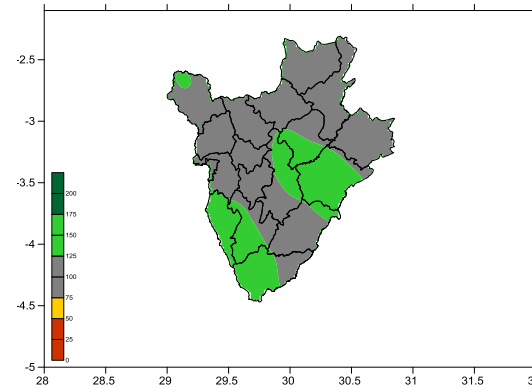
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BURUNDI DEC-JAN-FEB ANALOG YEAR 2005



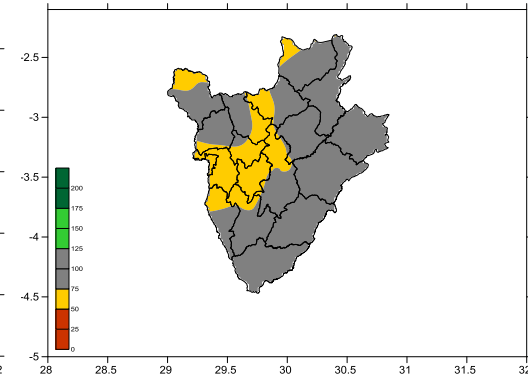
## DJF 2007-08

BURUNDI DEC-JAN-FEB ANALOG YEAR 2007



## DJF 2016-17

BURUNDI DEC-JAN-FEB ANALOG YEAR 2016

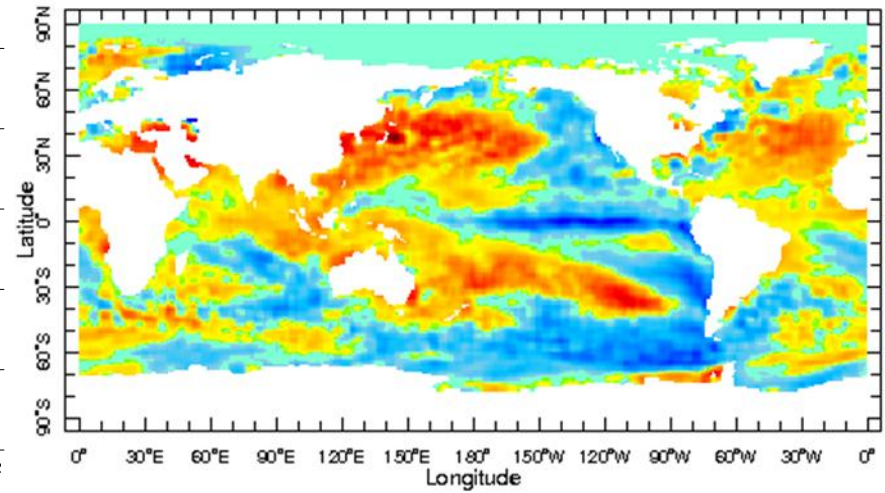
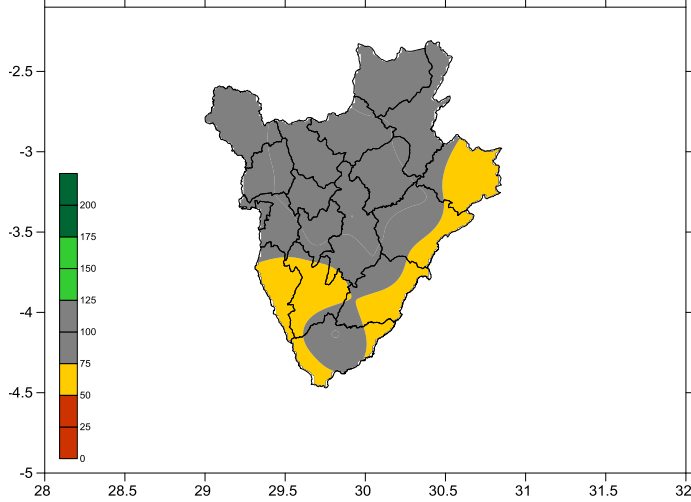




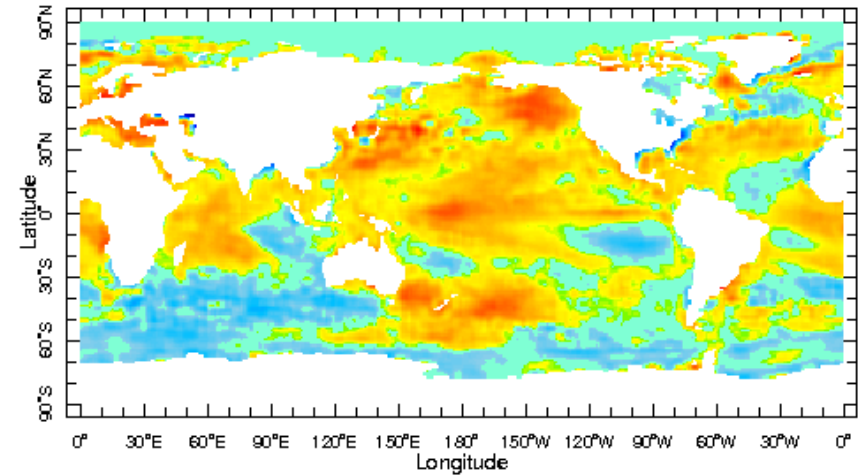
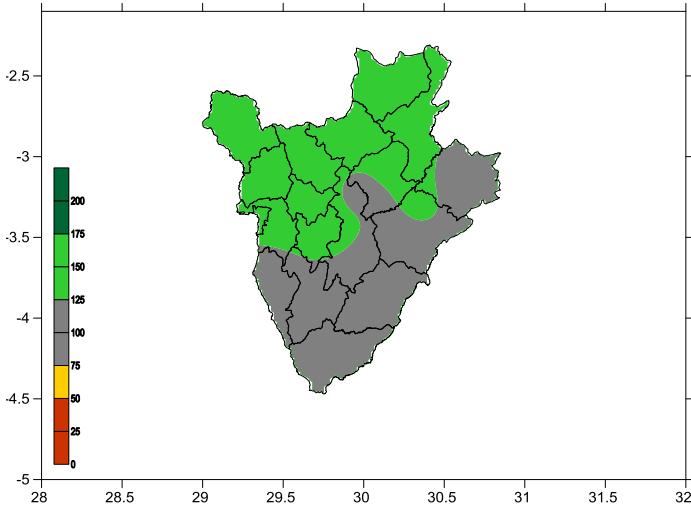
## ANALYSE DES ANNEES SECHES ET HUMIDES

# COMPOSITE DE SST ET PRECIPITATION NDJ

PRECIPITATION DES ANNEES SECHES NOV-DEC-JAN

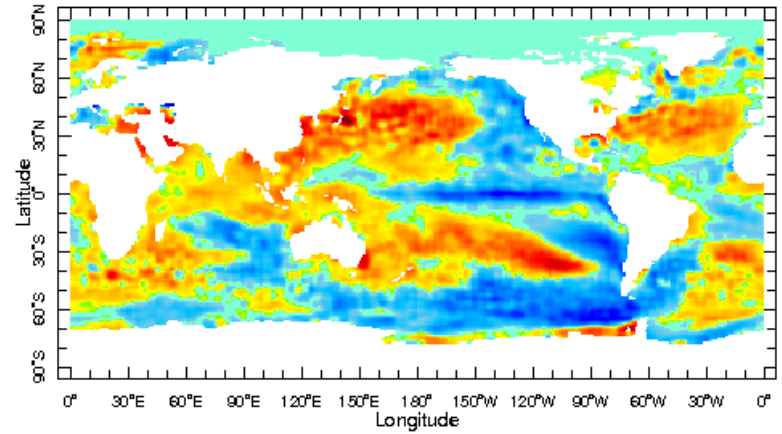
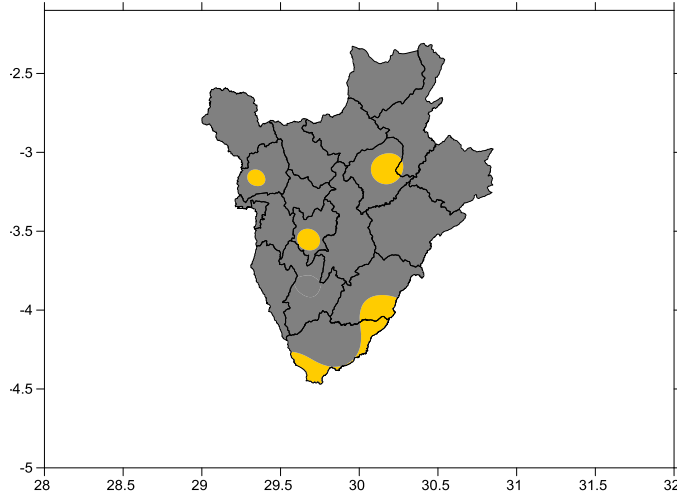


PRECIPITATION DES ANNEES HUMIDES NOV-DEC-JAN

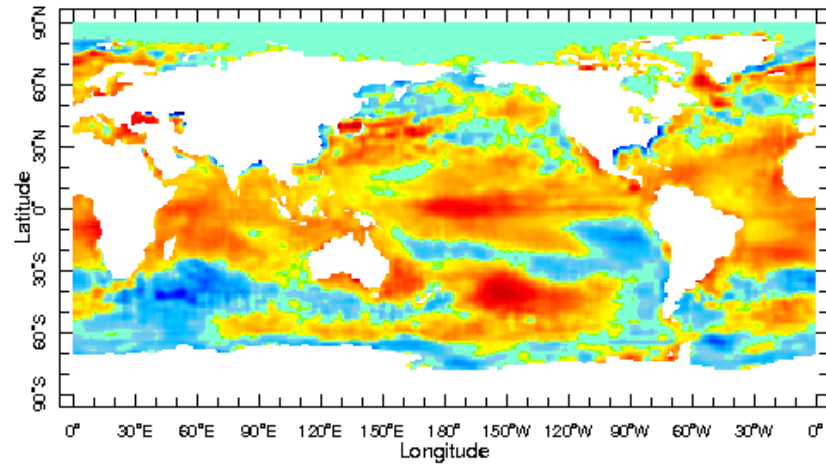
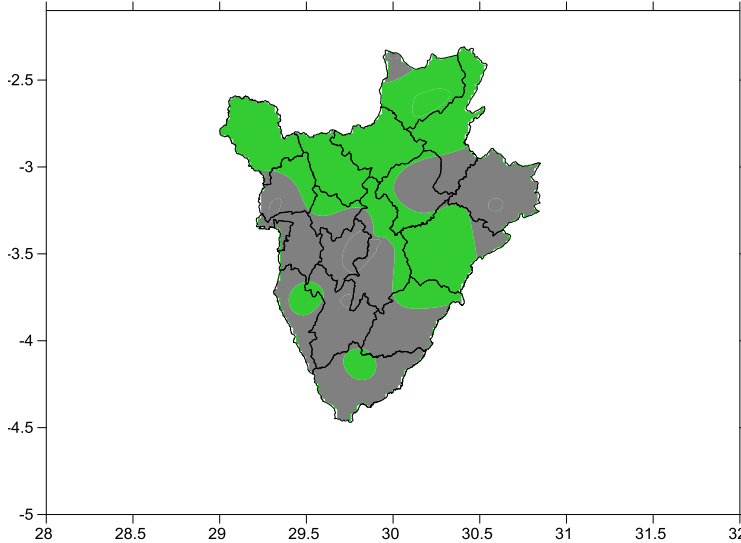


# COMPOSITE DE SST ET PRECIPITATION DJF

PRECIPITATION DES ANNEES SECHES DEC-JAN-FEB



PRECIPITATION DES ANNEES HUMIDES DEC-JAN-FEB





## ANALYSE DE CUMUL DES PRECIPITATION JOURNALIERE

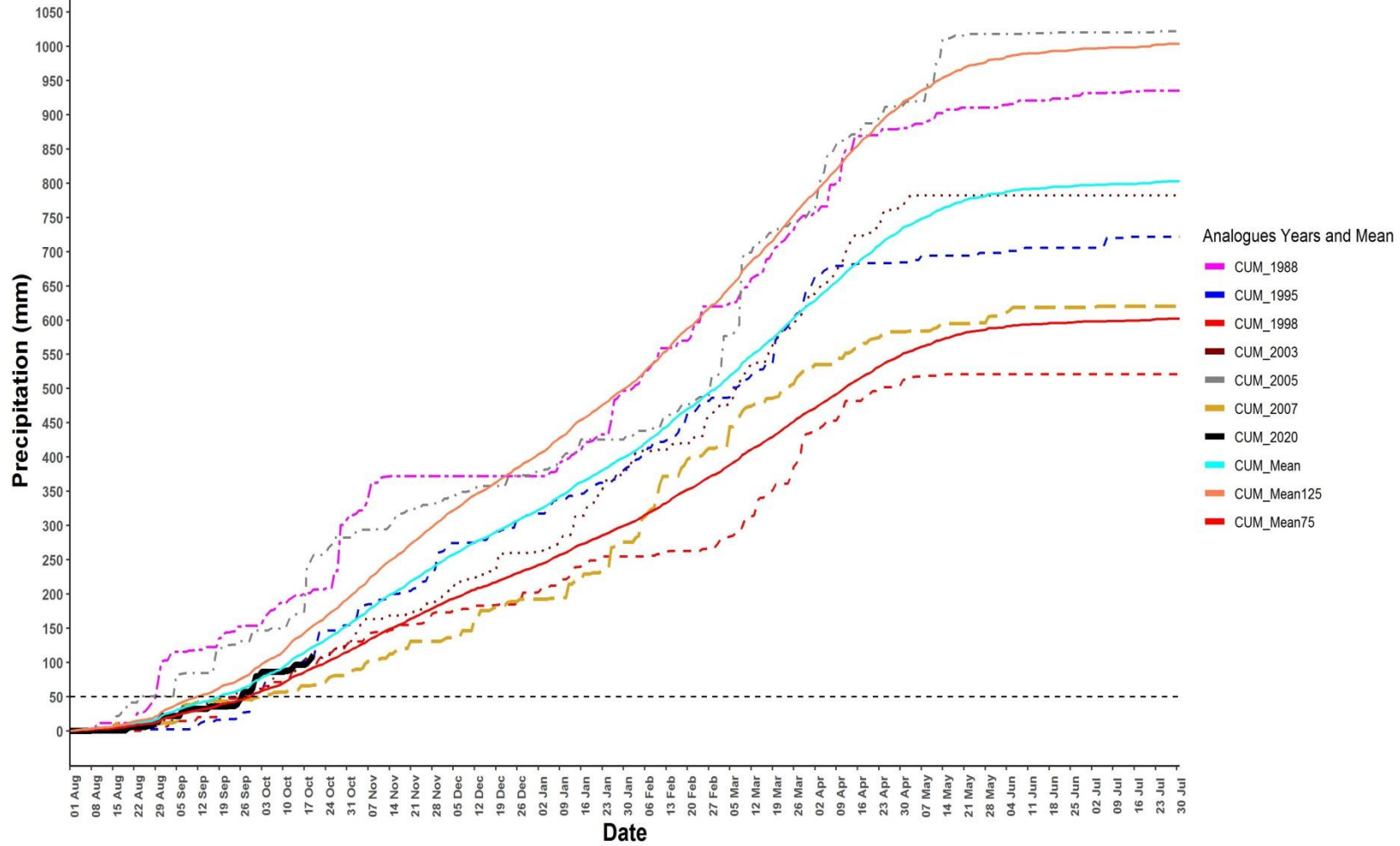




# **GRAPHIQUE DU PROFIL DE PRECIPITATION JOURNALIERE**

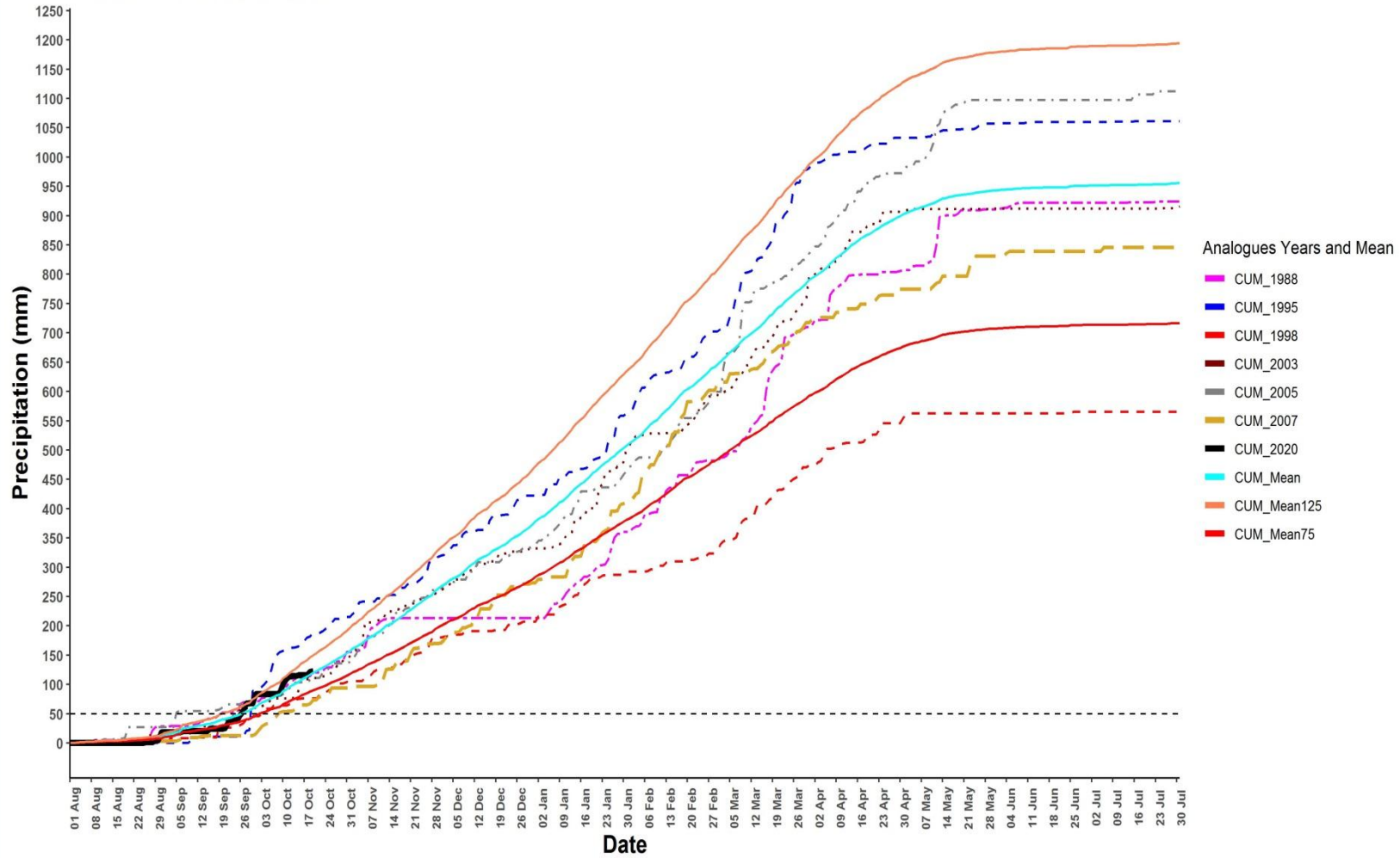


BURUNDI  
Rainfall Profile BUGABIRA



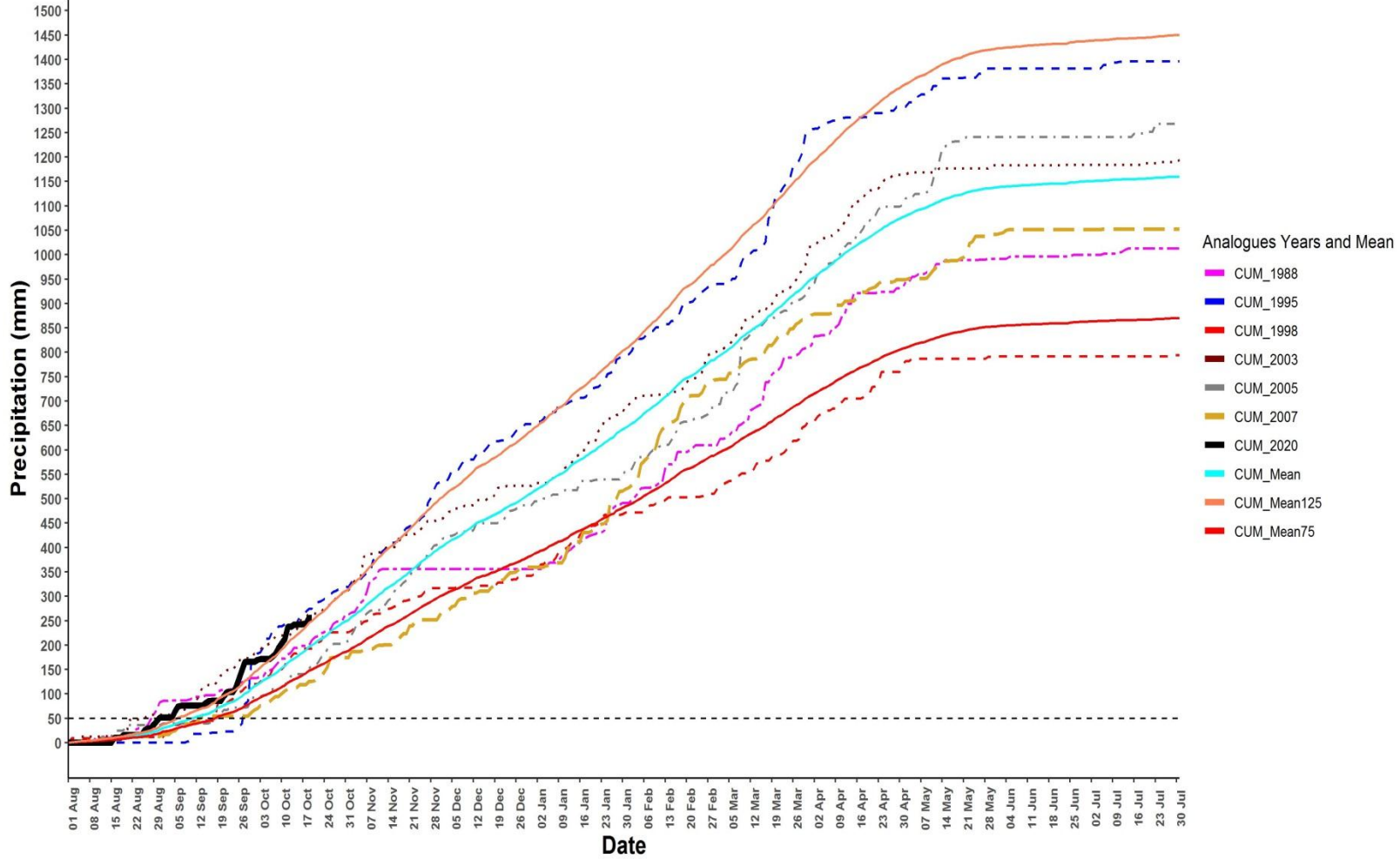


BURUNDI  
Rainfall Profile BUGARAMA-Commune



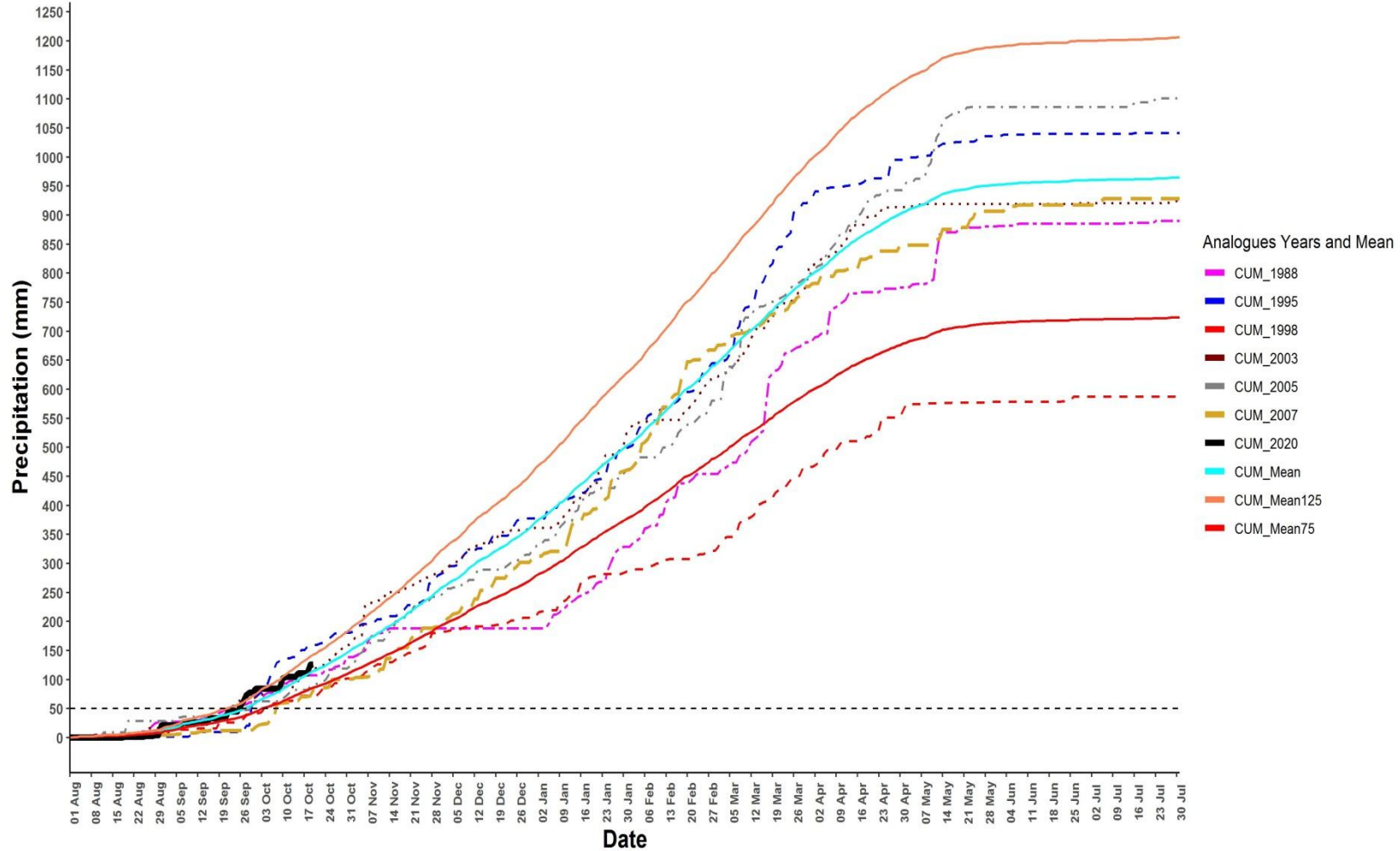


BURUNDI  
Rainfall Profile BUHORO





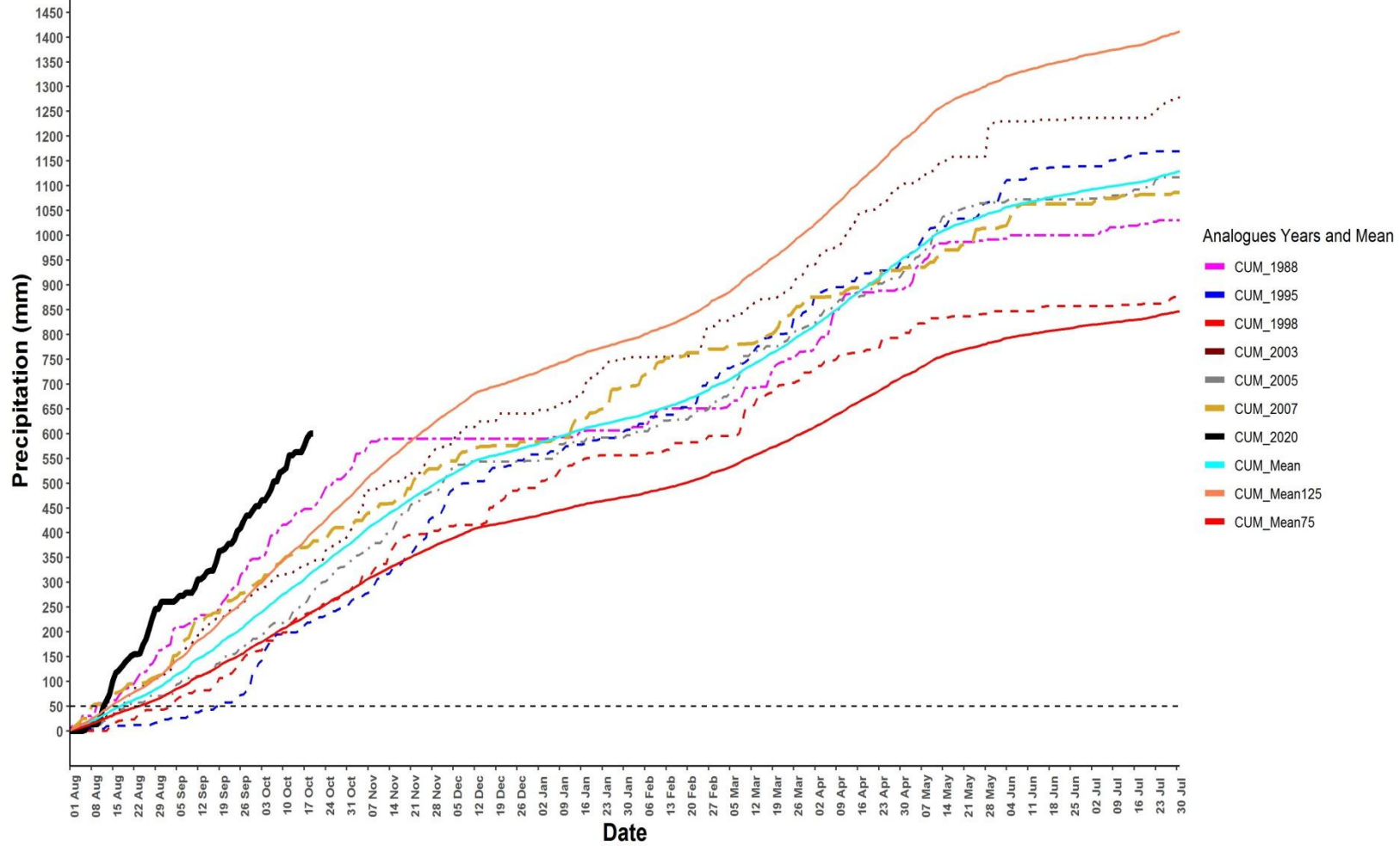
BURUNDI  
Rainfall Profile BUJUMBURA-AERO





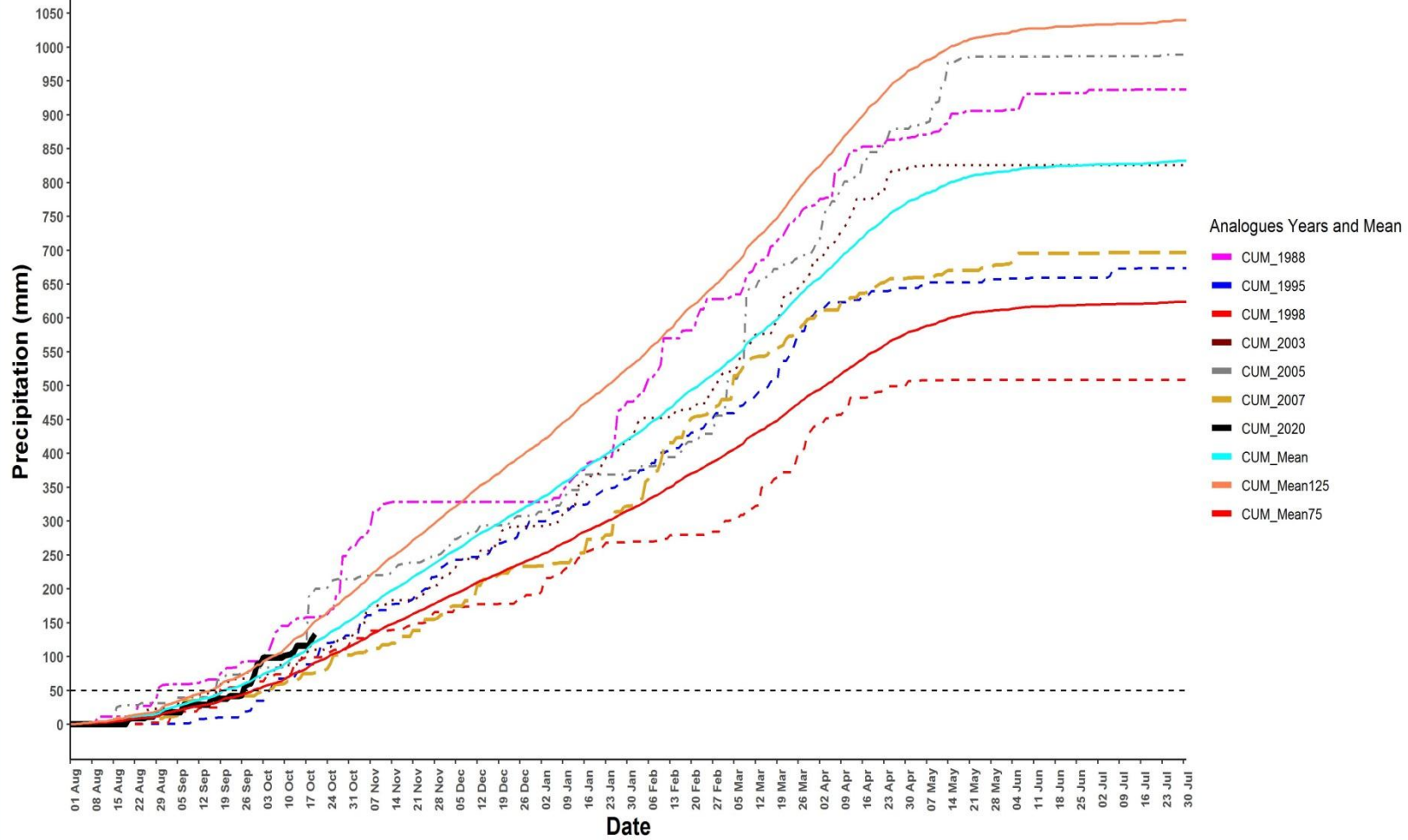
# BURUNDI

Rainfall Profile BURASIRA-S\_minaire



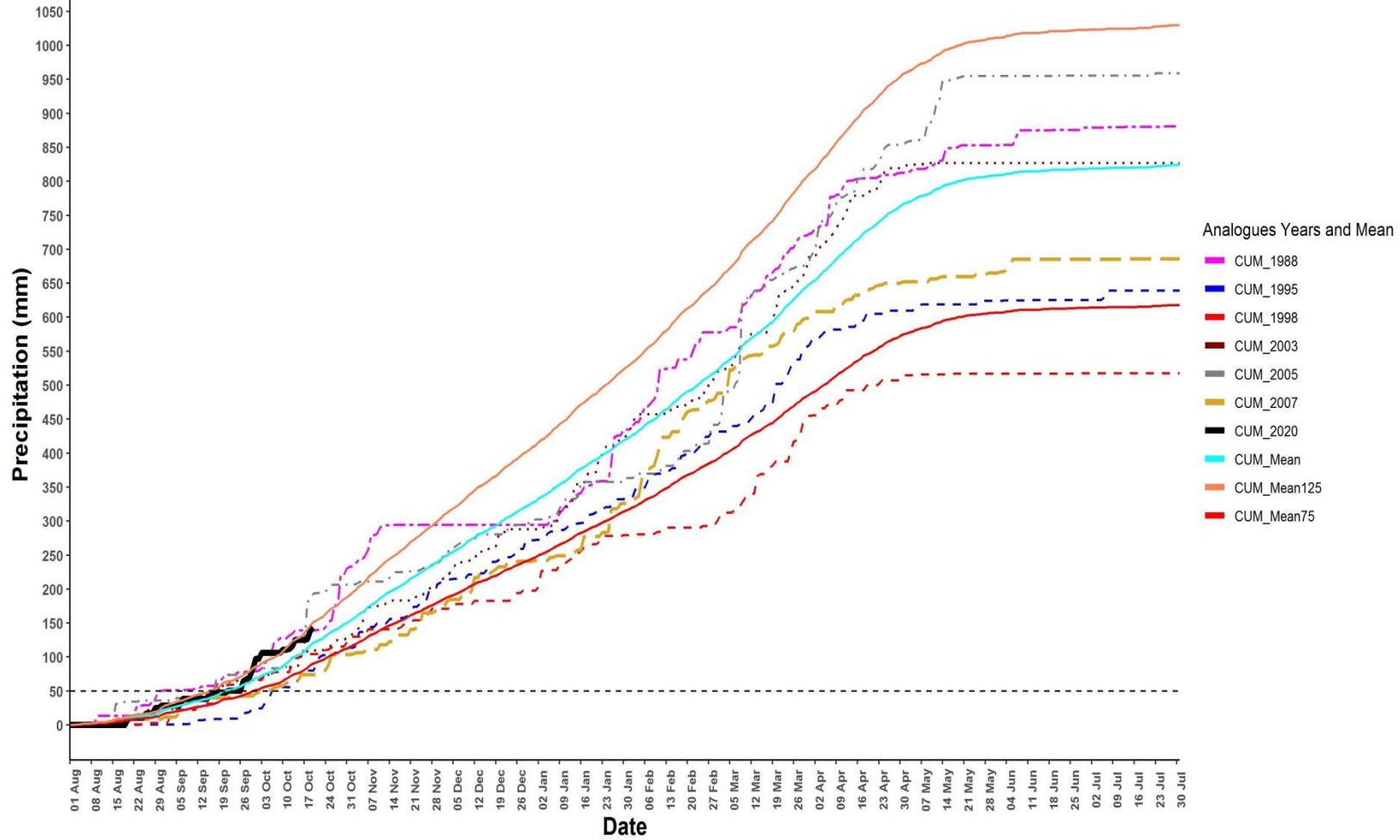


BURUNDI  
Rainfall Profile BUSONI





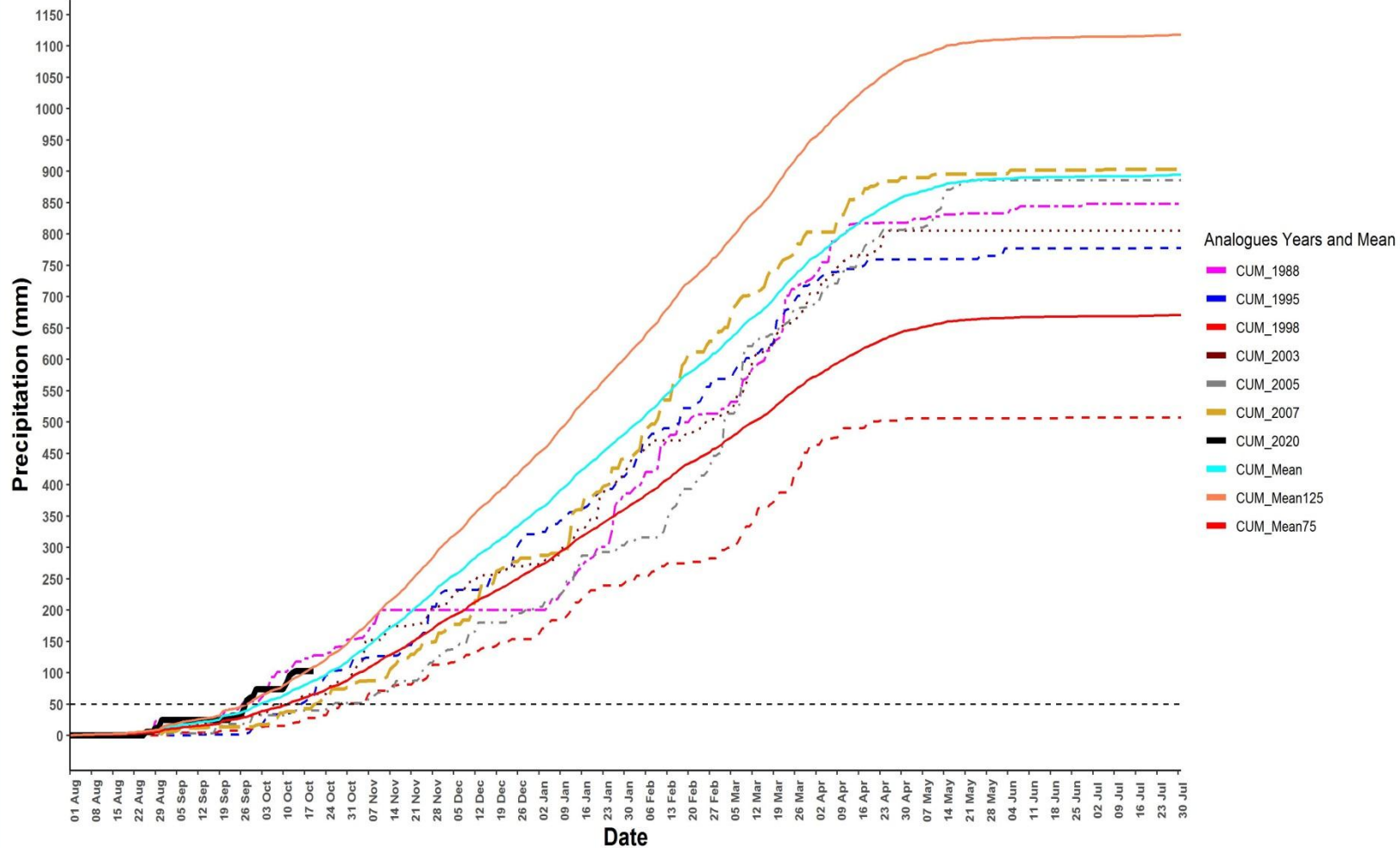
BURUNDI  
Rainfall Profile BWAMBARANGWE





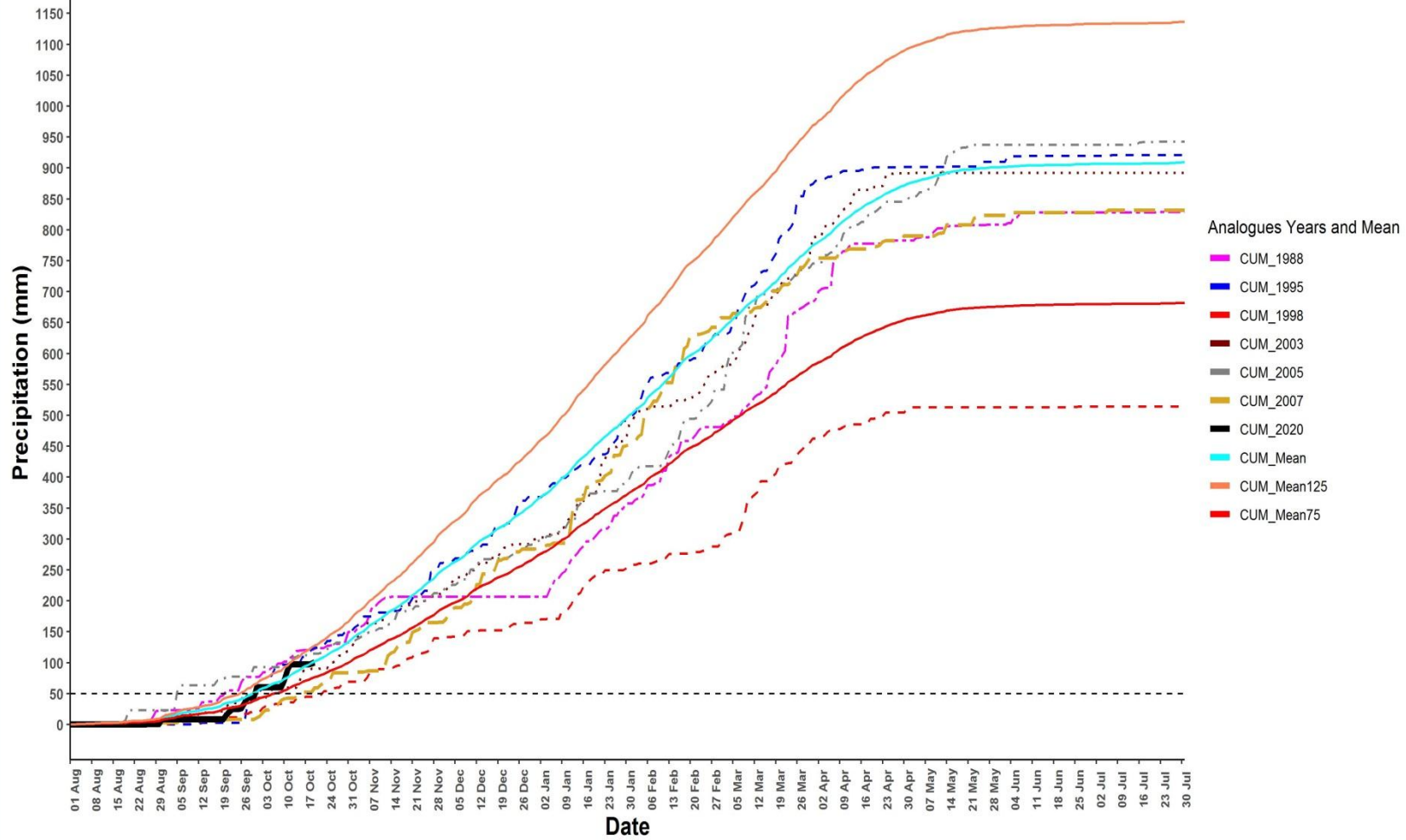


BURUNDI  
Rainfall Profile CANKUZO-PROJET



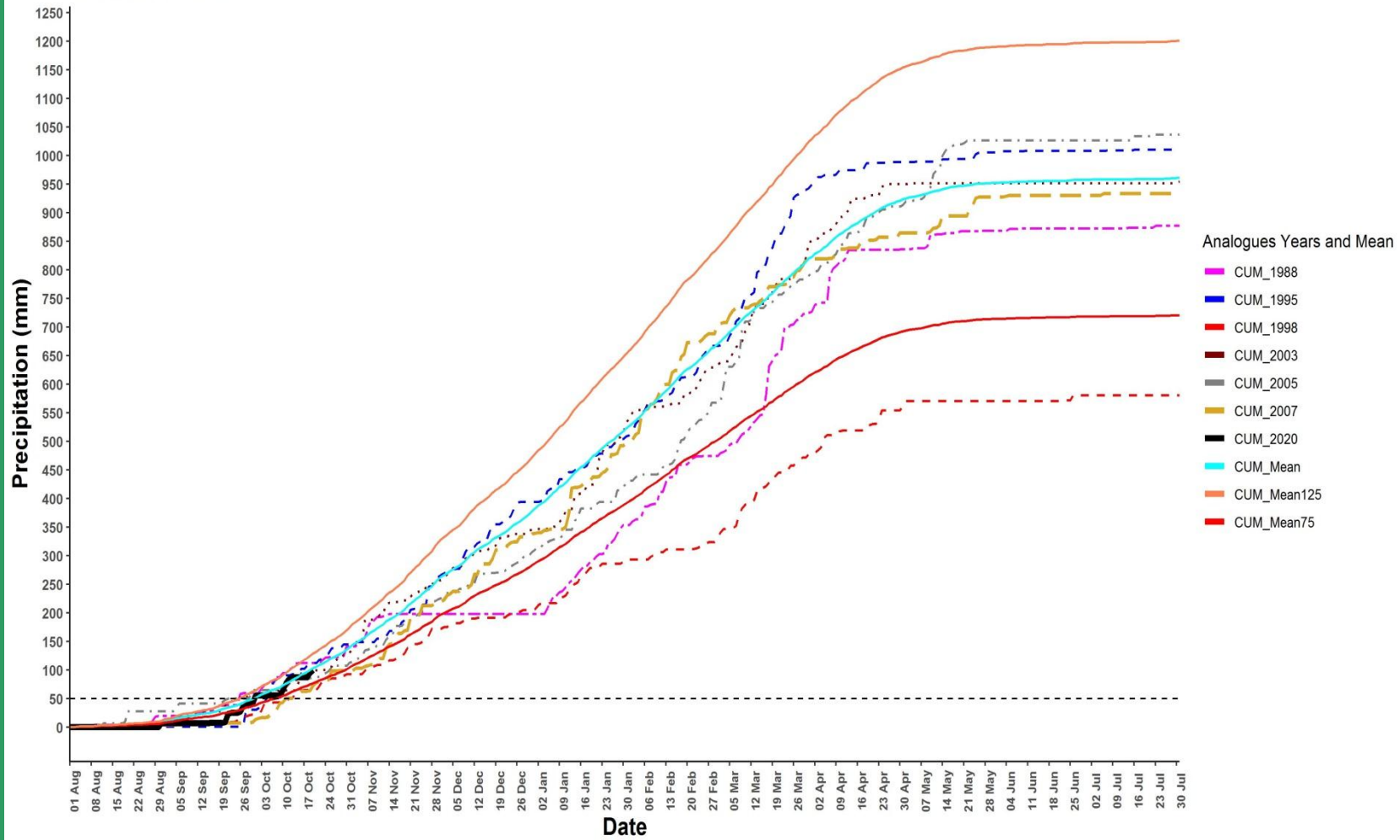


BURUNDI  
Rainfall Profile GIHETA



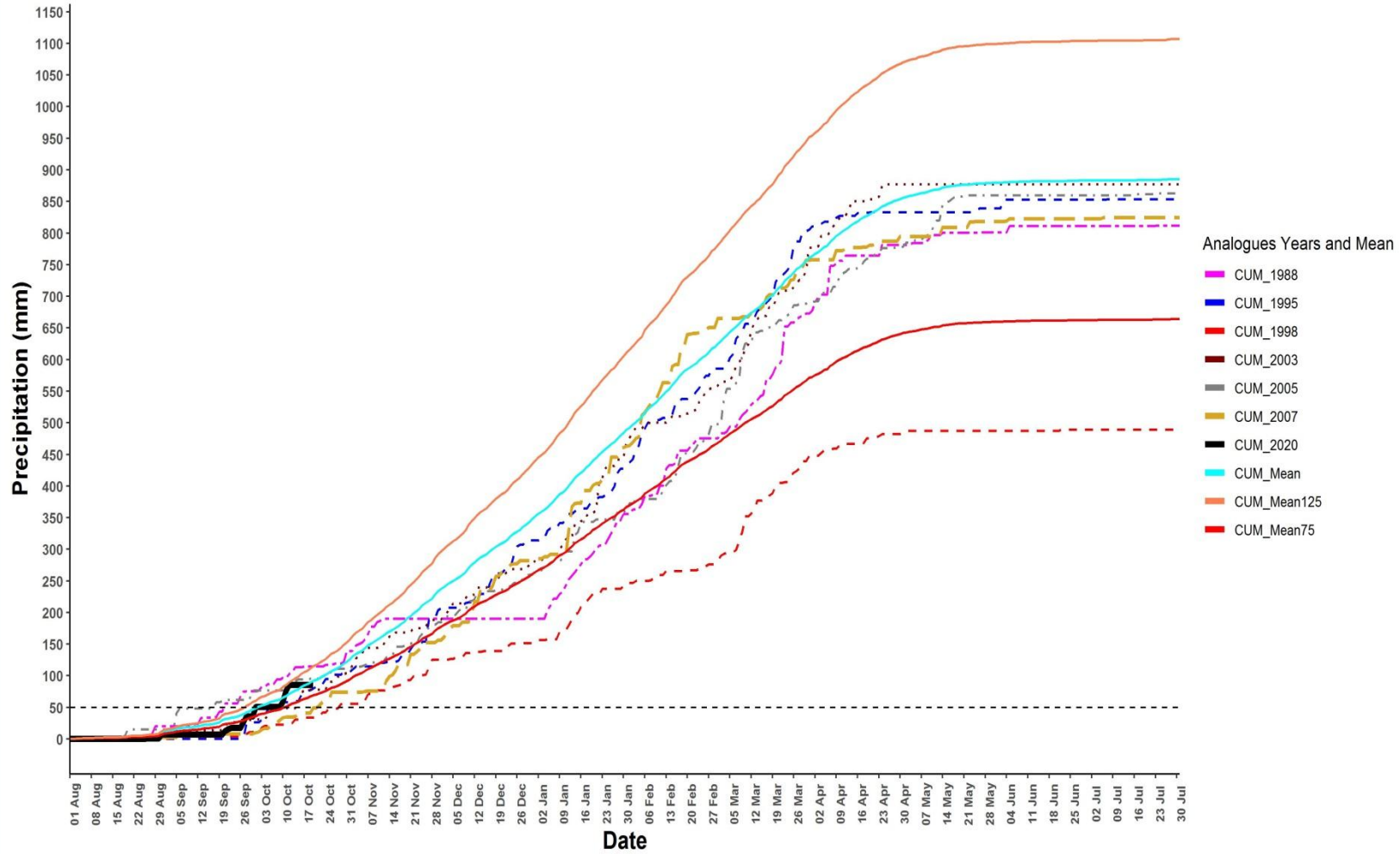


BURUNDI  
Rainfall Profile GISOZI



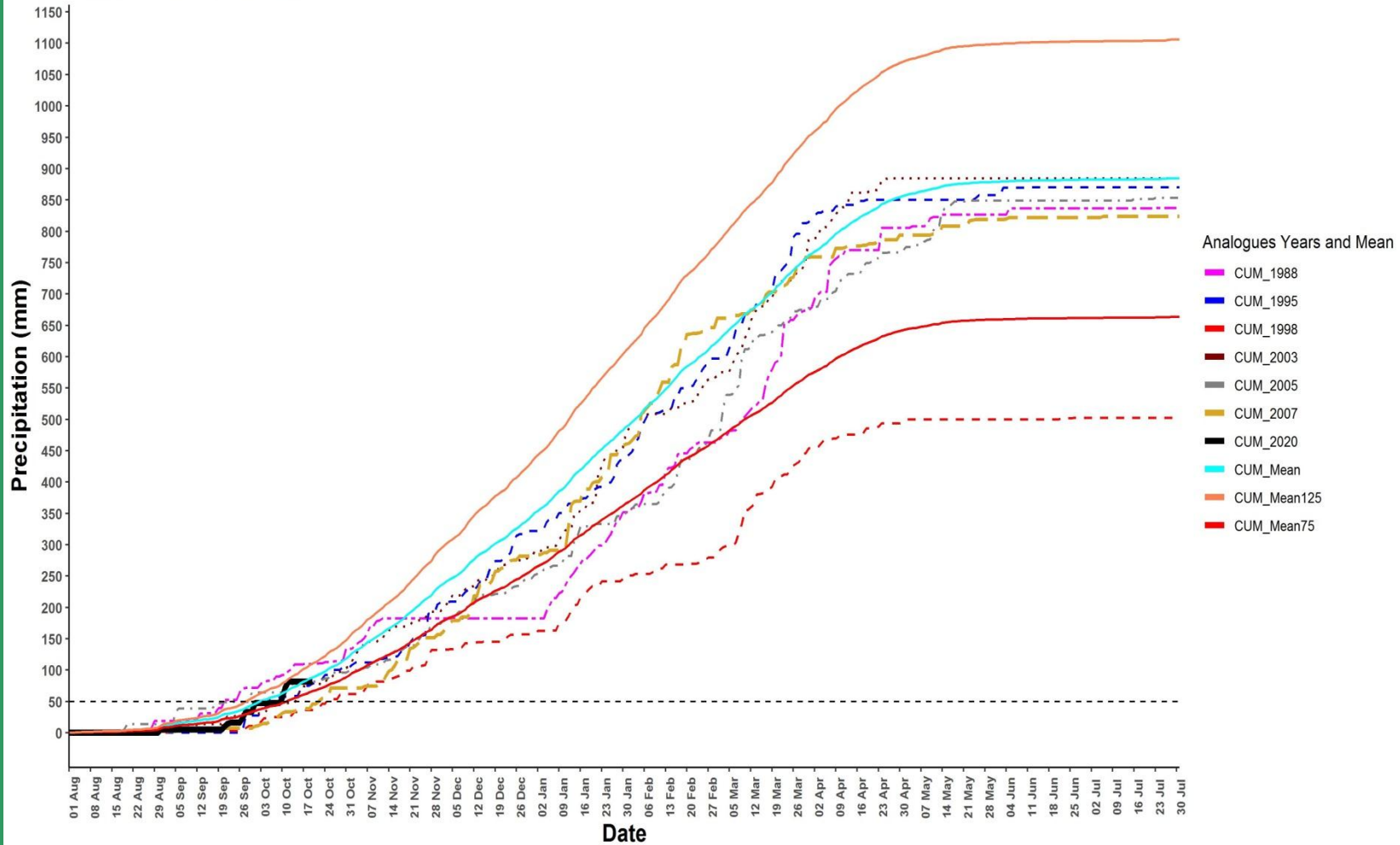


BURUNDI  
Rainfall Profile GITEGA\_Zege



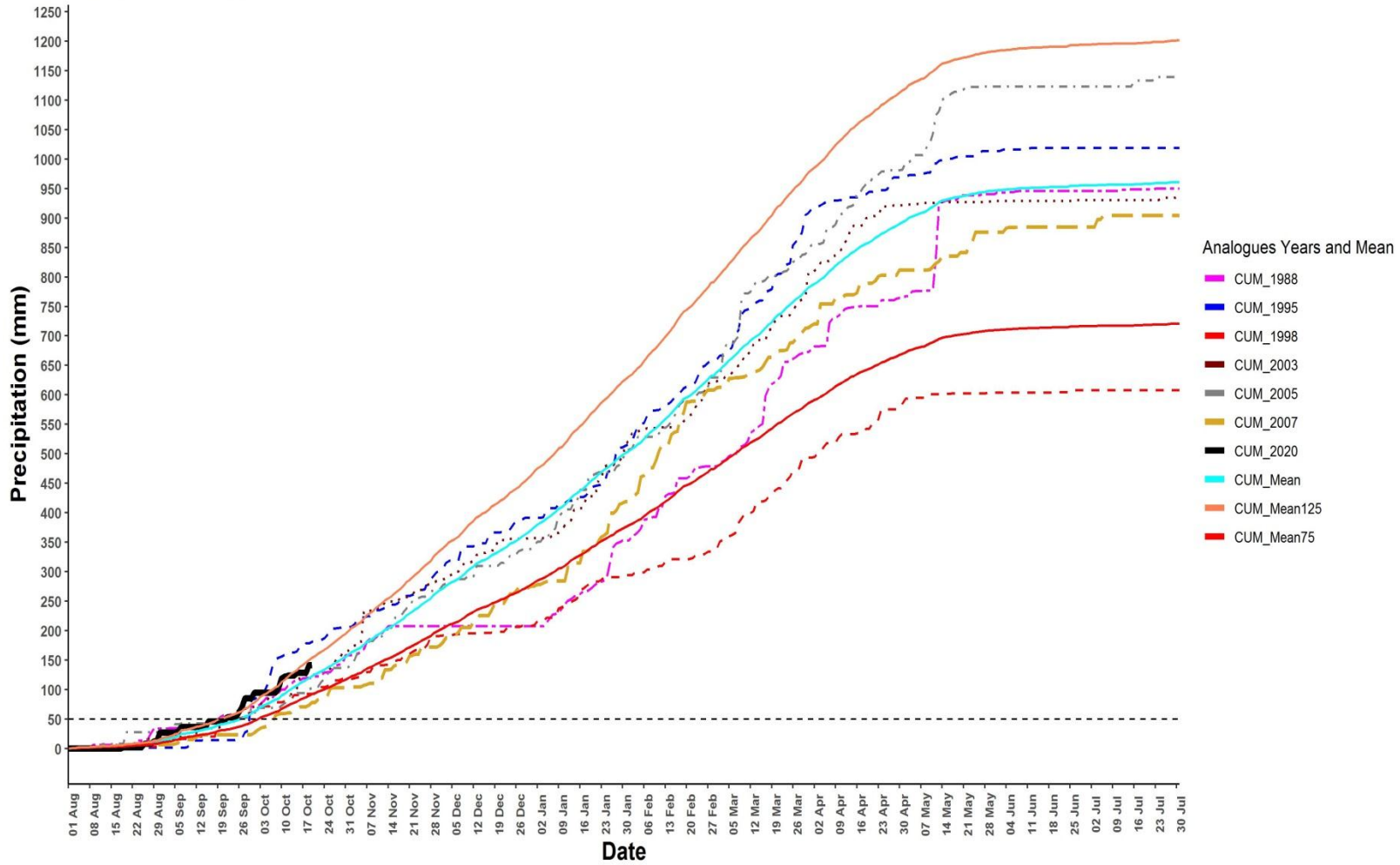


BURUNDI  
Rainfall Profile GITEGA-Aerodrome



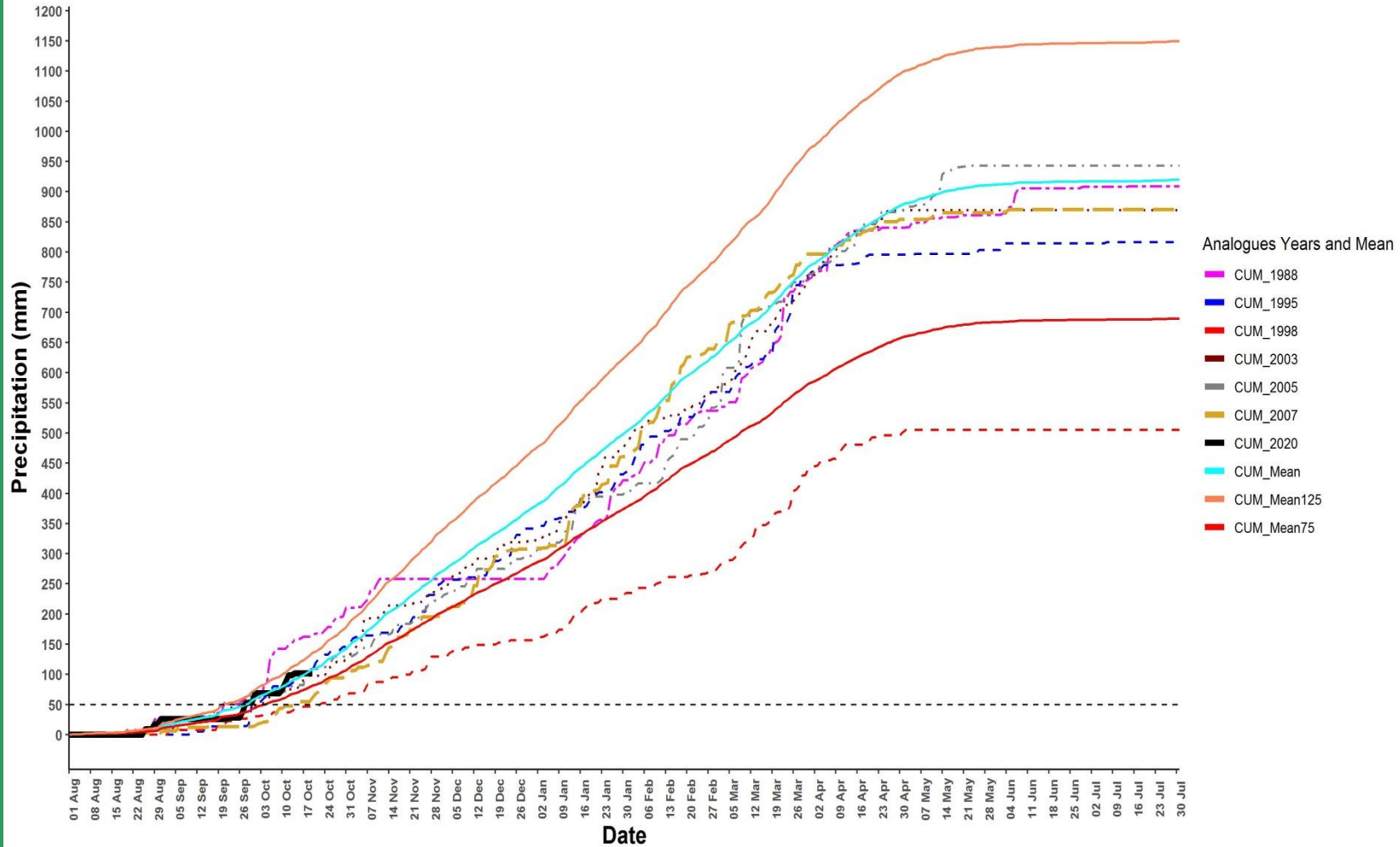


BURUNDI  
Rainfall Profile IMBO -Sems



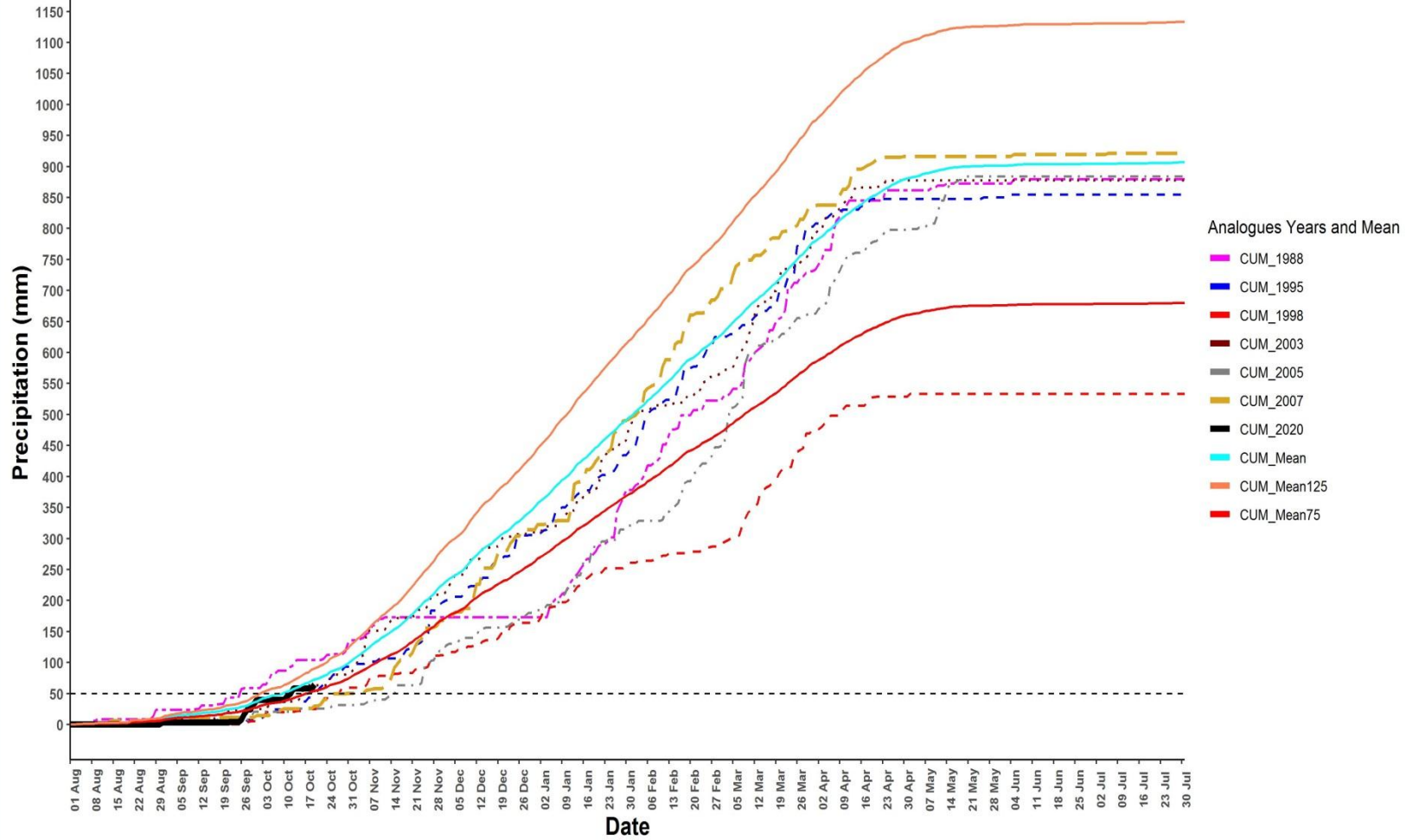


BURUNDI  
Rainfall Profile KARUZI





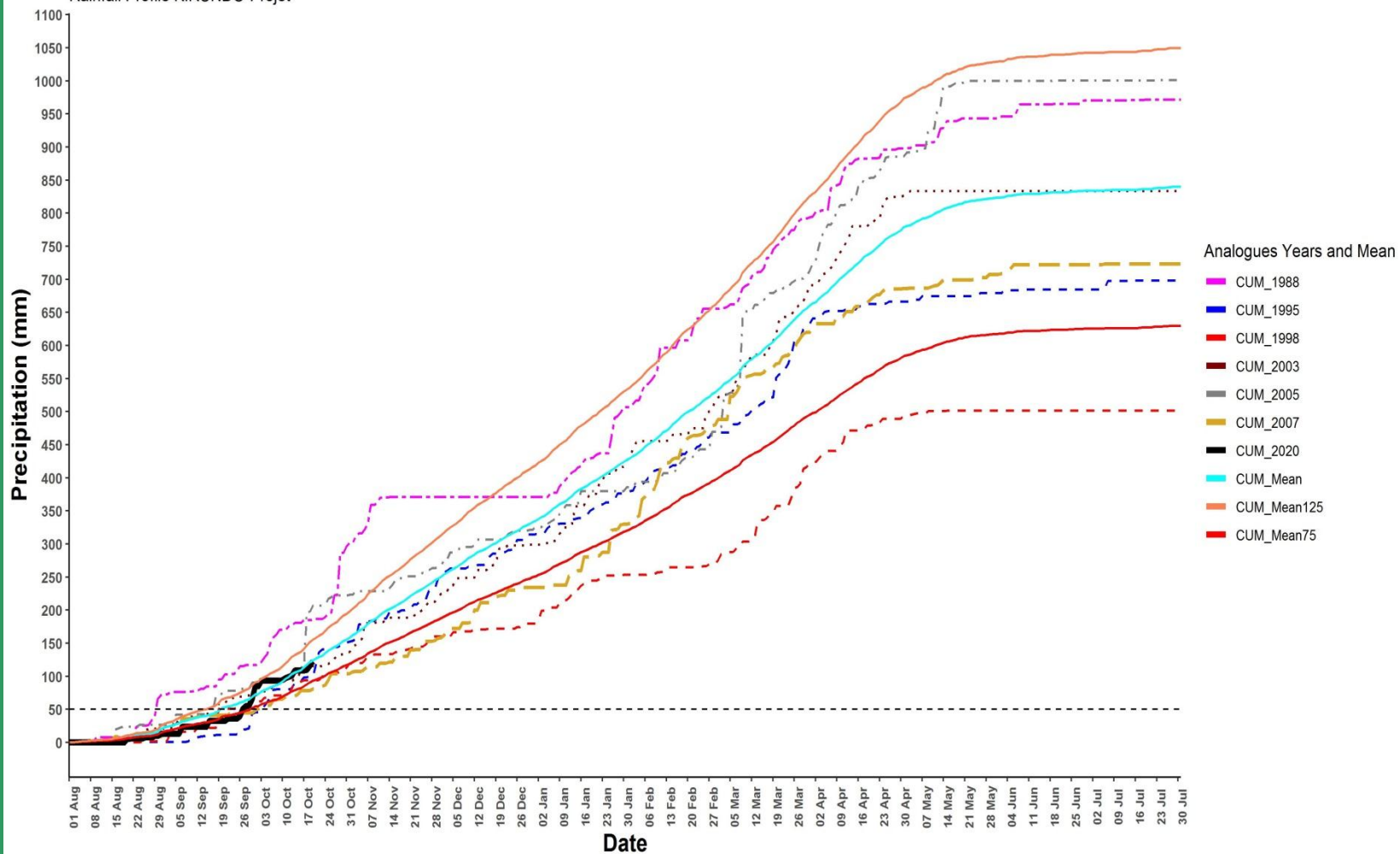
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Rainfall Profile KINYINYA





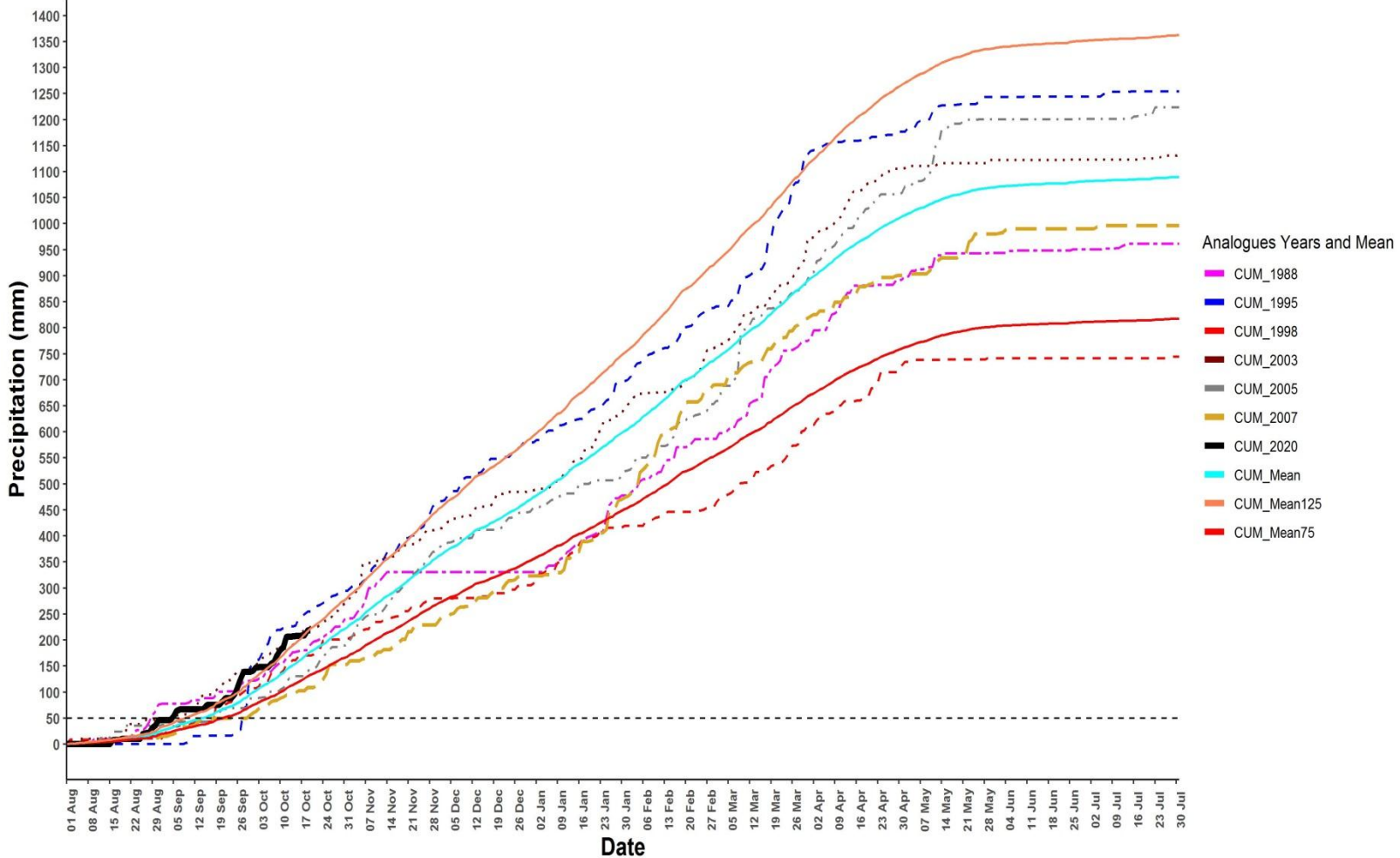


BURUNDI  
Rainfall Profile KIRUNDO-Projet



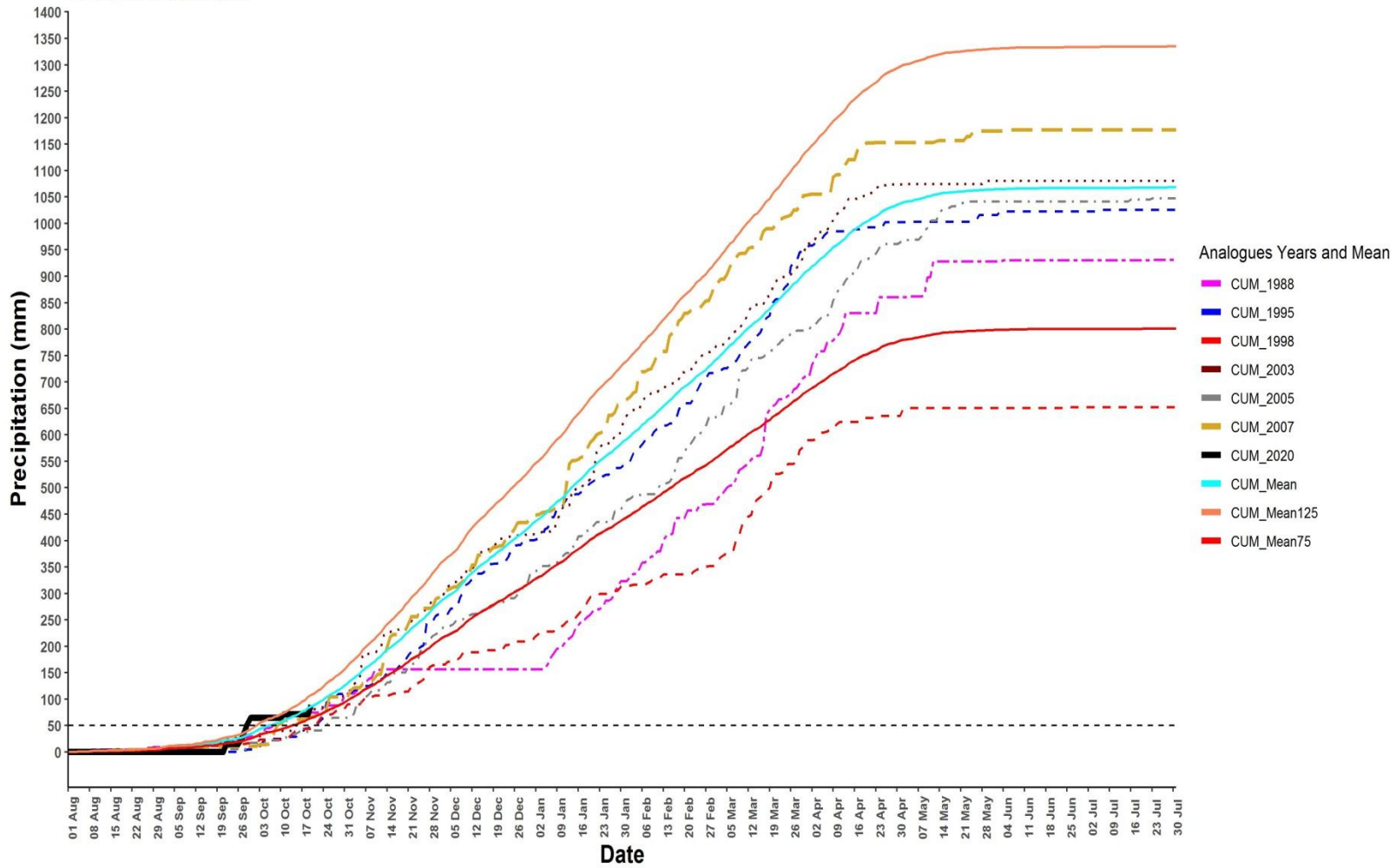


BURUNDI  
Rainfall Profile MABAYI



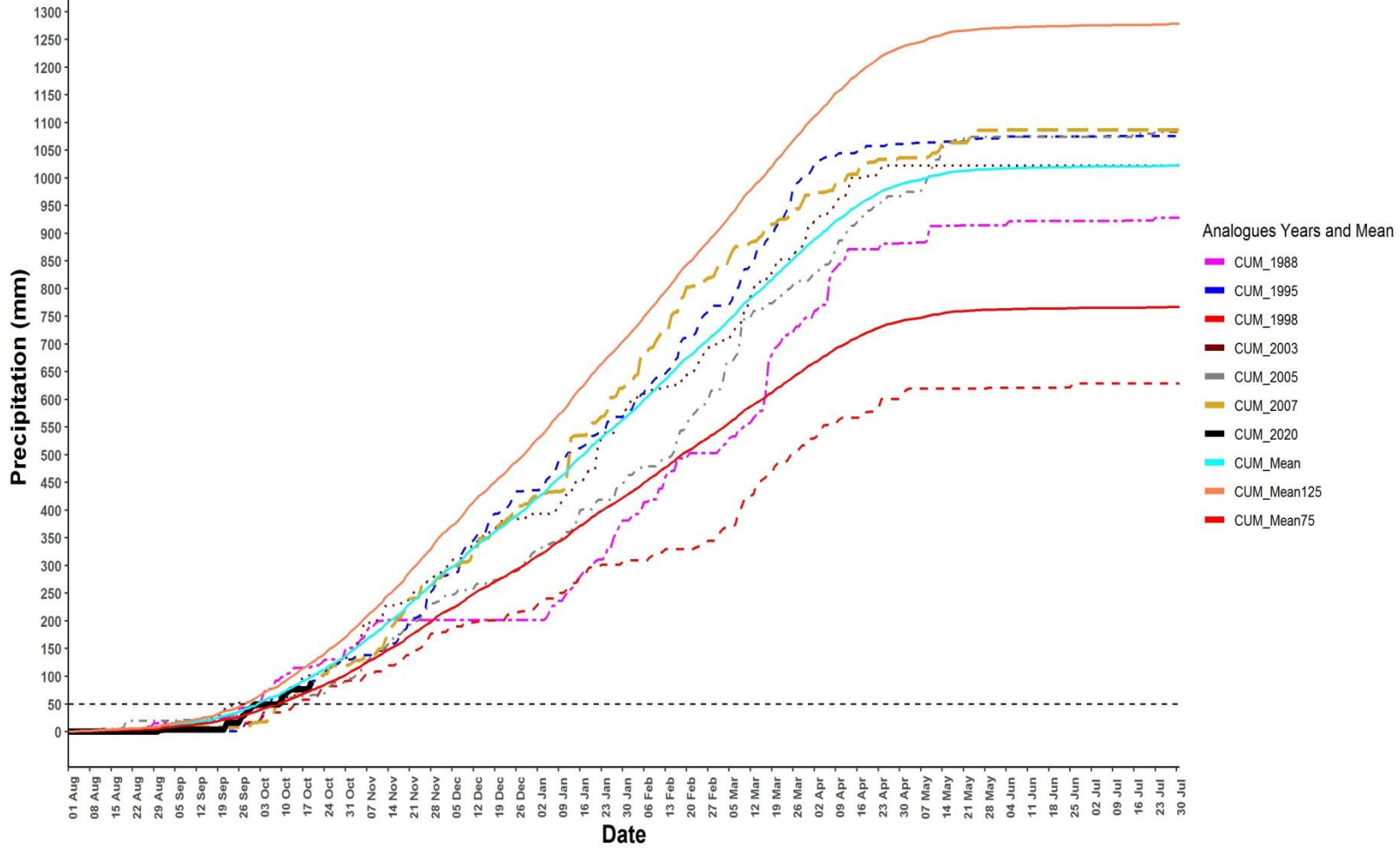


### BURUNDI Rainfall Profile MAKAMBA



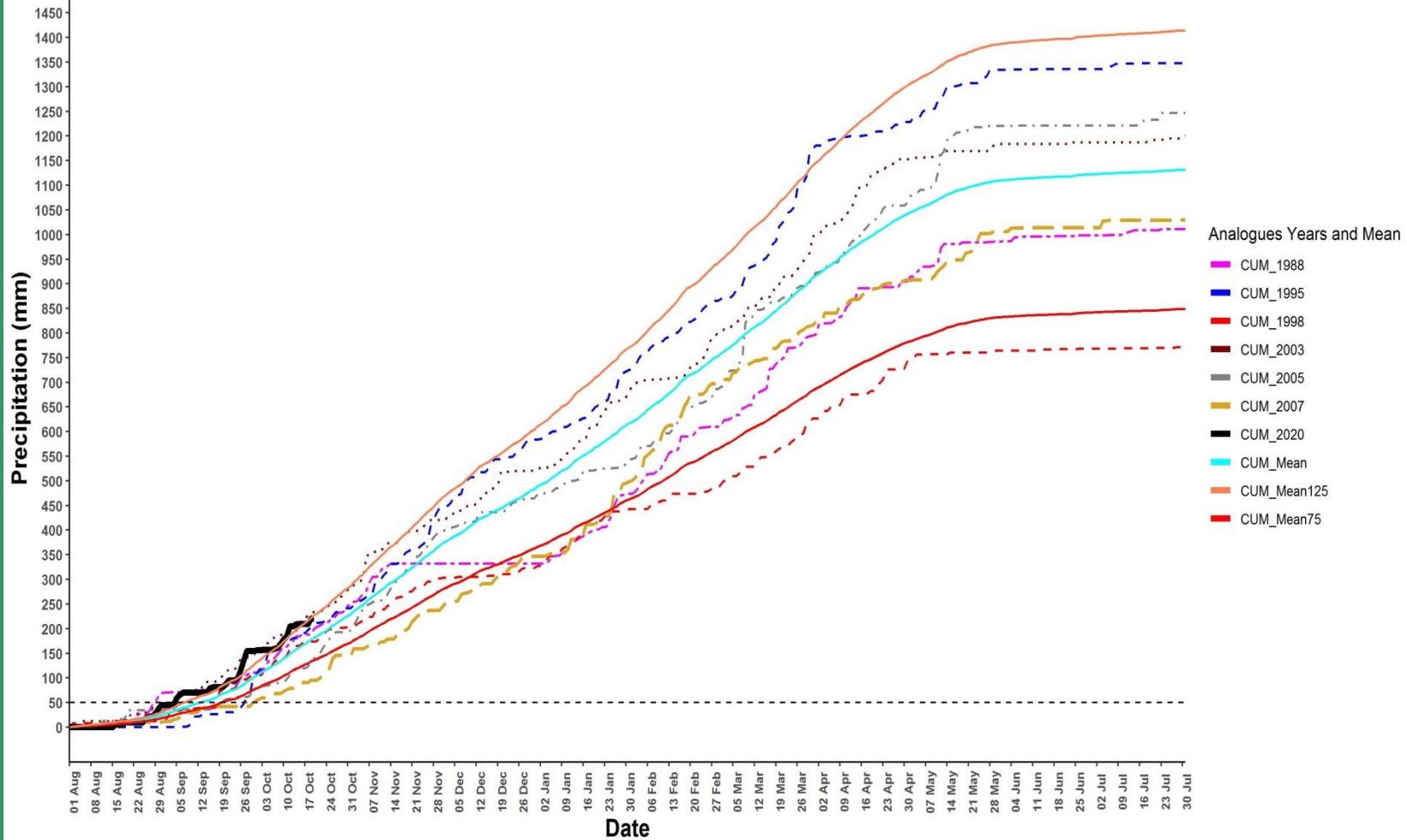


BURUNDI  
Rainfall Profile MATANA-Lyceee



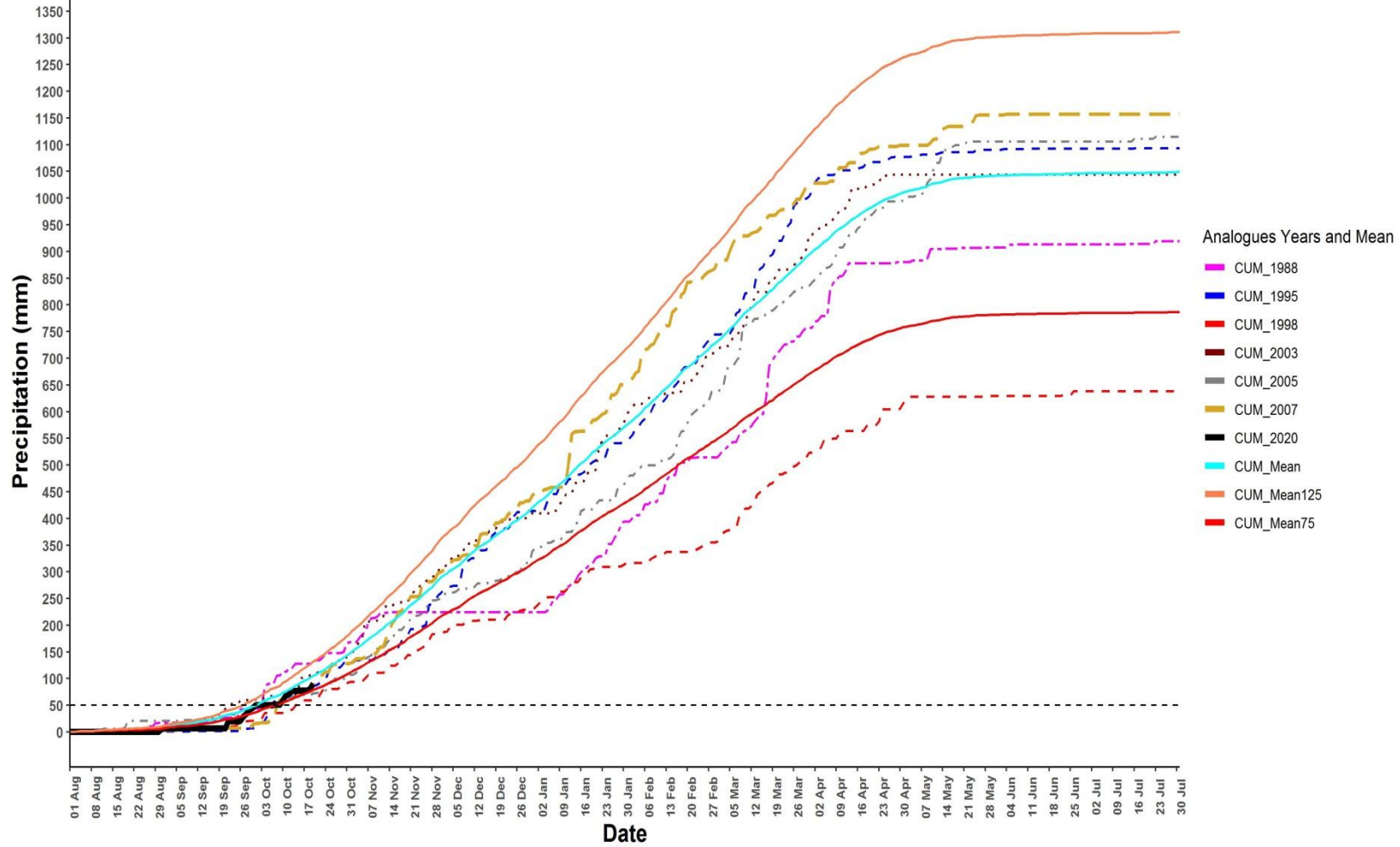


BURUNDI  
Rainfall Profile MPARAMBO



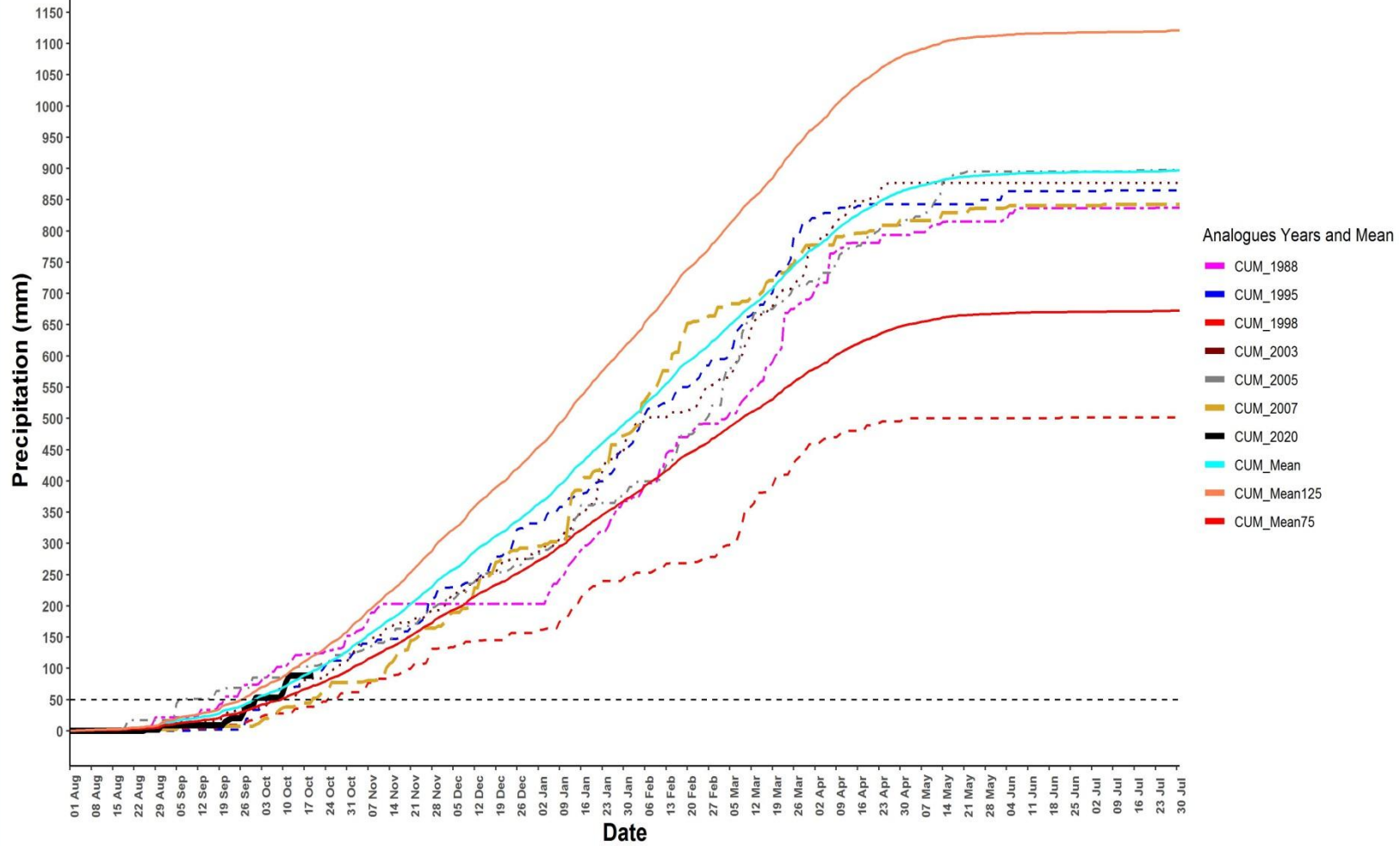


BURUNDI  
Rainfall Profile MPOTA-Tora



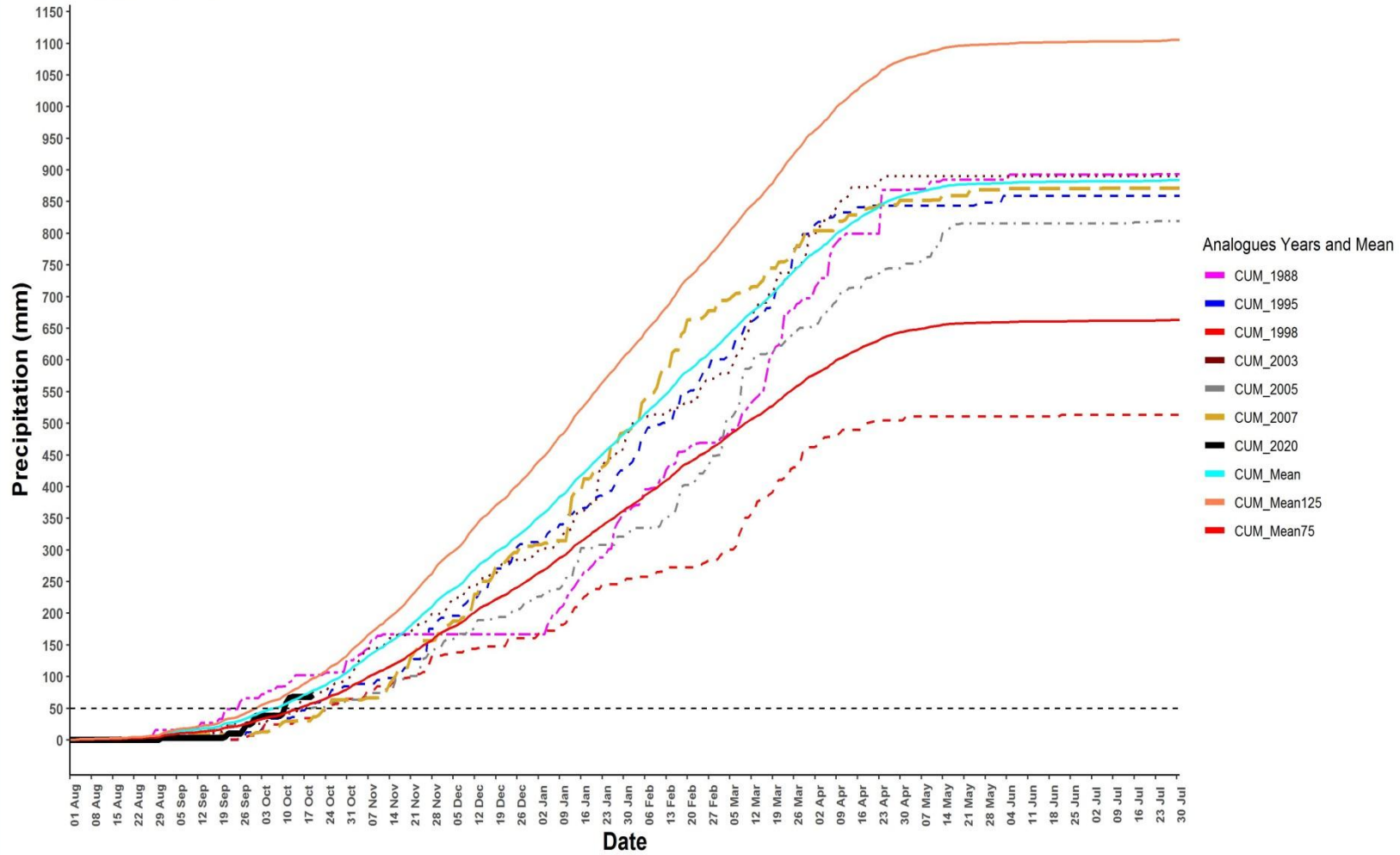


BURUNDI  
Rainfall Profile MUGERA-Paroisse





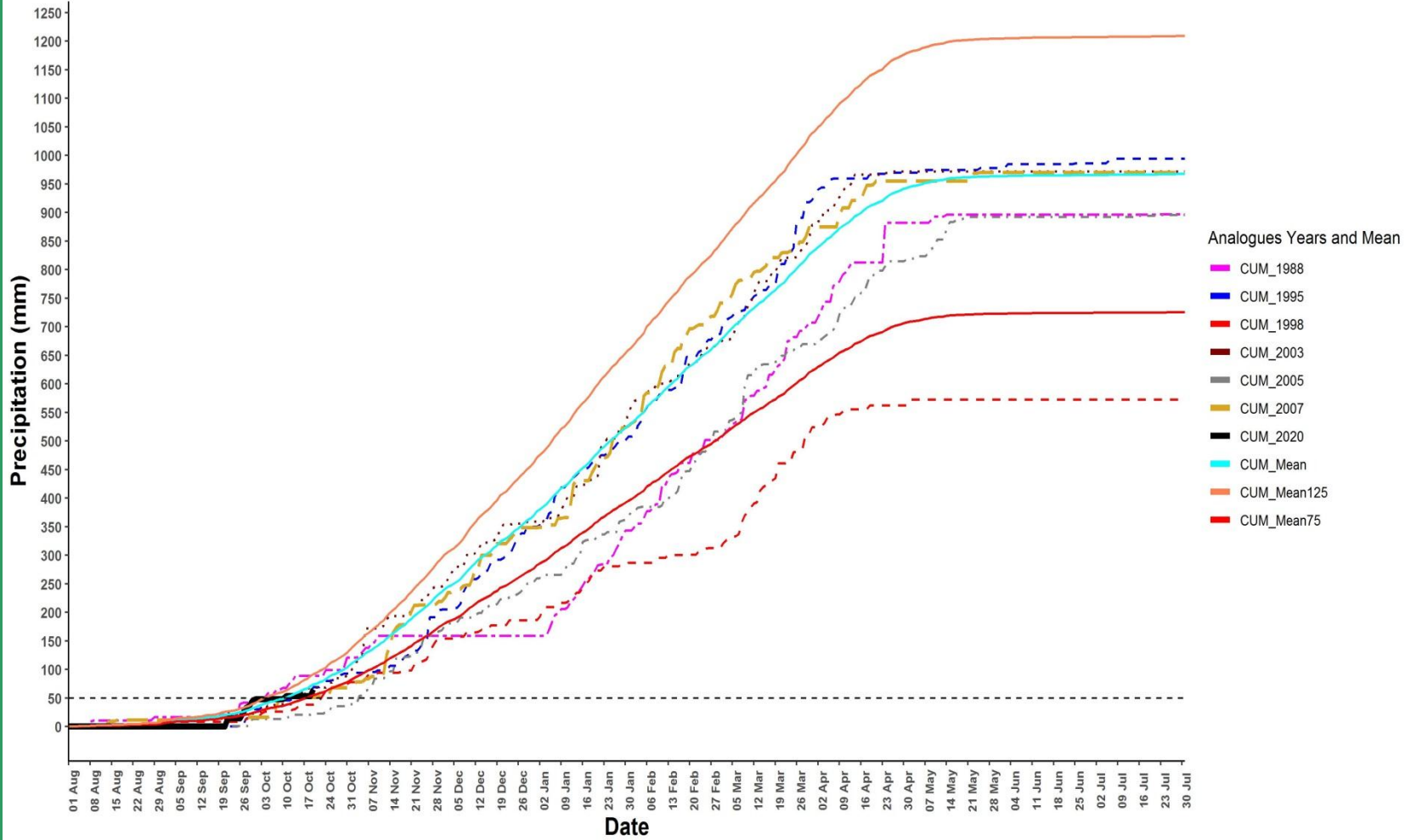
BURUNDI  
Rainfall Profile MURIZA





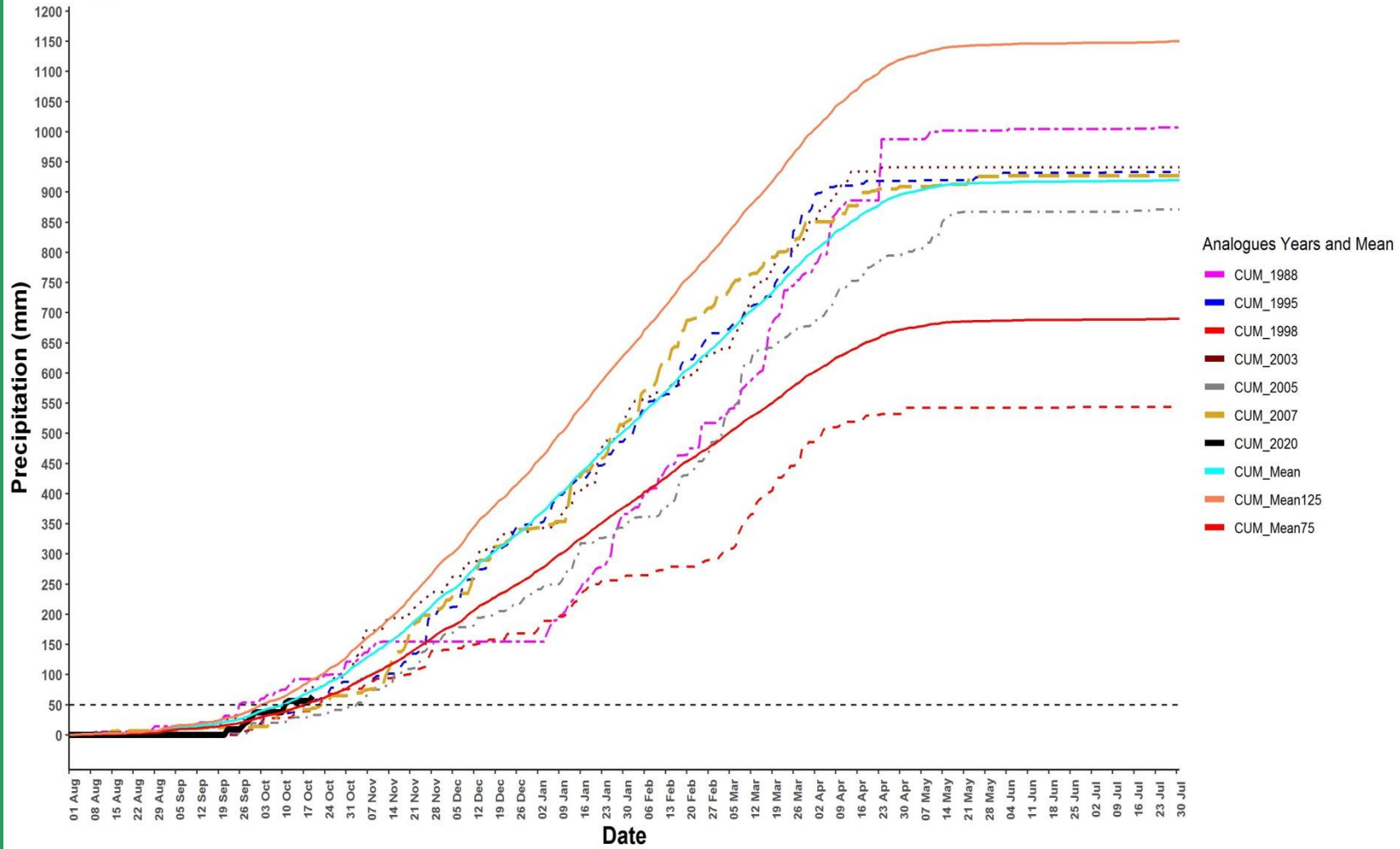


BURUNDI  
Rainfall Profile MUSASA



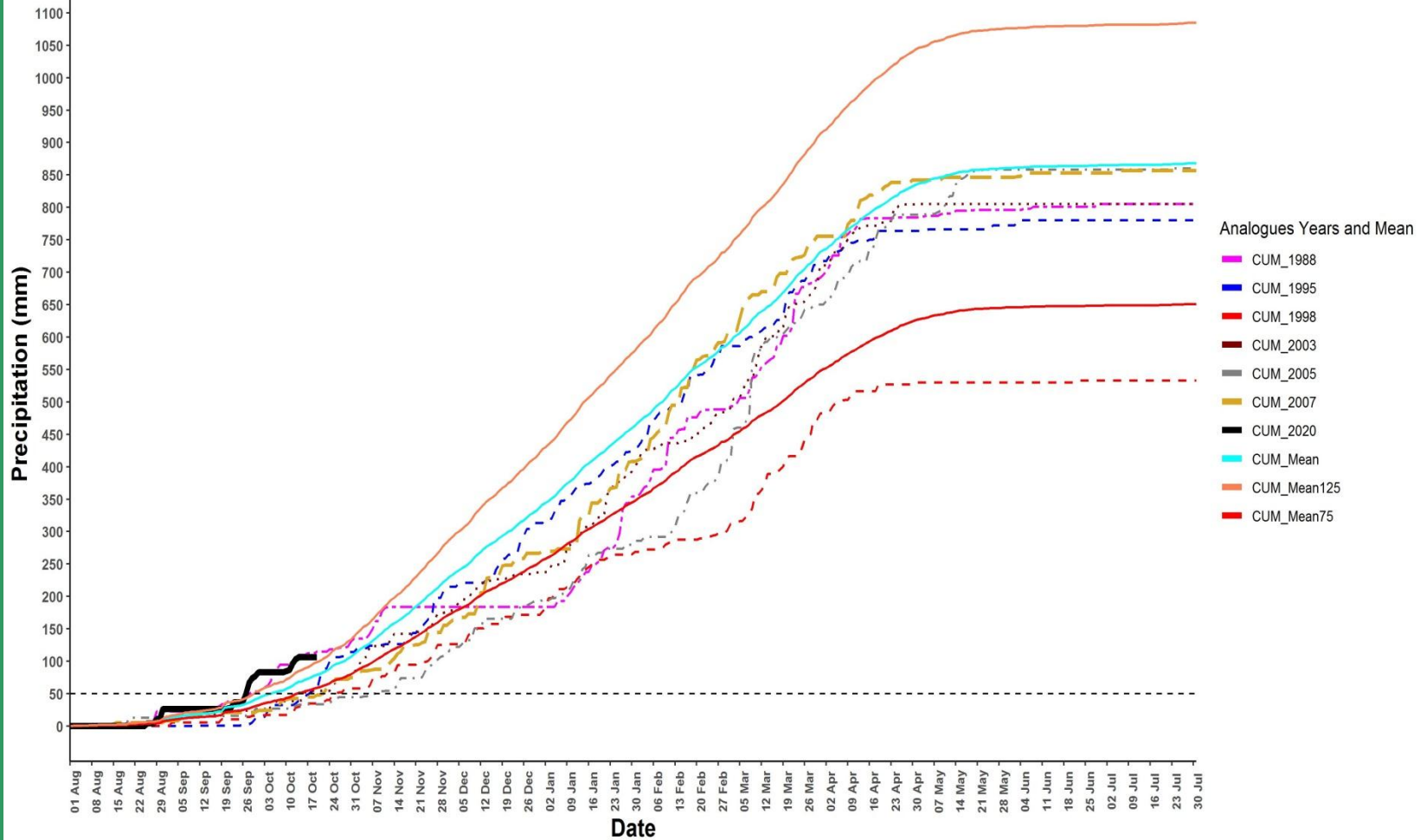


BURUNDI  
Rainfall Profile MUSONGATI



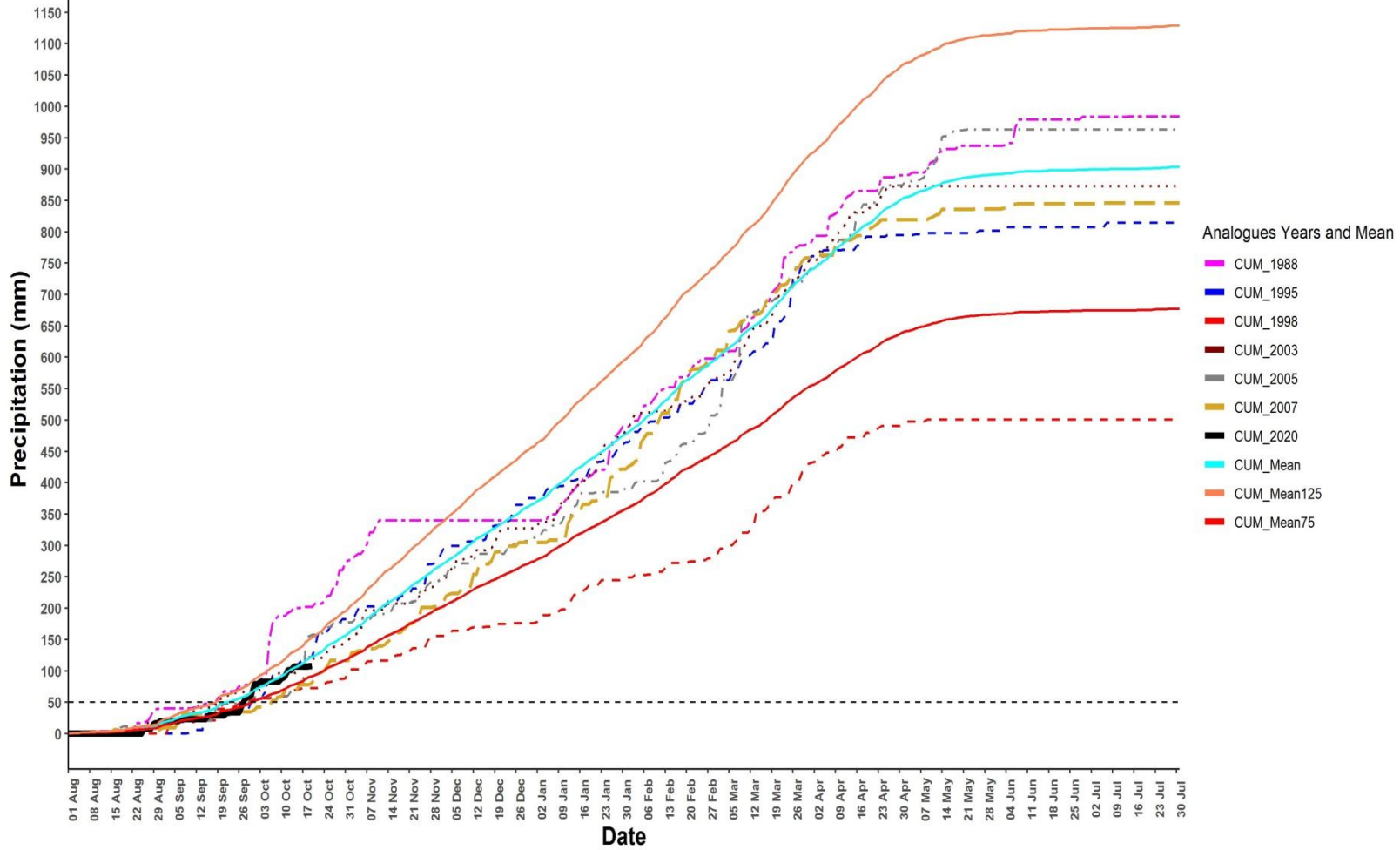


BURUNDI  
Rainfall Profile MUYAGA



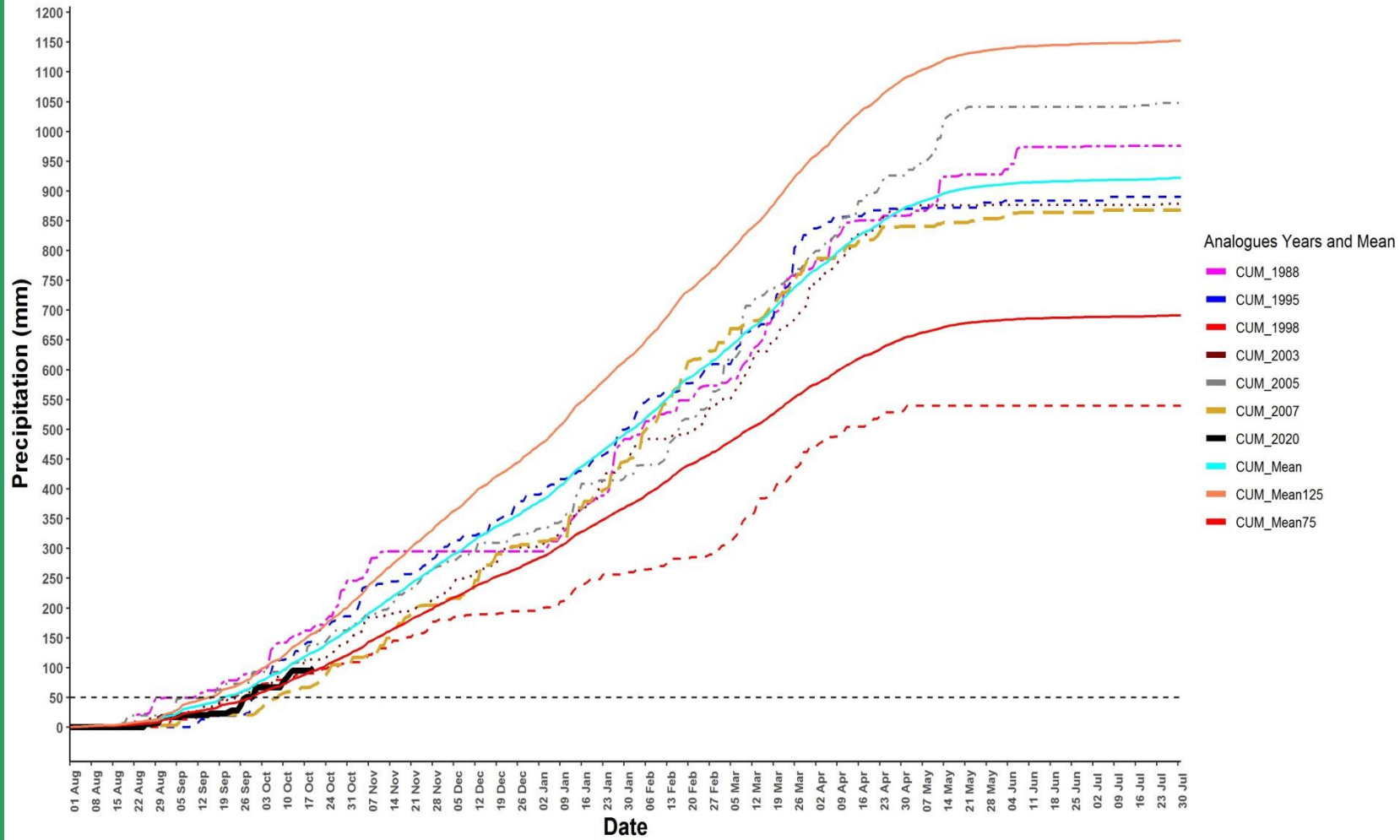


BURUNDI  
Rainfall Profile MUYINGA



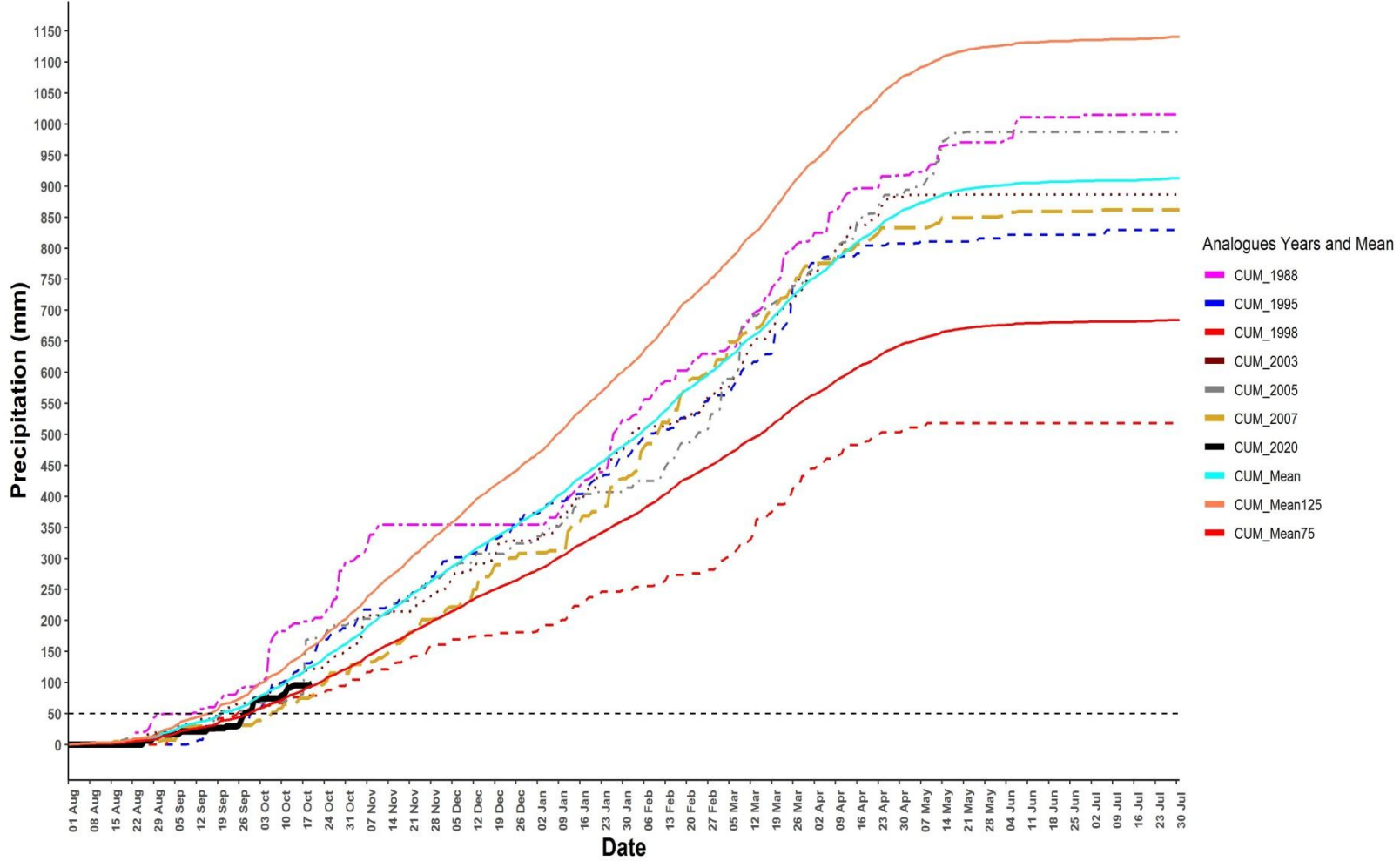


BURUNDI  
Rainfall Profile NGOZI



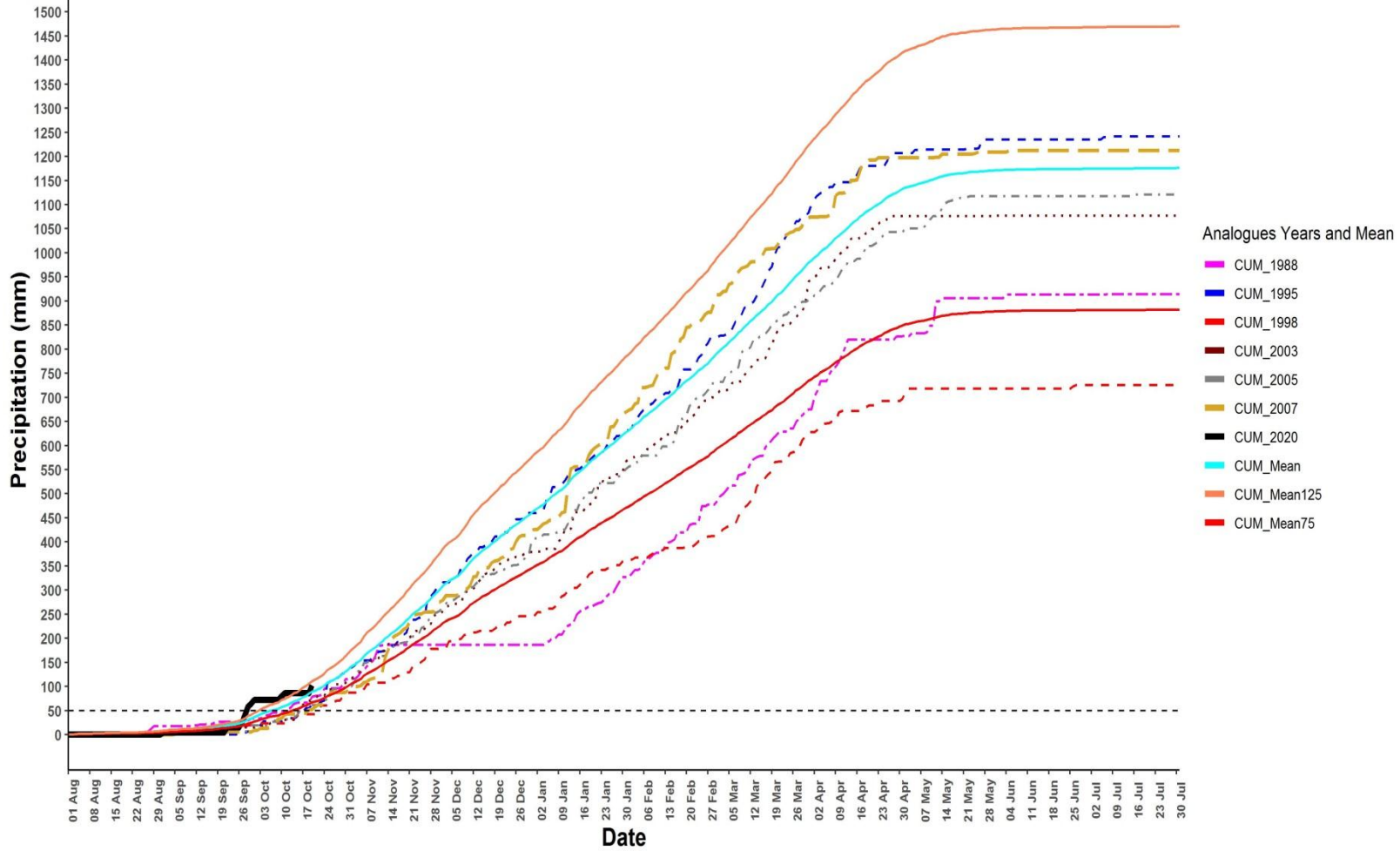


BURUNDI  
Rainfall Profile NYAMUSWAGA



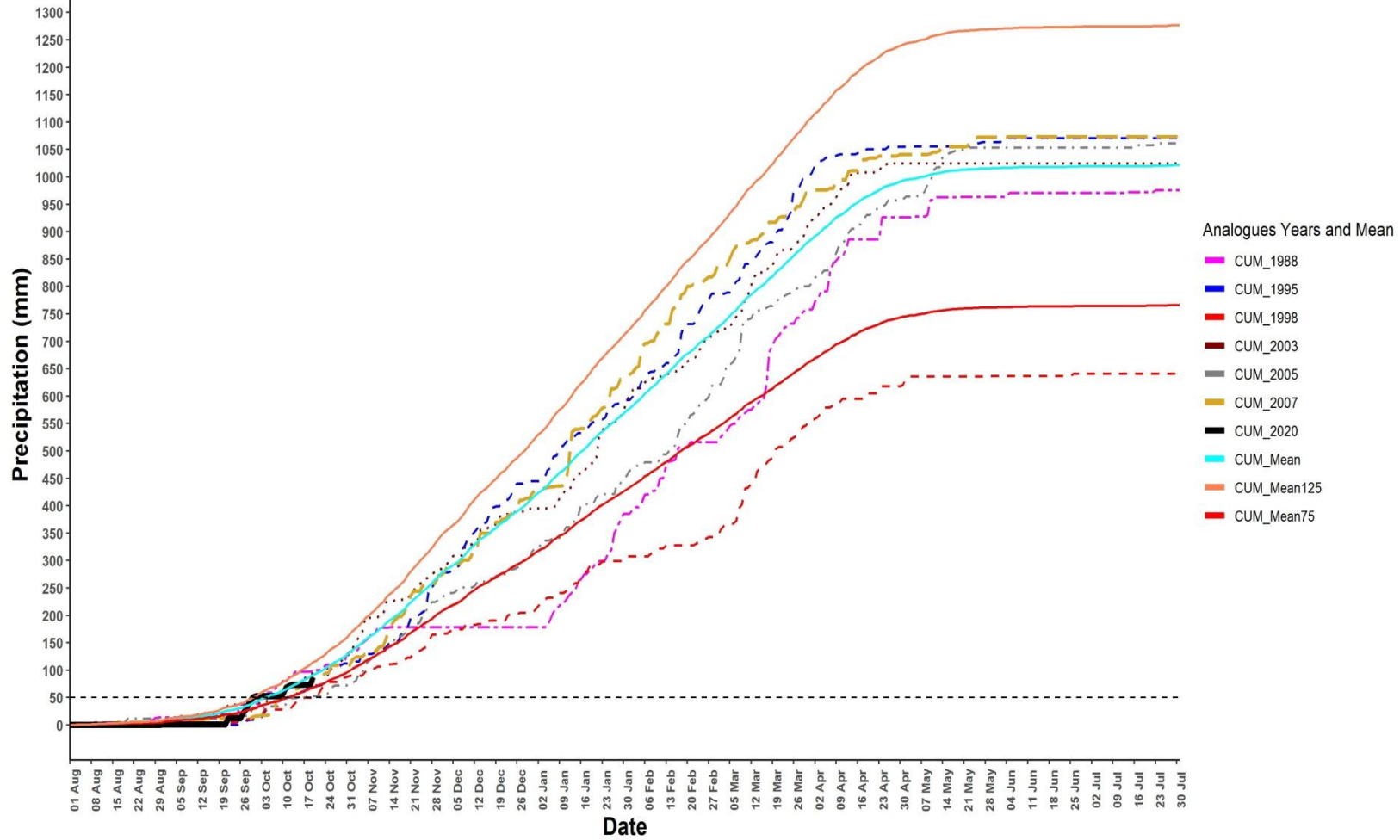


BURUNDI  
Rainfall Profile NYANZA LAC-Projet





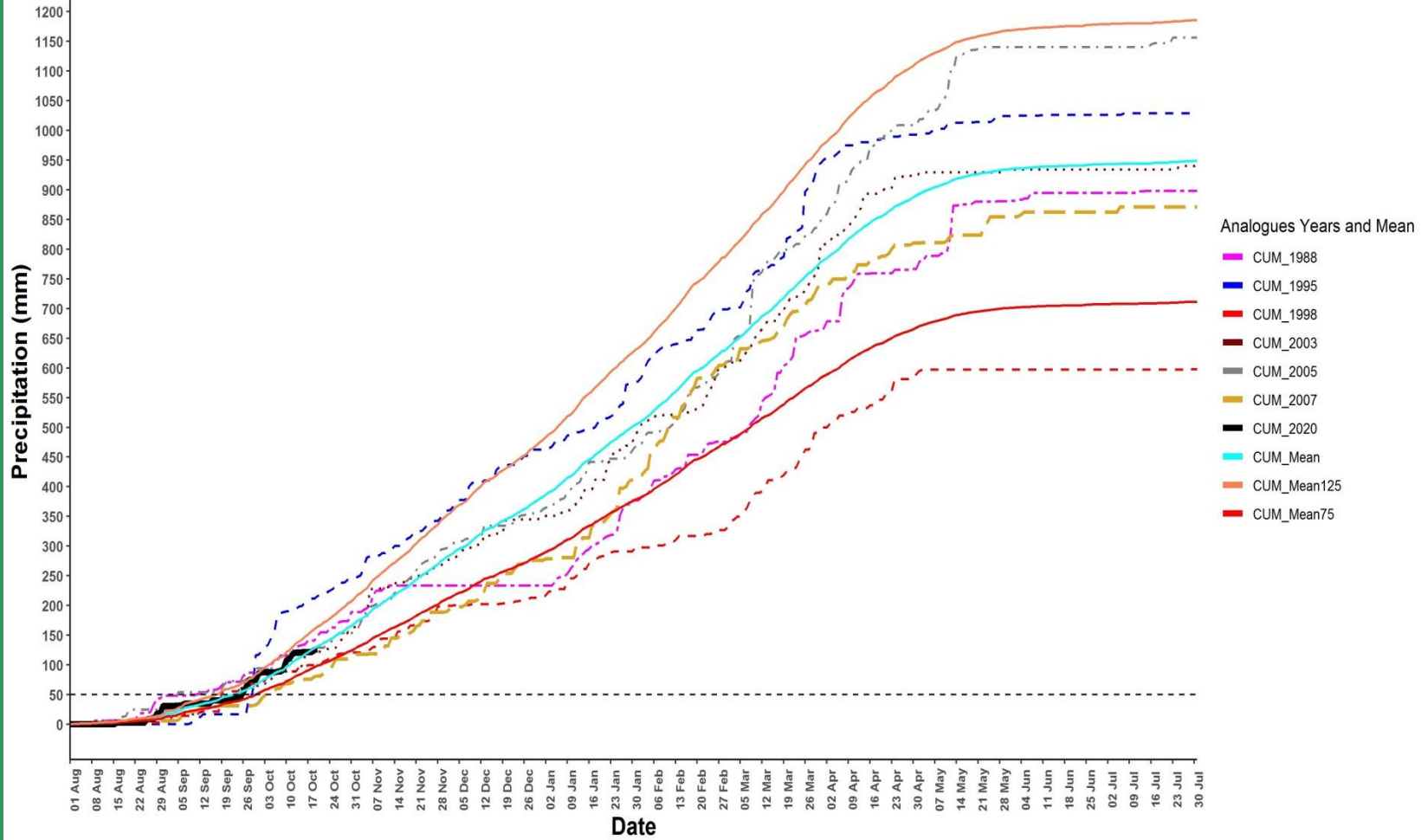
BURUNDI  
Rainfall Profile RUVYIRONZA





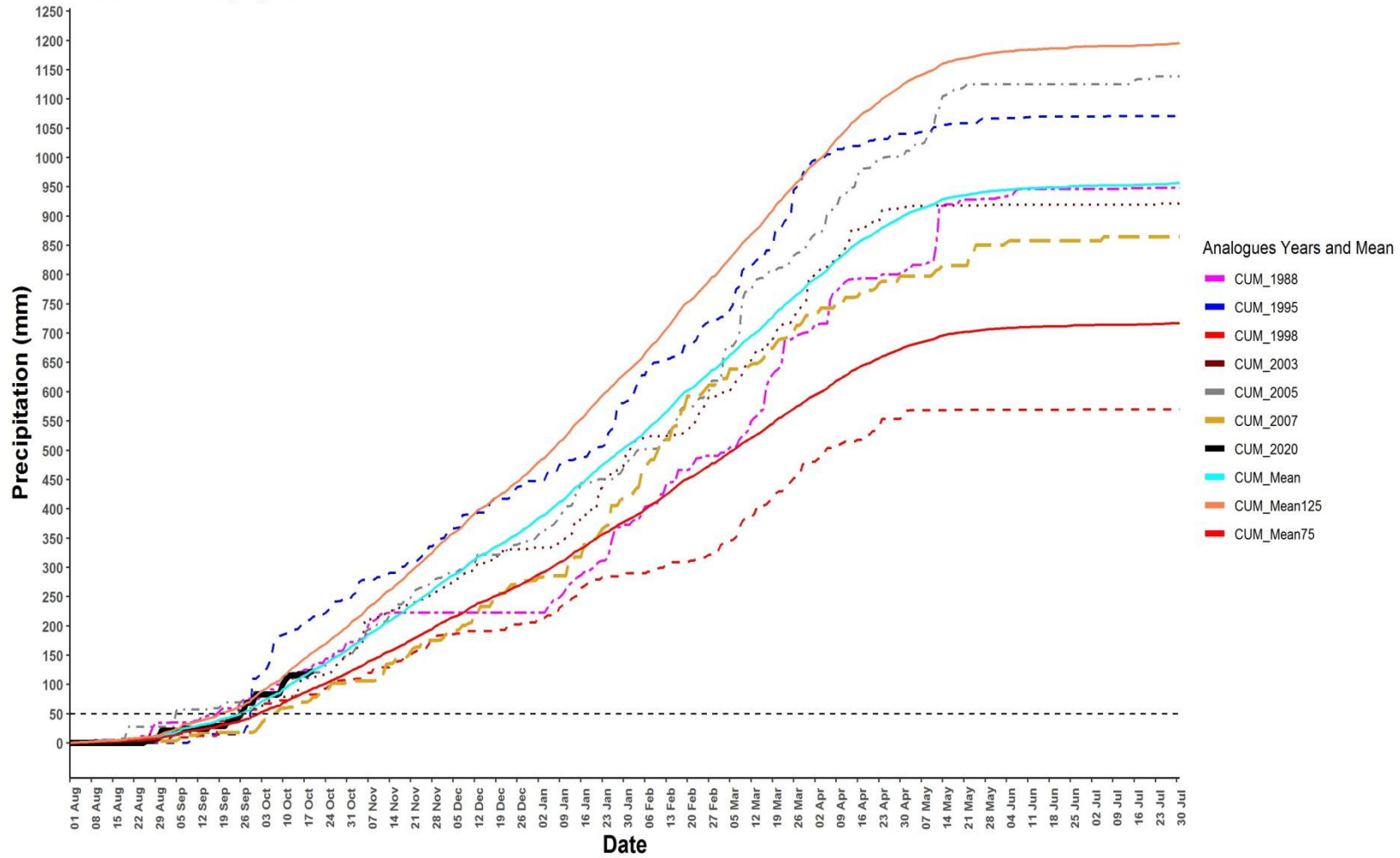


BURUNDI  
Rainfall Profile RWEGURA





BURUNDI  
Rainfall Profile TEZA-Nyabigondo

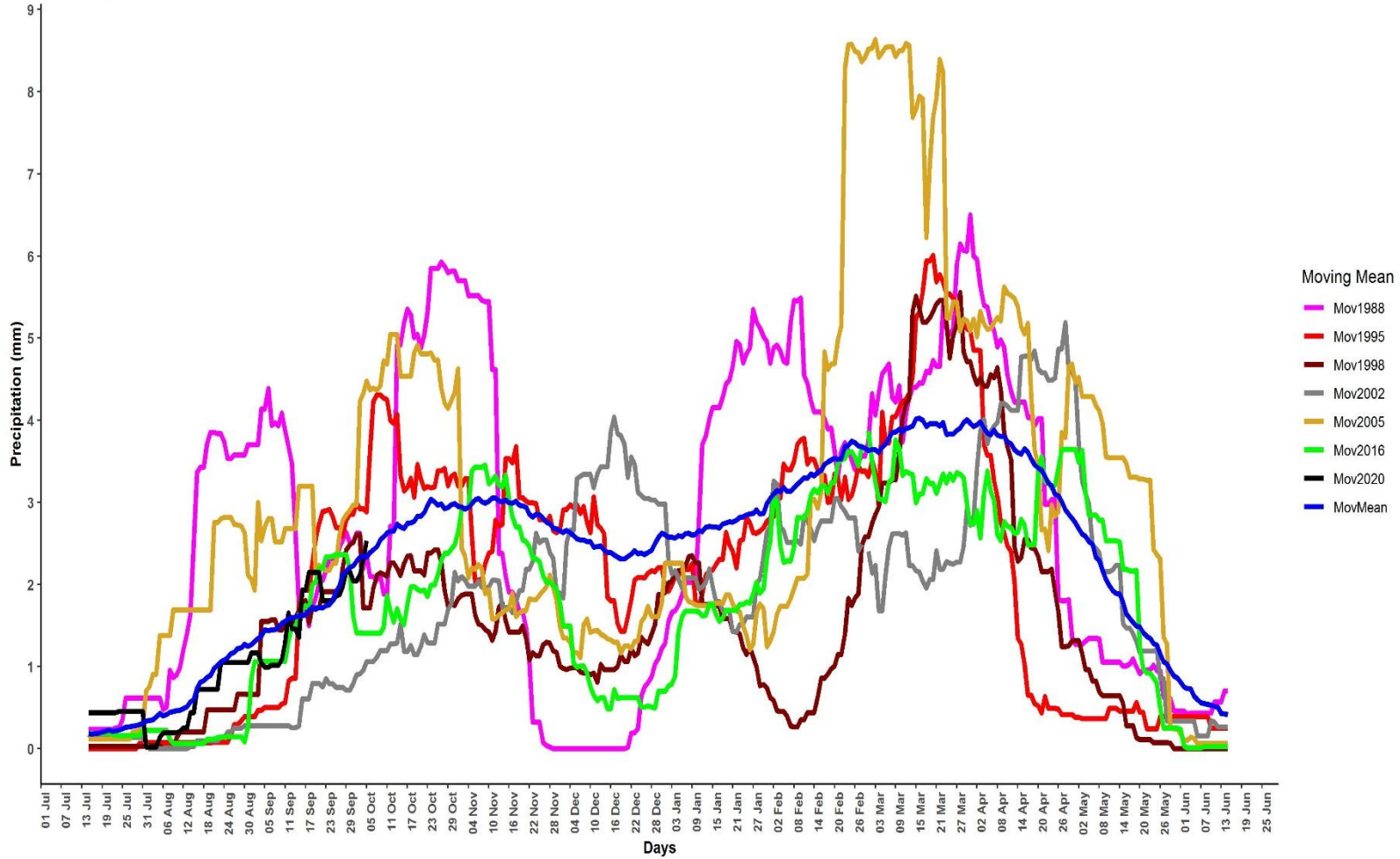




# **GRAPHIQUE CYCLE ANNUEL DE PRECIPITATION JOURNALIERE**

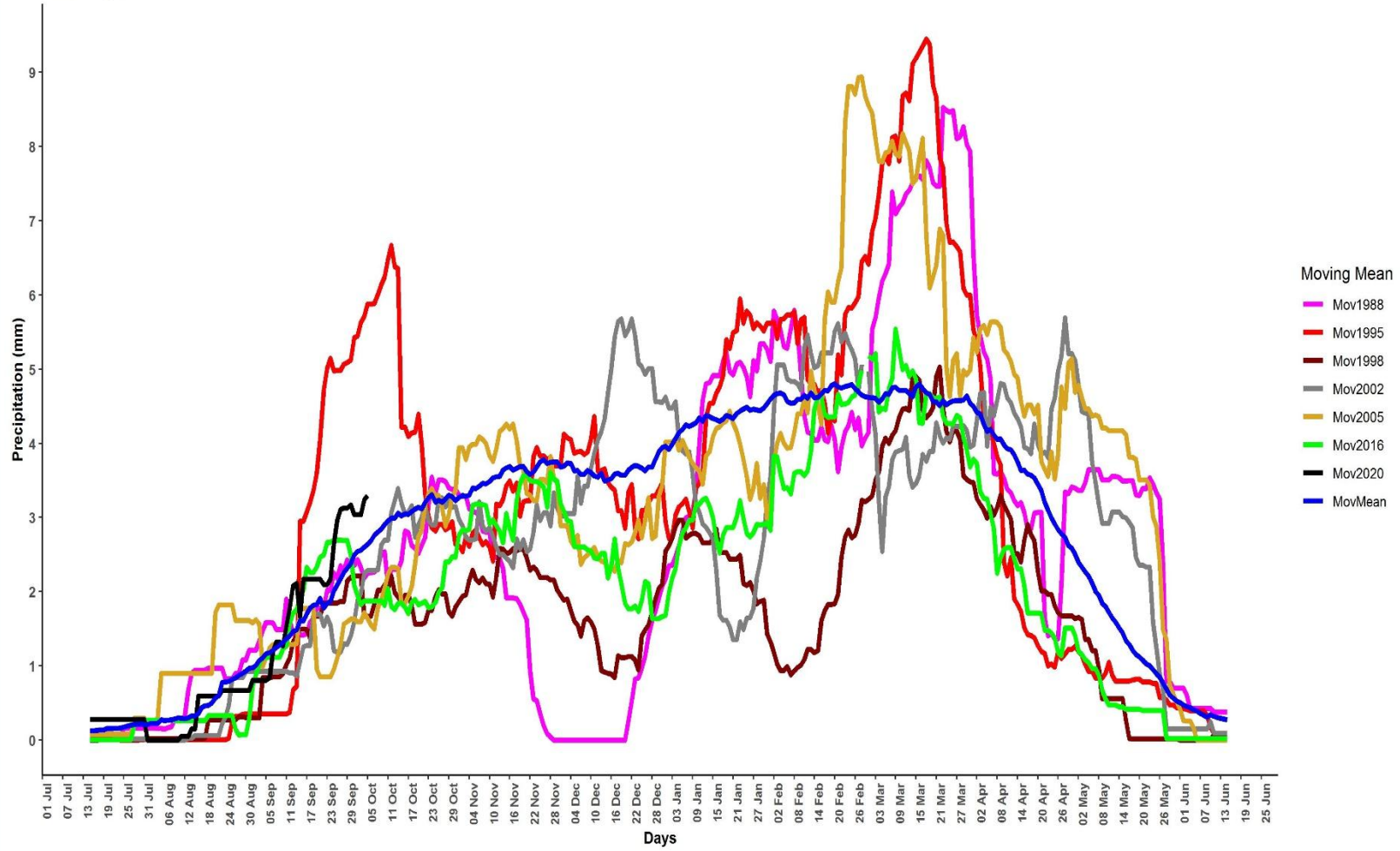


BUGABIRA  
Annual Cycle

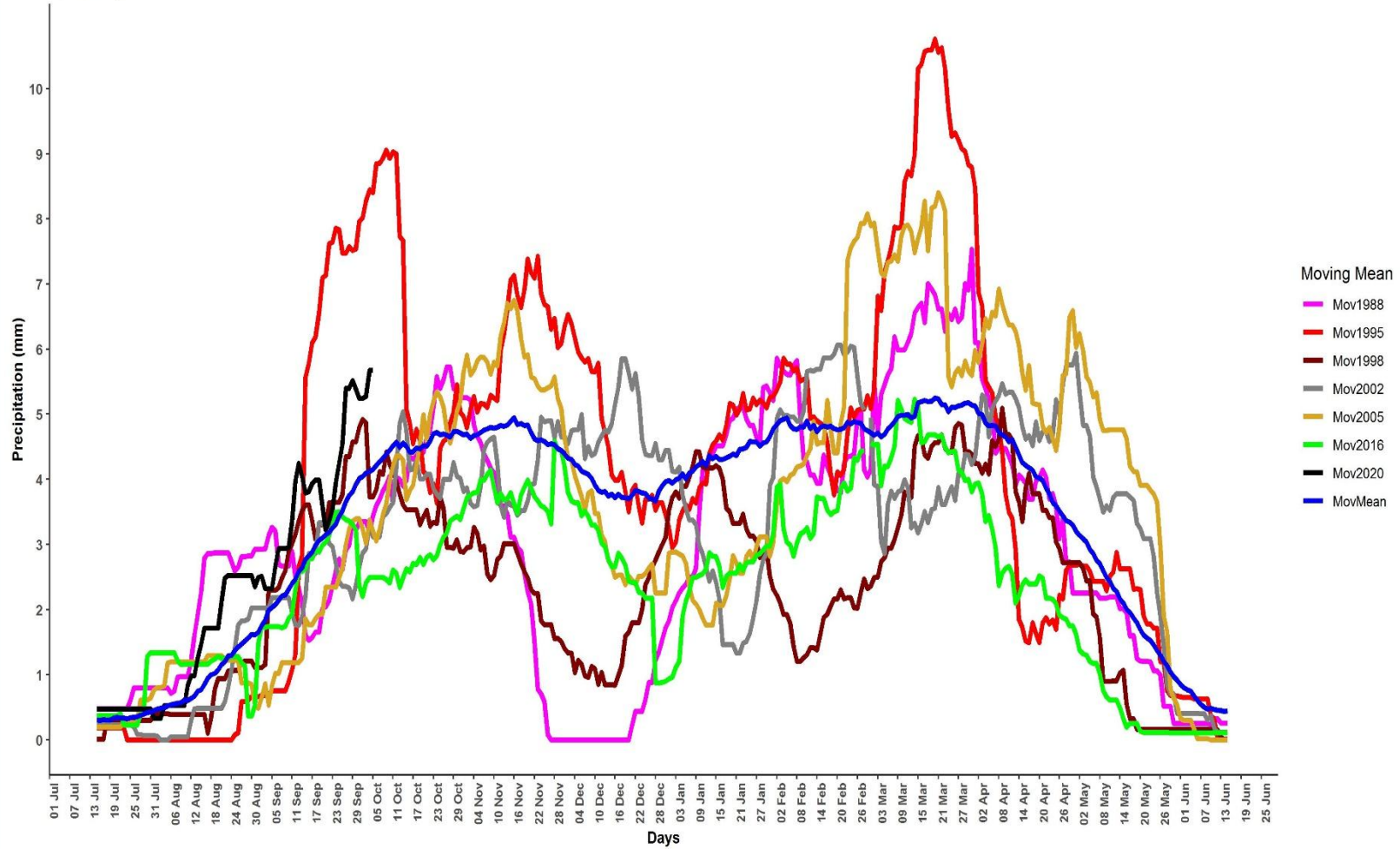




BUGARAMA-Commune  
Annual Cycle

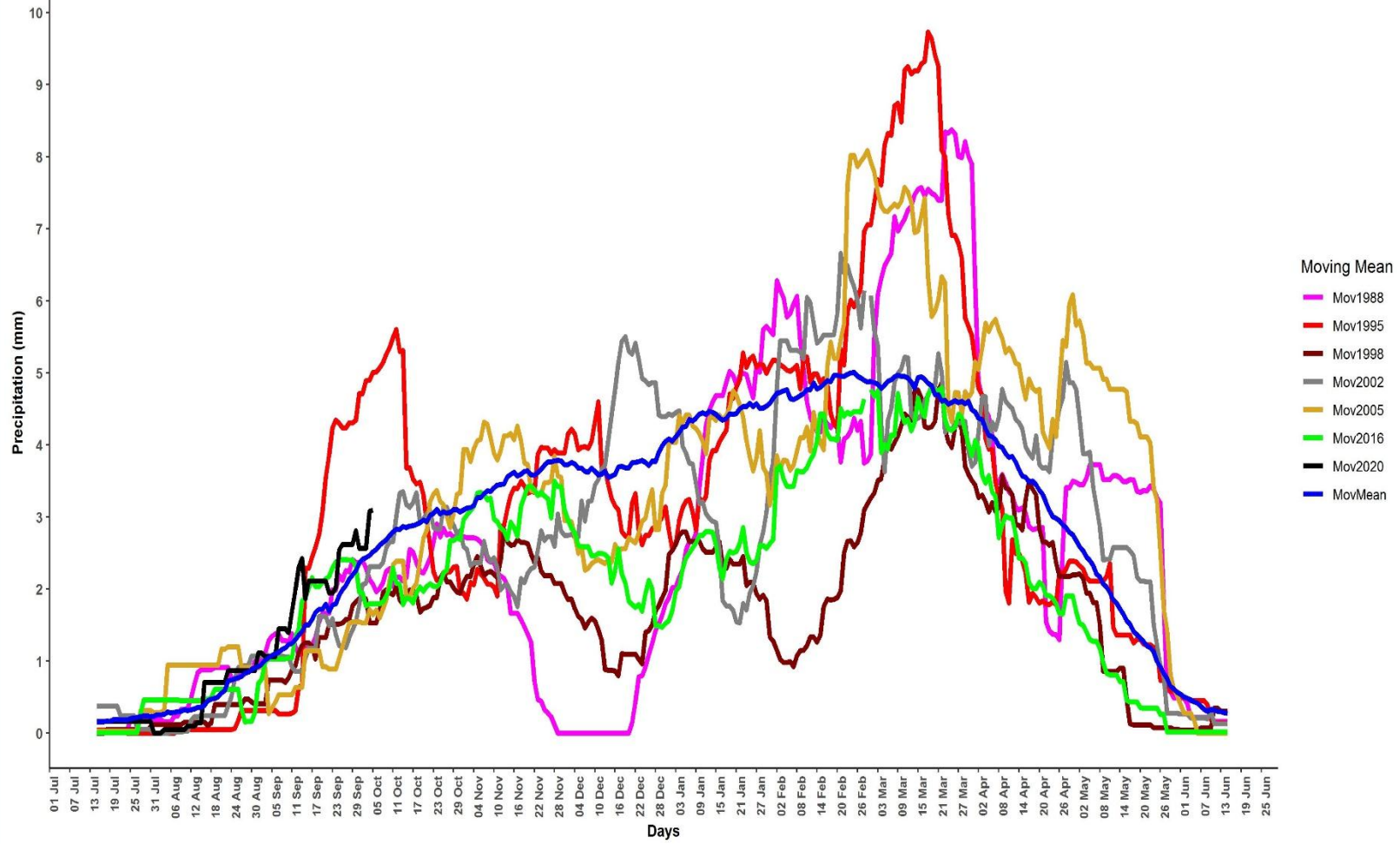


BUHORO  
Annual Cycle



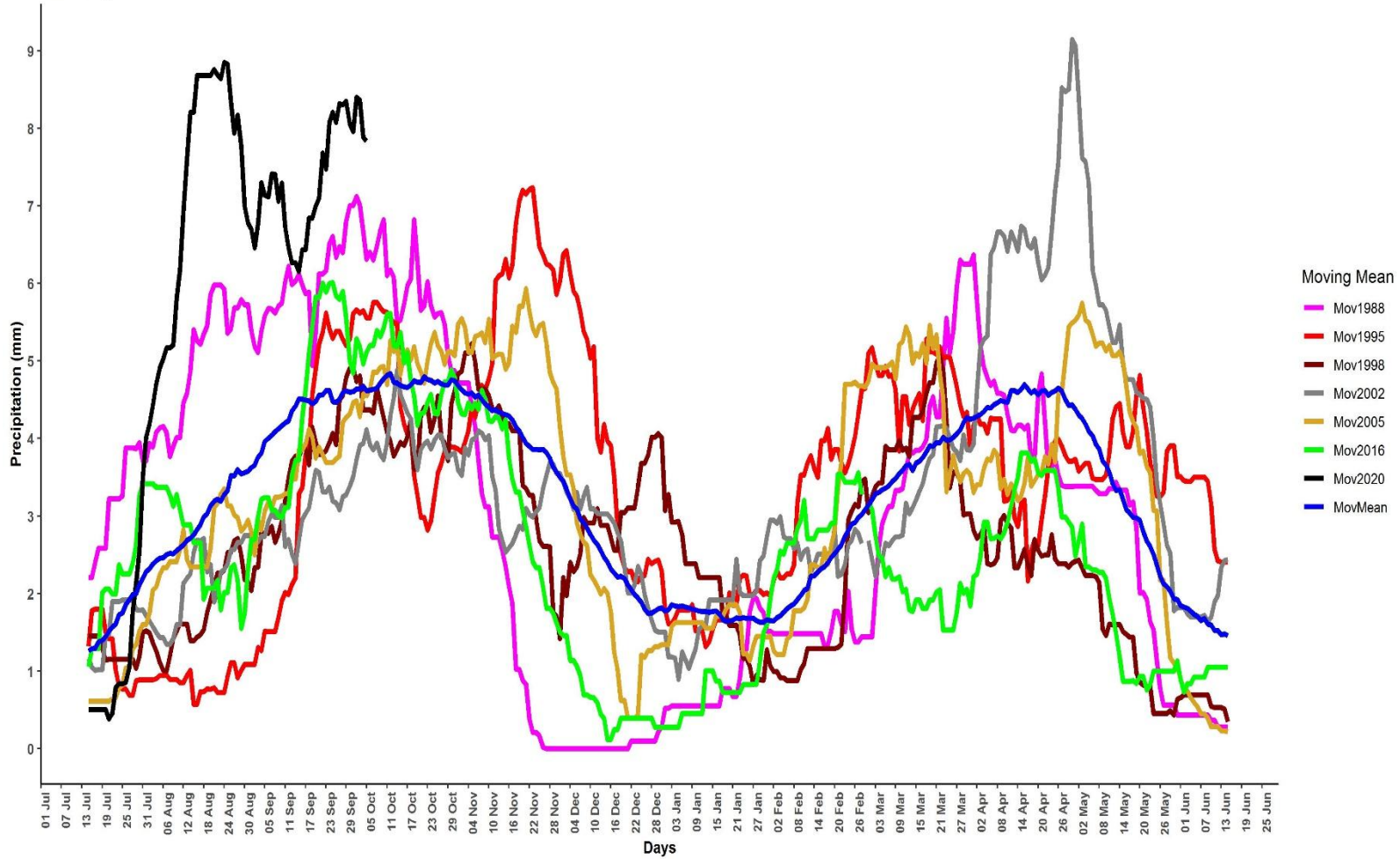


BUJUMBURA-AERO  
Annual Cycle





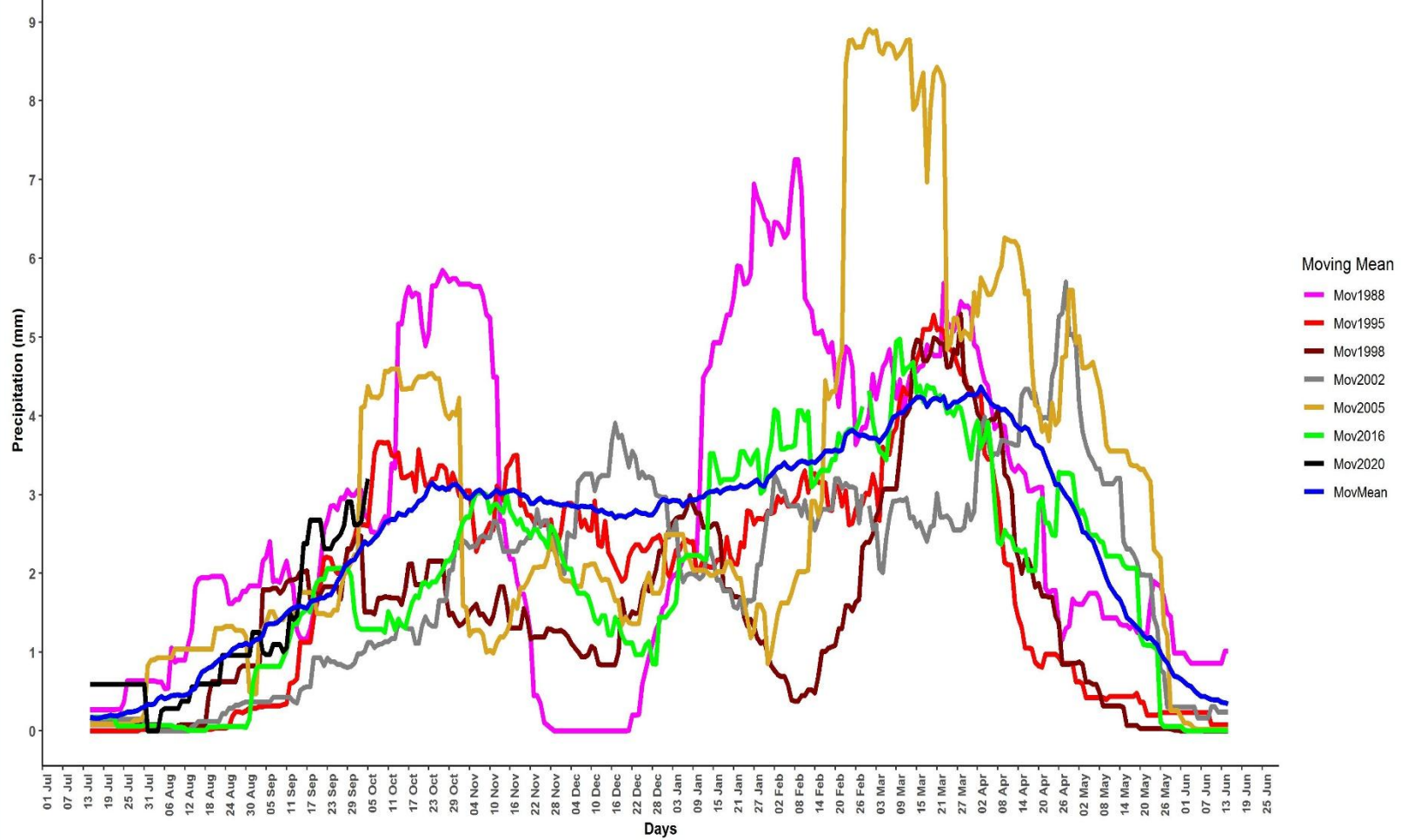
BURASIRA-S\_minaire  
Annual Cycle





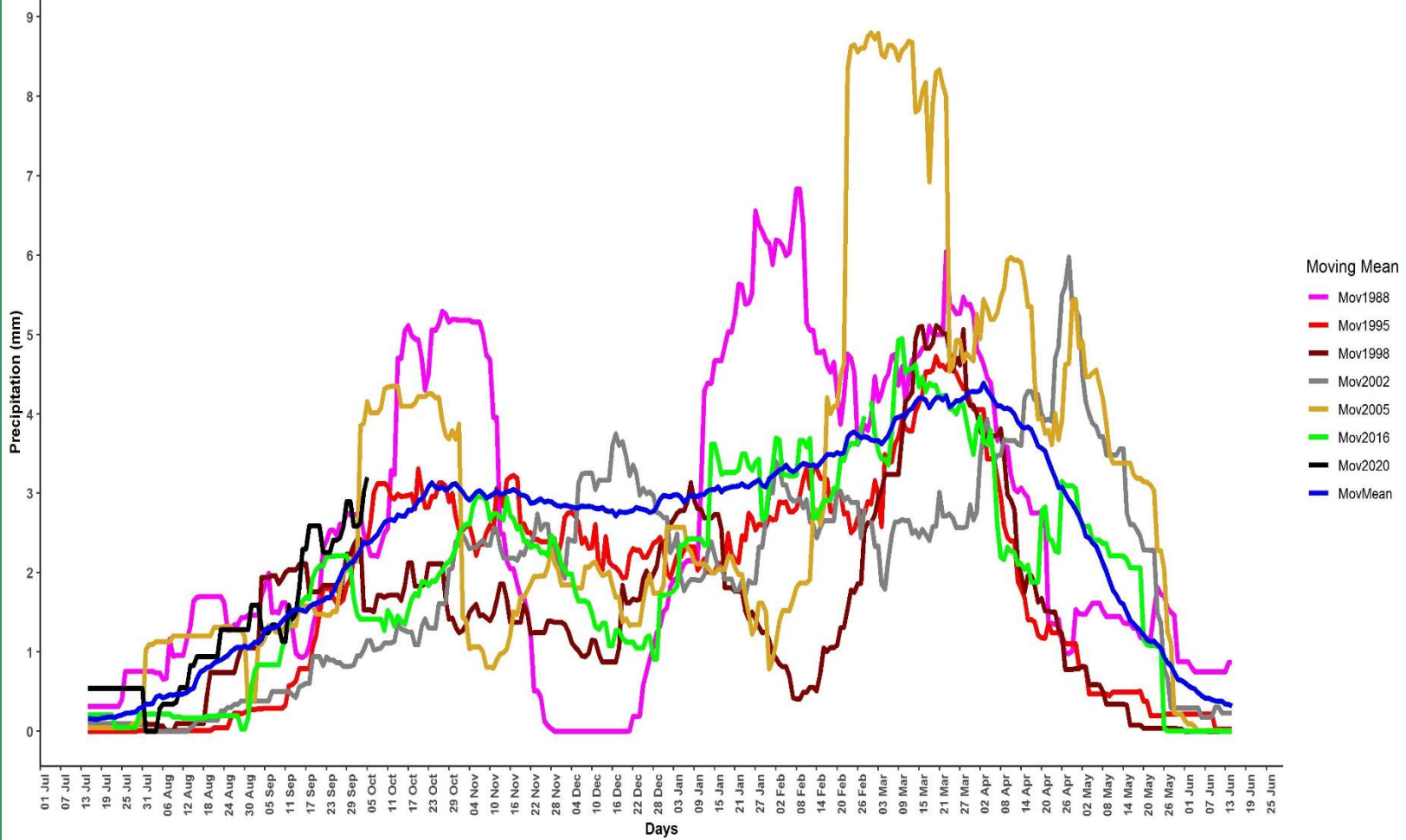


BUSONI  
Annual Cycle



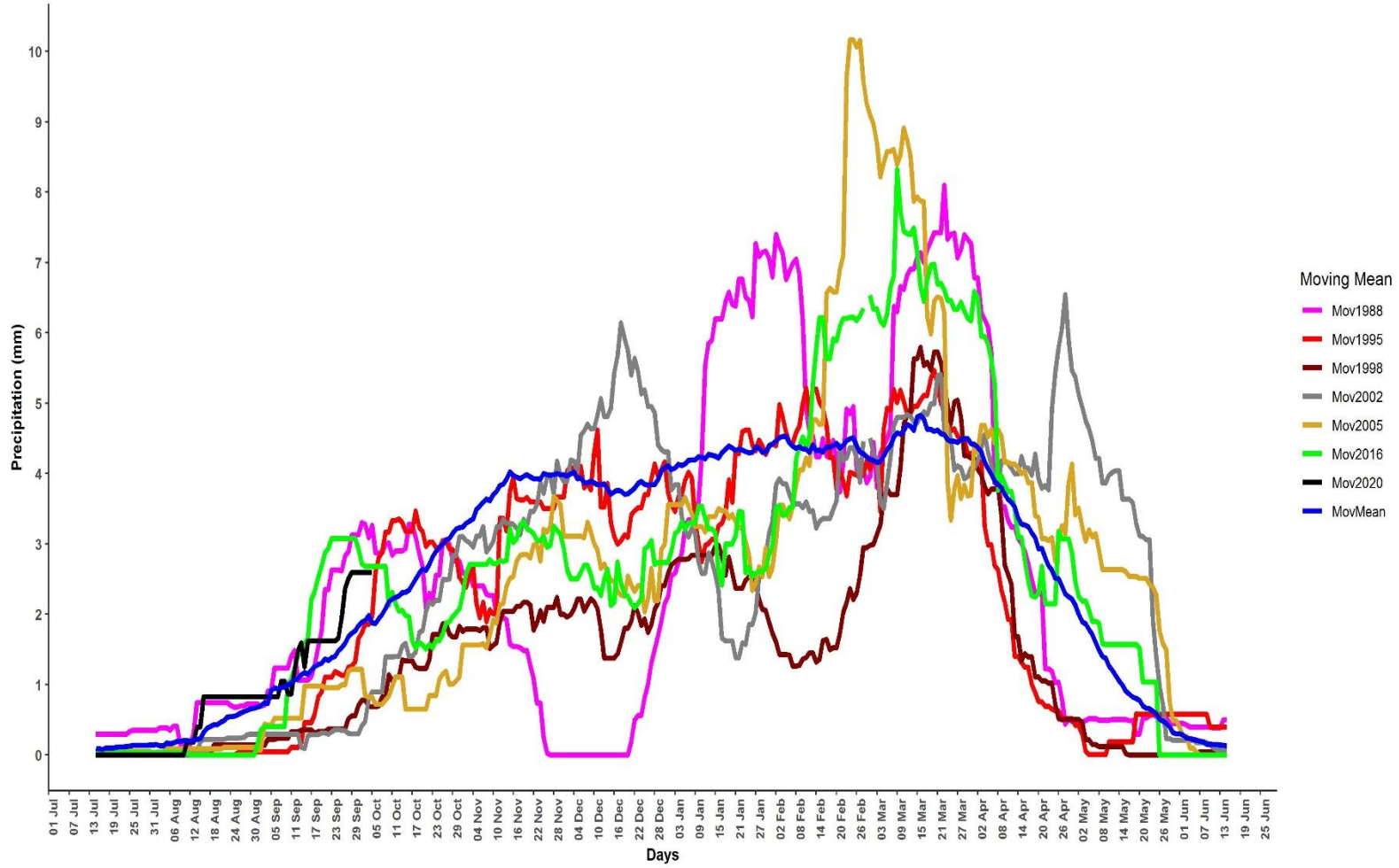


### BWAMBARANGWE Annual Cycle



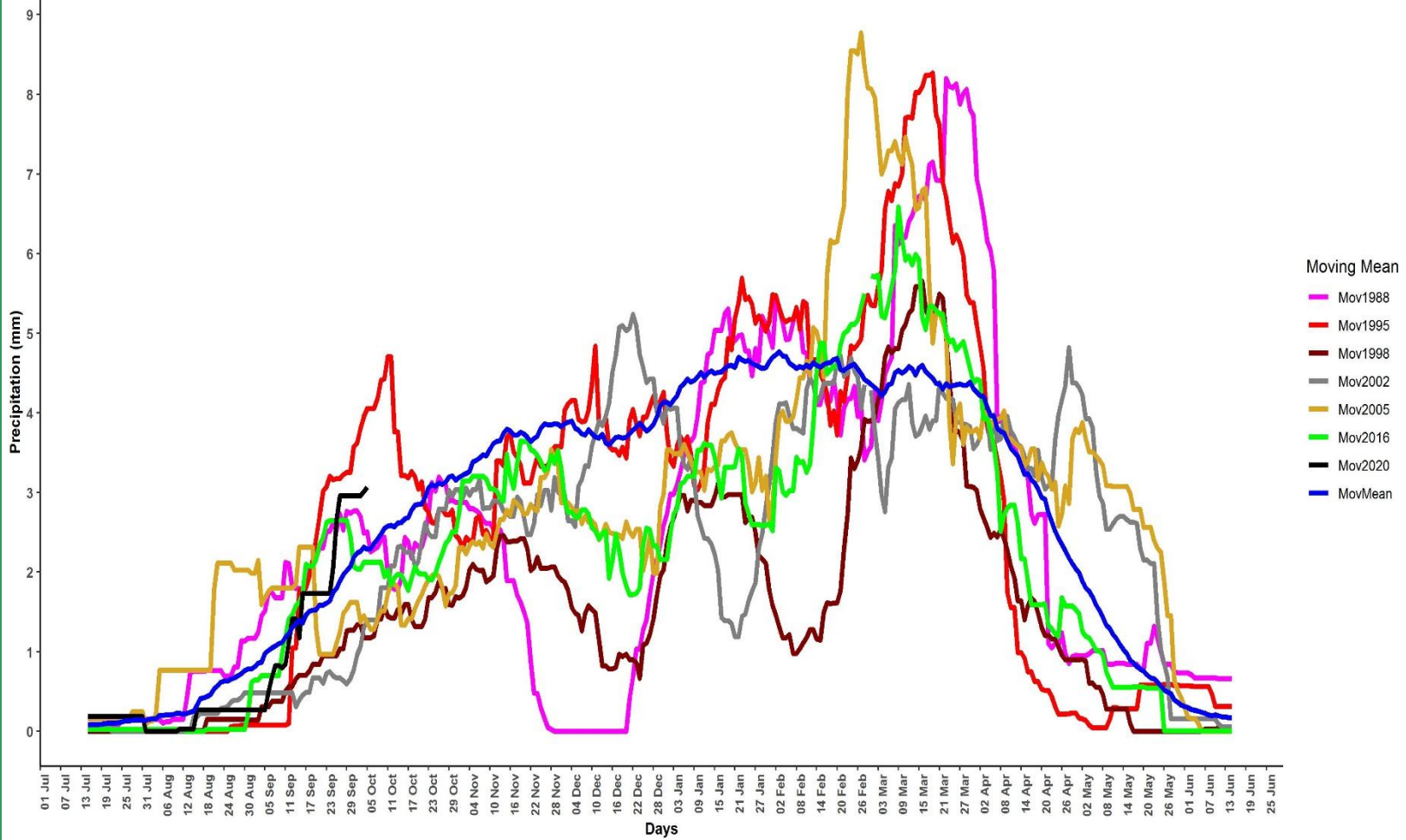


CANKUZO-PROJET  
Annual Cycle



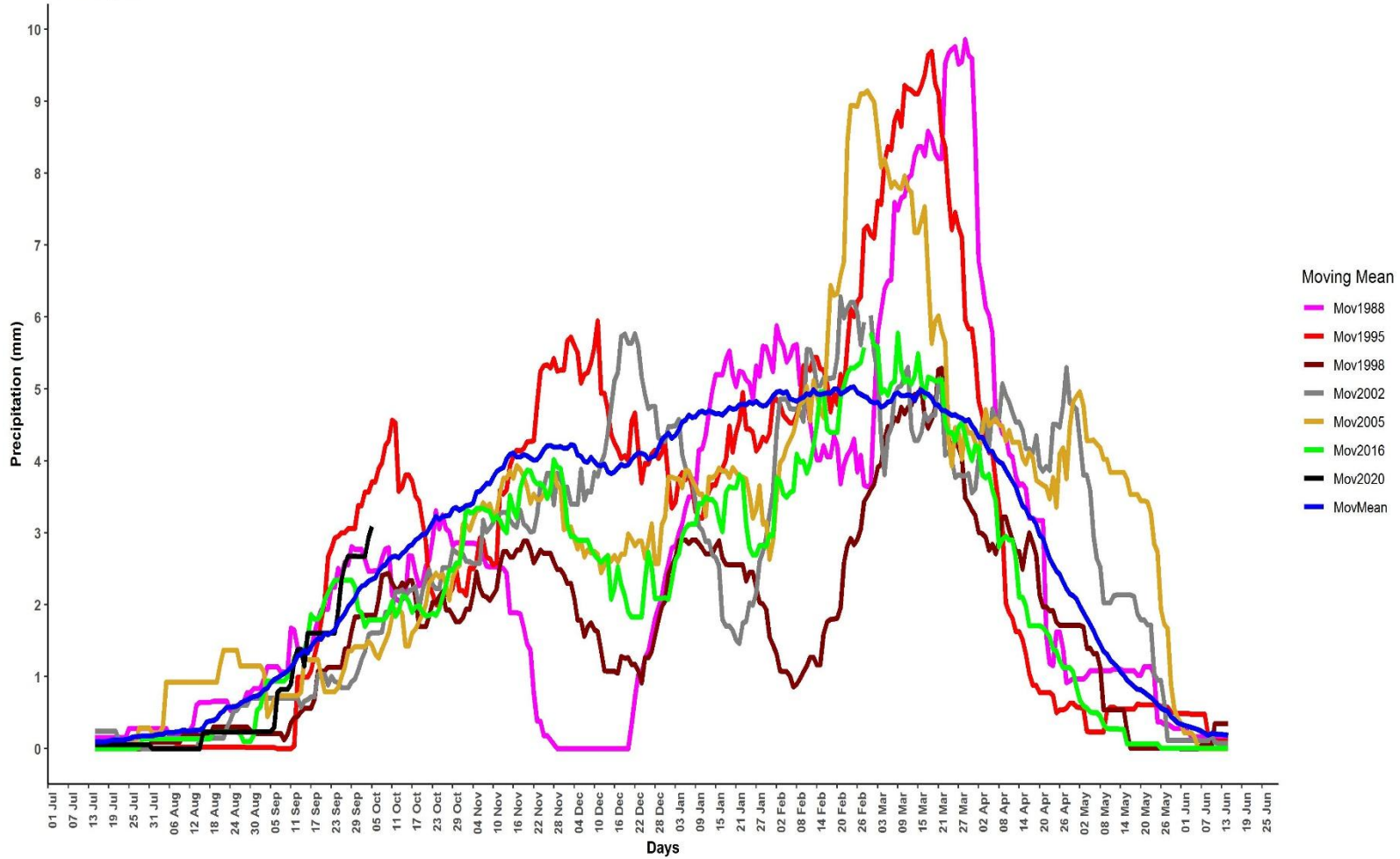


### GIHETA Annual Cycle



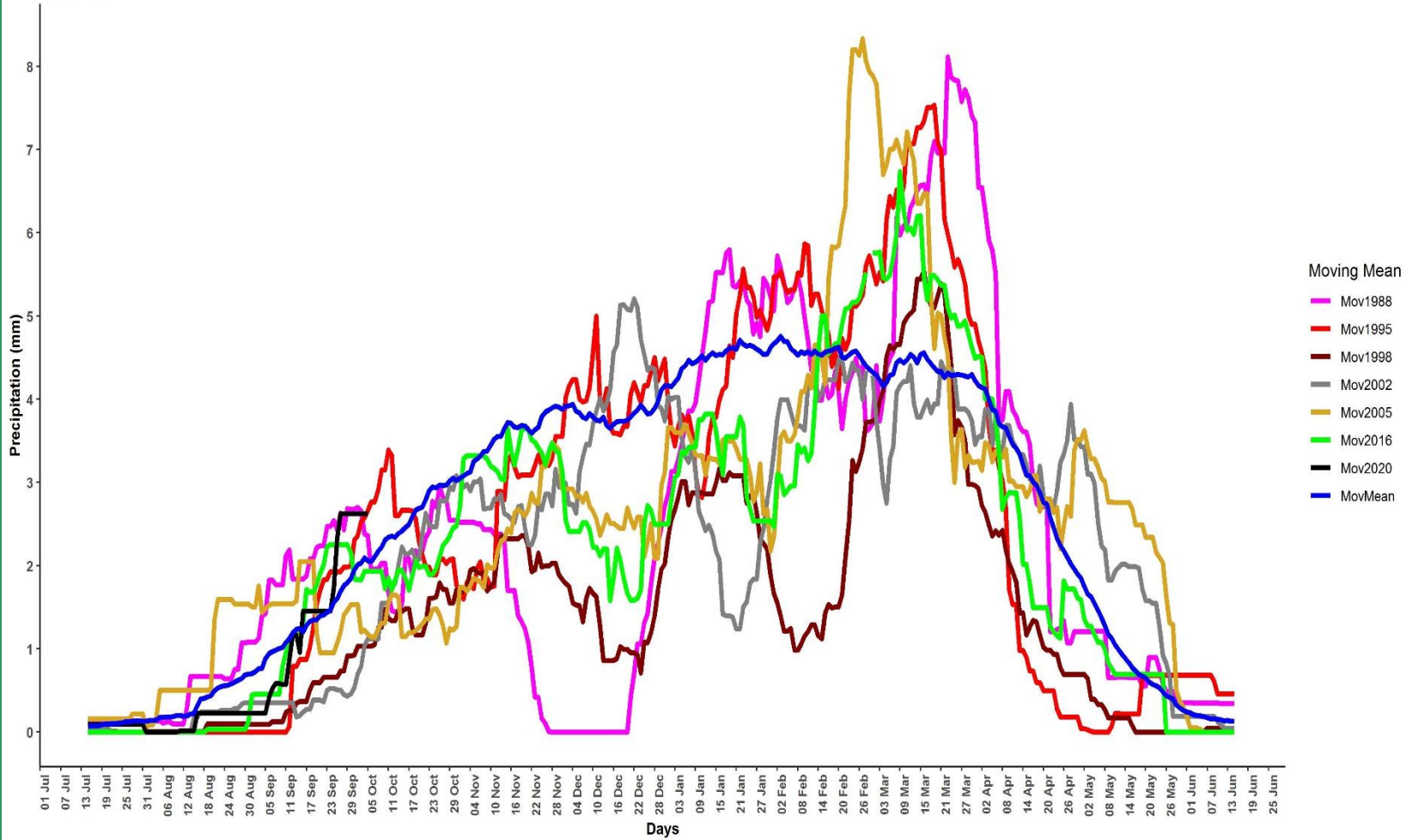


GISOZI  
Annual Cycle



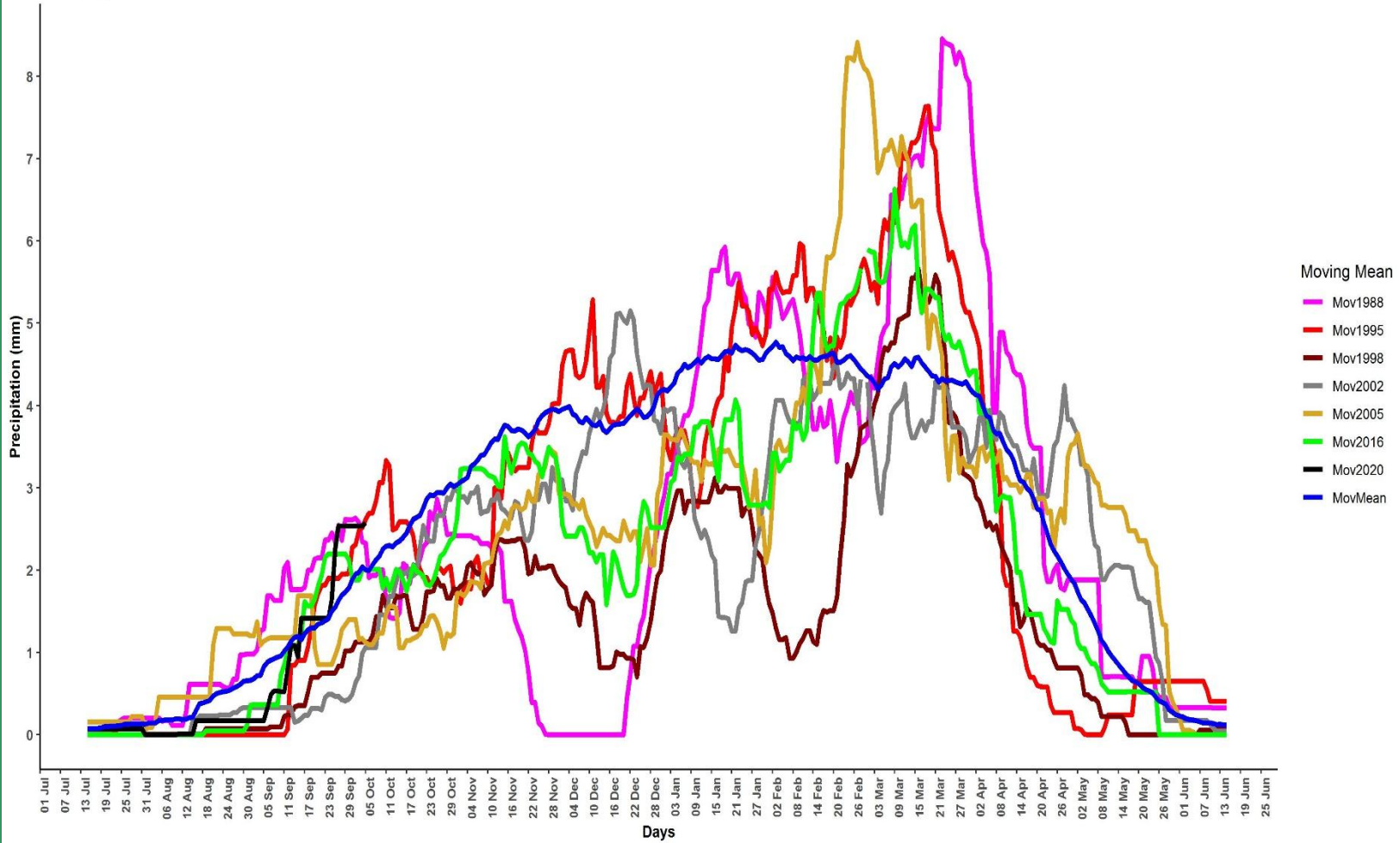


### GITEGA\_Zege Annual Cycle



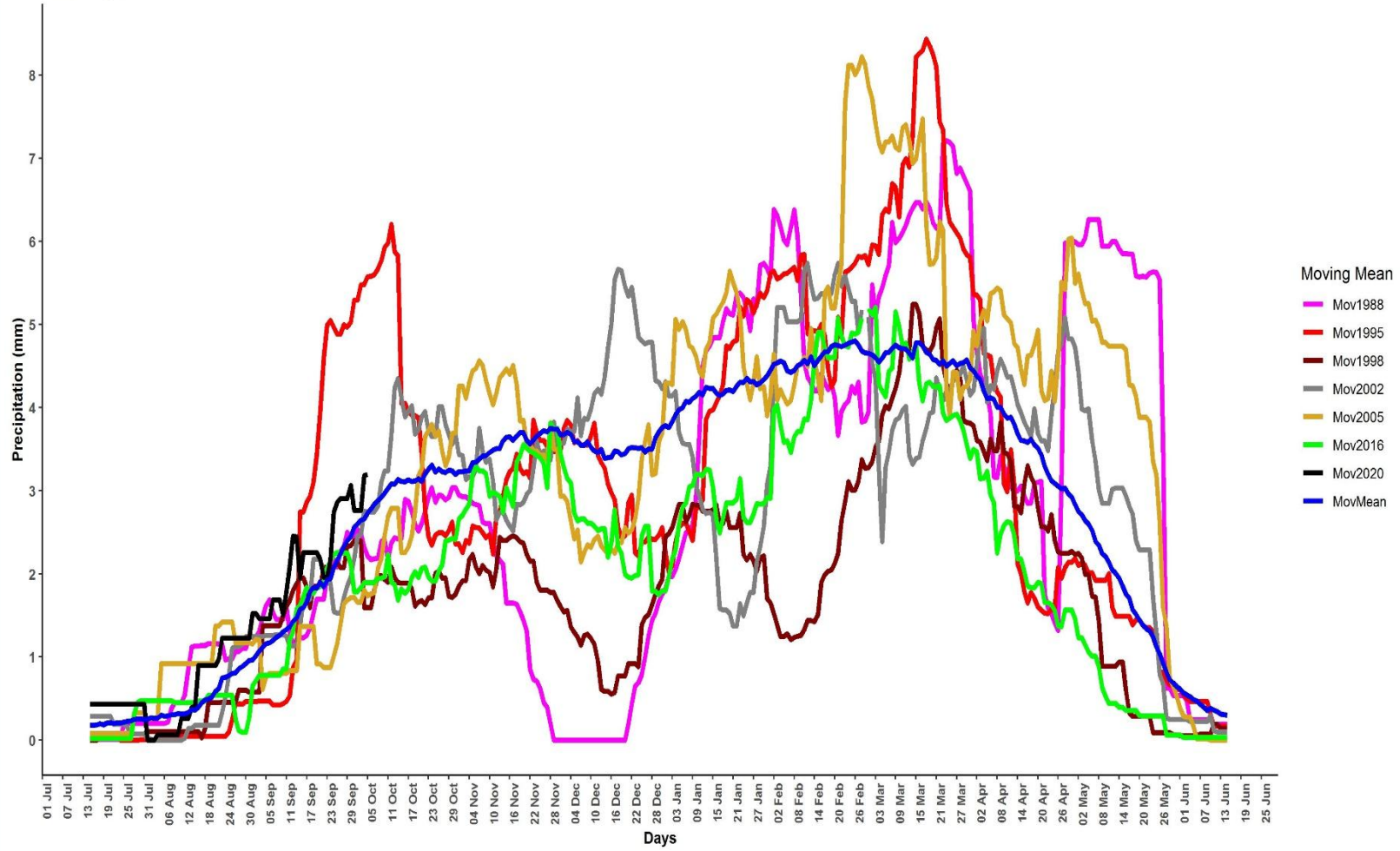


### GITEGA-Aerodrome Annual Cycle





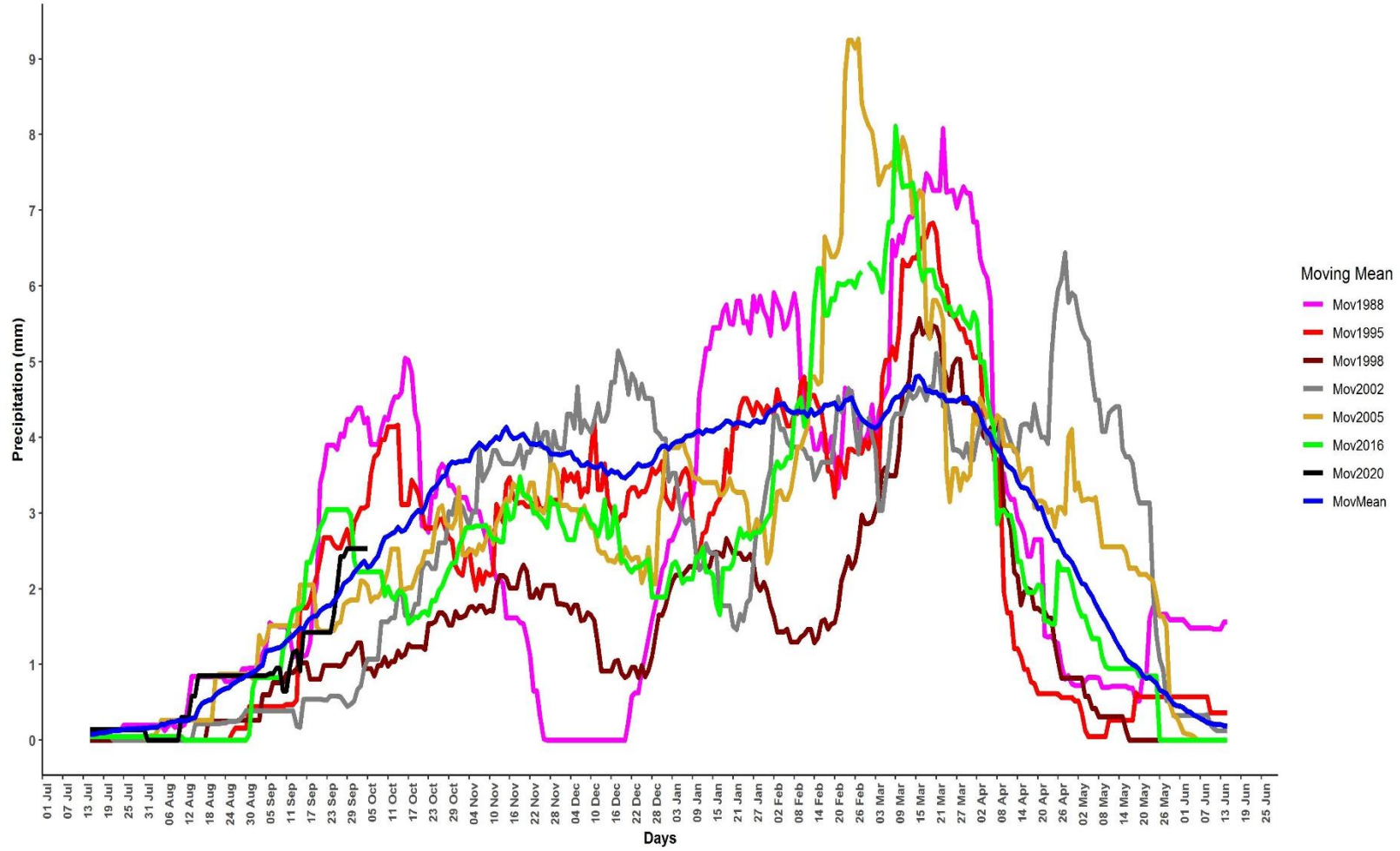
IMBO -Sems  
Annual Cycle





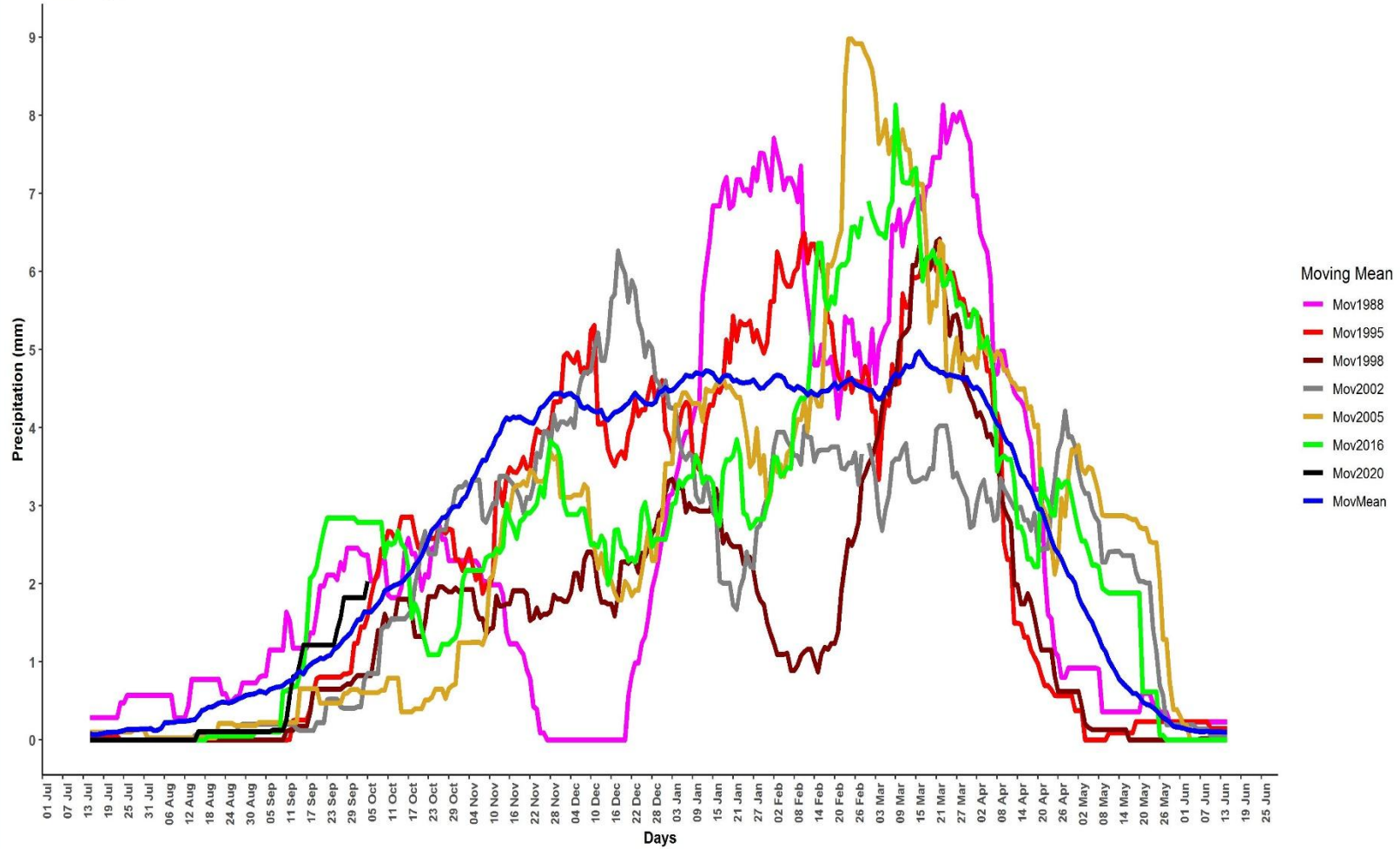


KARUZI  
Annual Cycle



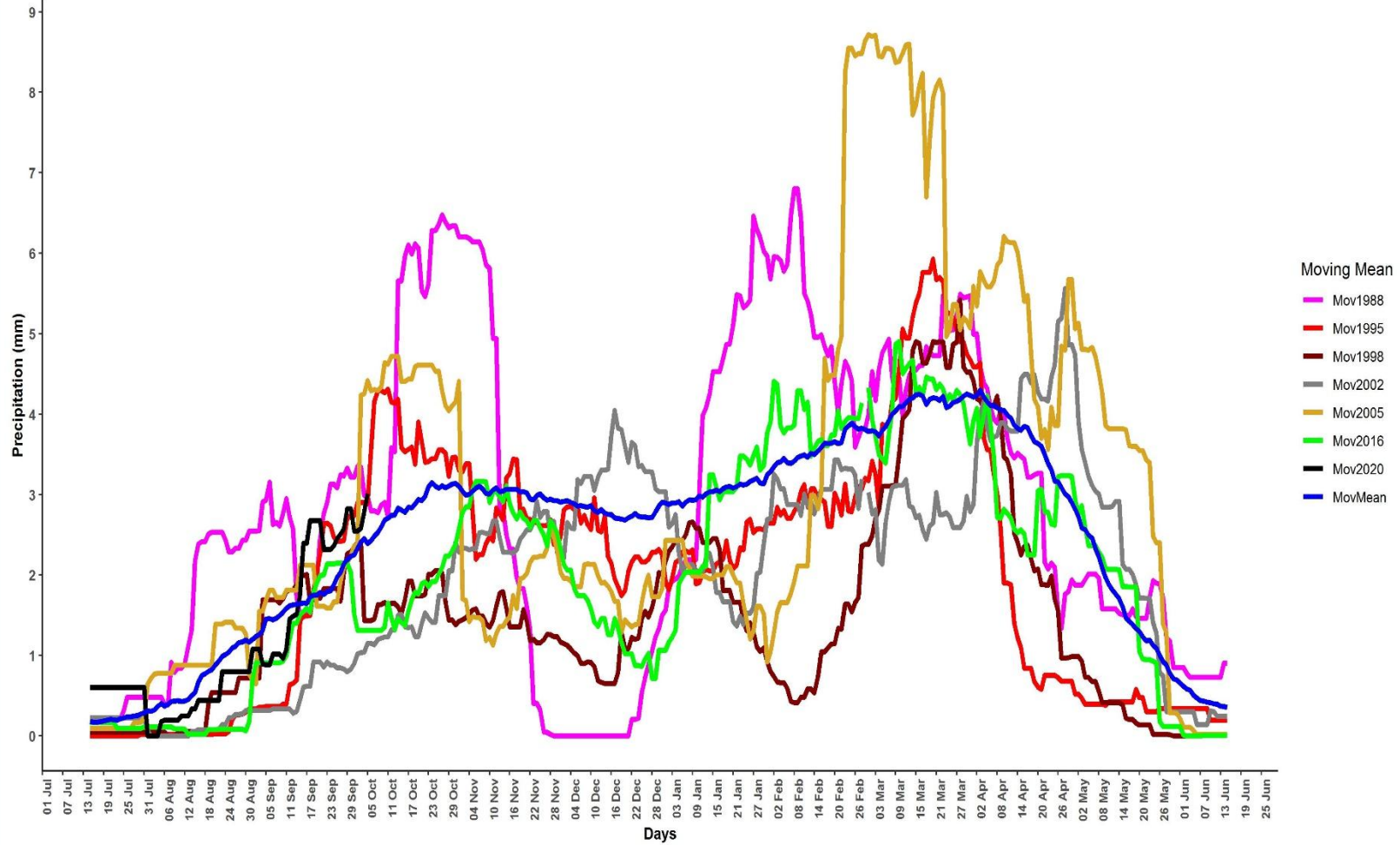


KINYINYA  
Annual Cycle



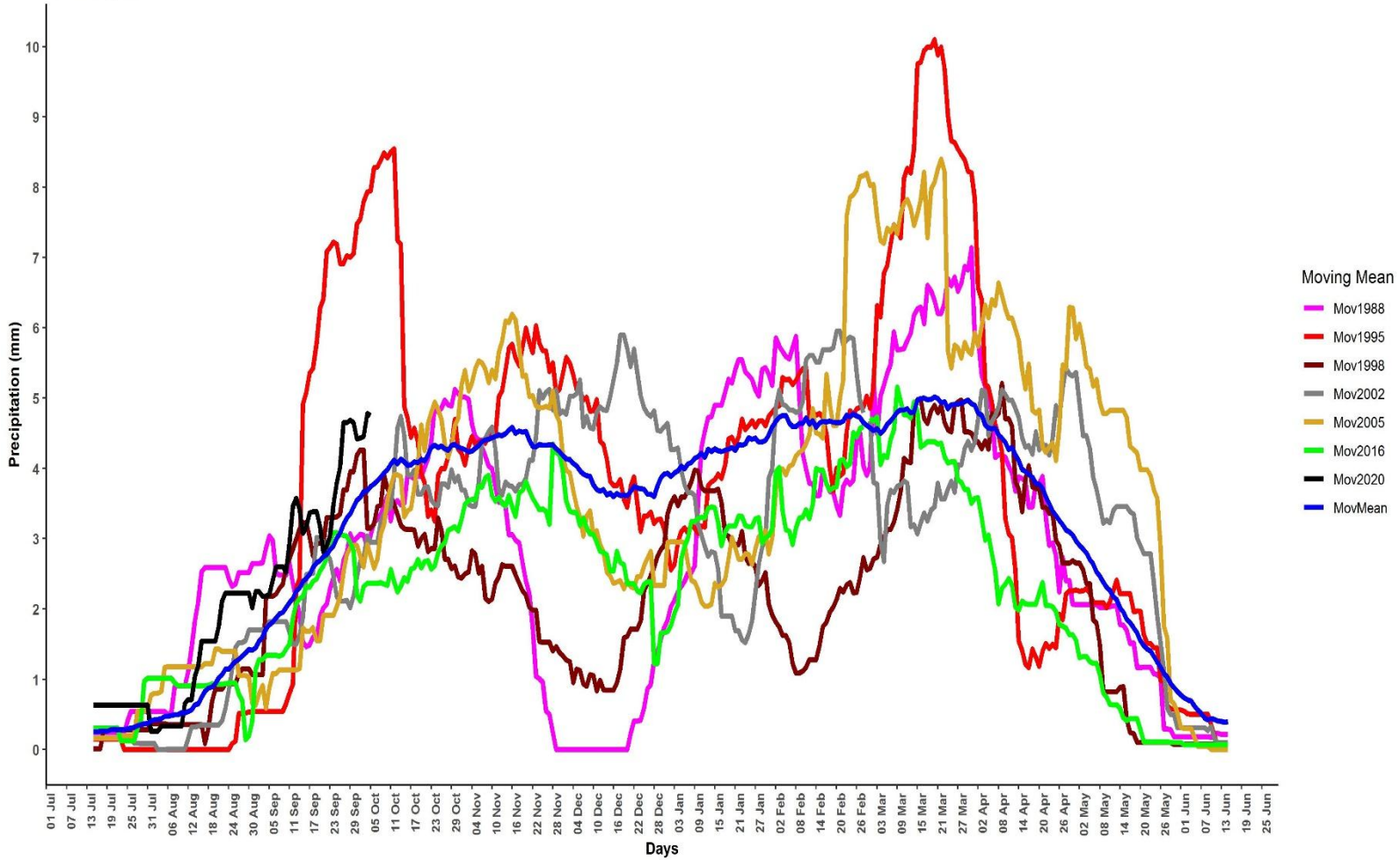


KIRUNDO-Projet  
Annual Cycle



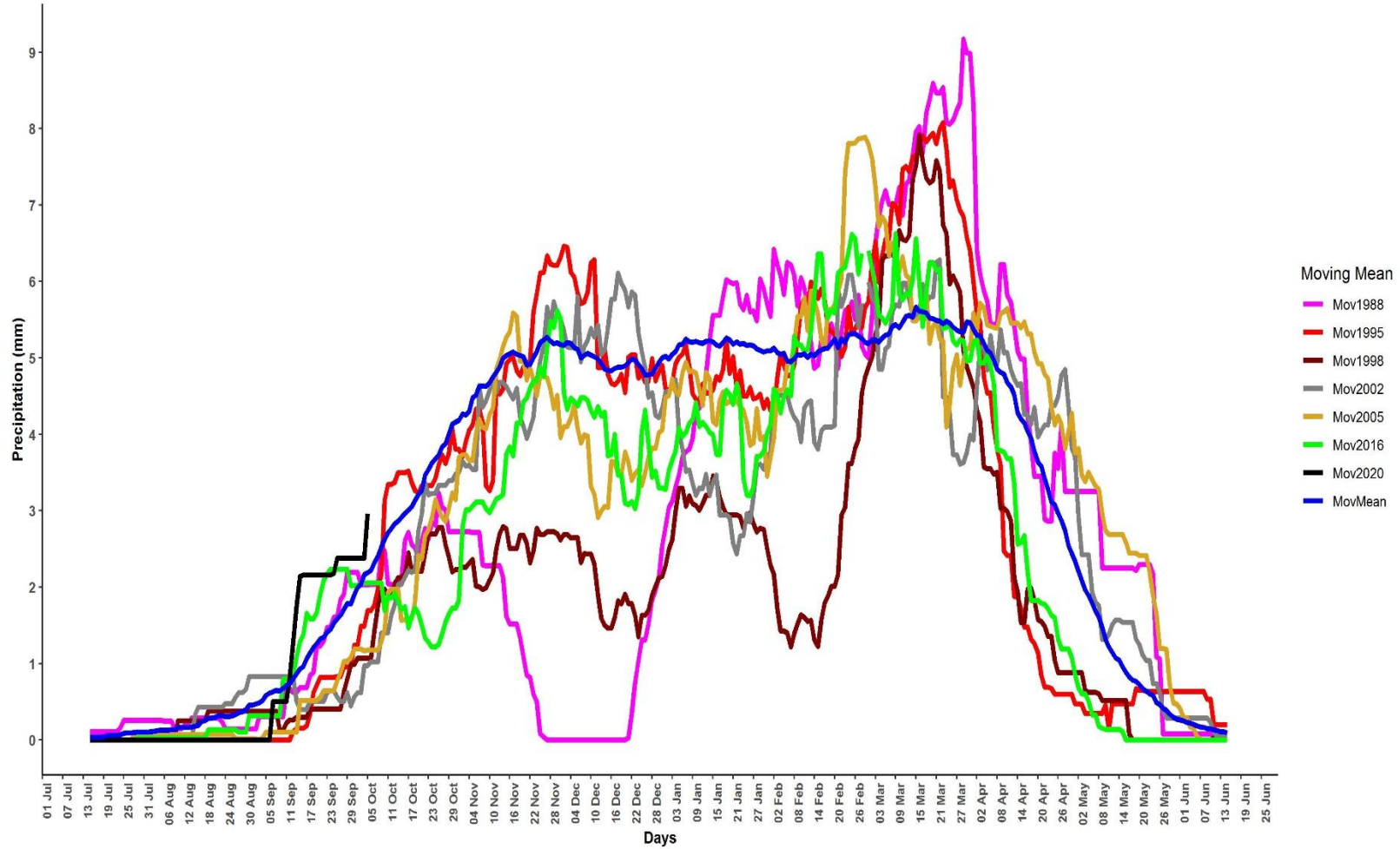


MABAYI  
Annual Cycle



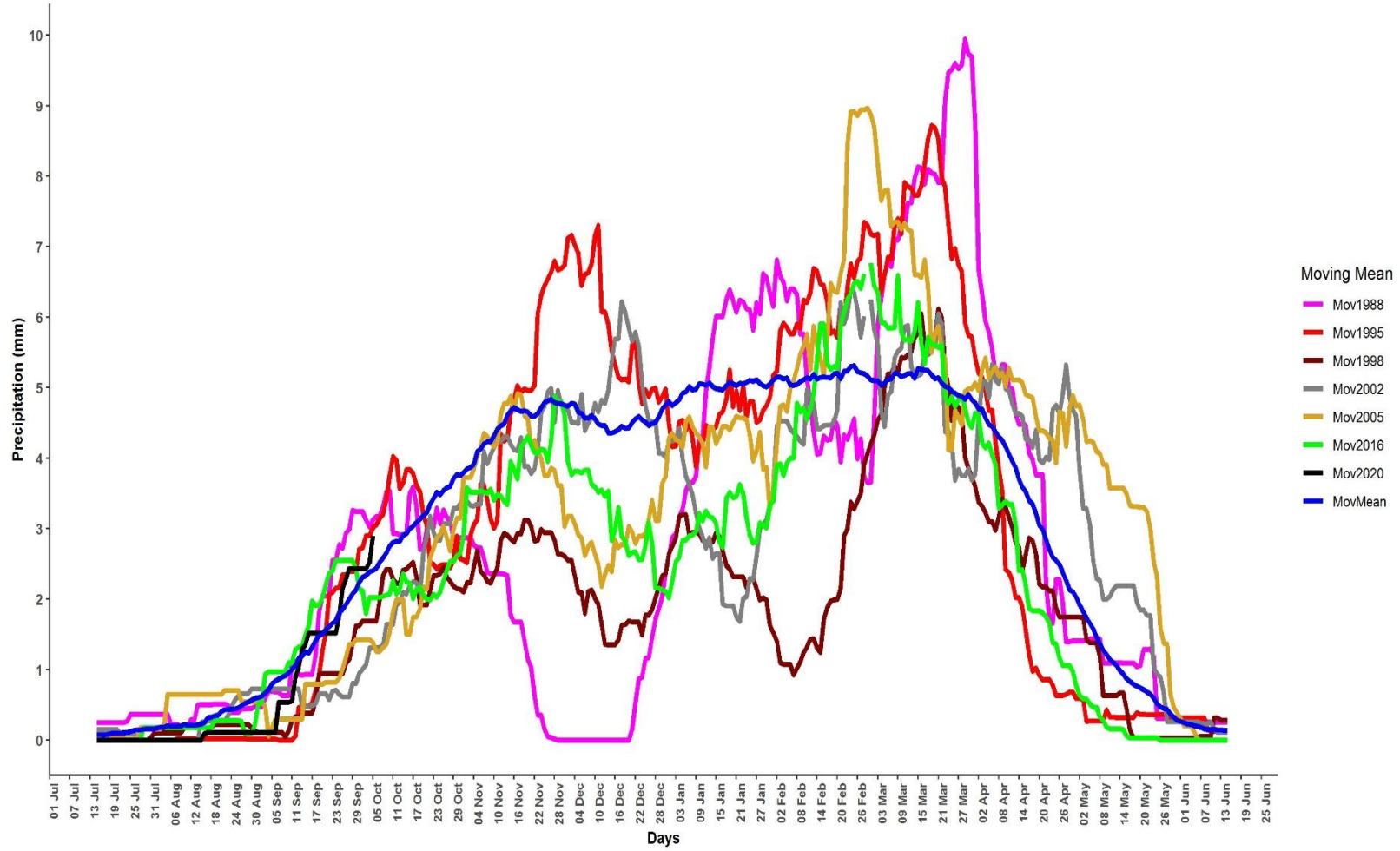


MAKAMBA  
Annual Cycle



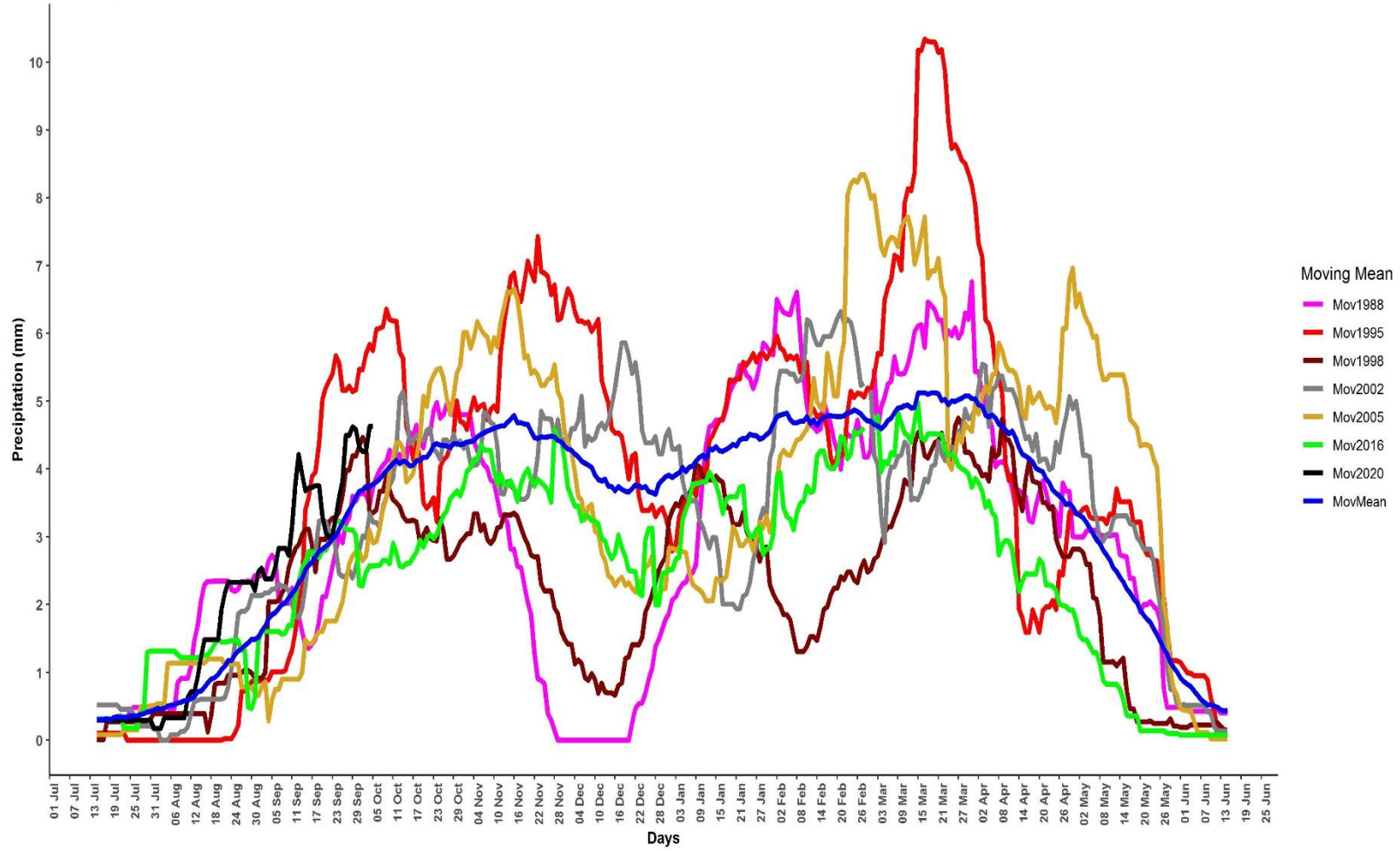


MATANA-Lycee  
Annual Cycle



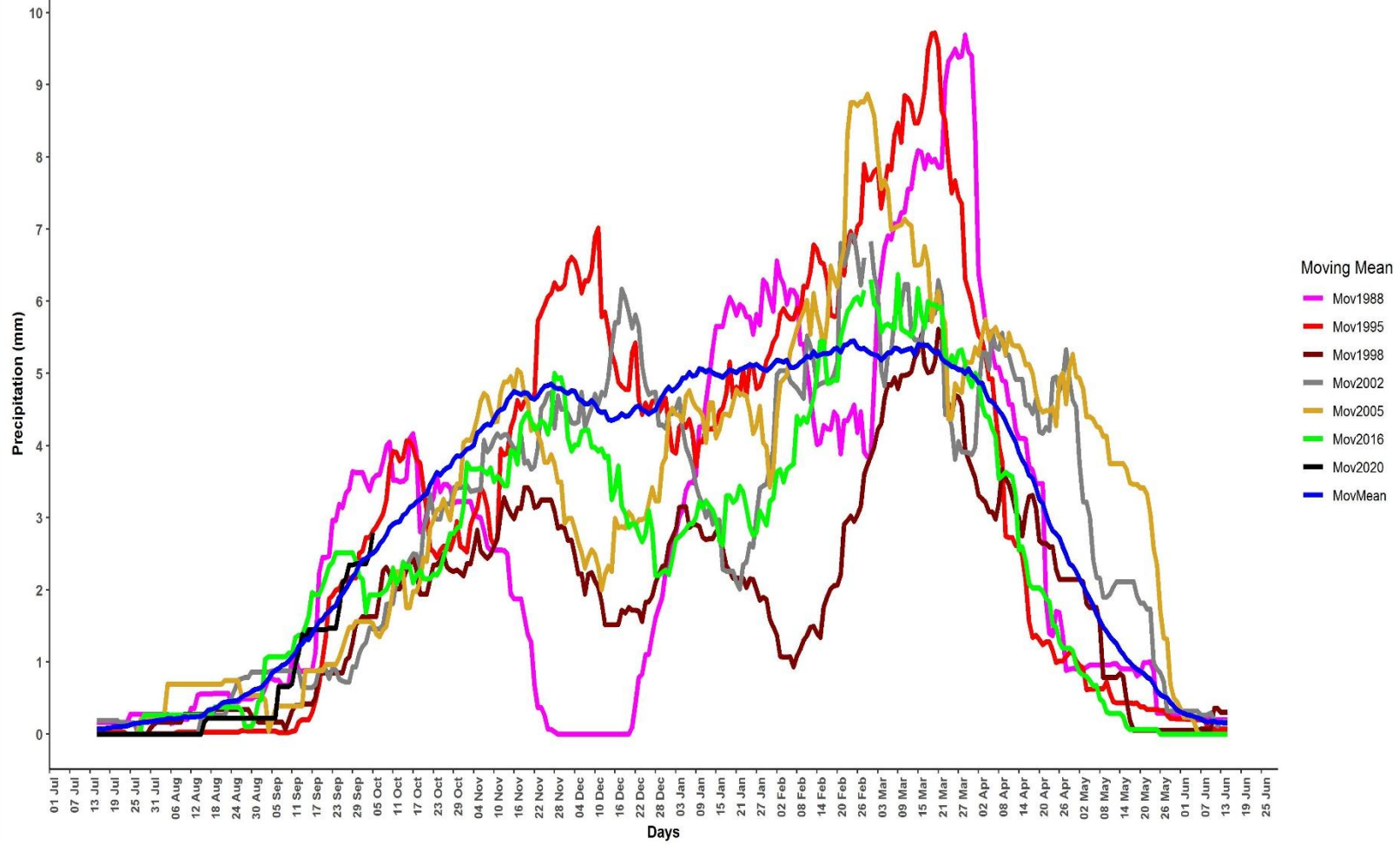


MPARAMBO  
Annual Cycle





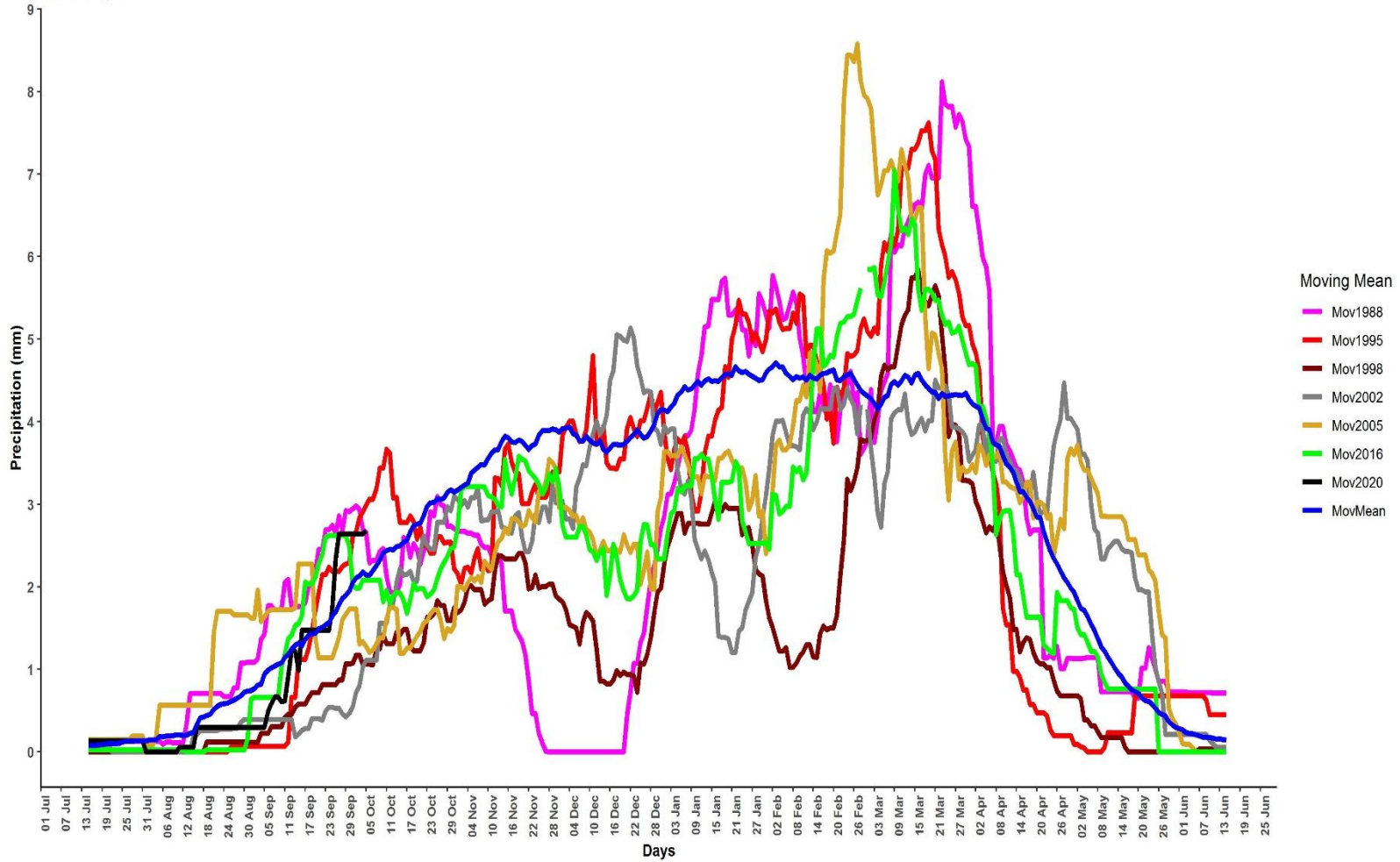
### MPOTA-Tora Annual Cycle





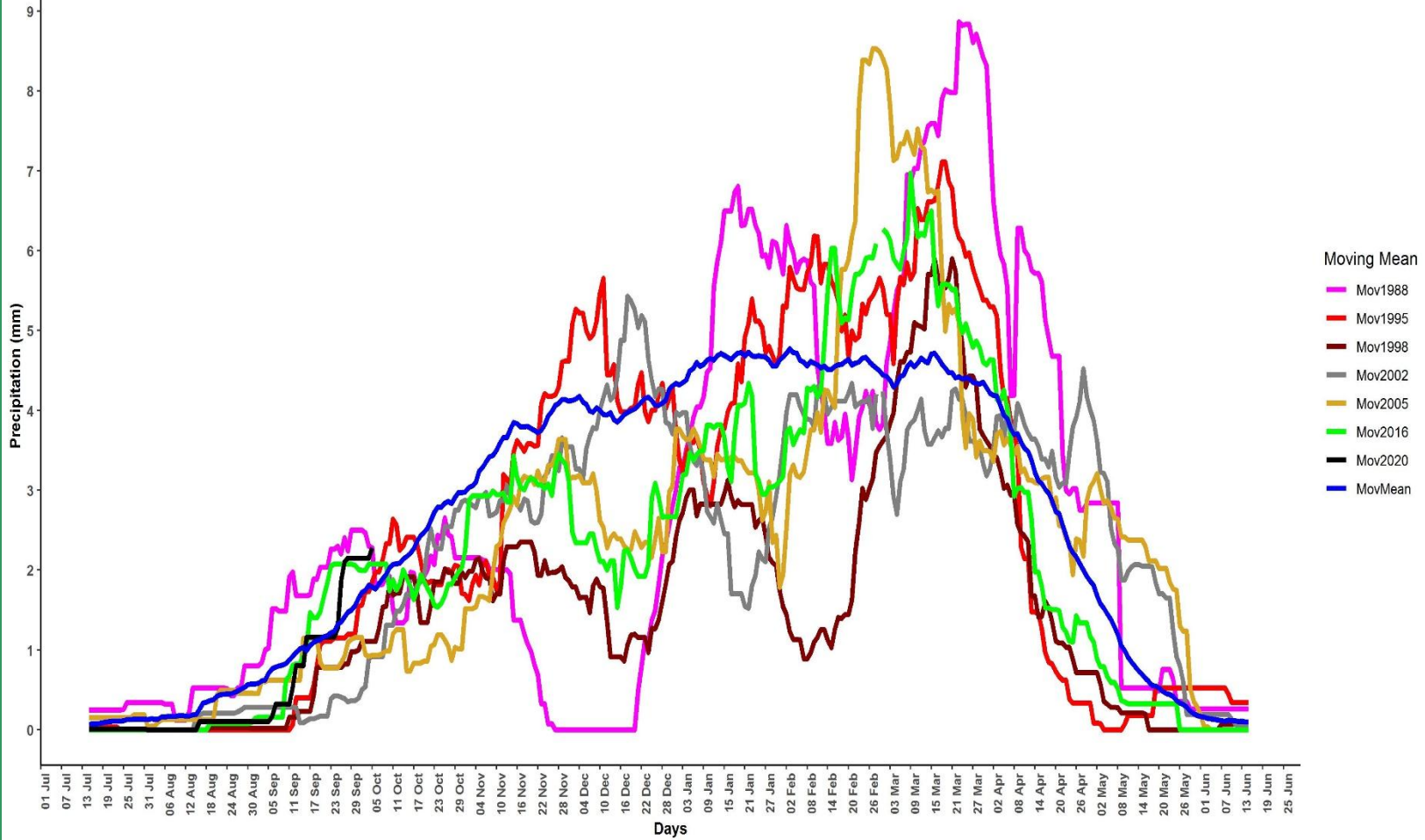


### MUGERA-Paroisse Annual Cycle



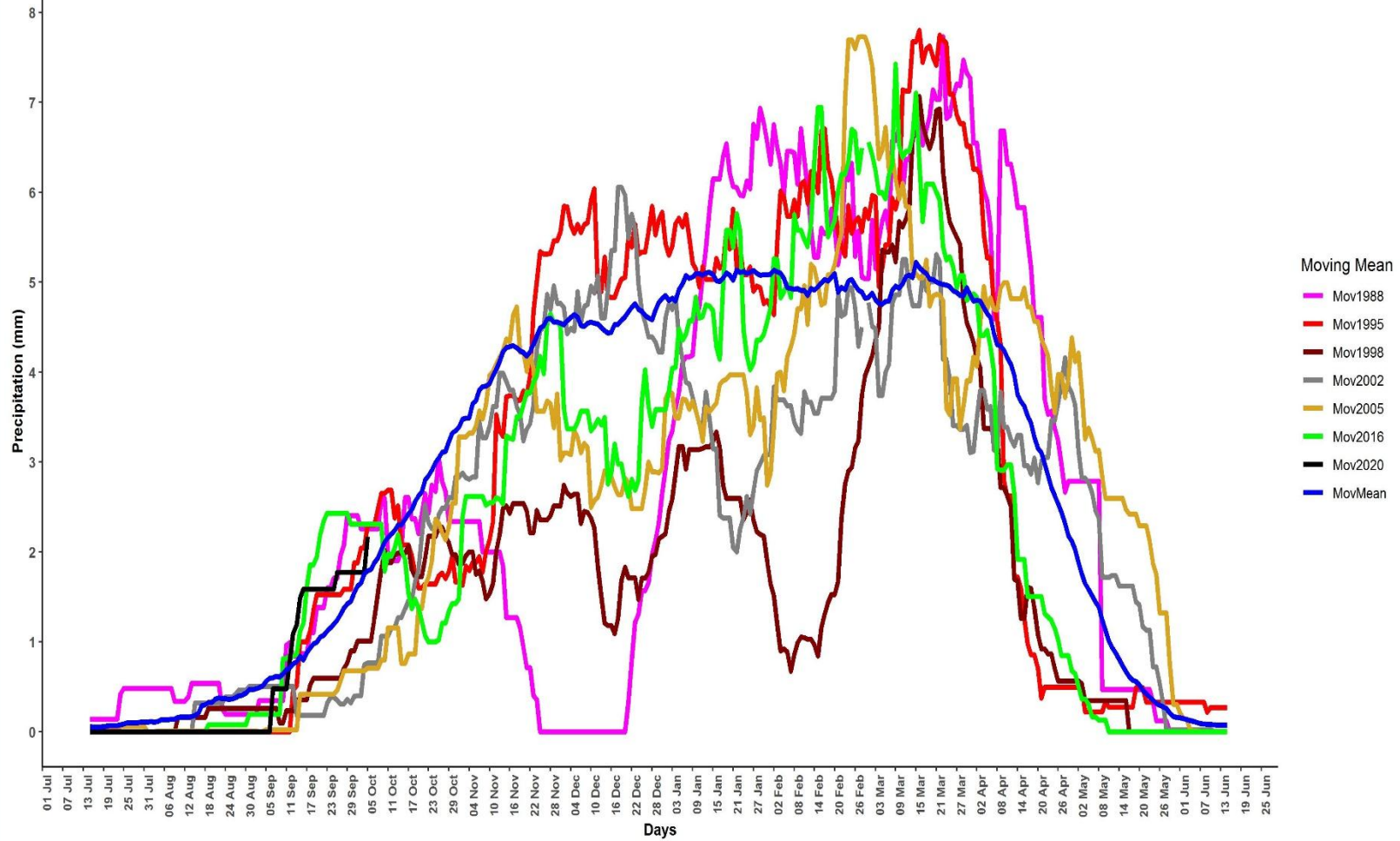


### MURIZA Annual Cycle





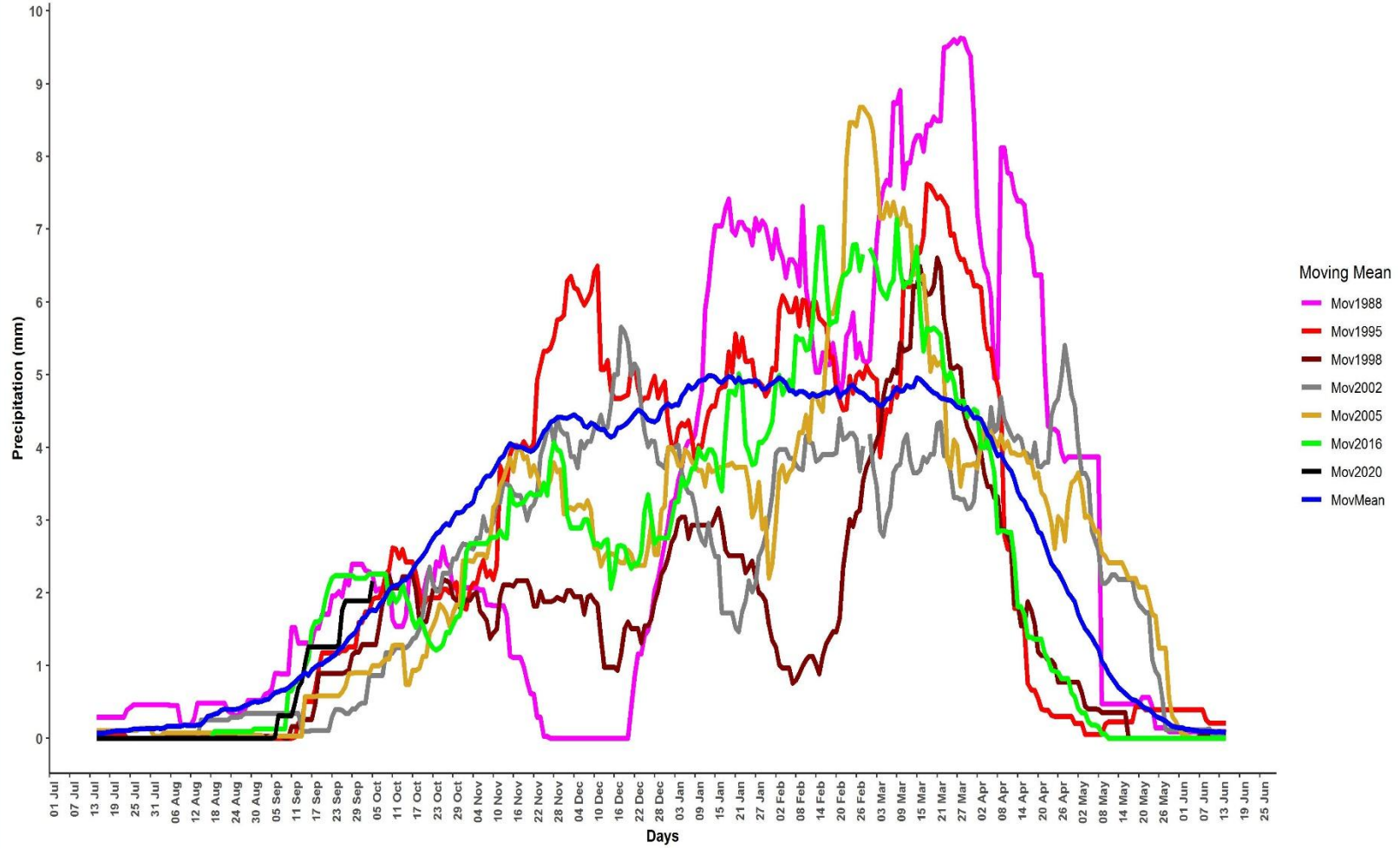
MUSASA  
Annual Cycle





# MUSONGATI

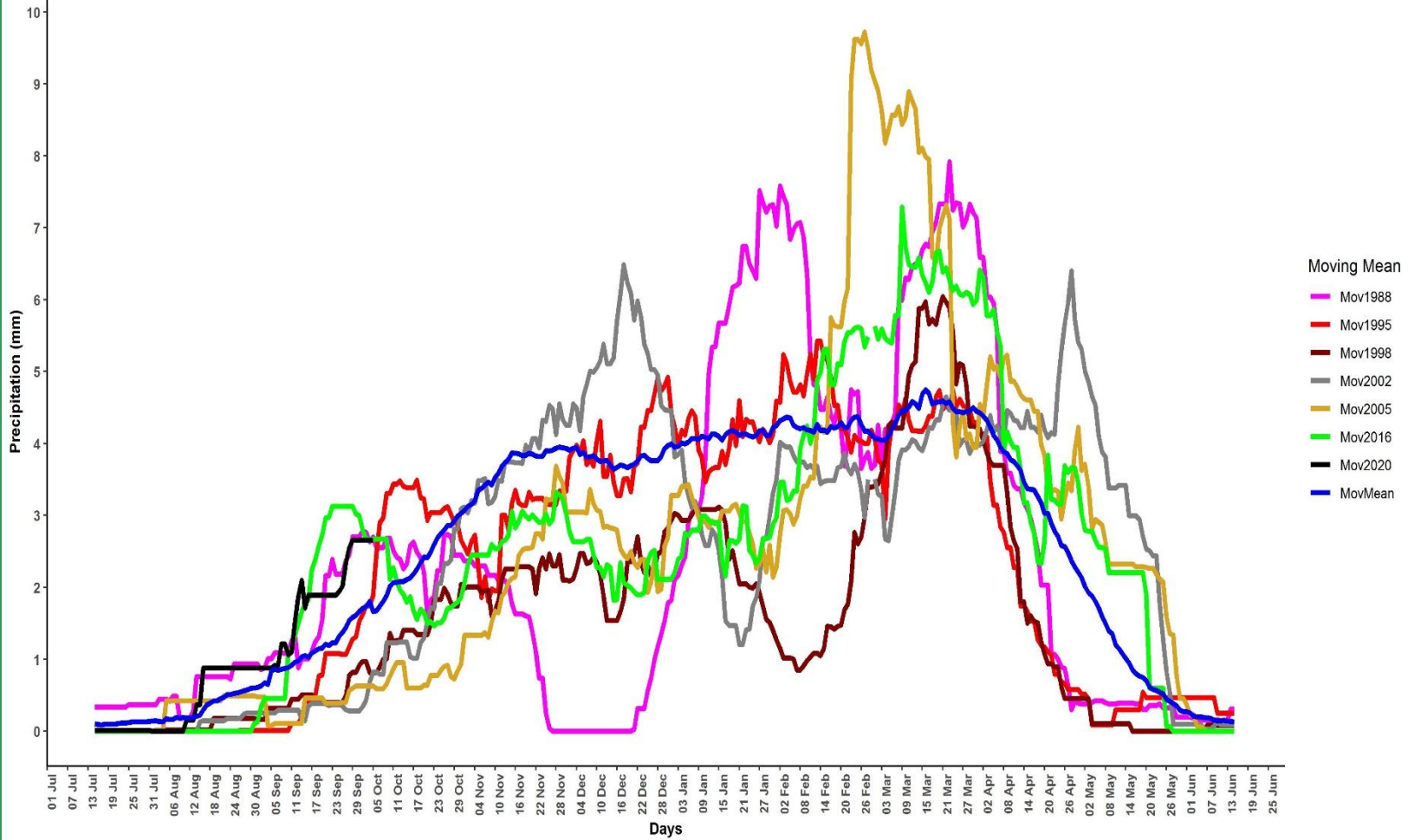
Annual Cycle





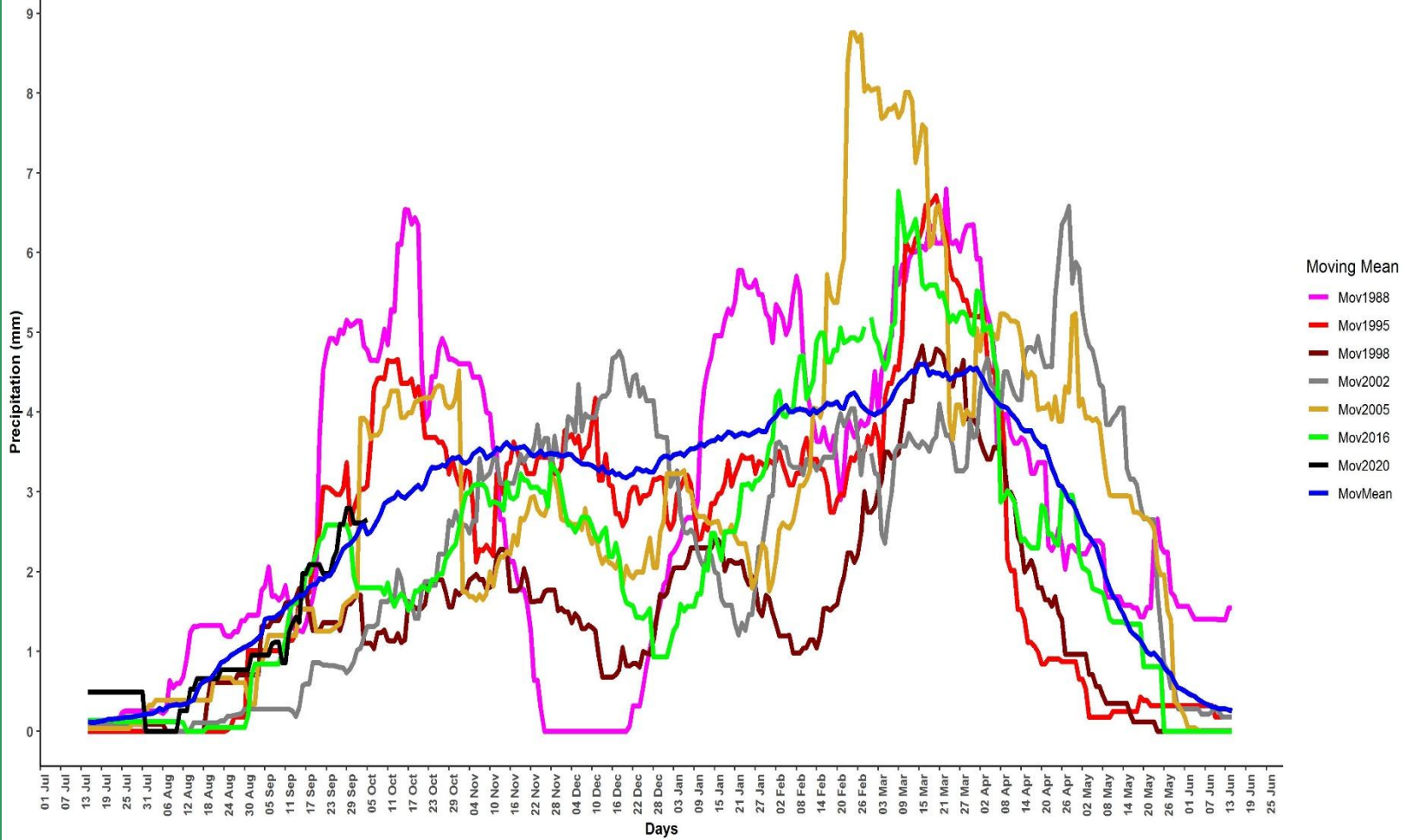
# MUYAGA

Annual Cycle



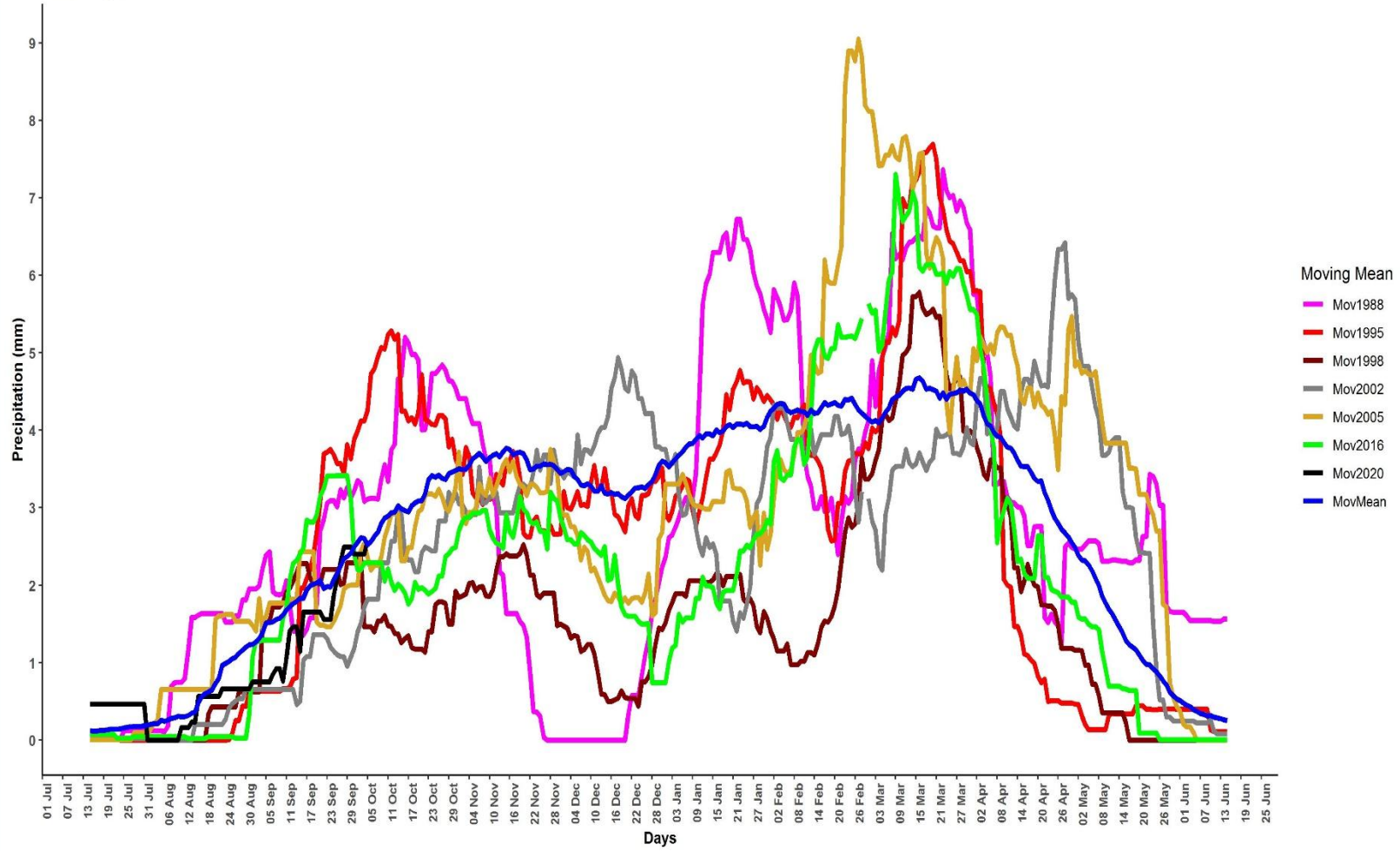


### MUYINGA Annual Cycle



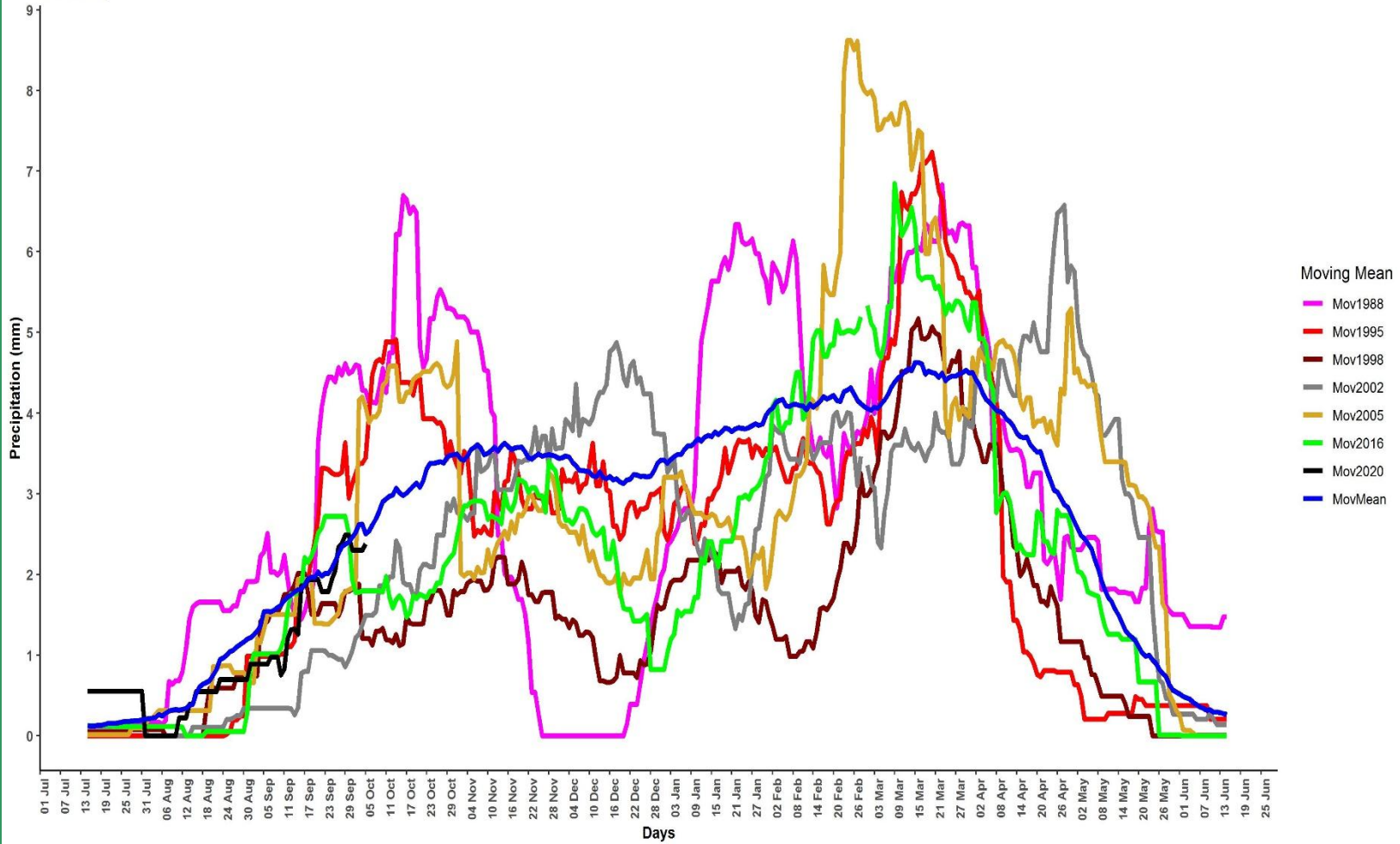


NGOZI  
Annual Cycle





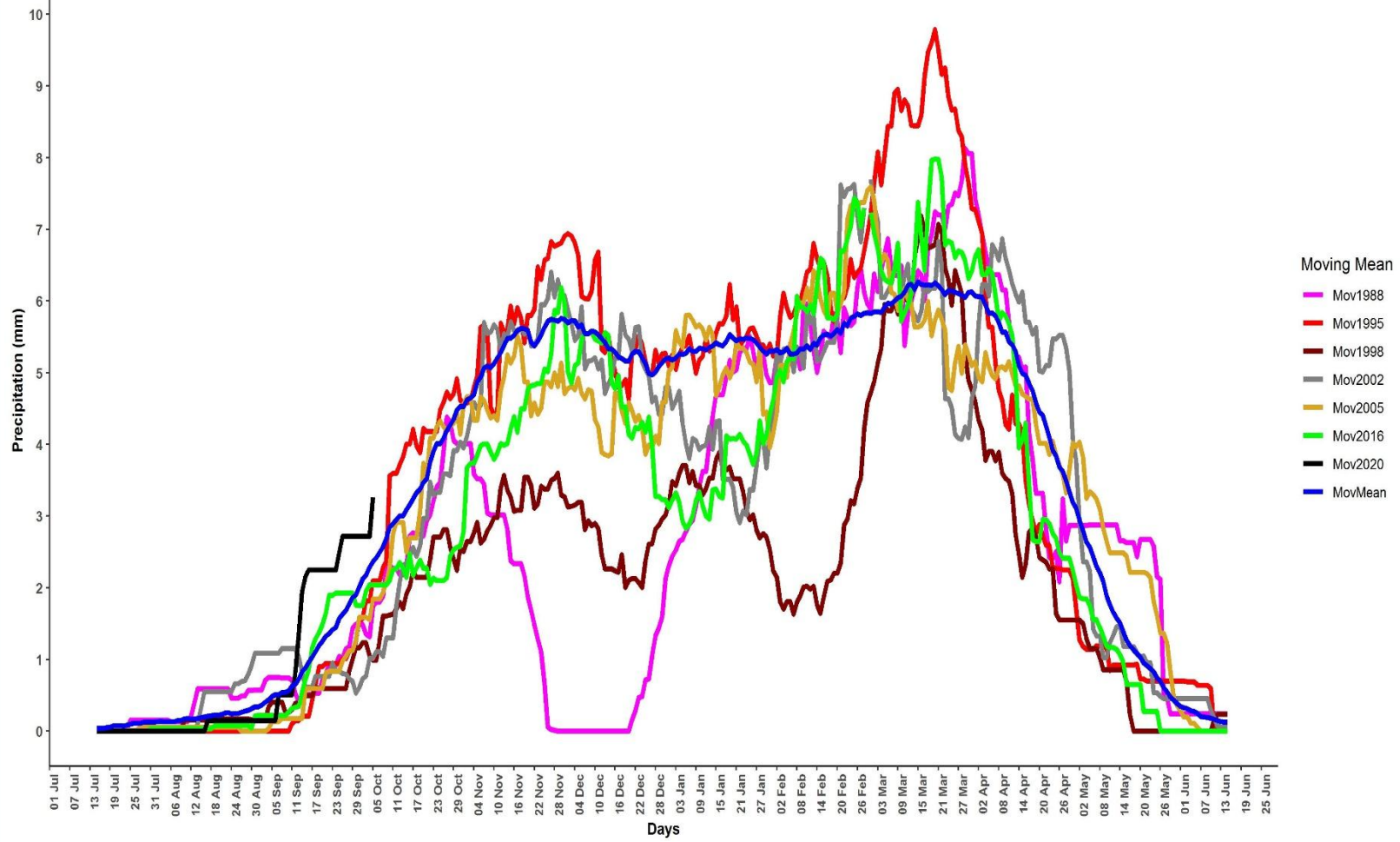
### NYAMUSWAGA Annual Cycle







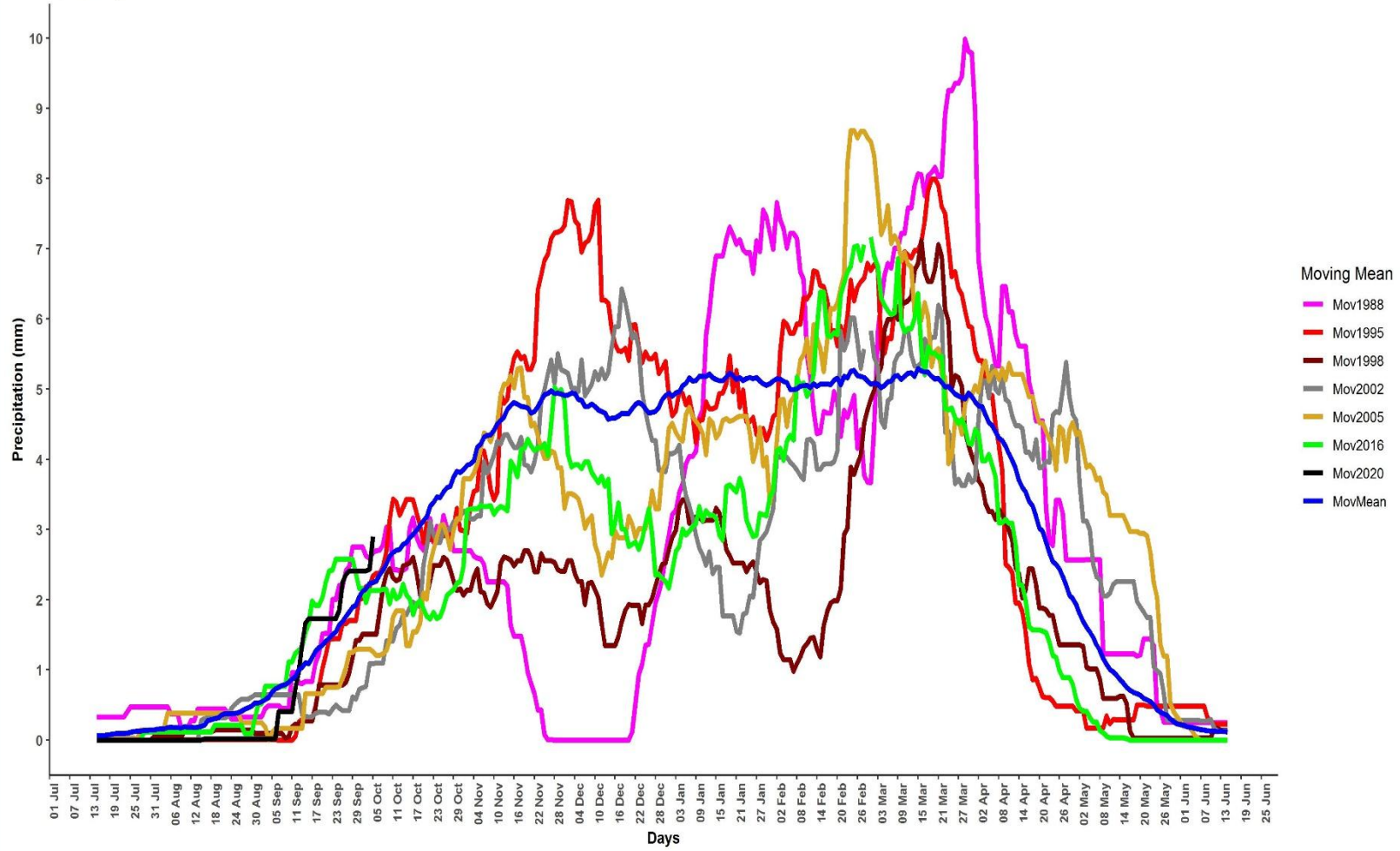
NYANZA LAC-Projet  
Annual Cycle





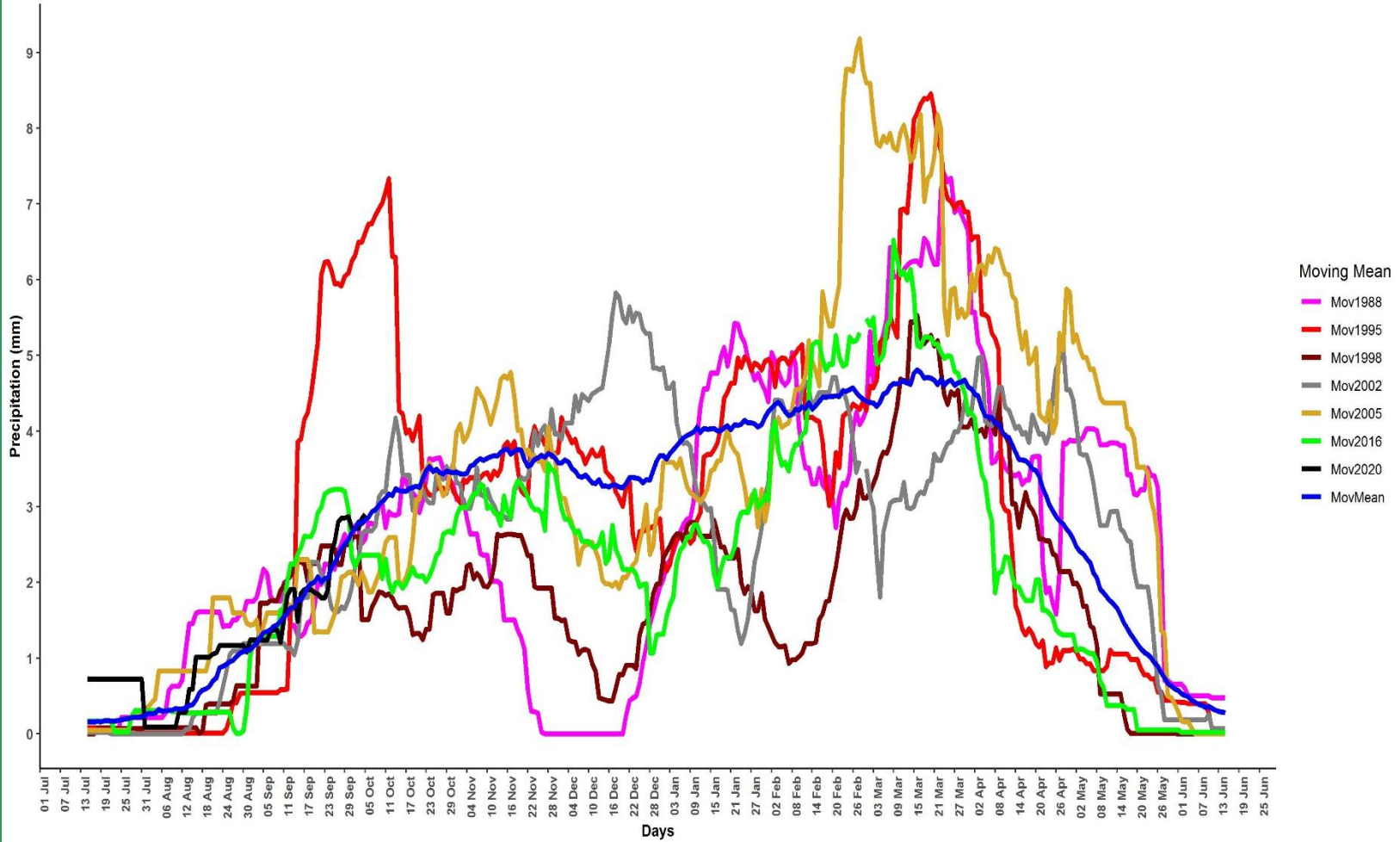
# RUVYIRONZA

Annual Cycle



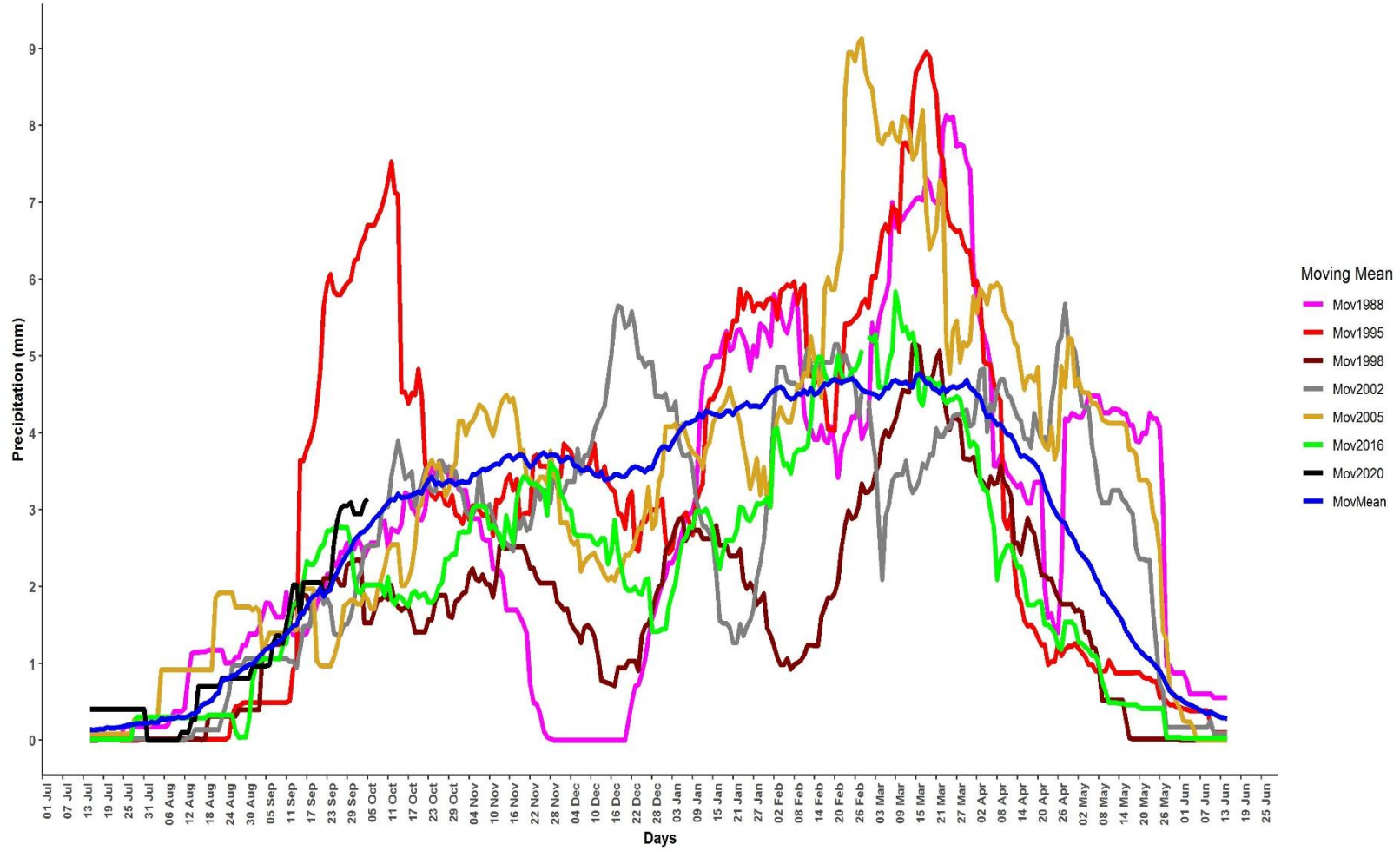


# RWEGURA Annual Cycle





TEZA-Nyabigondo  
Annual Cycle



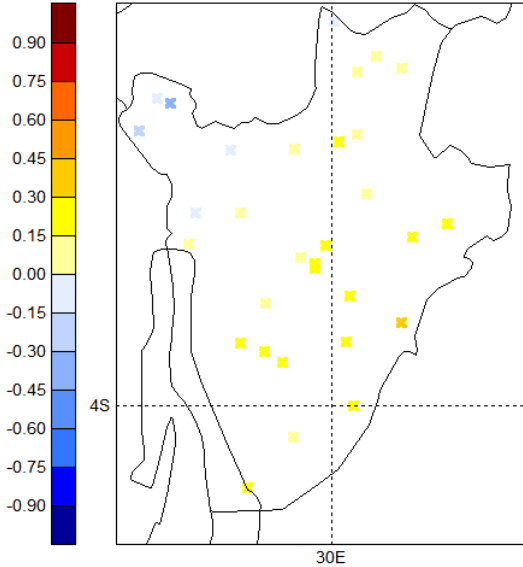


## CPT OUTLOOK

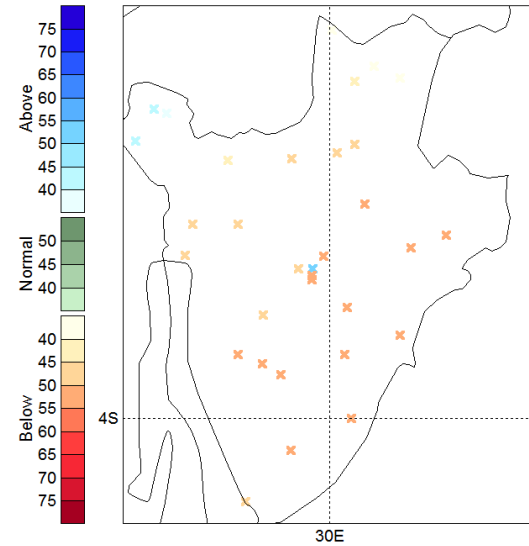
# FCST\_CFSv2\_NDJ\_2020-21



Skill\_map\_sst\_cfsv2\_oct\_2020\_ic\_ndj\_1982-2010



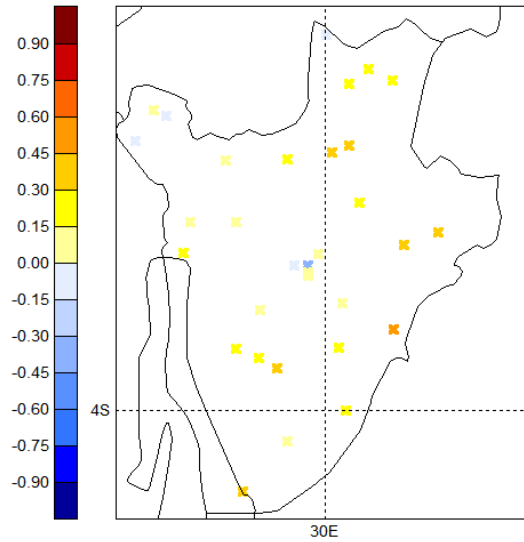
Probabilistic forecasts



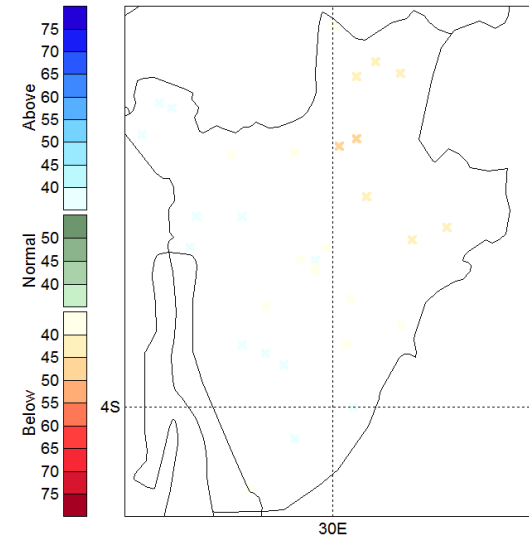


# FCST\_CMC2\_NDJ\_2020-21

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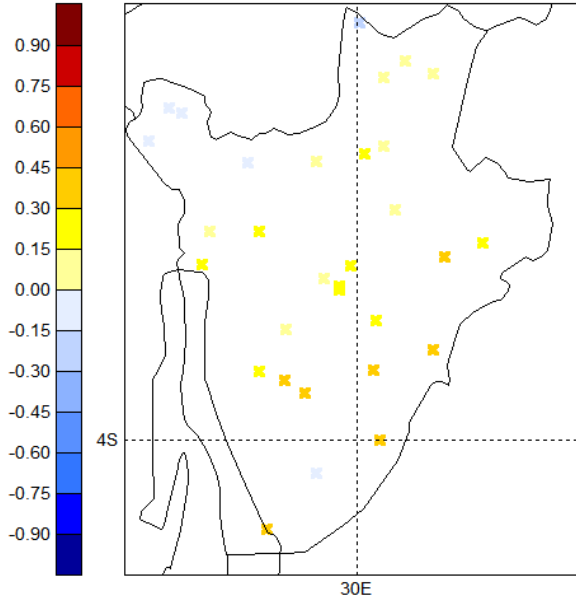
Probabilistic forecasts



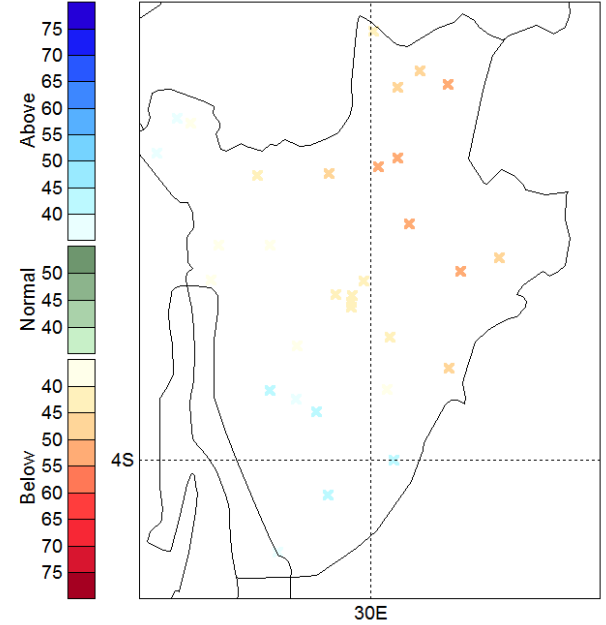


# FCST\_NMME\_NDJ\_2020

Skill\_map\_sst\_nmme\_oct\_2020\_ic\_ndj\_1982-2011



Probabilistic forecasts



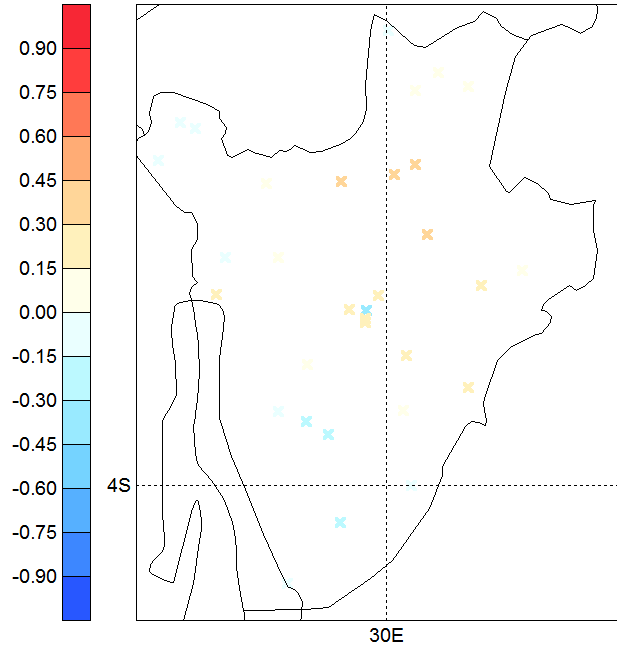




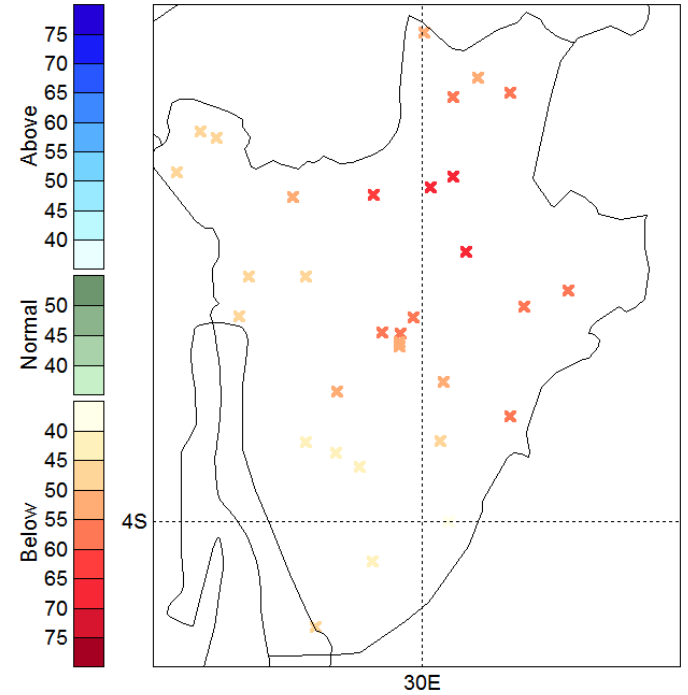
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Goodness 0.147

Skill\_map\_sst\_obs\_ncep\_reynold\_oct\_2020\_ic\_ndj\_1982.



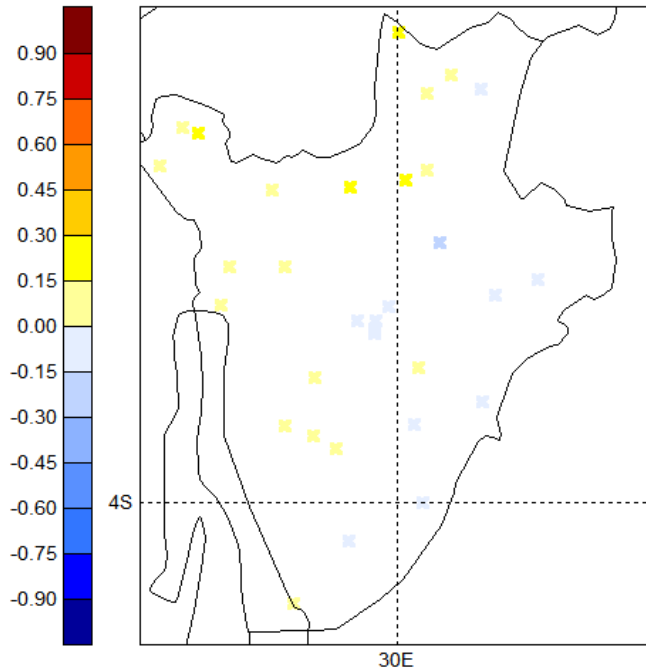
Probabilistic forecasts



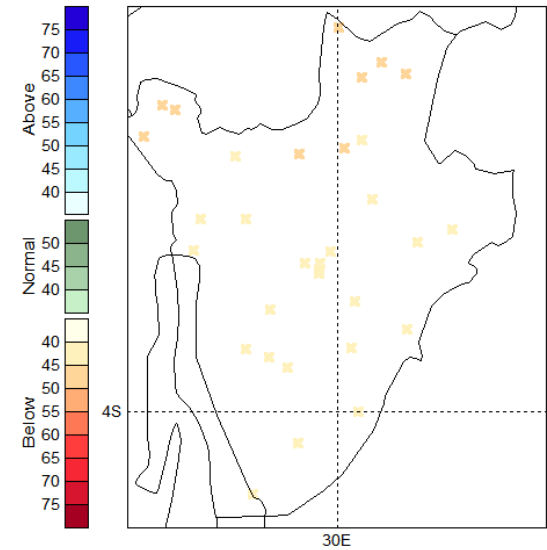
# FCST\_CFSv2\_DJF\_2020-21



Skill\_map\_sst\_cfsv2\_oct\_2020\_ic\_djf\_1982-2011



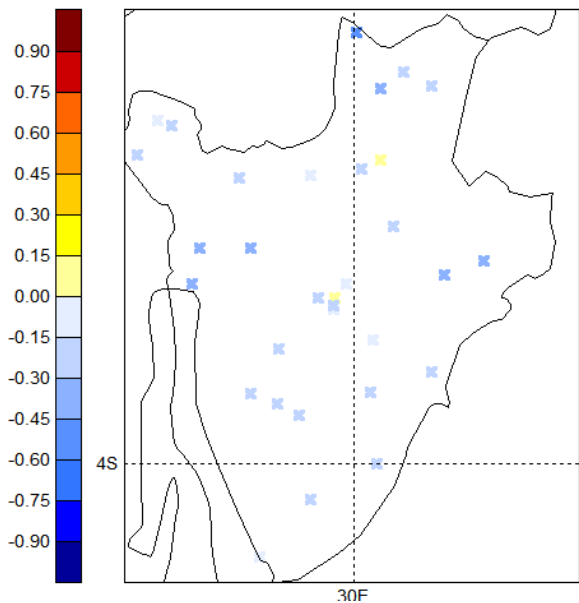
Probabilistic forecasts



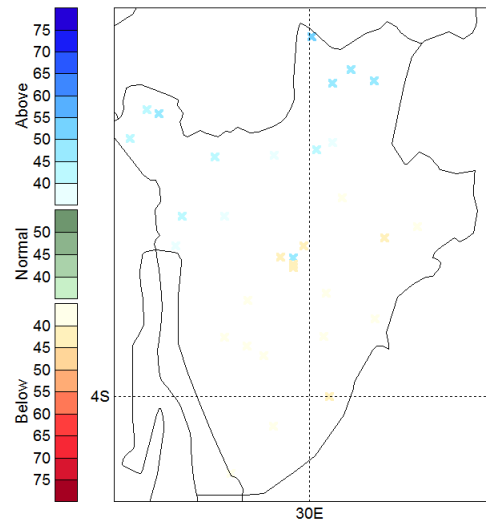
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Skill\_map\_sst\_cmc2\_oct\_2020\_ic\_djf\_1982-2011



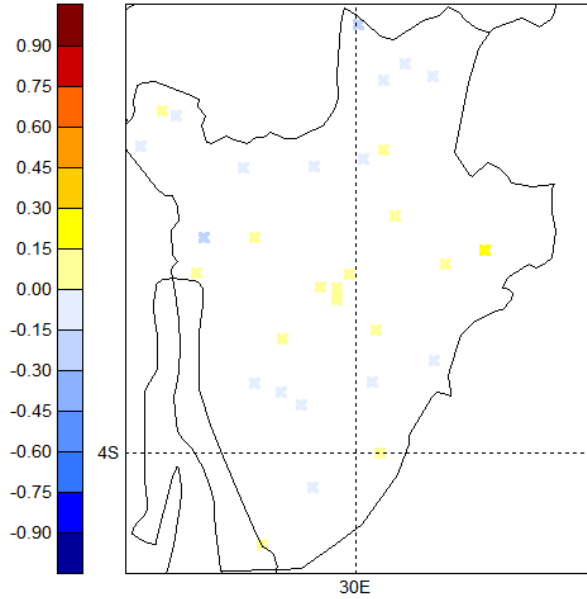
Probabilistic forecasts



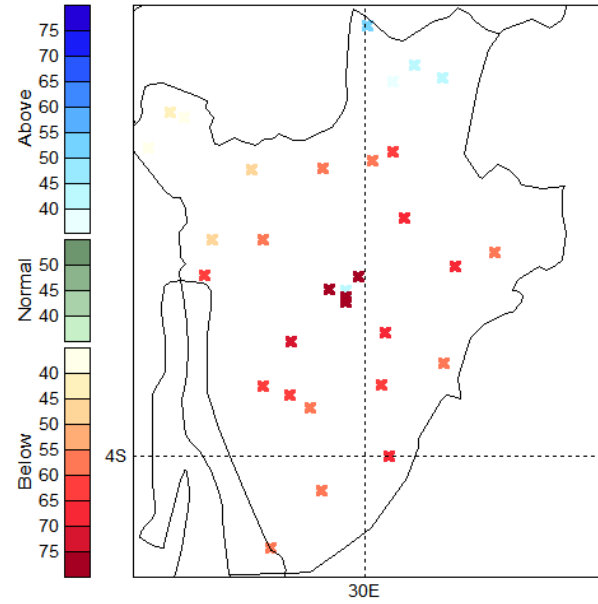


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Skill\_map\_sst\_nmme\_oct\_2020\_ic\_djf\_1982-2011



Probabilistic forecasts

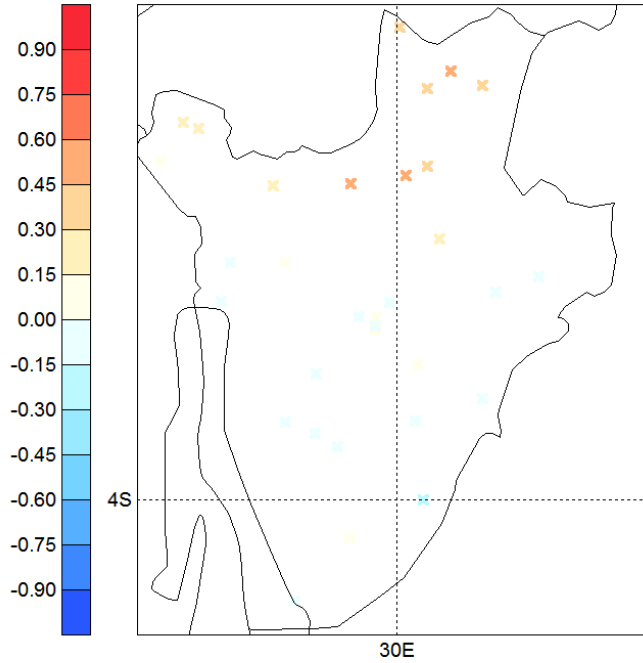




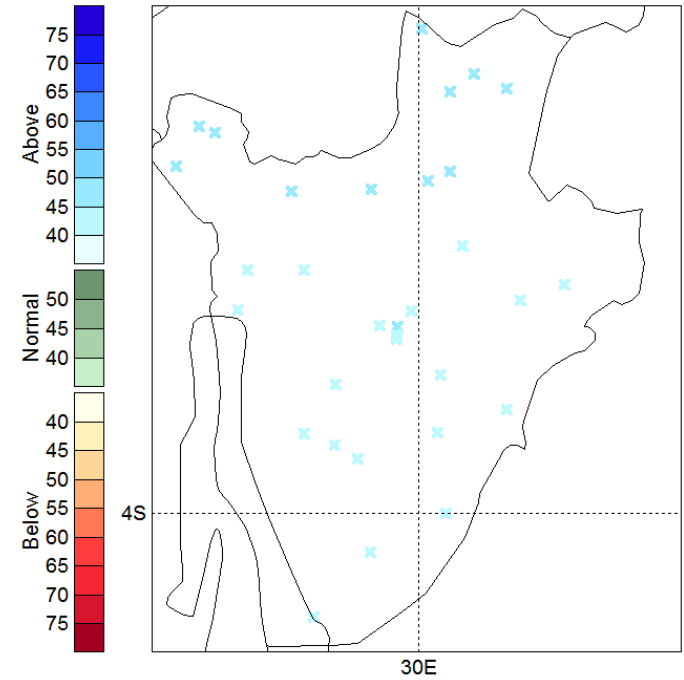
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Goodness 0.220

Skill\_map\_sst\_obs\_ncep\_reynold\_oct\_2020\_ic\_djf\_1982-



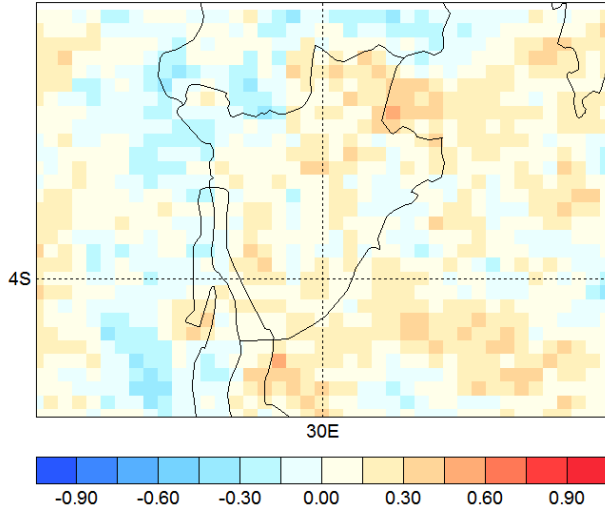
Probabilistic forecasts





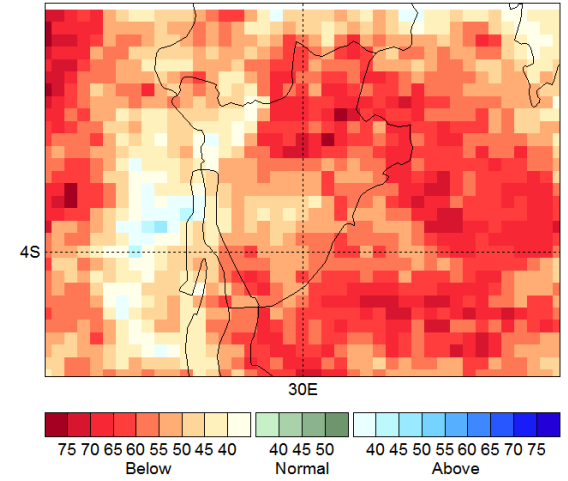
# PREVISION CFSV2 NDJ 2020-21

Skill\_map\_cfsv2\_oct\_2020\_ic\_ndj\_1982-2010

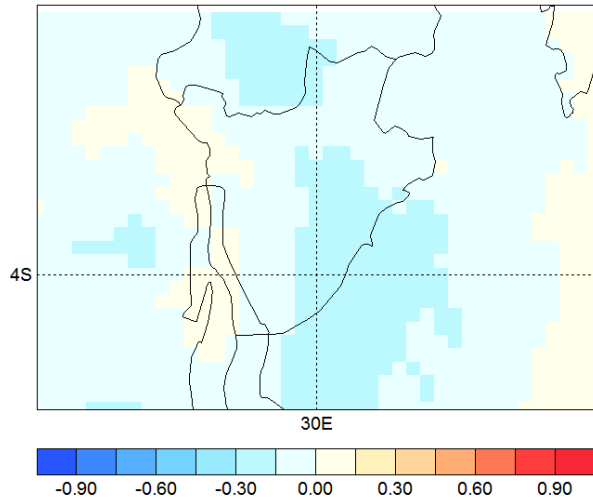


Goodness 0.155

Probabilistic forecasts

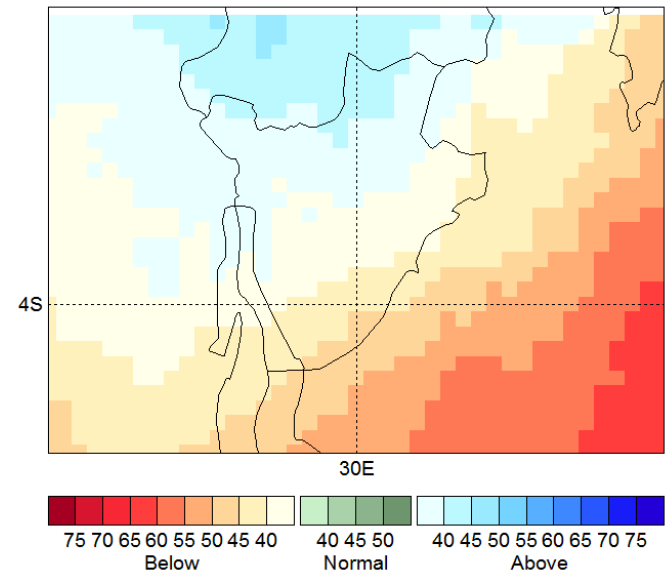


Skill\_map\_sst\_cfsv2\_oct\_2020\_ic\_ndj\_1982-2011



Goodness 0.019

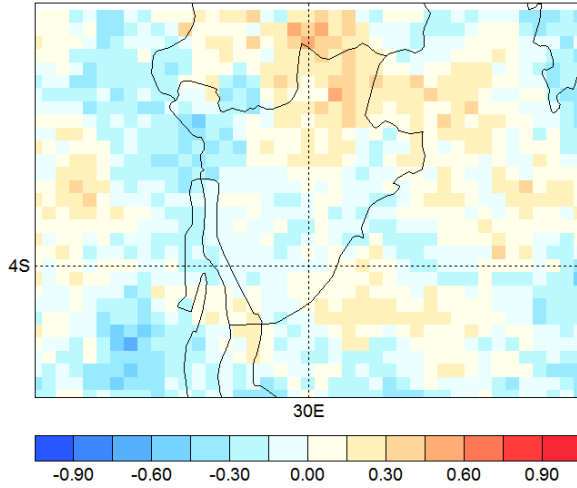
Probabilistic forecasts





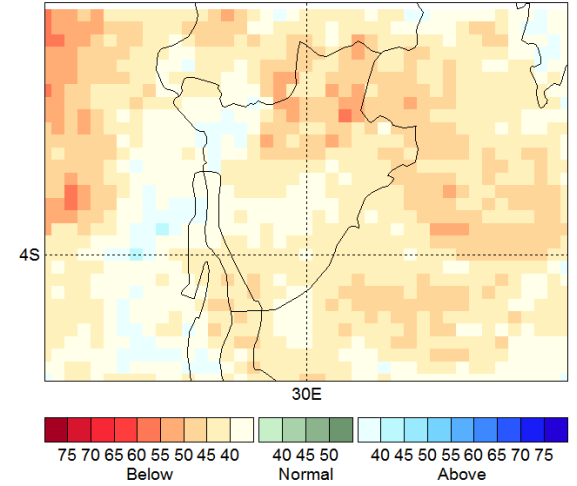
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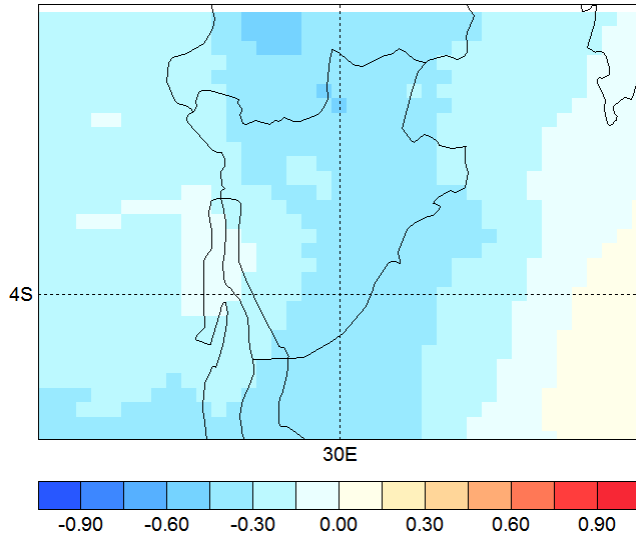


Goodness 0.105

Probabilistic forecasts

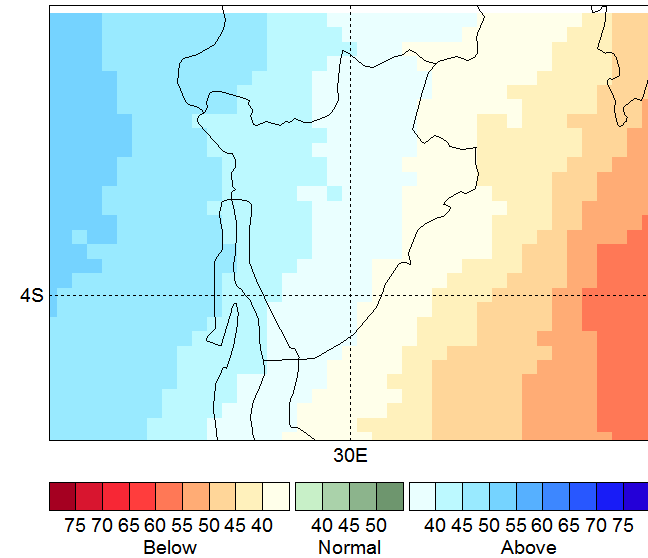


Skill\_map\_sst\_cmc\_oct\_2020\_ic\_ndj\_1982-2011



Goodness 0.094

Probabilistic forecasts

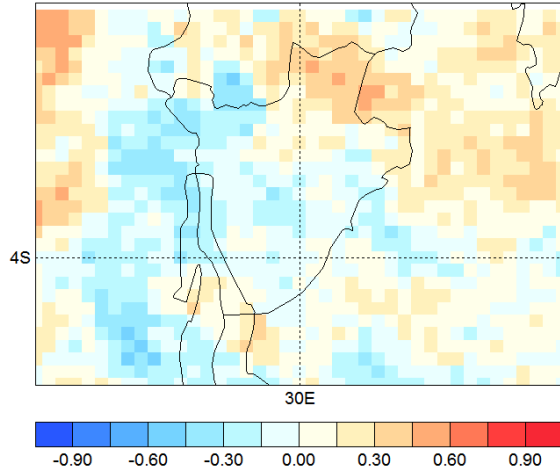




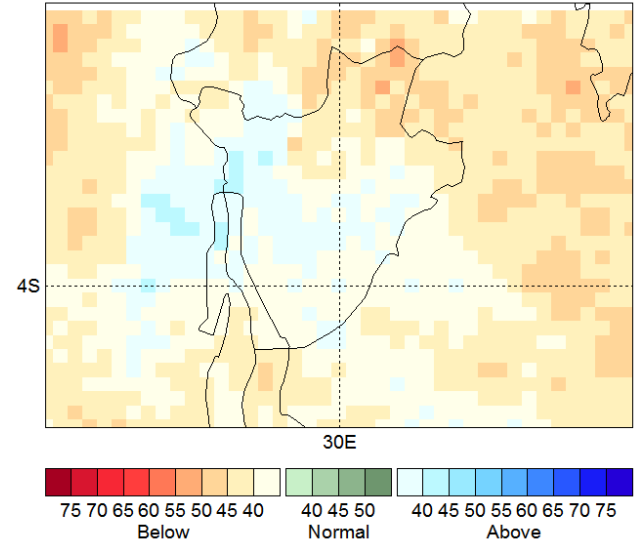
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Skill\_map\_sst\_nmee\_oct\_2020\_ic\_ndj\_1982-2011

Goodness 0.082

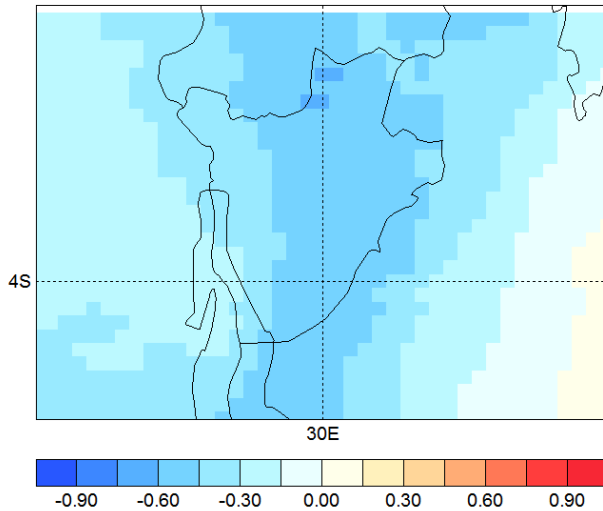


Probabilistic forecasts

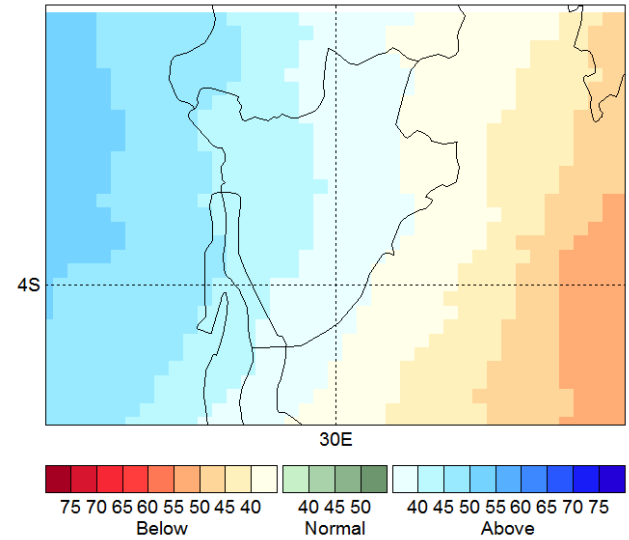


Skill\_map\_sst\_nmme\_oct\_2020\_ic\_ndj\_1982-2011

Goodness 0.059



Probabilistic forecasts

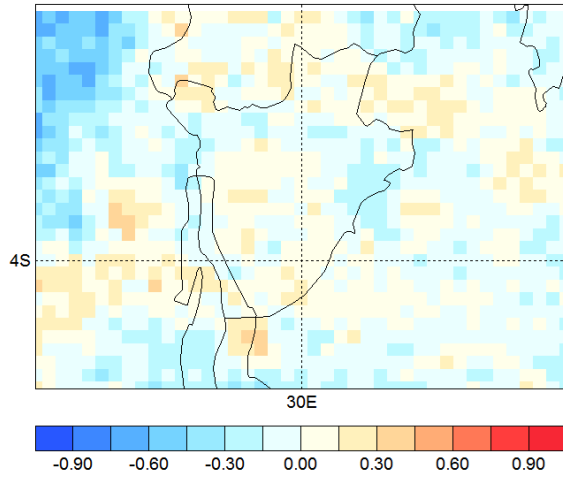






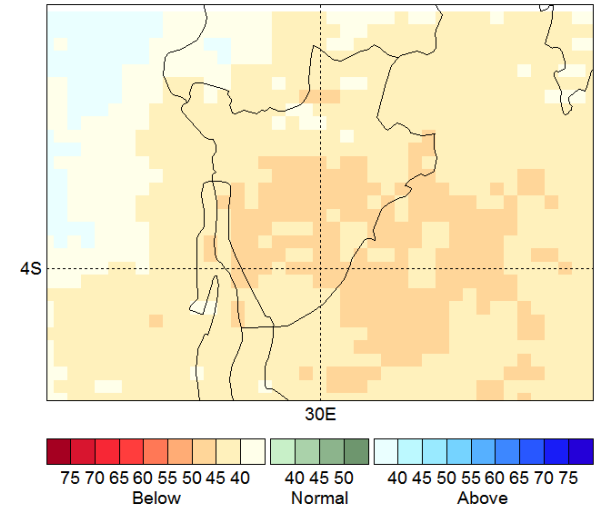
# PREVISION SST OBS NDJ 2020-21

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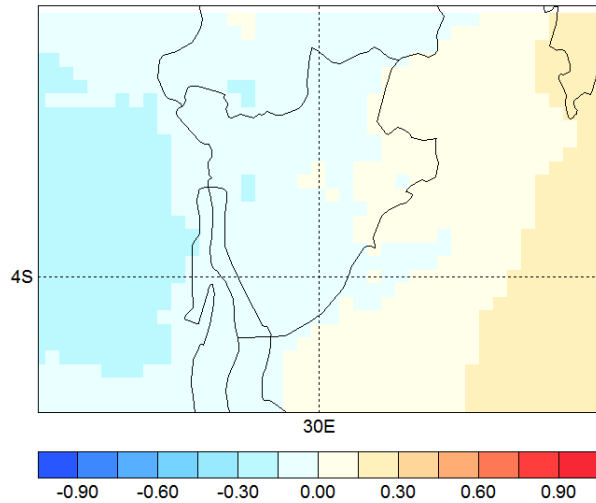


Goodness 0.109

Probabilistic forecasts

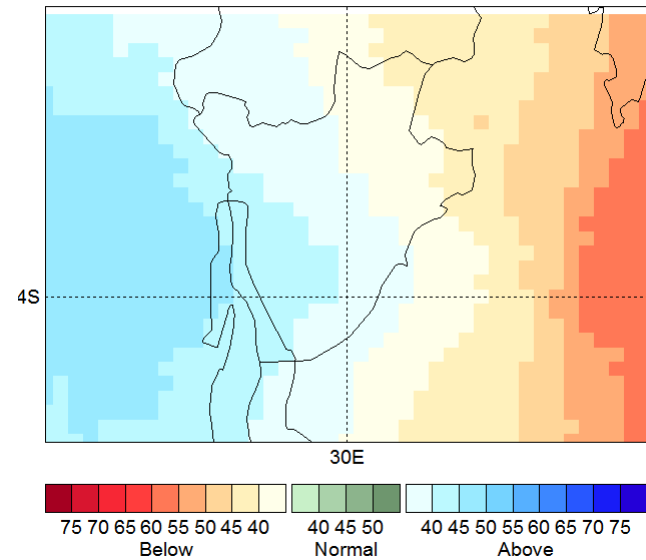


Skill\_map\_sst\_obs\_ncep\_reynold\_oct\_2020\_ic\_ndj\_1982-20



Goodness 0.107

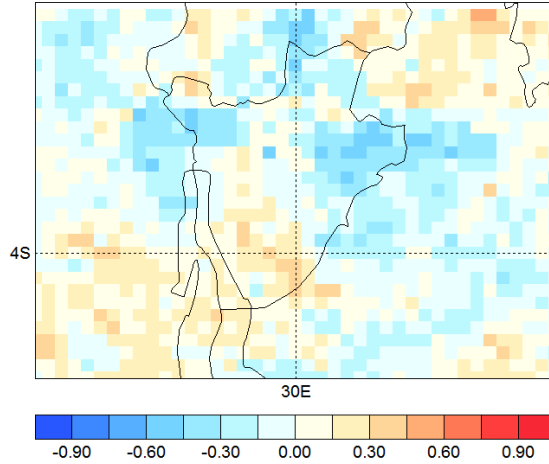
Probabilistic forecasts





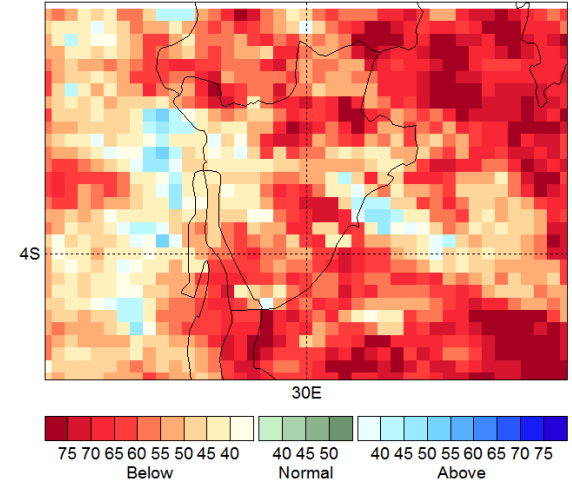
# PREVISION CFSV2 DJF 2020-21

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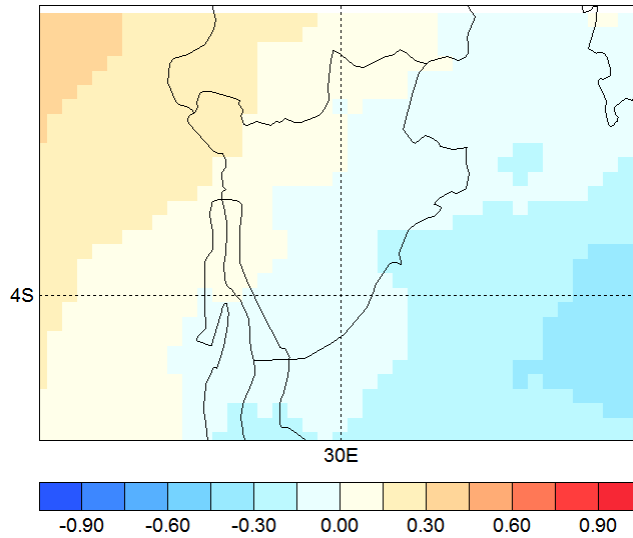


Goodness 0.044

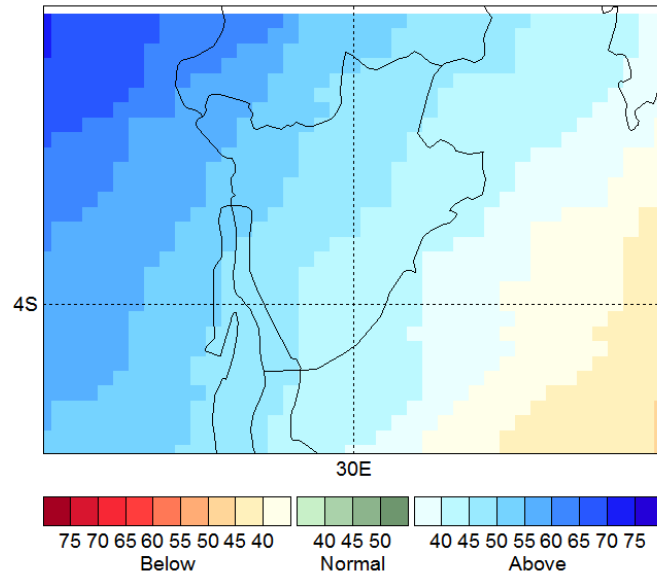
Probabilistic forecasts



Skill\_map\_sst\_cfsv2\_oct\_2020\_ic\_djf\_1982-2011



Goodness 0.241

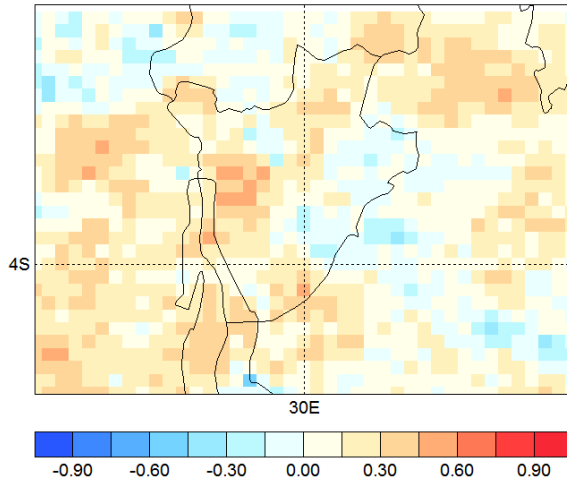


# PREVISION CMC2 DJF 2020-21

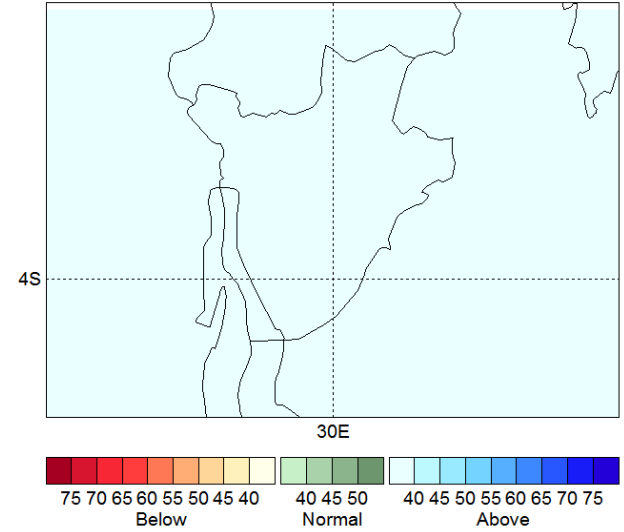


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Goodness 0.200

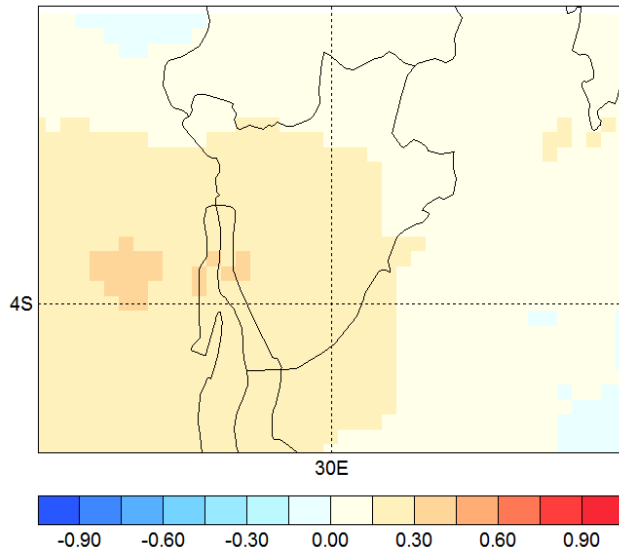


Probabilistic forecasts

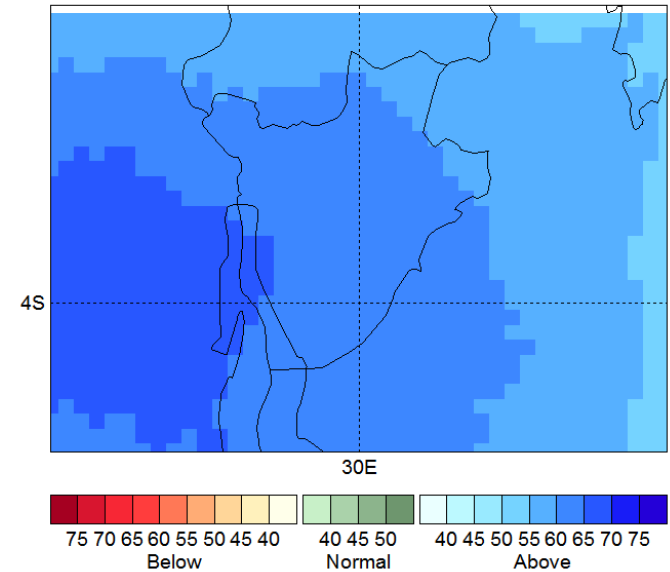


Skill\_map\_sst\_cmc2\_oct\_2020\_ic\_djf\_1982-2011

Goodness 0.292



Probabilistic forecasts

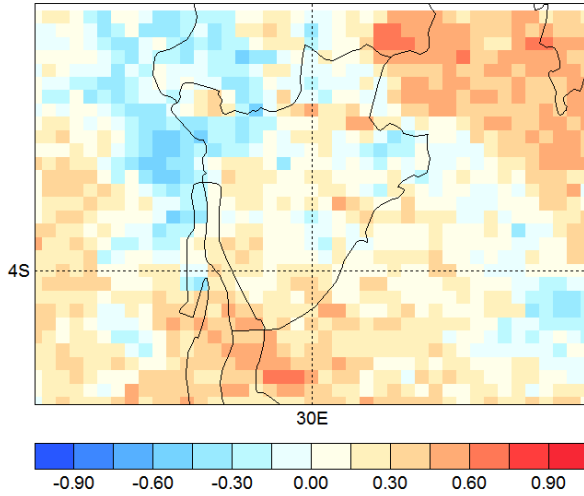




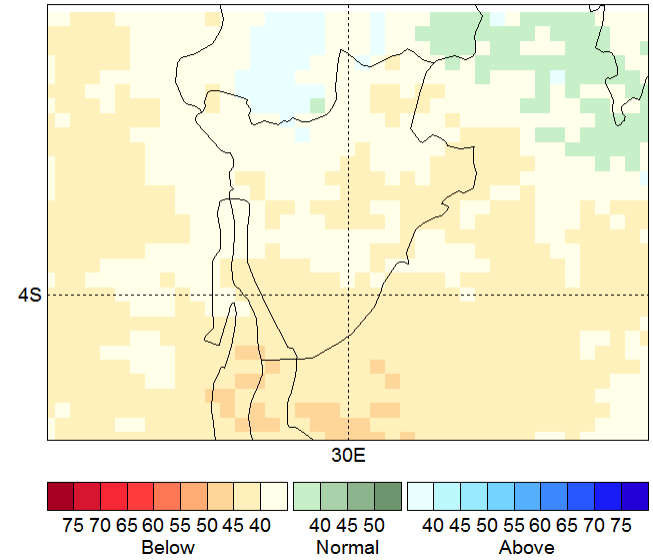
# PREVISION NMME DJF 2020-21

Skill\_map\_sst\_nmme\_oct\_2020\_ic\_djf\_1982-2011

Goodness 0.202

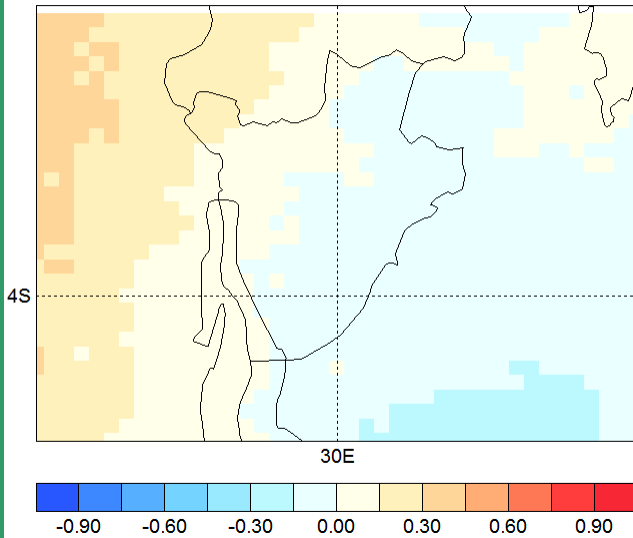


Probabilistic forecasts

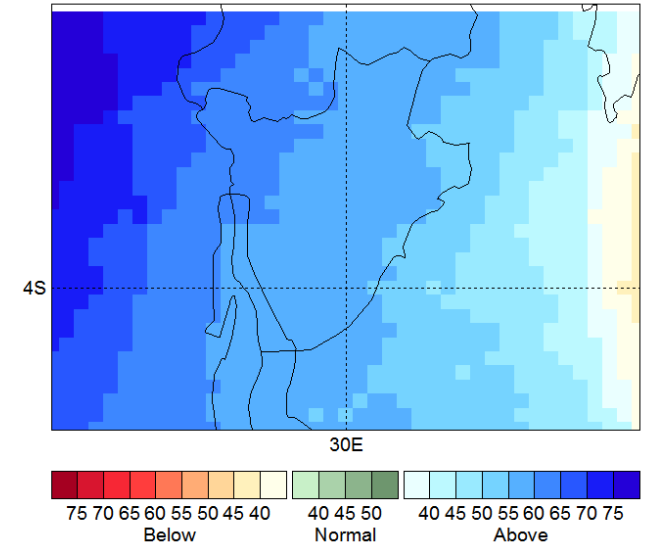


Skill\_map\_sst\_nmme\_oct\_2020\_ic\_djf\_1982-2011

Goodness 0.147



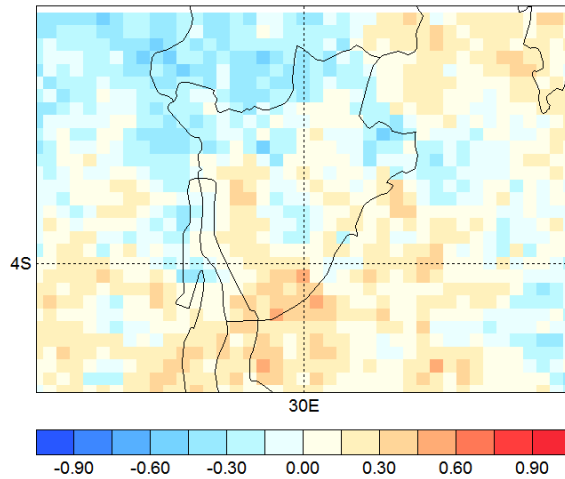
Probabilistic forecasts



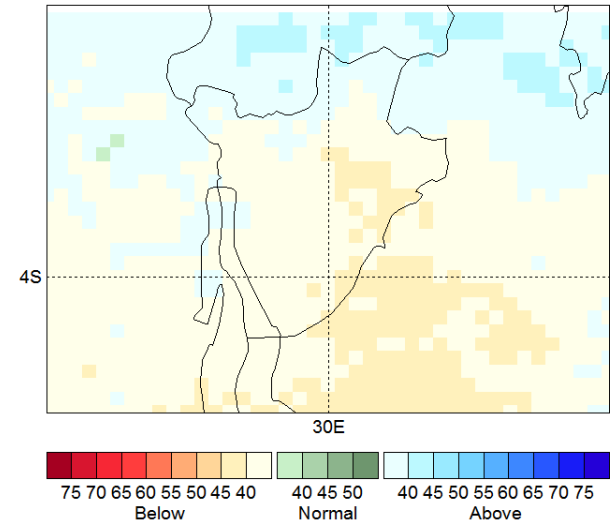


# PREVISION SST OBS DJF 2020-21

Skill\_map\_sst\_obs\_ncep\_reynold\_oct\_2020\_ic\_djf\_1982-20 Goodness 0.114

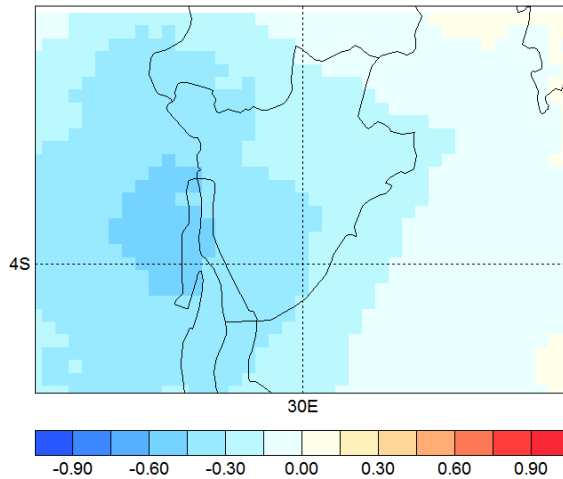


Probabilistic forecasts

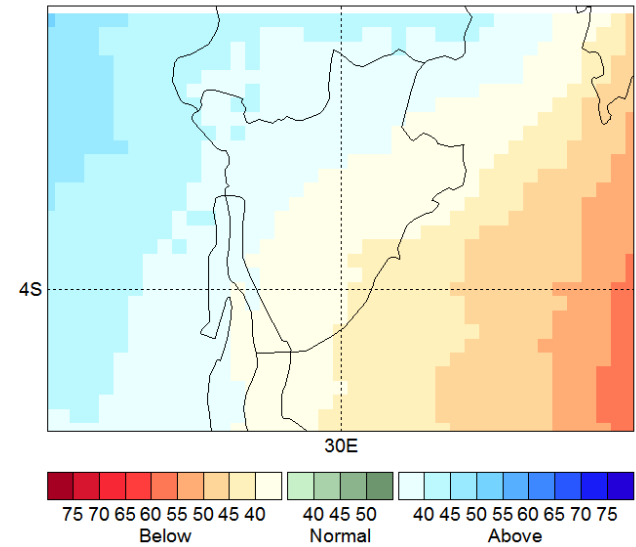


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Goodness 0.116



Probabilistic forecasts





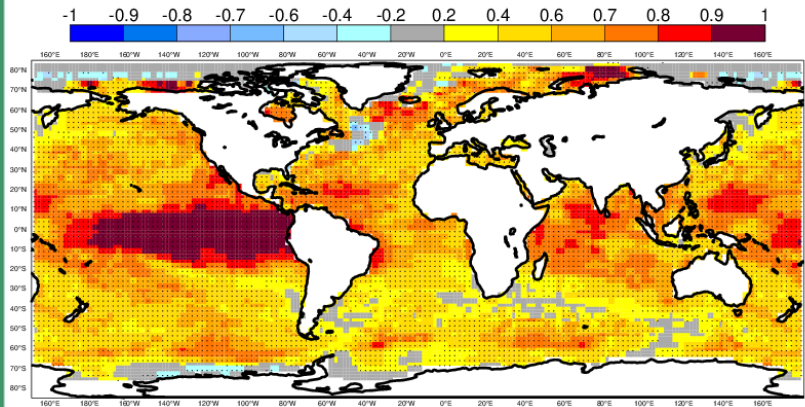
## ANALISES DES PRODUITS DES PREVISIONS DES CENTRES CLIMATQIES GLOBAUX

NDJ

(a)

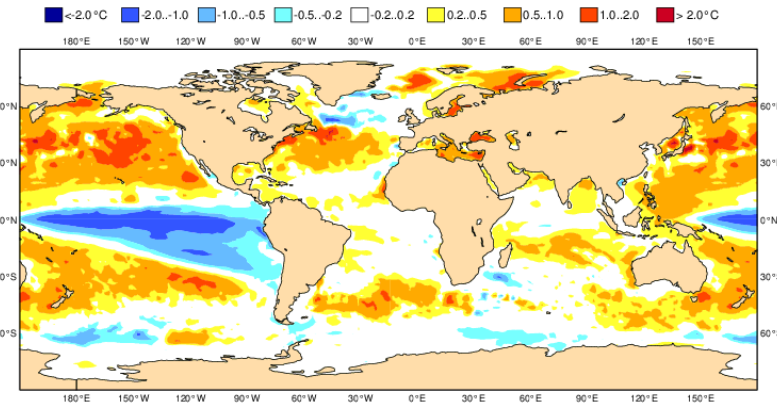
(b)

Anomaly Correlation Coefficient for 0001 with 25 ensemble members  
 Sea Surface temperature  
 Hindcast period 1981-2016 with start in October average over months 2 to 4  
 Black dots for values significantly different from zero with 95% confidence ( 1000 samples)



ECMWF Seasonal Forecast  
 Mean forecast SST anomaly  
 Forecast start is 01/10/20, climate period is 1993-2016  
 Ensemble size = 51, climate size = 600

System 5  
 NDJ 2020/21



**Figure M7:** Cartes d'anomalie de SSTs(a) ECMWF Model Skill (b) ECMWF Model forecast

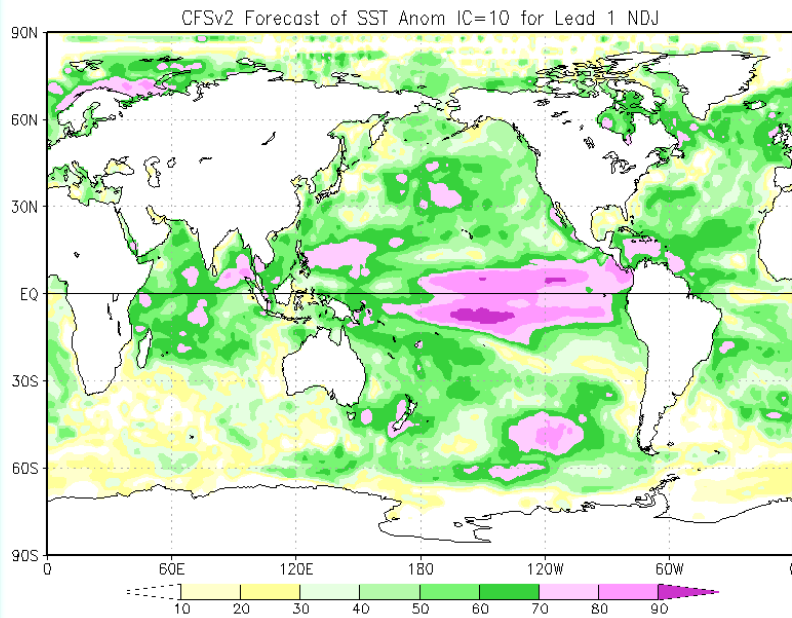
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[https://www.ecmwf.int/en/forecasts/charts/catalogue/seasonal\\_charts\\_ecmwf\\_sst?time=2017080100,2904,2017113000&area=Global&forecast\\_type\\_and\\_skill\\_measures=anomaly%20correlation](https://www.ecmwf.int/en/forecasts/charts/catalogue/seasonal_charts_ecmwf_sst?time=2017080100,2904,2017113000&area=Global&forecast_type_and_skill_measures=anomaly%20correlation)

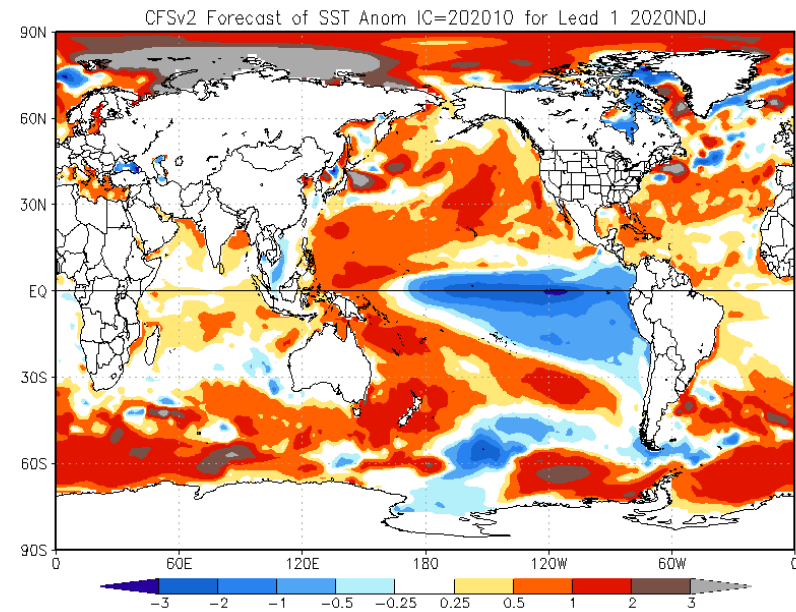
# MODELE CFSV2



(a)



(b)



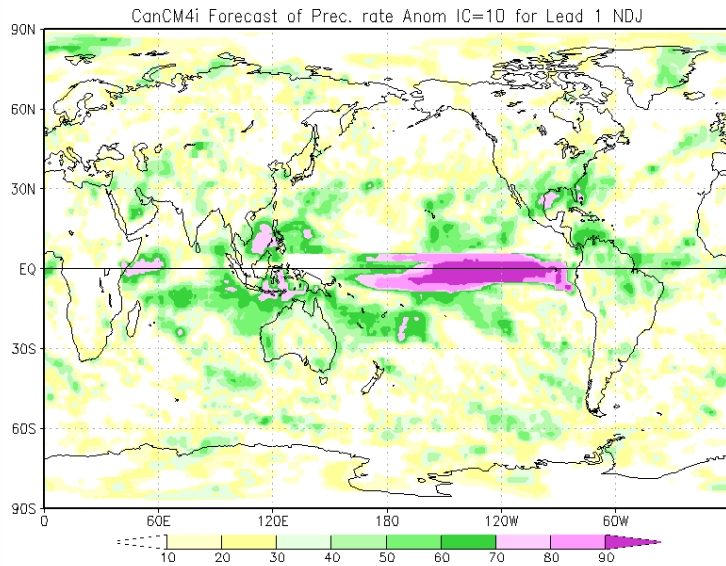
**Figure M2:** skill (a) CFSv2 Model forecast NDJ SST SST maps (b) CFSv2 Model forecast

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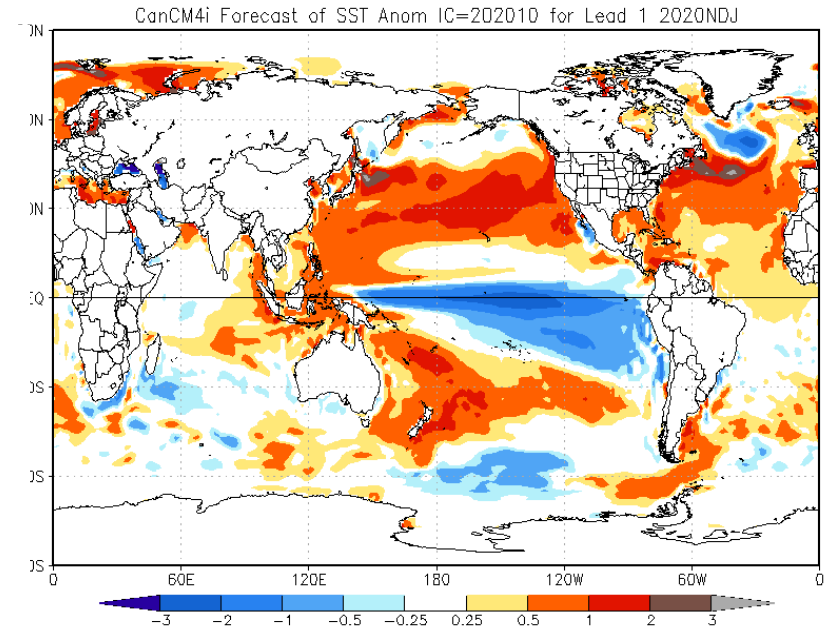
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(a)



(b)



**Figure M3: skill (a) CanCM4i Model forecast SON SST SST maps (b) CMC2 Model forecast**

[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/CMC2\\_ensemble\\_tmprfc\\_season2.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/CMC2_ensemble_tmprfc_season2.png)

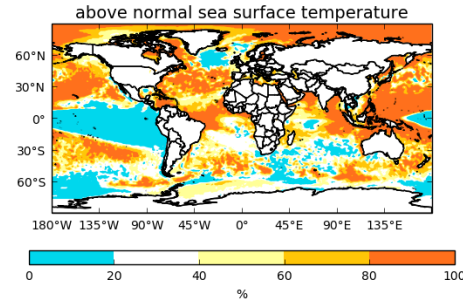
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ng

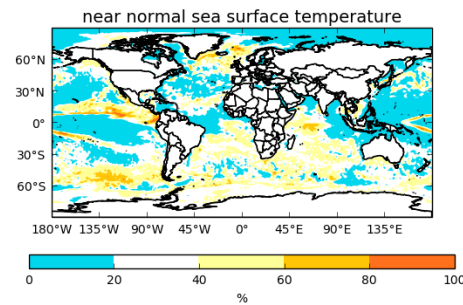
# UK METOFFICE

Probability of tercile categories Nov/Dec/Jan Issued October 2020

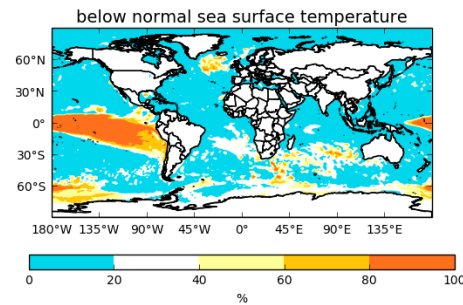
(a)



(b)



(c)



**Figure M4:** NDJ Global sea surface temperature (a) Above average (b) Near average (c) Below average

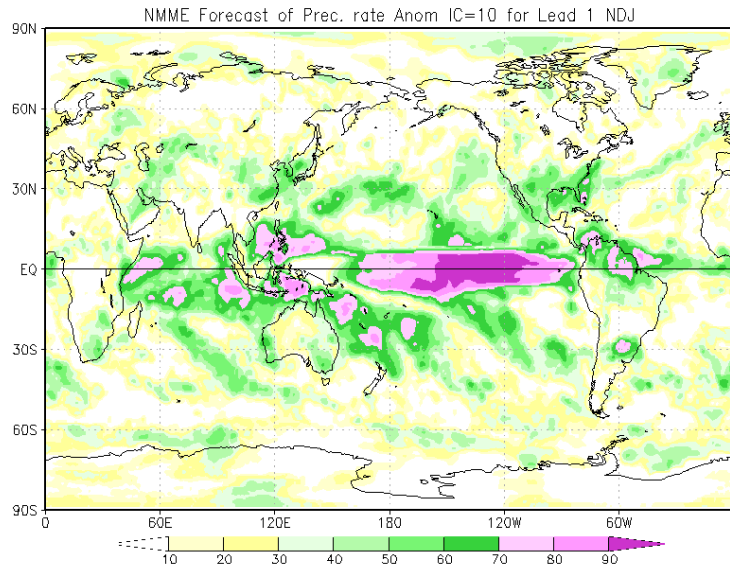


## ANALISES DES PRODUITS DE PREVISION DE SST MULTI- MODELES DE L'OMM

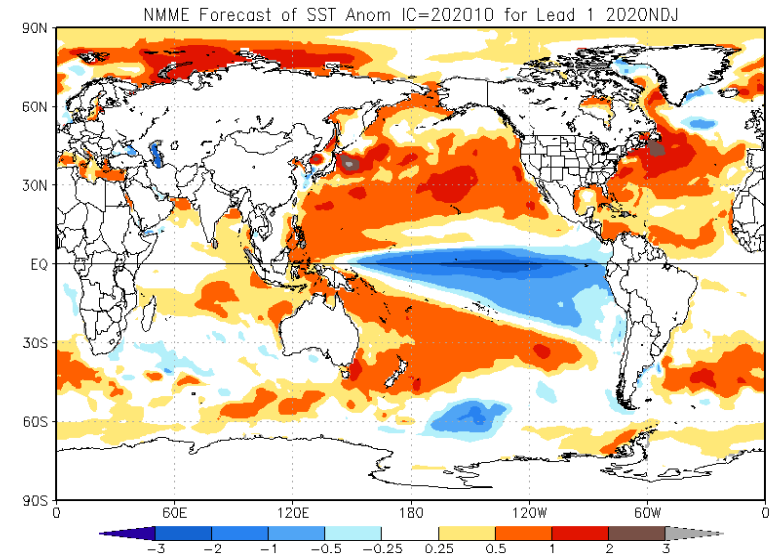
NDJ

# NMME

(a)



(b)



**Figure M5:** skill (a) NMME Model forecast NDJ SST maps (b) NMME Model forecas

[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/NMME\\_ensemble\\_tmepsfc\\_season2.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/NMME_ensemble_tmepsfc_season2.png)

[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill\\_NMME\\_ensemble\\_tmepsfc\\_season2.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill_NMME_ensemble_tmepsfc_season2.png)

# MULTI-MODELE EUROSIP

C3S multi-system seasonal forecast

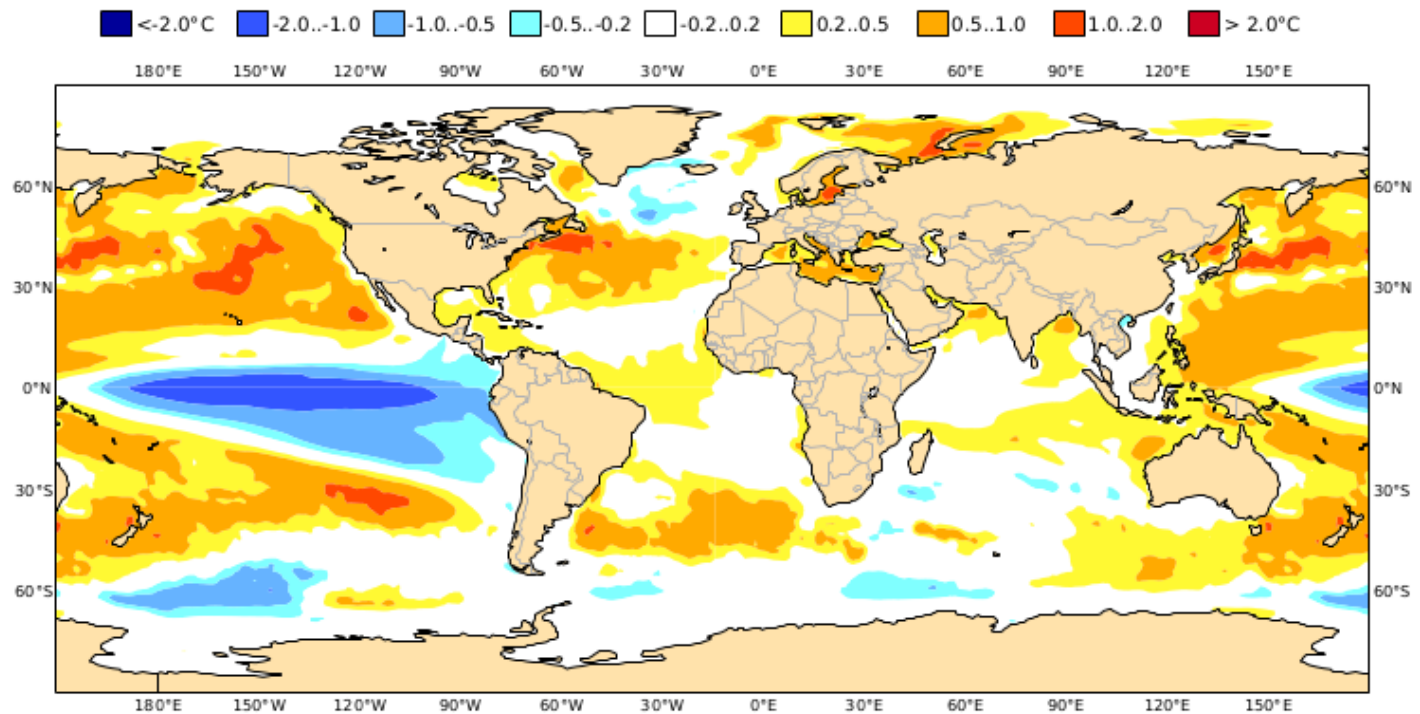
ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP/JMA

Mean forecast SST anomaly

NDJ 2020/21

Nominal forecast start: 01/10/20

Variance-standardized mean



**Figure M12:** EUROpean Seasonal to Inter-annual Prediction (EUROSIP) multi-model seasonal forecast of NDJ 2020-21 SST anomaly.

[https://climate.copernicus.eu/charts/c3s\\_seasonal/c3s\\_seasonal\\_spatial\\_mm\\_ssto\\_3m?facets=undefined&time=2020060100,720,2020070100&type=ensm&area=area08](https://climate.copernicus.eu/charts/c3s_seasonal/c3s_seasonal_spatial_mm_ssto_3m?facets=undefined&time=2020060100,720,2020070100&type=ensm&area=area08)



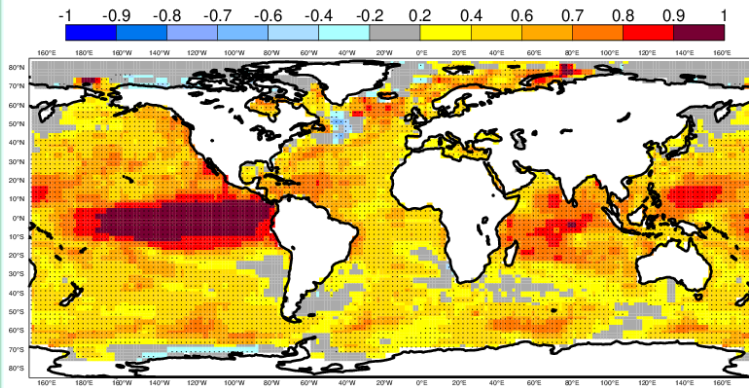
## ANALISES DES PRODUITS DES PREVISIONS DES CENTRES CLIMATQIES GLOBAUX

DJF

(a)

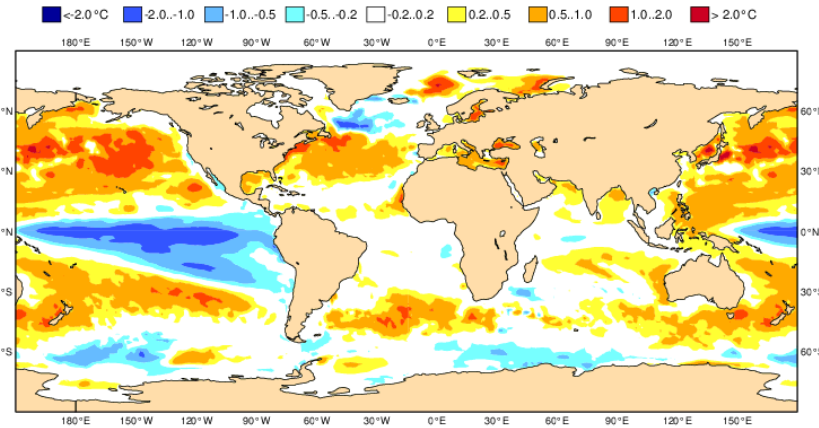
(b)

Anomaly Correlation Coefficient for 0001 with 25 ensemble members  
 Sea Surface temperature  
 Hindcast period 1981-2016 with start in October average over months 3 to 5  
 Black dots for values significantly different from zero with 95% confidence ( 1000 samples)



ECMWF Seasonal Forecast  
 Mean forecast SST anomaly  
 Forecast start is 01/10/20, climate period is 1993-2016  
 Ensemble size = 51, climate size = 600

System 5  
 DJF 2020/21



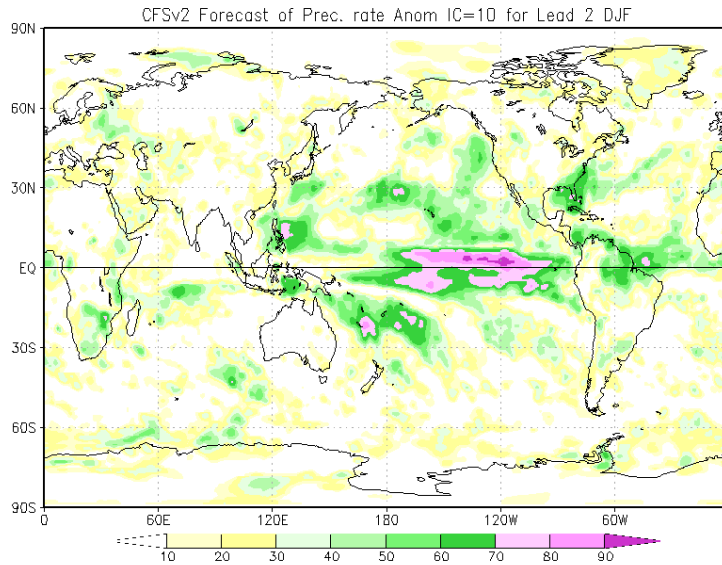
**Figure M7:** DJF SST anomaly maps (a) ECMWF Model Skill (b) ECMWF Model forecast

[http://www.ecmwf.int/en/forecasts/charts/seasonal/sea-surface-temperature-long-range-forecast?time=2016020100,2880,2016053100&area=Global&forecast\\_type\\_and\\_skill\\_measures=ensemble%20mean](http://www.ecmwf.int/en/forecasts/charts/seasonal/sea-surface-temperature-long-range-forecast?time=2016020100,2880,2016053100&area=Global&forecast_type_and_skill_measures=ensemble%20mean)  
[https://www.ecmwf.int/en/forecasts/charts/catalogue/seasonal\\_charts\\_ecmwf\\_sst?time=2017080100,2904,2017113000&area=Global&forecast\\_type\\_and\\_skill\\_measures=anomaly%20correlation](https://www.ecmwf.int/en/forecasts/charts/catalogue/seasonal_charts_ecmwf_sst?time=2017080100,2904,2017113000&area=Global&forecast_type_and_skill_measures=anomaly%20correlation)

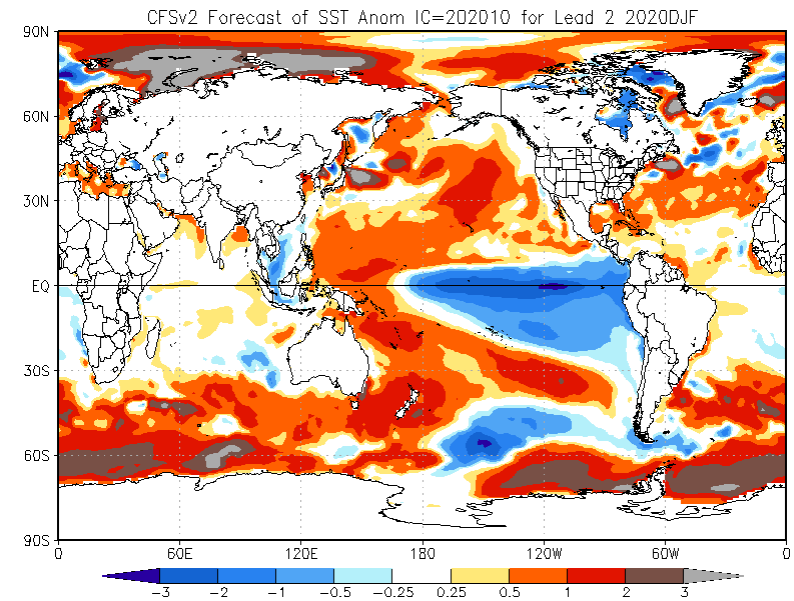
# MODELE CFSV2



(a)



(b)



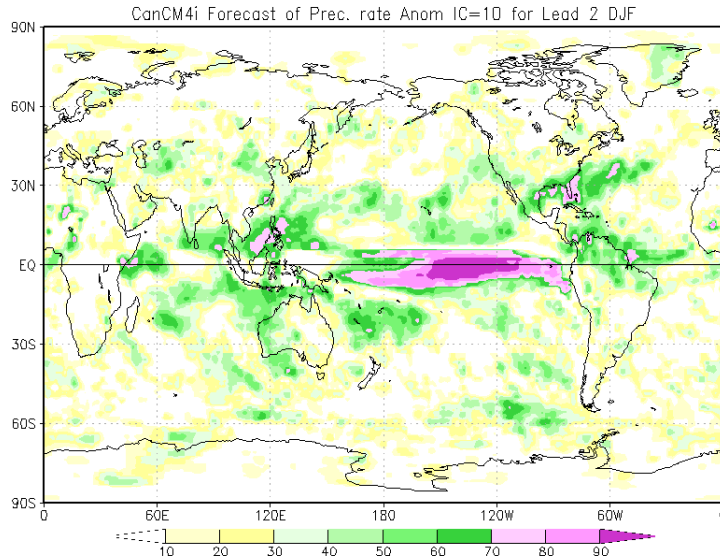
**Figure M2: skill (a) CFSv2 Model forecast DJF SST SST maps (b) CFSv2 Model forecast**

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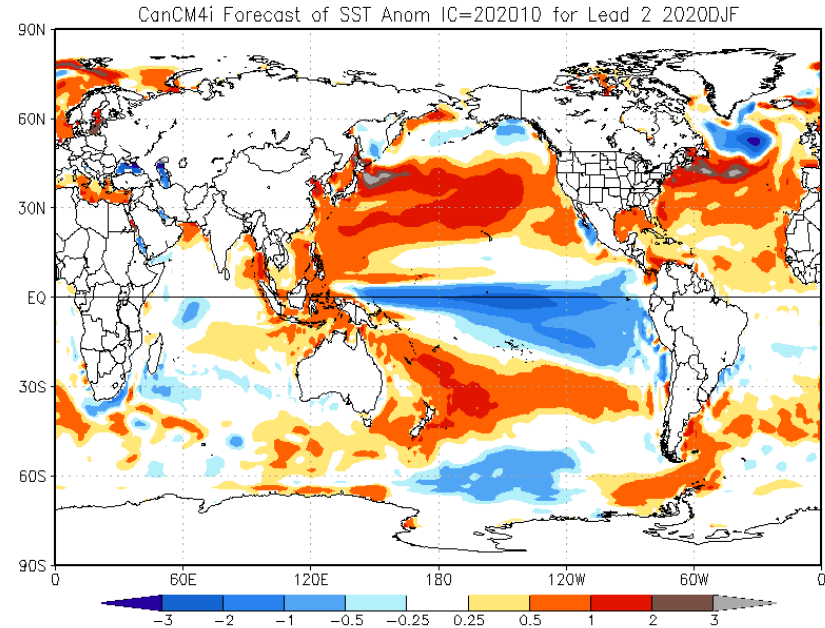
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(a)



(b)



**Figure M3: skill (a) CanCM4i Model forecast DJF SST SST maps (b) CanCM4i Model forecast**

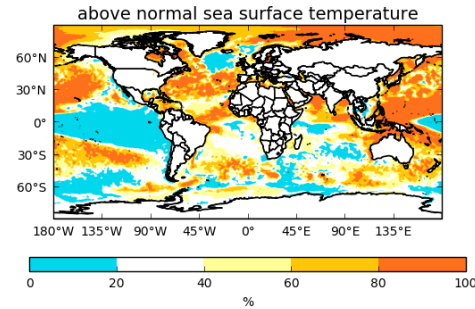
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[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill\\_CMC2\\_ensemble\\_tmprfc\\_season2.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill_CMC2_ensemble_tmprfc_season2.png)

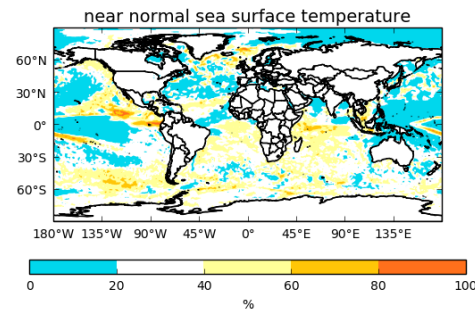
# UK METOFFICE

Probability of tercile categories Dec/Jan/Feb Issued October 2020

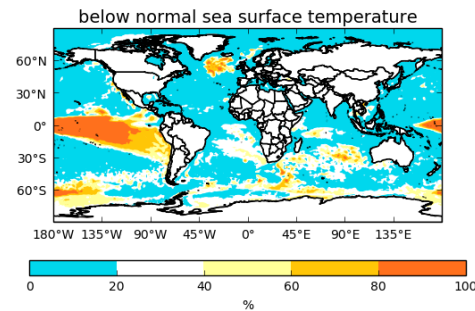
(a)



(b)



(c)



**Figure M4:** DJF Global sea surface temperature (a) Above average (b) Near average (c) Below average

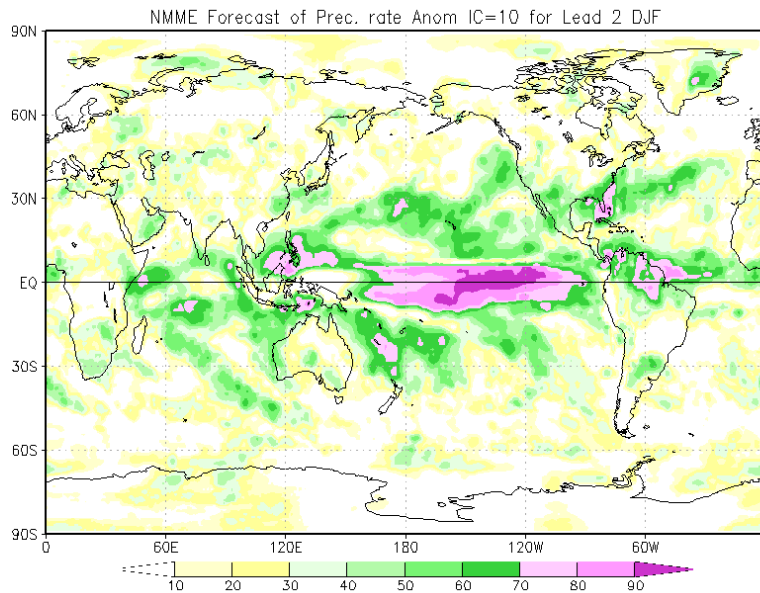


# ANALISES DES PRODUITS DE PREVISION MULTI-MODELES DE L'OMM

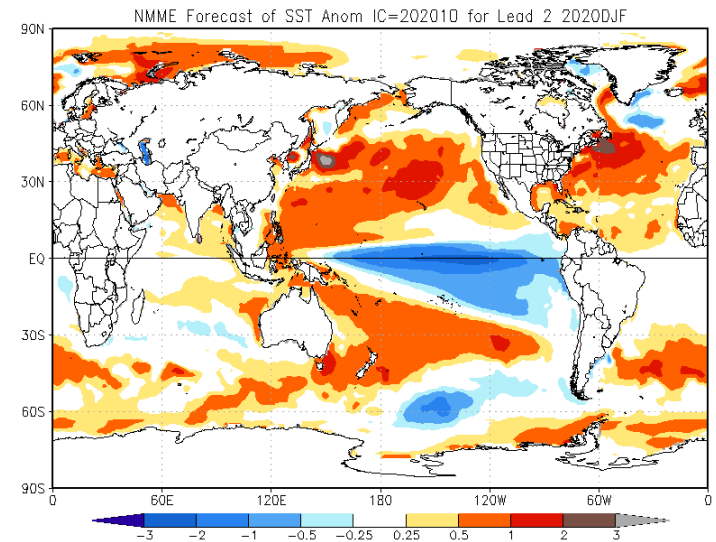
DJF

# NMME

(a)



(b)



**Figure M5:** skill (a) NMME Model forecast DJF SST maps (b) NMME Model forecast

[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/NMME\\_ensemble\\_tmprfc\\_season2.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/NMME_ensemble_tmprfc_season2.png)

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# MULTI-MODELE EUROSIP

C3S multi-system seasonal forecast

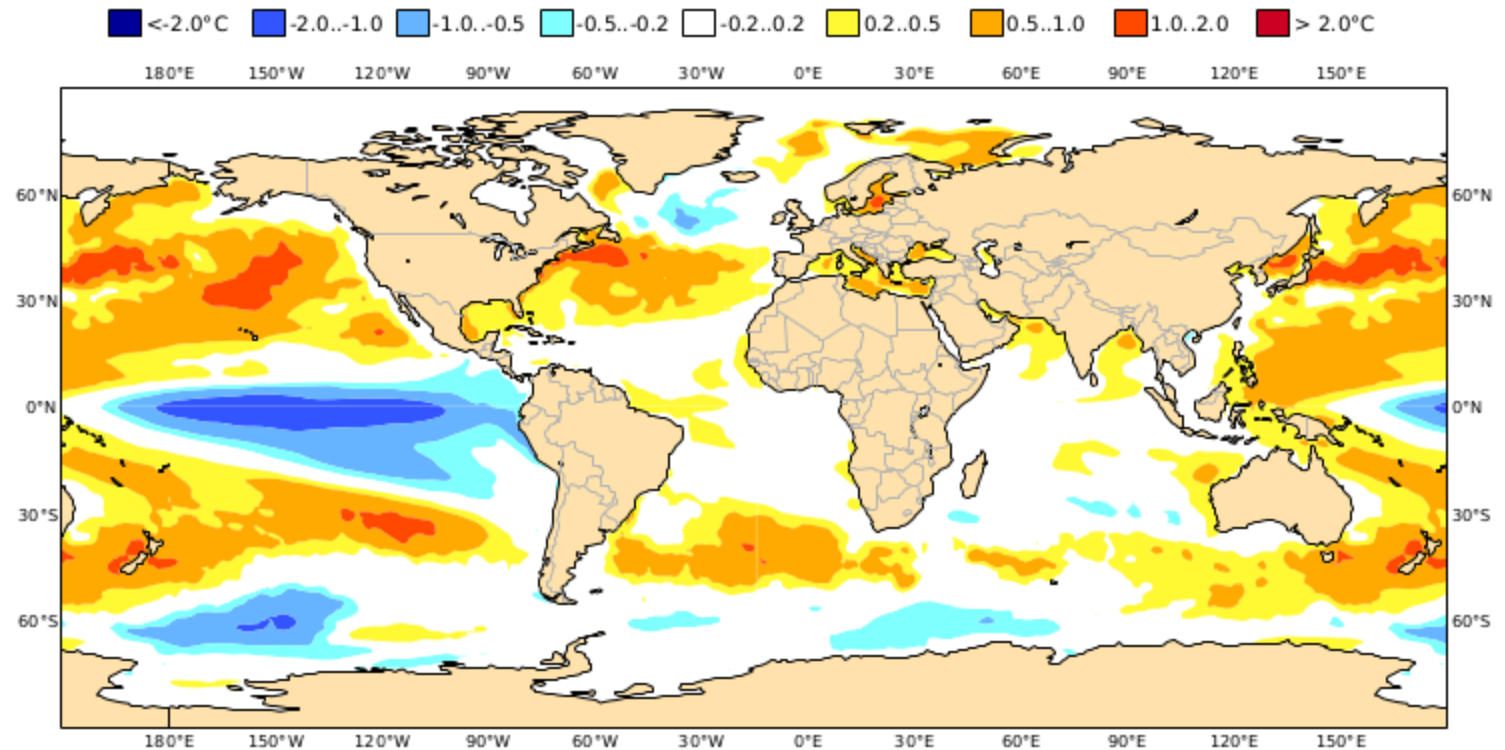
ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP/JMA

Mean forecast SST anomaly

DJF 2020/21

Nominal forecast start: 01/10/20

Variance-standardized mean

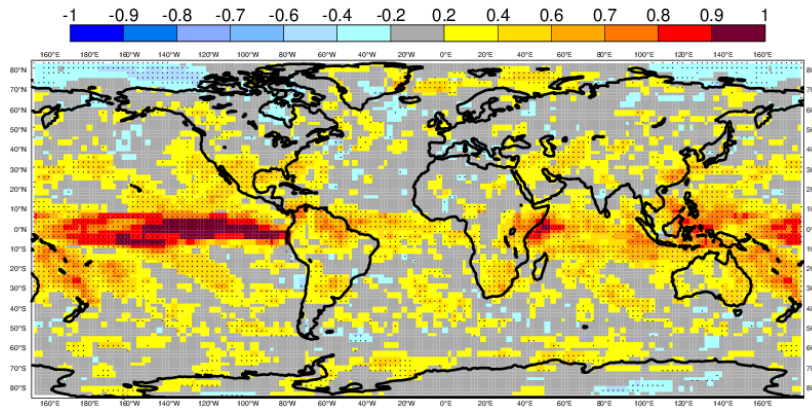


[https://climate.copernicus.eu/charts/c3s\\_seasonal/c3s\\_seasonal\\_spatial\\_mm\\_ssto\\_3m?facets=undefined&time=2020060100,1464,2020080100&type=ensm&area=area08](https://climate.copernicus.eu/charts/c3s_seasonal/c3s_seasonal_spatial_mm_ssto_3m?facets=undefined&time=2020060100,1464,2020080100&type=ensm&area=area08)



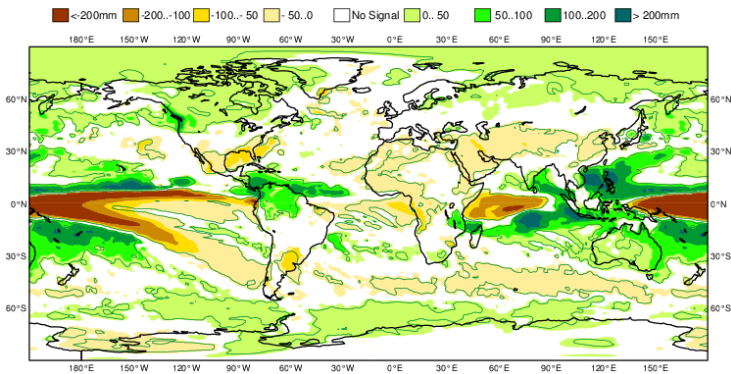
# ANALISES DES PRODUITS DES PREVISIONS DE PRECIPITATION DES CENTRES CLIMATIQUES GLOBAUX NDJ

Anomaly Correlation Coefficient for 0001 with 25 ensemble members  
 Precipitation  
 Hindcast period 1981-2014 with start in October average over months 2 to 4  
 Black dots for values significantly different from zero with 95% confidence ( 1000 samples)



ECMWF Seasonal Forecast  
 Mean precipitation anomaly  
 Forecast start is 01/10/20, climate period is 1993-2016  
 Ensemble size = 51, climate size = 600

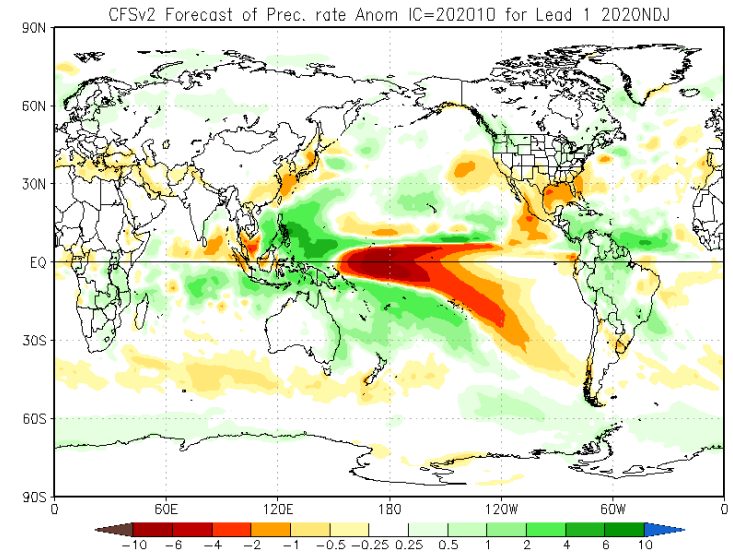
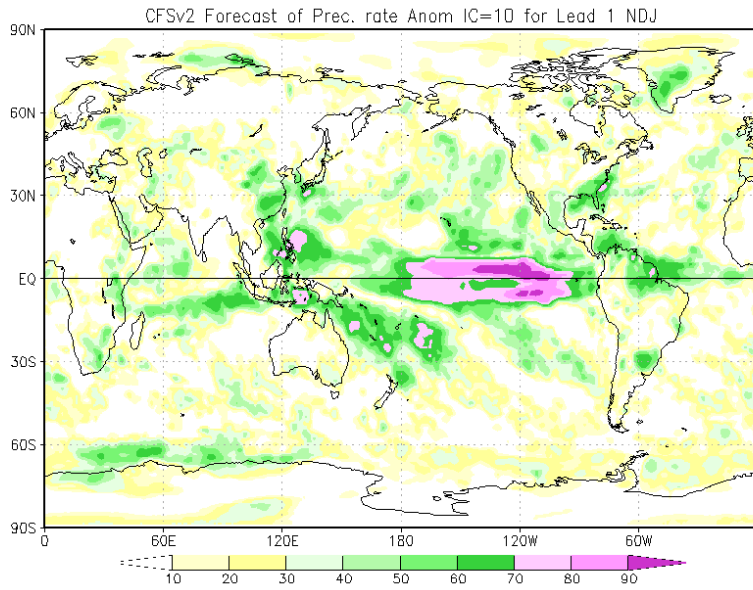
System 5  
 NDJ 2020/21  
 Shaded areas significant at 10% level  
 Solid contour at 1% level



**Figure PR1: skill (a) ECMWF Model anomaly forecast for NDJ precipitation**

[http://www.ecmwf.int/en/forecasts/charts/seasonal/rain-long-range-forecast?time=2016020100,2880,2016053100&area=Global&forecast\\_type\\_and\\_skill\\_measures=tercile%20summary](http://www.ecmwf.int/en/forecasts/charts/seasonal/rain-long-range-forecast?time=2016020100,2880,2016053100&area=Global&forecast_type_and_skill_measures=tercile%20summary)  
[http://www.ecmwf.int/en/forecasts/charts/seasonal/rain-long-range-forecast?time=2016020100,2880,2016053100&area=Global&forecast\\_type\\_and\\_skill\\_measures=anomaly%20correlation](http://www.ecmwf.int/en/forecasts/charts/seasonal/rain-long-range-forecast?time=2016020100,2880,2016053100&area=Global&forecast_type_and_skill_measures=anomaly%20correlation)

# CFSv2 MODEL



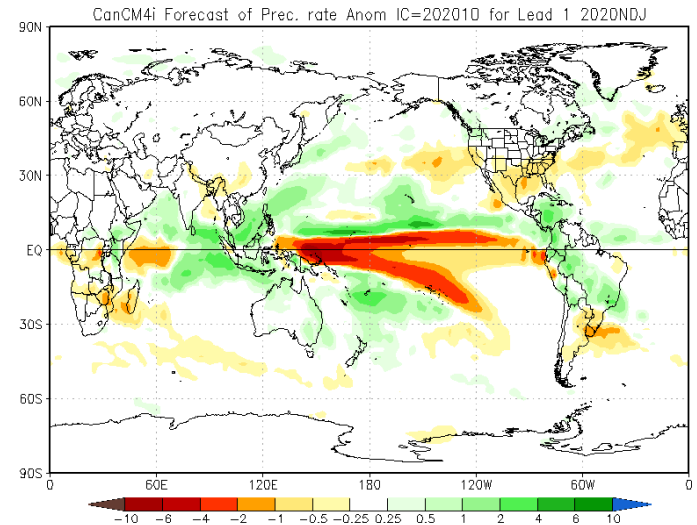
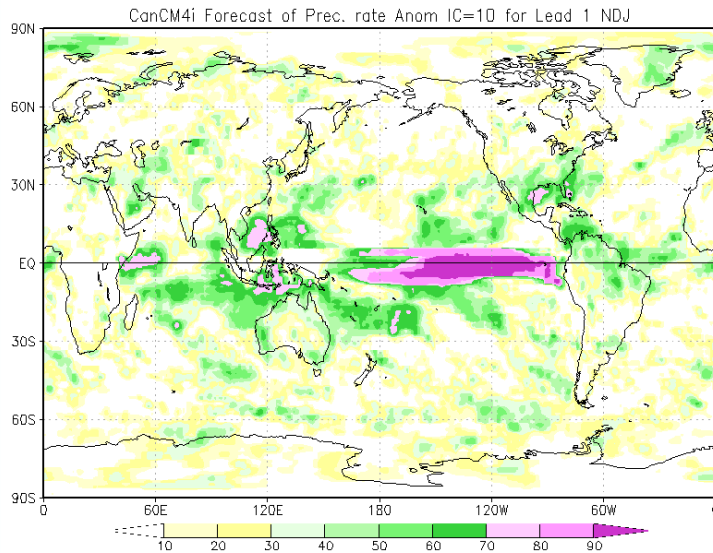
**Figure PR2 :** skill (a) CFSv2 Model anomaly forecast. Mean NDJ precipitation rate (b) CFSv2 Model forecast

[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/CFSv2\\_ensemble\\_prate\\_season1.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/CFSv2_ensemble_prate_season1.png)

[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill\\_CFSv2\\_ensemble\\_prate\\_season1.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill_CFSv2_ensemble_prate_season1.png)



# MODELE CANCM4i

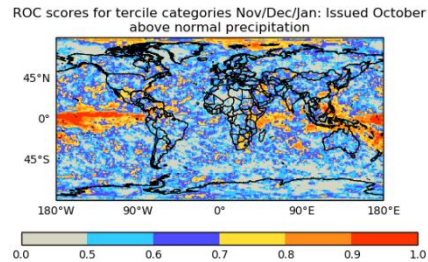


**Figure PR3:** skill (a) CanCM4i Model anomaly forecast. Mean NDJ precipitation rate (b) CMC2 Model forecast

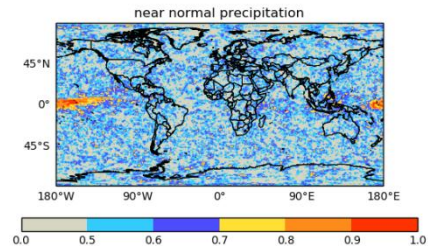
[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill\\_CMC2\\_ensemble\\_prate\\_season1.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill_CMC2_ensemble_prate_season1.png)

[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/CMC2\\_ensemble\\_prate\\_season1.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/CMC2_ensemble_prate_season1.png)

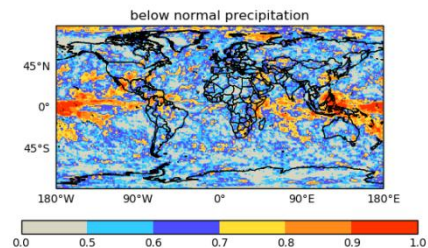
(a)



(b)

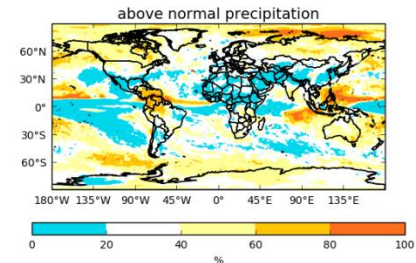


(c)

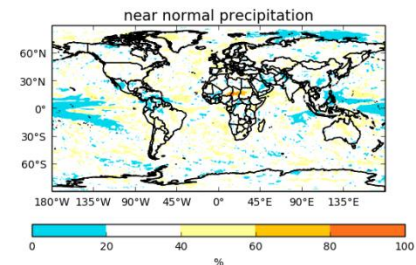


Probability of tercile categories Nov/Dec/Jan Issued October 2020

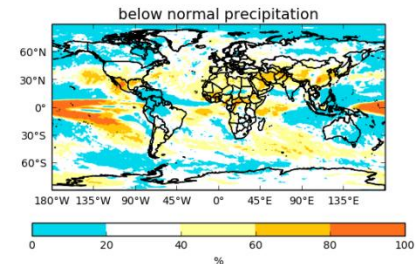
(d)



(e)



(f)



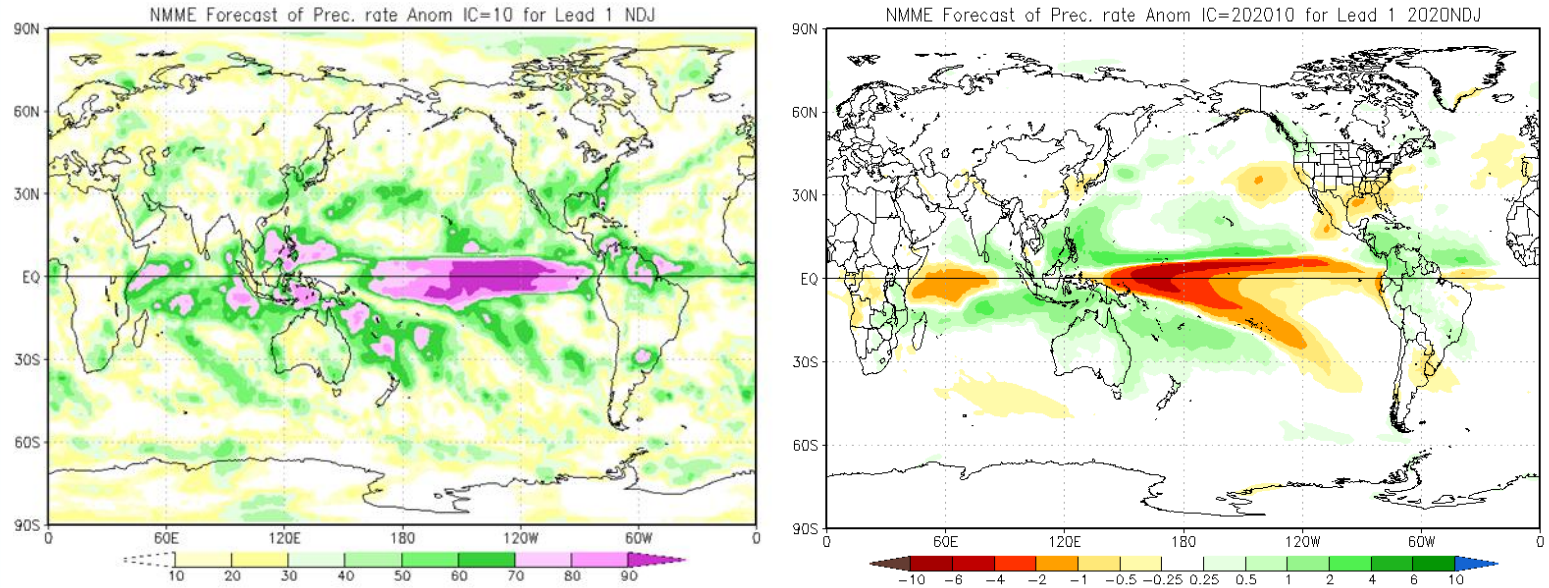
**Figure PR4:** Mean NDJ precipitation, with (a), (b) and (c) showing the ROC scores for the tercile categories; above, near and below normal, respectively. The probability forecasts for the tercile categories are (d) above normal, (e) near normal and (f) below normal.

<http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/gpc-outlooks/glob-seas-prob-skill>  
<http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/gpc-outlooks/glob-seas-prob>



# **ANALYSES DE PREVISION DE PRECIPITATION MULTI MODELE NDJ**

# NMME



**Figure PR5:** Mean NDJ precipitation rate (a) NMME forecast skill (b) NMME anomaly forecast

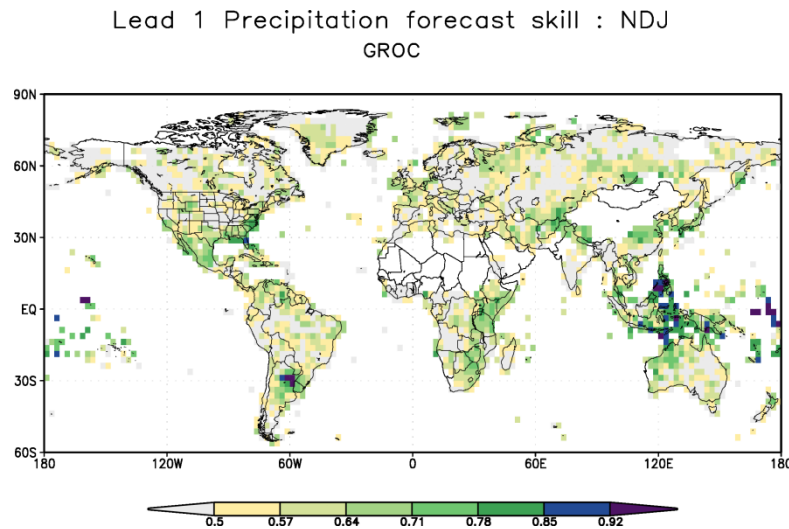
[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/NMME\\_ensemble\\_prate\\_season1.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/NMME_ensemble_prate_season1.png)

[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill\\_NMME\\_ensemble\\_prate\\_season1.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill_NMME_ensemble_prate_season1.png)

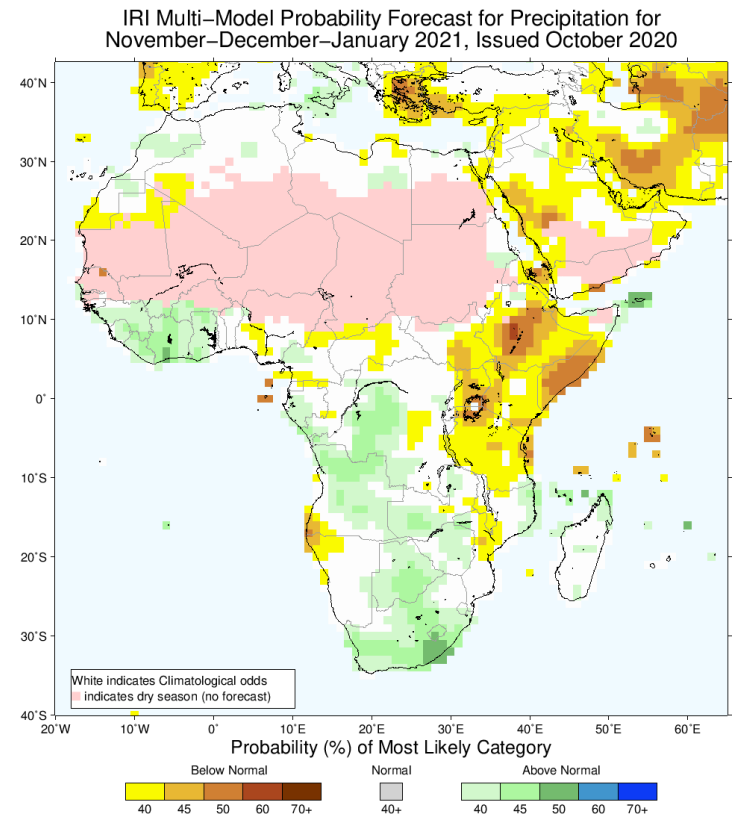
# MULTI-MODELE IRI

## Generalized ROC (GROC) Precipitation Forecast Skill

(a)



(b)



**Figure PR6:** skill (a) IRI Multi-Model probability forecast. NDJ 2020-21 precipitation (b) IRI Multi-Model probability forecast

<http://iri.columbia.edu/our-expertise/climate/forecasts/seasonal-climate-forecasts/>

# MULTI-MODELE EUROSIP

C3S multi-system seasonal forecast

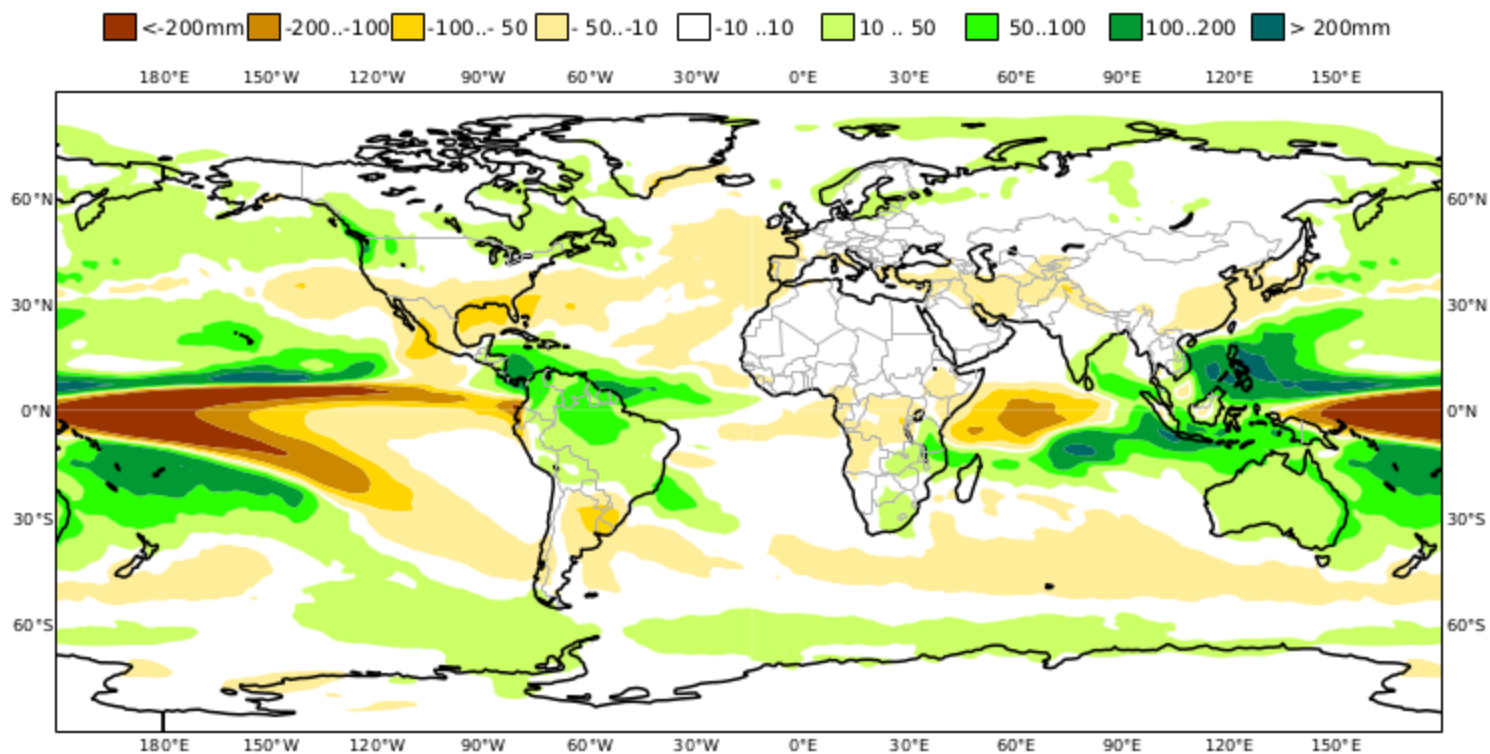
ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP/JMA

Mean precipitation anomaly

NDJ 2020/21

Nominal forecast start: 01/10/20

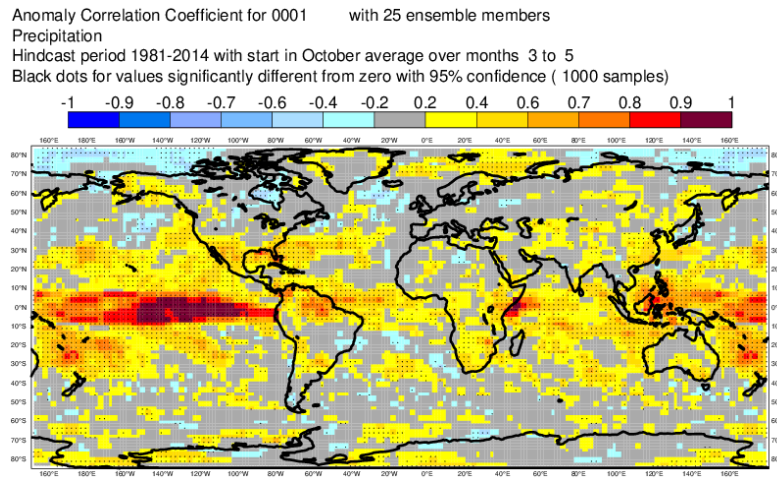
Variance-standardized mean



[climate.copernicus.eu/charts/c3s\\_seasonal/c3s\\_seasonal\\_spatial\\_mm\\_rain\\_3m?facets=undefined&time=2020060100,720,2020070100&type=ensm&area=area08](https://climate.copernicus.eu/charts/c3s_seasonal/c3s_seasonal_spatial_mm_rain_3m?facets=undefined&time=2020060100,720,2020070100&type=ensm&area=area08)

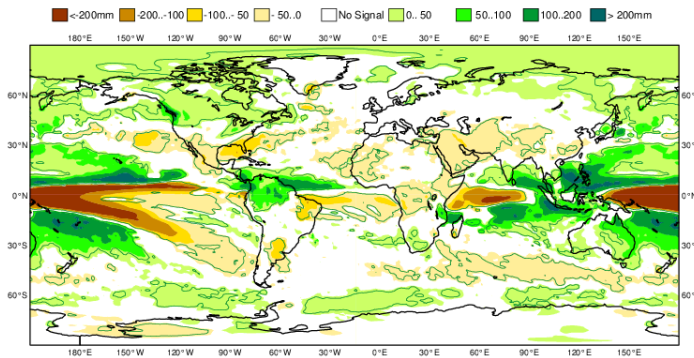


**ANALISES DES PRODUITS DES PREVISIONS DE PRECIPITATION DES CENTRES  
CLIMATIQUES GLOBAUX  
DJF**



ECMWF Seasonal Forecast  
 Mean precipitation anomaly  
 Forecast start is 01/10/20, climate period is 1993-2016  
 Ensemble size = 51, climate size = 600

System 5  
 DJF 2020/21  
 Shaded areas significant at 10% level  
 Solid contour at 1% level

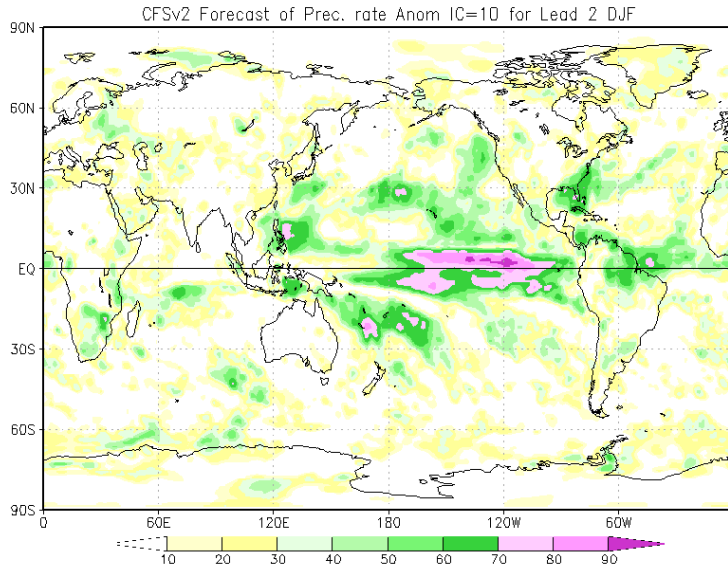


**Figure PR1: skill (a) ECMWF Model anomaly forecast for DJF precipitation**

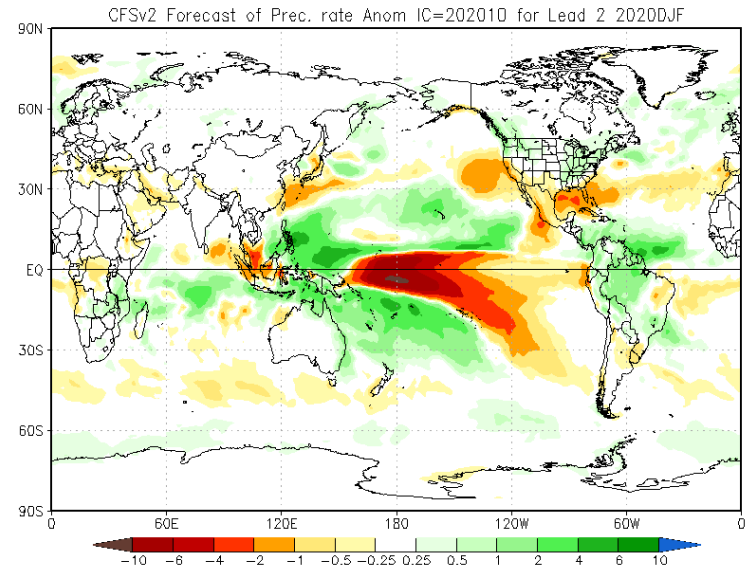
[http://www.ecmwf.int/en/forecasts/charts/seasonal/rain-long-range-forecast?time=2016020100,2880,2016053100&area=Global&forecast\\_type\\_and\\_skill\\_measures=tercile%20summary](http://www.ecmwf.int/en/forecasts/charts/seasonal/rain-long-range-forecast?time=2016020100,2880,2016053100&area=Global&forecast_type_and_skill_measures=tercile%20summary)  
[http://www.ecmwf.int/en/forecasts/charts/seasonal/rain-long-range-forecast?time=2016020100,2880,2016053100&area=Global&forecast\\_type\\_and\\_skill\\_measures=anomaly%20correlation](http://www.ecmwf.int/en/forecasts/charts/seasonal/rain-long-range-forecast?time=2016020100,2880,2016053100&area=Global&forecast_type_and_skill_measures=anomaly%20correlation)



(a)



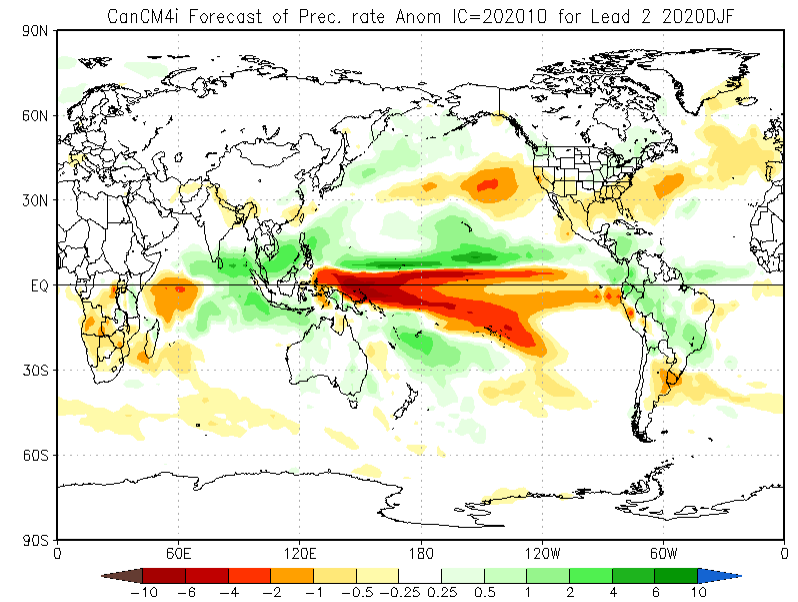
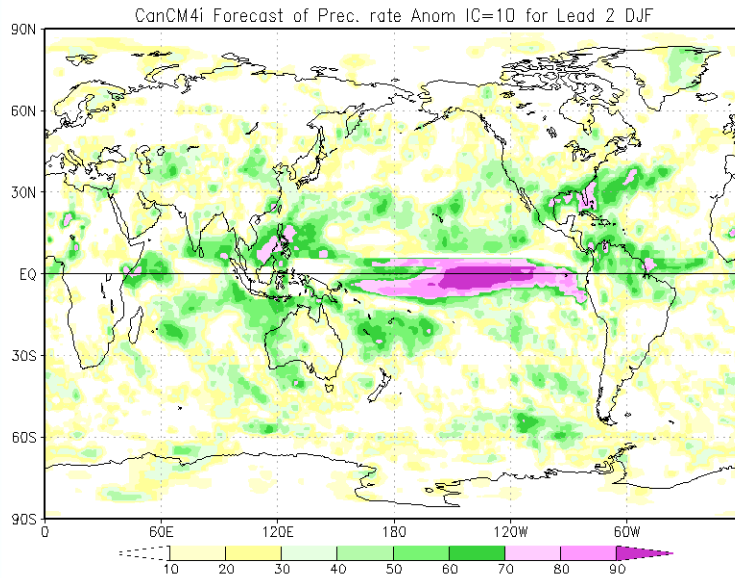
(b)



**Figure PR2** : skill (a) CFSv2 Model anomaly forecast Mean DJF precipitation rate  
(b) CFSv2 Model forecast

[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/CFSv2\\_ensemble\\_prate\\_season2.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/CFSv2_ensemble_prate_season2.png)  
[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill\\_CFSv2\\_ensemble\\_prate\\_season2.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill_CFSv2_ensemble_prate_season2.png)

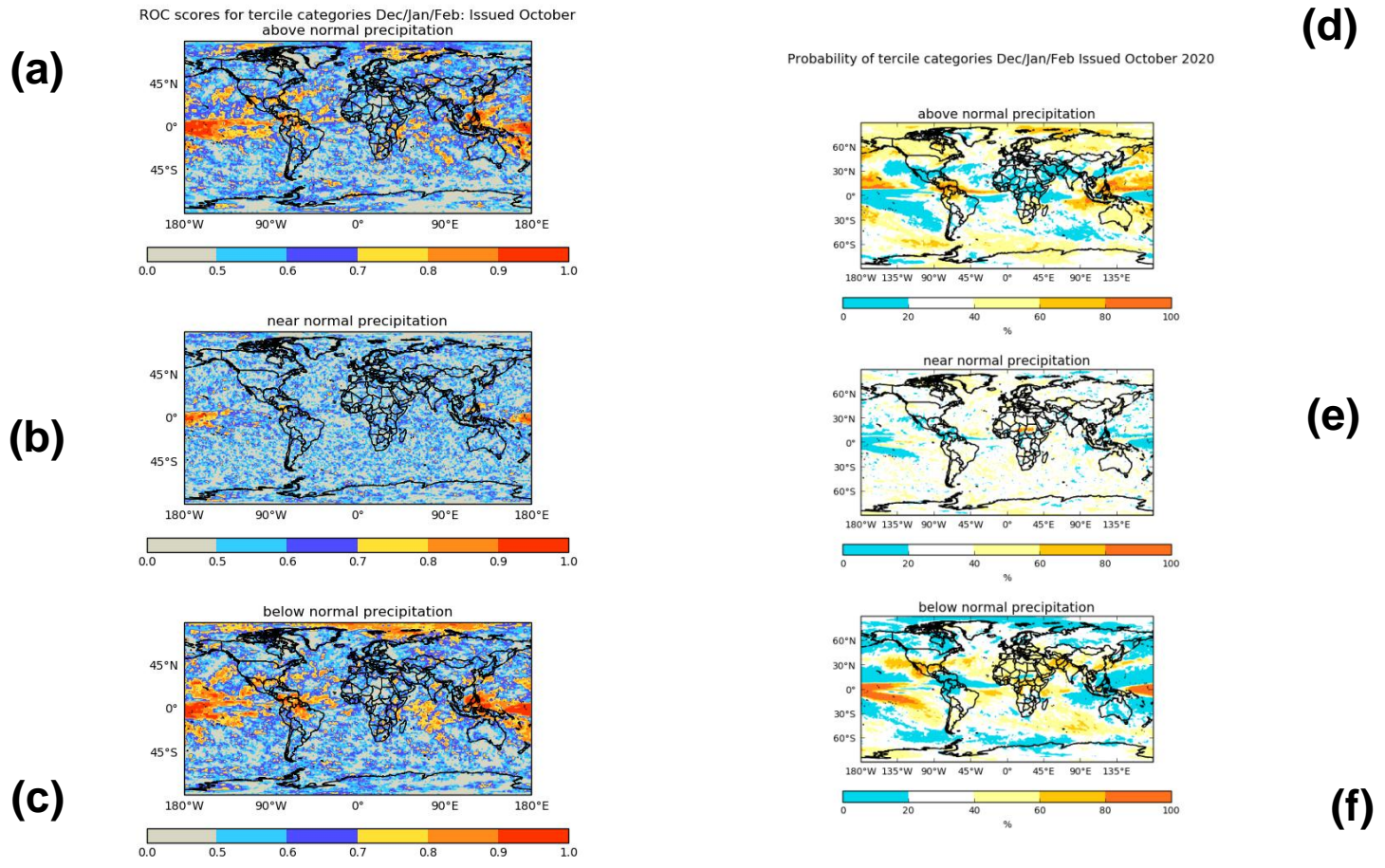
# MODELE CANCM4i



**Figure PR3:** skill (a) CANCM4i Model anomaly forecast. Mean DJF precipitation rate (b) CMC2 Model forecast

[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill\\_CMC2\\_ensemble\\_prate\\_season2.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill_CMC2_ensemble_prate_season2.png)

[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/CMC2\\_ensemble\\_prate\\_season2.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/CMC2_ensemble_prate_season2.png)

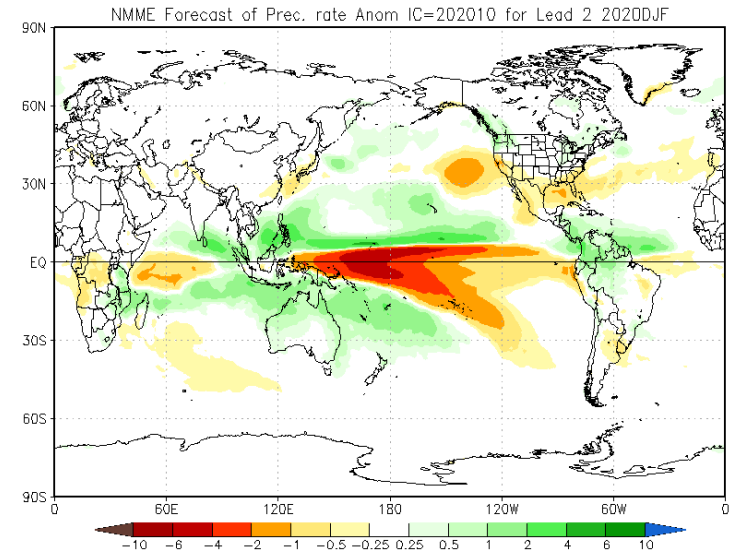
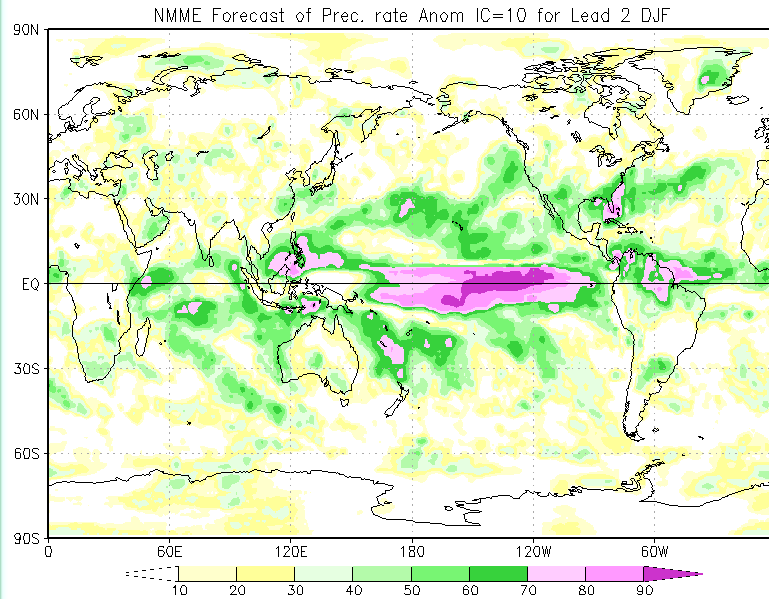


**Figure PR4 :** Mean DJF precipitation, with (a), (b) and (c) showing the ROC scores for the tercile categories; above, near and below normal, respectively. The probability forecasts for the tercile categories are (d) above normal, (e) near normal and (f) below normal.

<http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/gpc-outlooks/glob-seas-prob-skill>  
<http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/gpc-outlooks/glob-seas-probh>



# **ANALYSES DE PREVISION DE PRECIPITATION MULTI MODELE DJF**



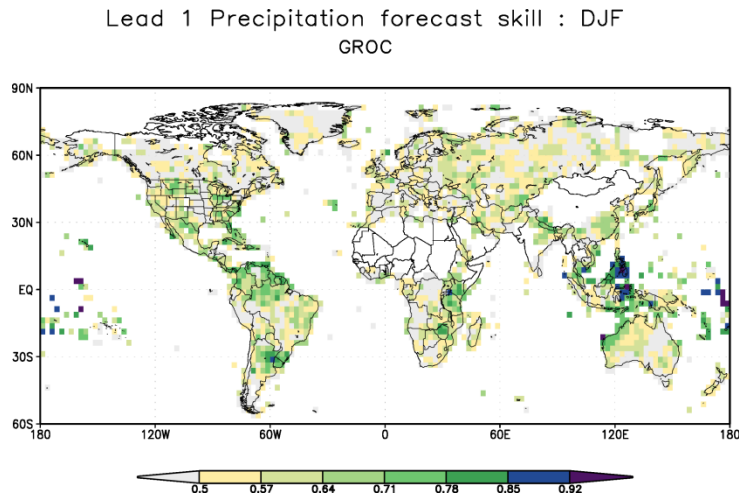
**Figure PR5:** Mean DJF precipitation rate (a) NMME forecast skill (b) NMME anomaly forecast

[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/NMME\\_ensemble\\_prate\\_season2.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/NMME_ensemble_prate_season2.png)

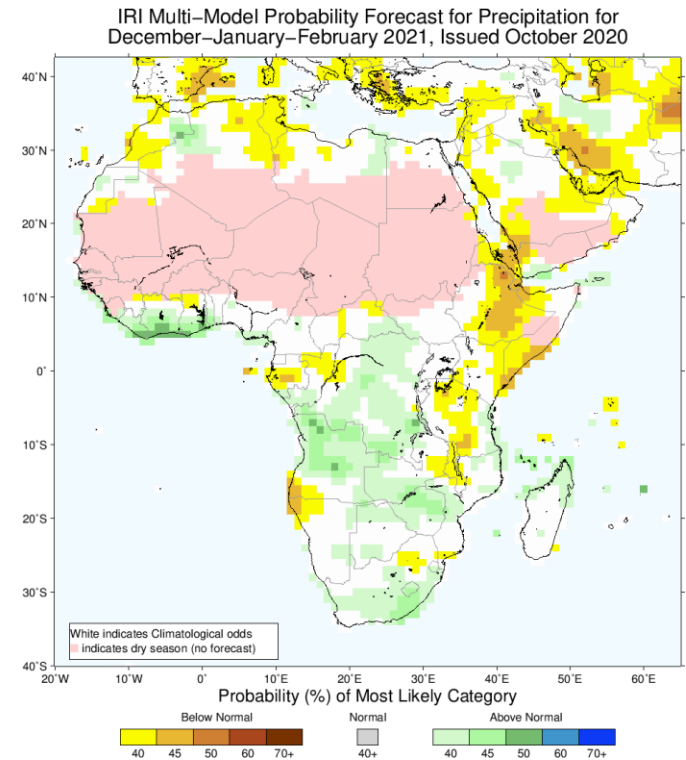
[http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill\\_NMME\\_ensemble\\_prate\\_season2.png](http://www.cpc.ncep.noaa.gov/products/NMME/current/images/skill_NMME_ensemble_prate_season2.png)

(a)

## Generalized ROC (GROC) Precipitation Forecast Skill



(b)



**Figure PR6:** skill (a) IRI Multi-Model probability forecast. DJF 2020-21 precipitation (b) IRI Multi-Model forecast  
<http://iri.columbia.edu/our-expertise/climate/forecasts/verification/>

<http://iri.columbia.edu/our-expertise/climate/forecasts/seasonal-climate-forecasts/>

# EUROSIP MULTI-MODEL

C3S multi-system seasonal forecast

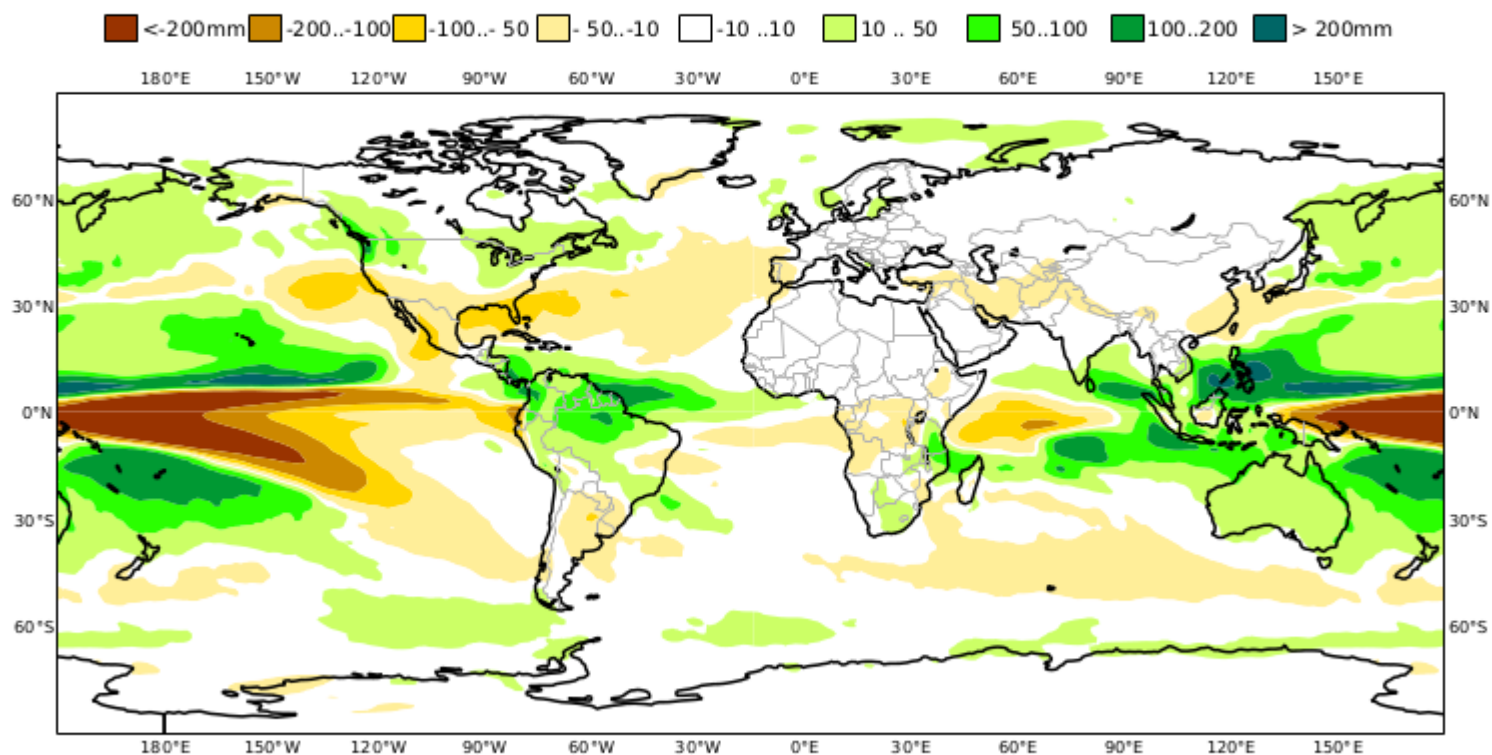
ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP/JMA

Mean precipitation anomaly

DJF 2020/21

Nominal forecast start: 01/10/20

Variance-standardized mean



**Figure PR14: DJF 2020-21 precipitation forecast by EUROSIP Multi-Model**

[https://www.ecmwf.int/en/forecasts/charts/seasonal/seasonal\\_charts\\_eurosip\\_rain?facets=Product%20group,Spatial%20maps&time=2019070100,3648,2019113000&forecast\\_type\\_and\\_skill\\_measures=tercile%20summary&area=Global](https://www.ecmwf.int/en/forecasts/charts/seasonal/seasonal_charts_eurosip_rain?facets=Product%20group,Spatial%20maps&time=2019070100,3648,2019113000&forecast_type_and_skill_measures=tercile%20summary&area=Global)



## COMBINAISON DES RÉSULTATS DE L'ÉTAPE 1 À L'ÉTAPE 8 ET GÉNÉRATION DES PRÉVISIONS CLIMATIQUES SAISONNIÈRES POUR NDJ ET DJF 2020-21

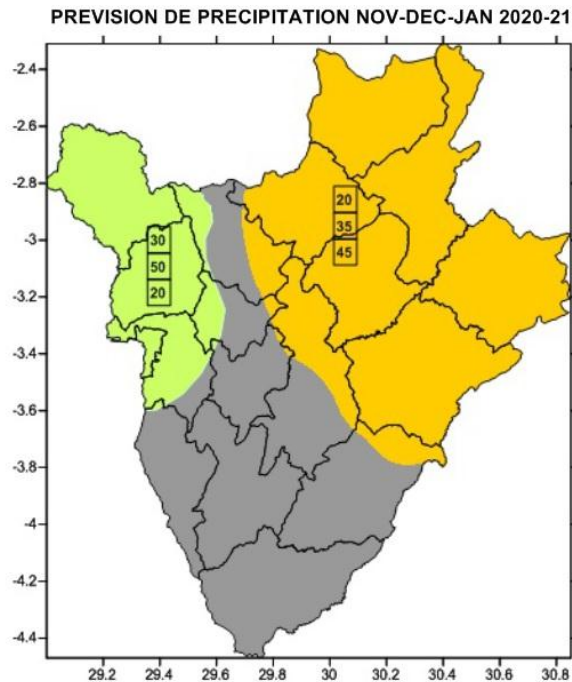




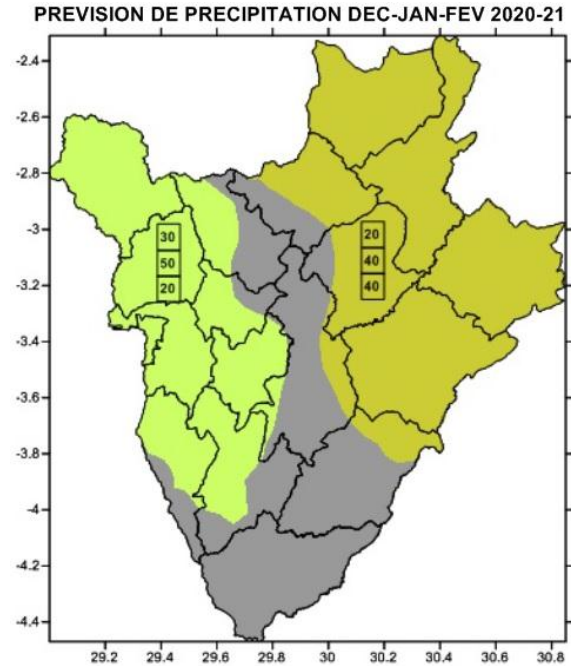
# PREVISION NDJ-DJF 2020-21

## NDJ 2020-21

## DJF 2020-21



- |                              |  |
|------------------------------|--|
| A : AU-DESSUS DE LA MOYENNE  | PRECIPITATION NORMALE                  |
| N : PROCHE DE LA MOYENNE     | PROCHE AU-DESSUS DE LA NORMALE         |
| B : EN DESSOUS DE LA MOYENNE | PRECIPITATION PROCHE DE LA NORMALE     |
|                              | PRECIPITATION EN DESSOUS DE LA NORMALE |



- |                              |   |
|------------------------------|---|
| A : AU-DESSUS DE LA MOYENNE  | PRECIPITATION NORMALE                                 |
| N : PROCHE DE LA MOYENNE     | PROCHE AU-DESSUS DE LA NORMALE                        |
| B : EN DESSOUS DE LA MOYENNE | PRECIPITATION PROCHE DE LA NORMALE                    |
|                              | PRECIPITATION NORMALE PROCHE EN DESSOUS DE LA NORMALE |



***THANKS FOR ALL***