



DEKADAL TECHNICAL NOTE

DEKAD 1

JANUARY, 2021 AND FORECAST

WEEK 1 AND 2

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Reviewed and revised by: **Godefroid NSHIMIRIMANA**

Edited by:

Presented by: **Godefroid NSHIMIRIMANA**

OUTLINE

- Dekadal average precipitation in percent of average
- Past four weeks SST anomalies
- Last month SST anomalies
- Past four weeks and month velocity potential, TPW anomalies with MJO, Kelvin and Rossby wave overlaid on global maps (850 et 200)
- Past 4 weeks precipitable water and outlooks
- Hovmoller diagram of velocity potential, anomalies for 5N-5S , 15N-15S with waves overlay including outlooks
- Ecmwf mjo forecast
- Hovmoller diagram for TPW and OLR with waves overlaid including outlook
- Past 3 weeks olr anomalies
- Past 4 weeks velocity potential and month stream function anomalies with MJO, kelvin and rossby wave overlaid on global maps 850 hpa Mean Sea Level Presssure (dekadals climatology, dekadals mean and anomaly overlaid)

OUTLINE

- Observed mslp for the recent 10 day period with anomalies superimposed on the left and climatology of mslp for the past 10 day period
- Geopotential height 500 hpa
- ITD, CAB, ITCZ dekad 3 of december 2020
- Wind anomalies for the recent 10 day period 850 and 700 hpa
- Relative humidity recent 10 days anomalies, climatology 850 for dekad 3 of December 2020
- Relative humidity recent 10 days anomalies, climatology 700 for dekad 3 of December 2020
- Ir image and Velocity Potential anomaly
- Extremes events table recorded during the dekad in Africa and socio economic impacts
- Precipitation forecasts from ECMWF for week 1 & 2

OUTLINE

- MJO forecast
- Wind anomaly forecast from GFS
- Week 1 AT 700 hPa relative vorticity forecast from cfs ecmwf
- Week 1 AT 700 hPa divergence wind forecast ecmwf
- Monthly forecast from WMO lead centre single ensemble and multimodel
- Precipitation and anomaly forecast
- S2S products from the hazard center of university of california at SANTA BARBARA
- Precipitation probability forecast SUBX
- Climatology of precipitations for upcoming week 1 and 2

ESTIMATE CUMULATIVE PRECIPITATION IN PERCENT OF AVERAGE FOR DEKAD 1 JANUARY 2021

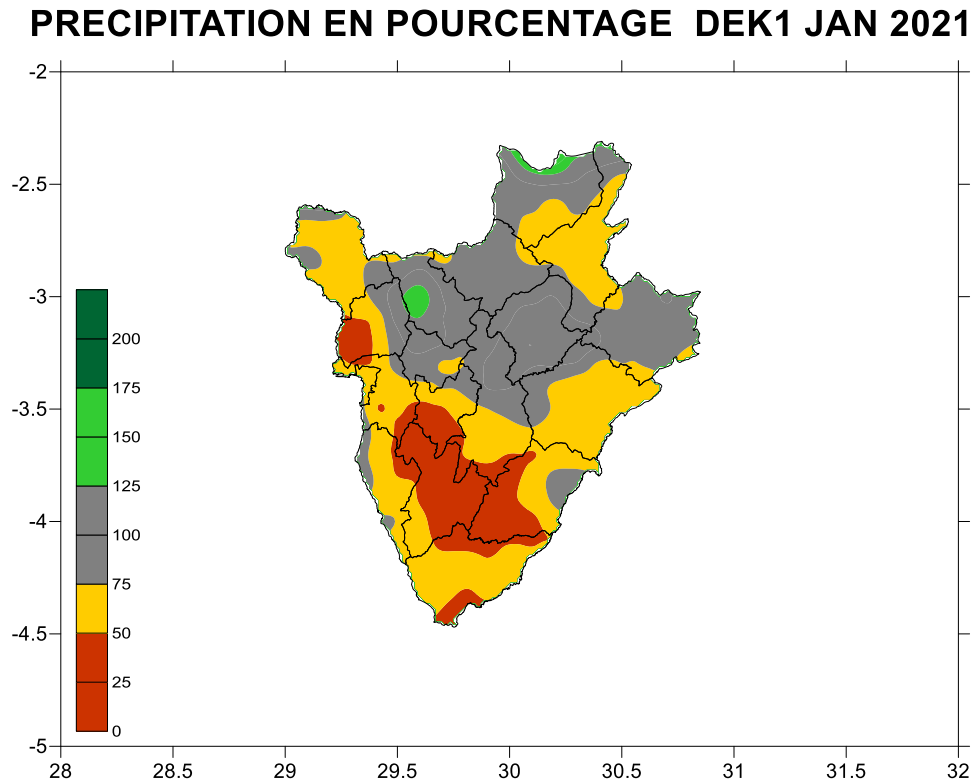


Figure 1: This map displays decadal average precipitation in percent of average
The figure show well below to below average precipitation prevailed over most parts of the Country during the first dekad of January 2021

Data : [http://iridl.ldeo.columbia.edu/expert/SOURCES/.NOAA/.NCEP/.CPC/.FEWS/.Africa/.DAILY/.ARC2/.daily/.est_prdp/X/-20/0.5/70/GRID/Y/-40/0.5/40/GRID/T/\(21-31%20Dec%202020%20\)/RANGE/T/SUM/](http://iridl.ldeo.columbia.edu/expert/SOURCES/.NOAA/.NCEP/.CPC/.FEWS/.Africa/.DAILY/.ARC2/.daily/.est_prdp/X/-20/0.5/70/GRID/Y/-40/0.5/40/GRID/T/(21-31%20Dec%202020%20)/RANGE/T/SUM/)

Weekly Sea Surface Temperature Anomaly

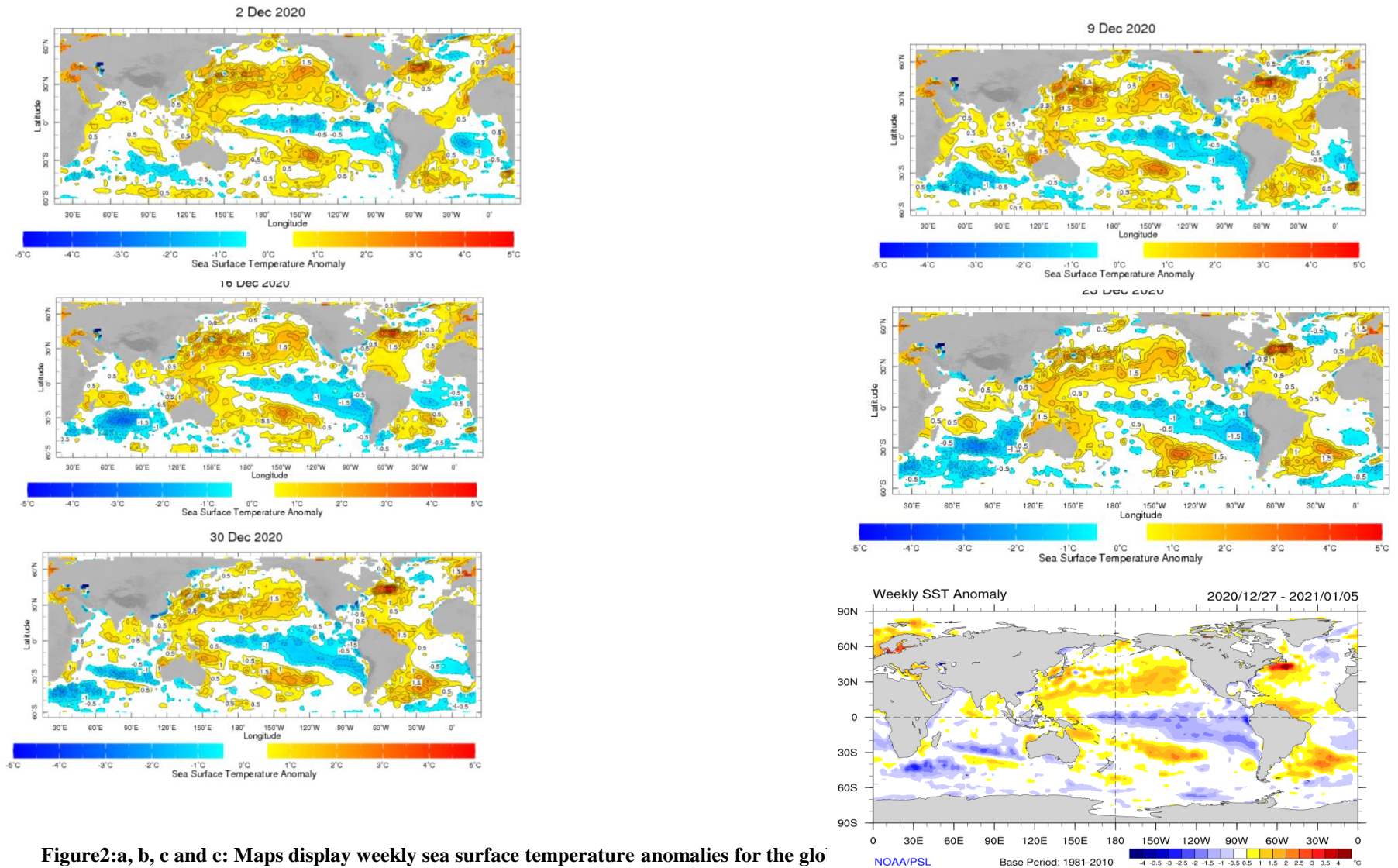


Figure 2: a, b, c and c: Maps display weekly sea surface temperature anomalies for the globe: http://iridl.ldeo.columbia.edu/maproom/Global/Ocean_Temp/Weekly_Anomaly.html?

During the last four weeks, below-average SSTs have persisted across the most of the equatorial Pacific Ocean. Neutral to Below average SSTs have persisted across the most of Tropical South Atlantic and Gulf Guinea.

LAST MONTH SST OBSERVED

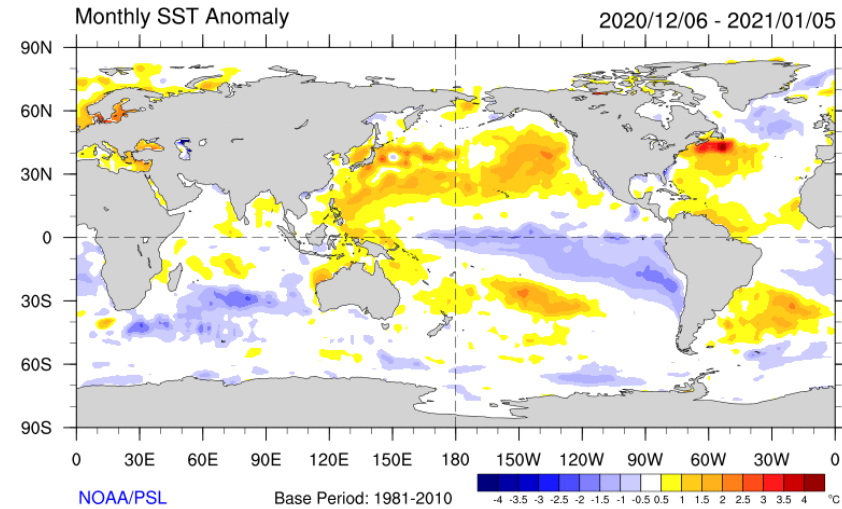
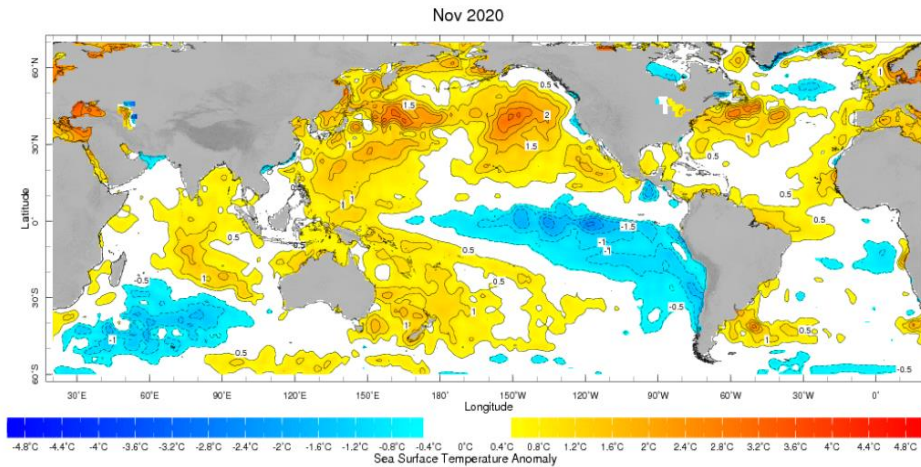


Figure 4 : This map displays monthly sea surface temperature anomalies for the globe.

During November and last 30 days, the Cooling persisted across central to the eastern Equatorial Pacific Ocean. Neutral to cold persisted across the Tropical south Atlantic ; the persisted cooling across South-Western Indian Ocean (SWIO); the heating persisted across western Equatorial Pacific and the warming persisted across northern Pacific Ocean.

http://iridl.ldeo.columbia.edu/maproom/Global/Ocean_Temp/Anomaly.html. Accessed 20/12/2020.

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

SST OBS AND FCST FOR TWO WEEK

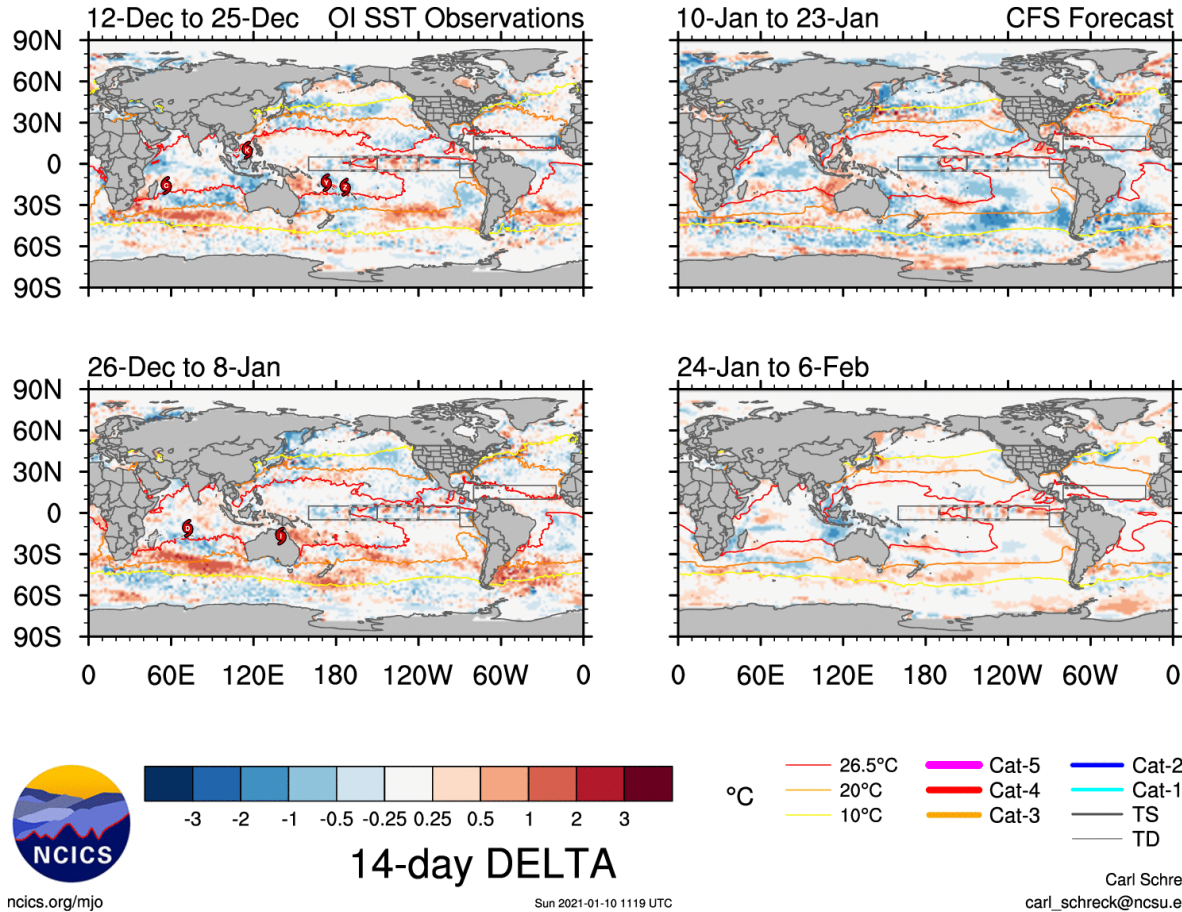


Figure 5: Sea Surface Temperature and FCST for two week

<https://ncics.org/pub/mjo/v2/sst/global.delta.21.png>

PAST FOUR WEEK AND MONTH VELOCITY POTENTIAL, TPW ANOMALIES WITH MJO, KELVIN AND ROSSBY WAVE OVERLAID ON GLOBAL MAPS 850 ET 200

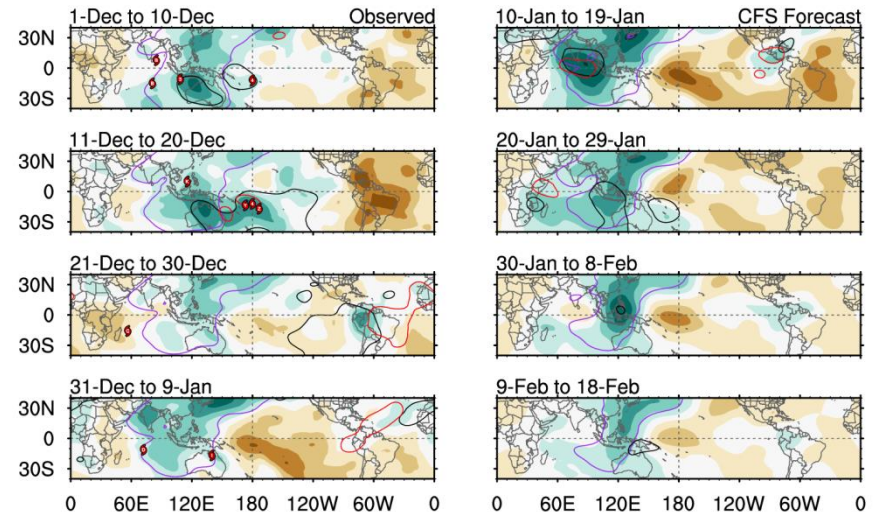
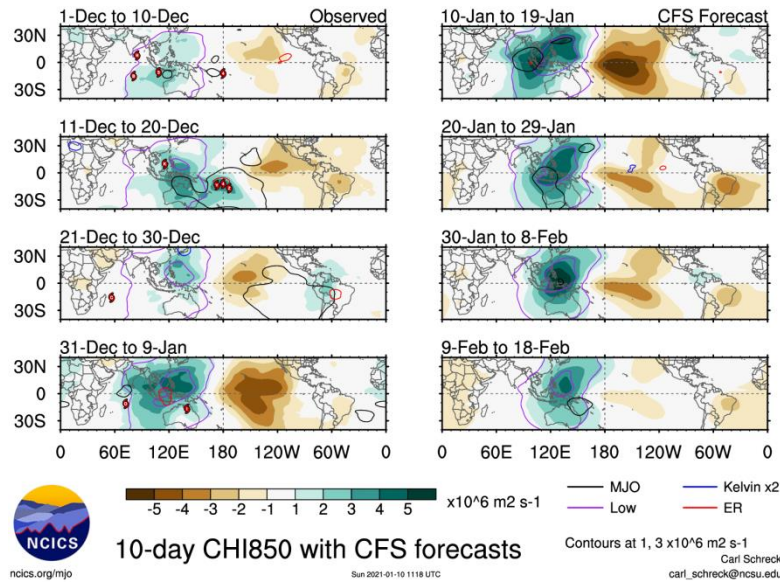


Figure 6a and b: past four week and month velocity potential W

<https://ncics.org/pub/mjo/v2/map/chi850.cfs.all.global.7.png>

<https://ncics.org/pub/mjo/v2/map/chi200.cfs.all.global.7.png>

<https://ncics.org/portfolio/monitor/mjo/>

PAST 4 WEEKS PRECIPITABLE WATER AND OUTLOOKS

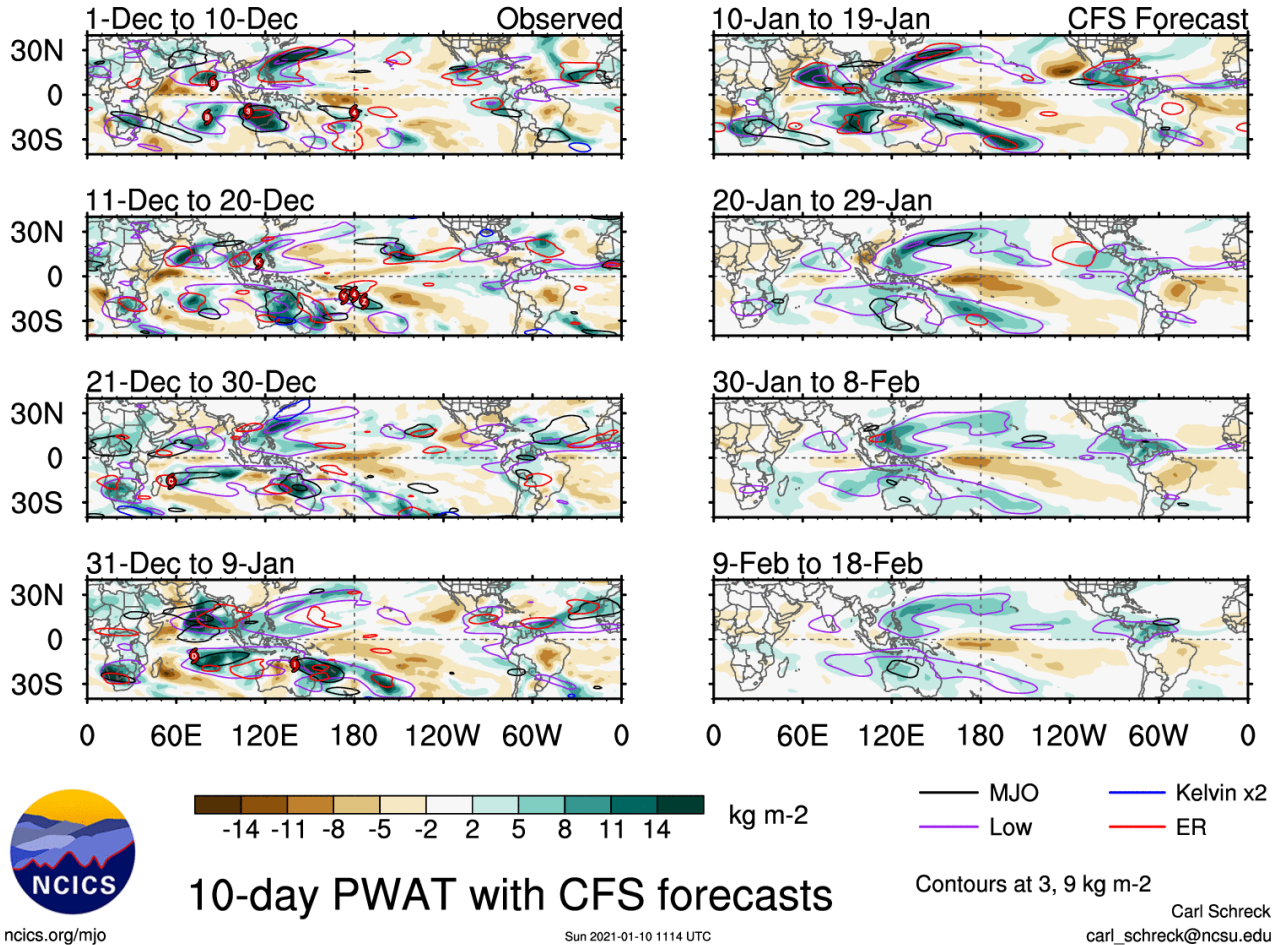


Figure 7: past 4 weeks precipitable water and outlooks

<https://ncics.org/pub/mjo/v2/map/pwat.cfs.all.global.7.png>

<https://ncics.org/portfolio/monitor/mjo>

HOVMOLLER DIAGRAM OF VELOCITY POTENTIAL, ANOMALIES FOR 15N-15S WITH WAVES OVERLAY INCLUDING OUTLOOKS

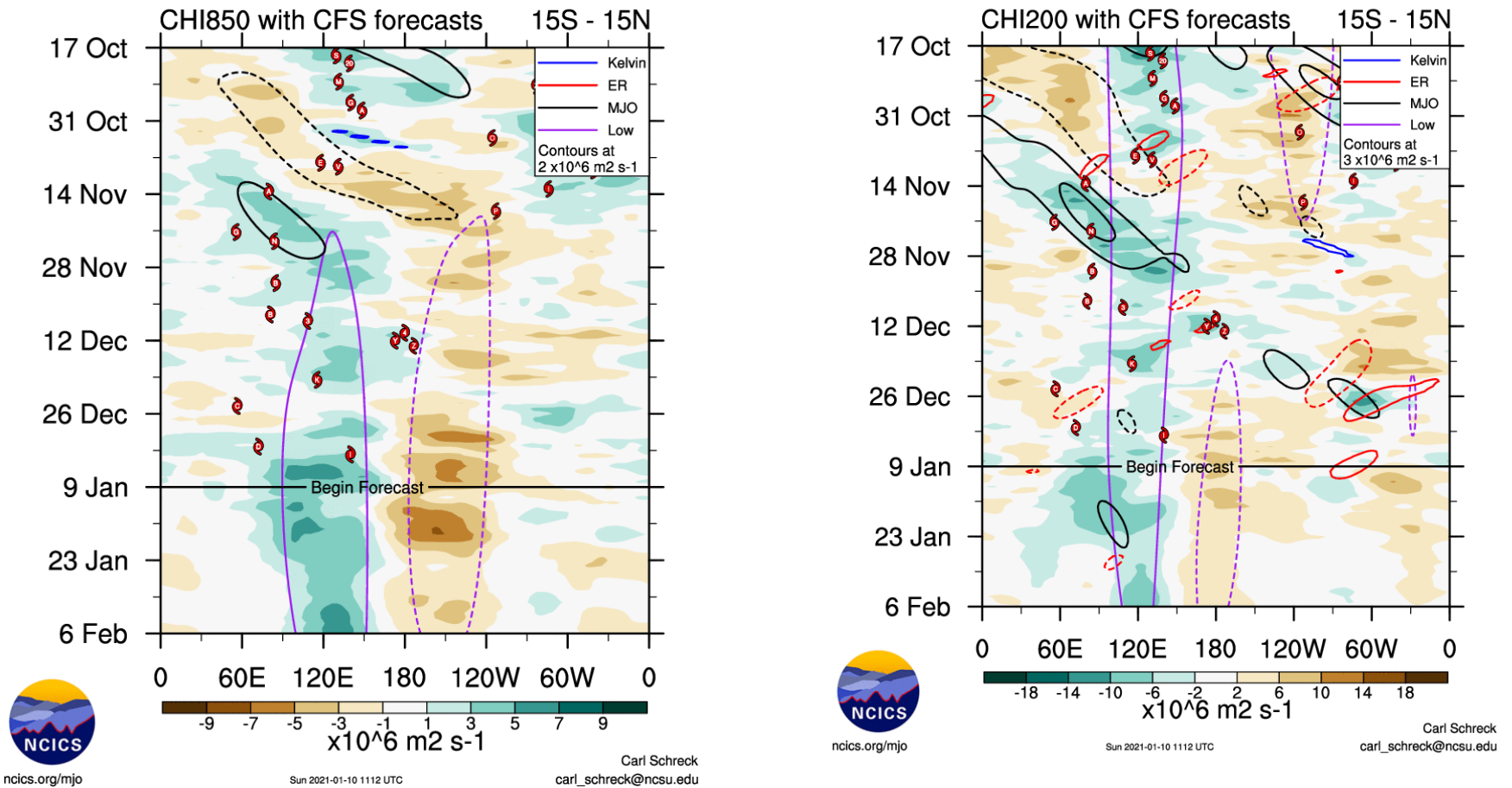


Figure 8: anomalies for 15n-15s with waves overlay including outlooks

<https://ncics.org/pub/mjo/v2/hov/chi200.cfs.eqtr.png>

<https://ncics.org/pub/mjo/v2/hov/chi850.cfs.wide.png>

<https://ncics.org/portfolio/monitor/mjo/>

HOVMOLLER DIAGRAM OF VELOCITY POTENTIAL, ANOMALIES FOR 5S-5N WITH WAVES OVERLAY INCLUDING OUTLOOKS

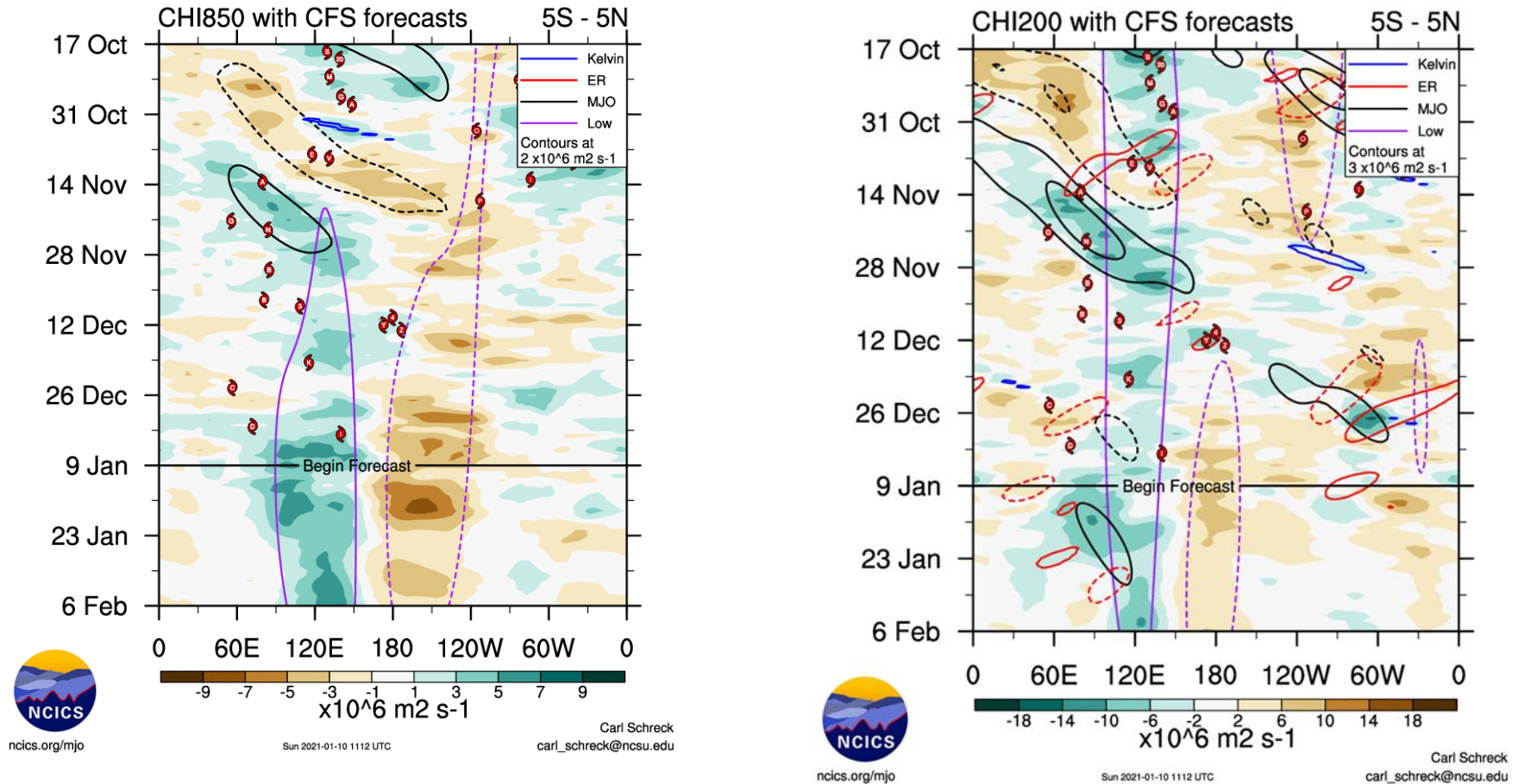
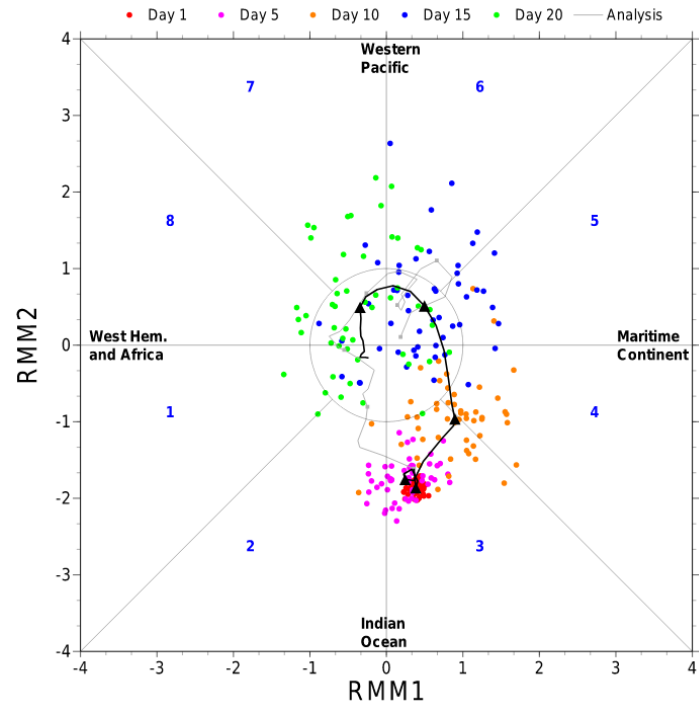


Figure 9: anomalies for 15n-5s with waves overlay including outlooks

<https://ncics.org/pub/mjo/v2/hov/chi200.cfs.south.png>
<https://ncics.org/pub/mjo/v2/hov/chi850.cfs.south.png>

ECMWF MJO FORECAST

ECMWF MONTHLY FORECASTS
FORECAST BASED 07/01/2021 00UTC



VELOCITY POTENTIAL AT 200 HPA
Ensemble mean between Lat 15S and 15N
FORECAST BASED 07/01/2021 00UTC

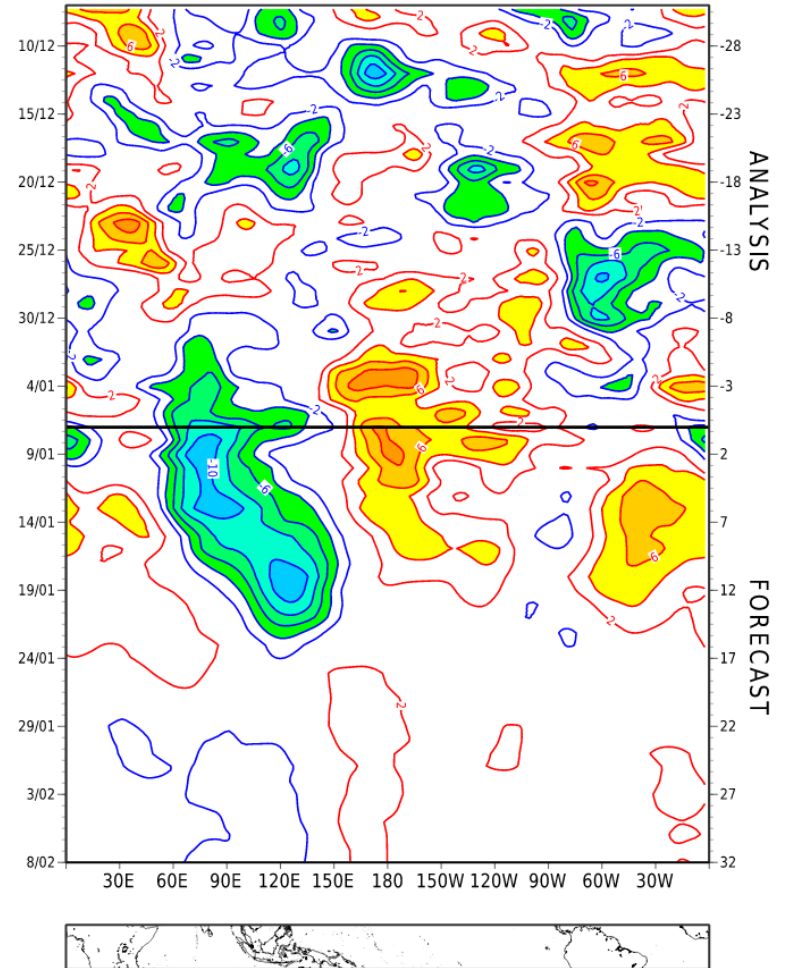


Figure 10a and b: ECMWF MJO FORECAST

https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_mjo_family_index?facets=undefined&time=2019080500,0,2019080500

https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_mjo_family_time_longitudes?facets=undefined&time=2019112500,0,2019112500

PAST 3 WEEKS OLR ANOMALIES

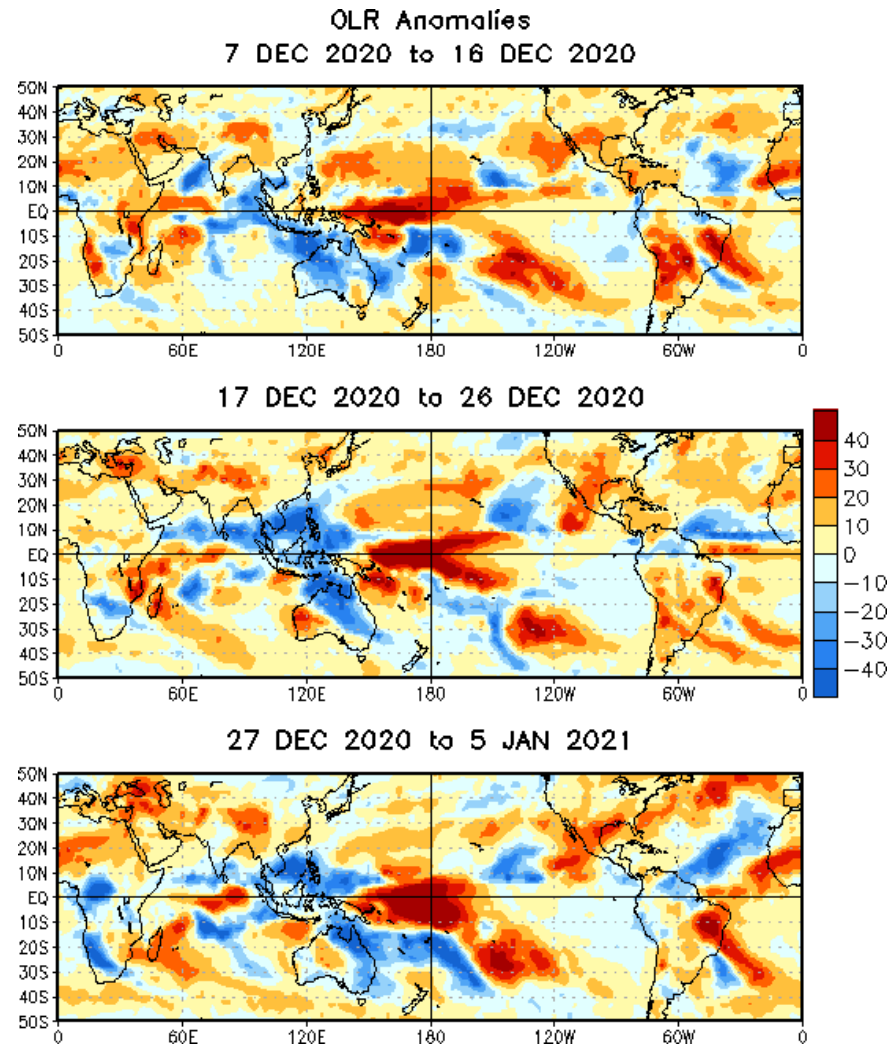


Figure 11: PAST 3 WEEKS OLR ANOMALIES

https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/olra_last30days-3plots.gif

OBSERVED MSLP FOR THE DEKAD 2 December 2020 WITH ANOMALIES SUPERIMPOSED ON THE LEFT AND CLIMATOLOGY OF MSLP FOR THE DEKAD 2 December

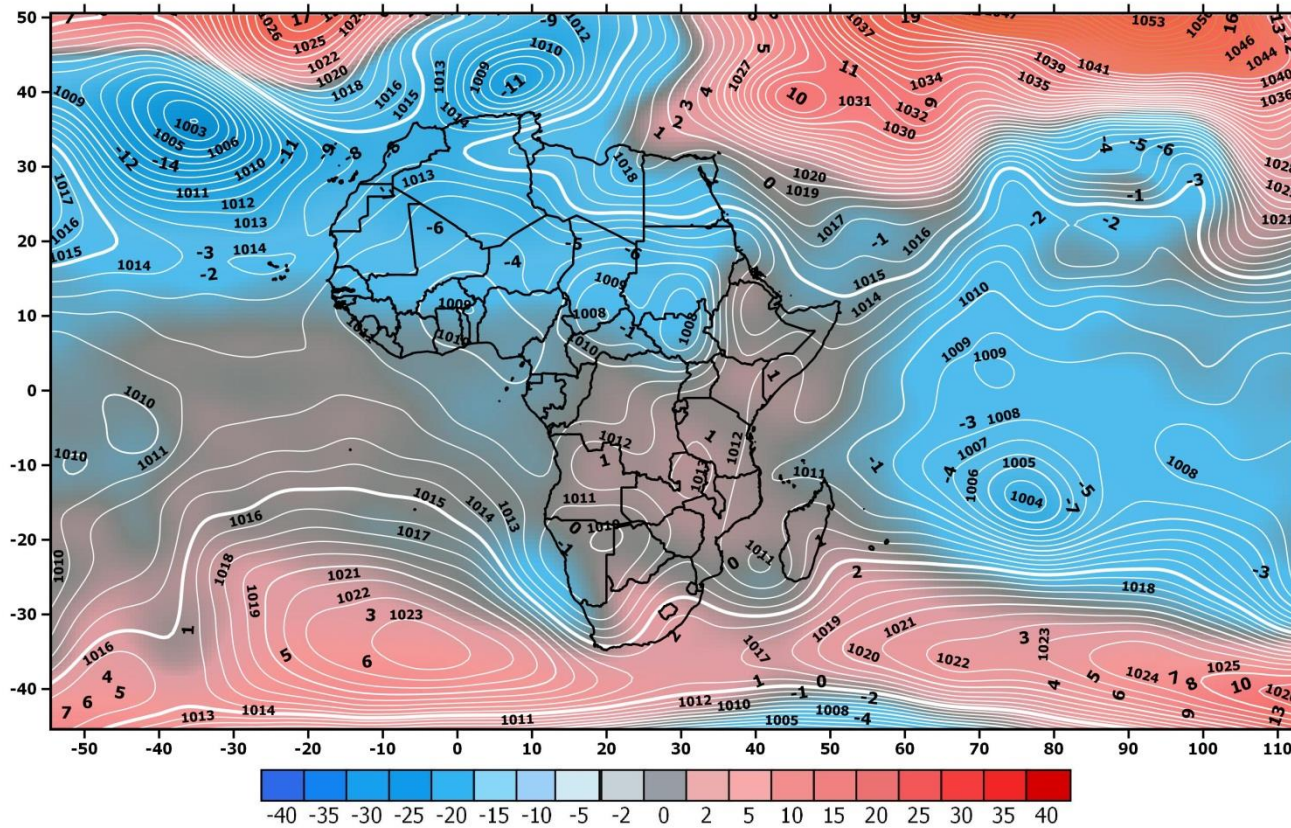


Figure 13: MSLP obs-anom and MSLP-climatology

Data source: <http://iridl.ldeo.columbia.edu/expert/SOURCES/.NOAA/.NCEP-NCAR/.CDAS-1/.DAILY/.Intrinsic/.MSL/.pressure>

WIND ANOMALIES FOR THE RECENT 7 DAY PERIOD 850 AND 700 hPa

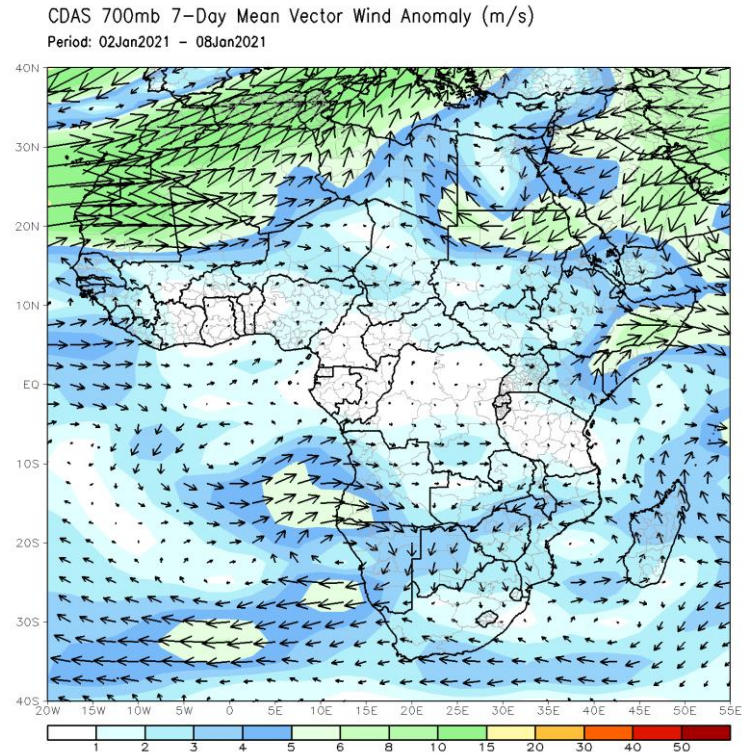
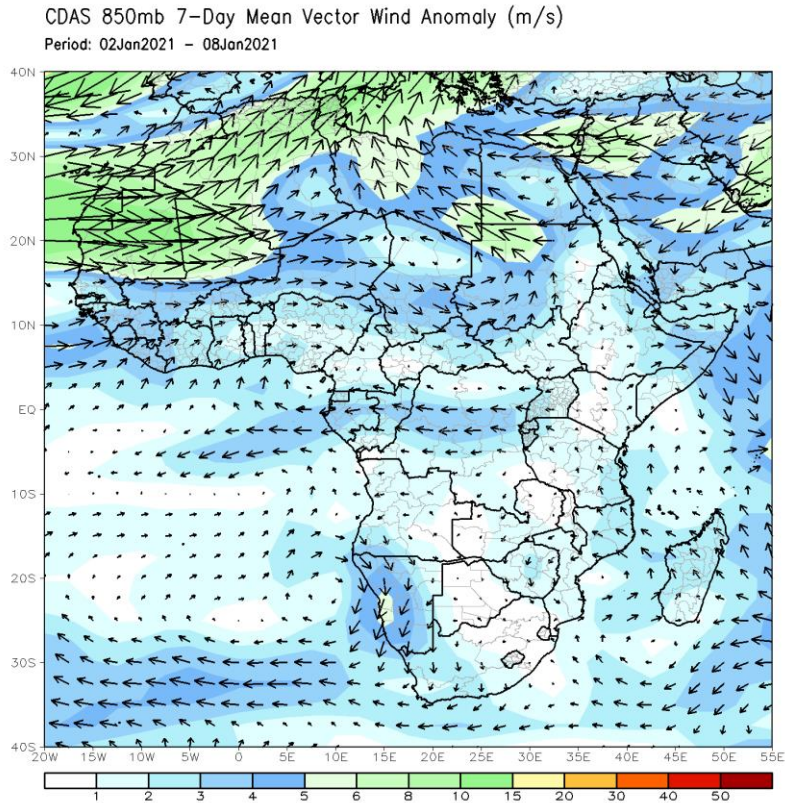
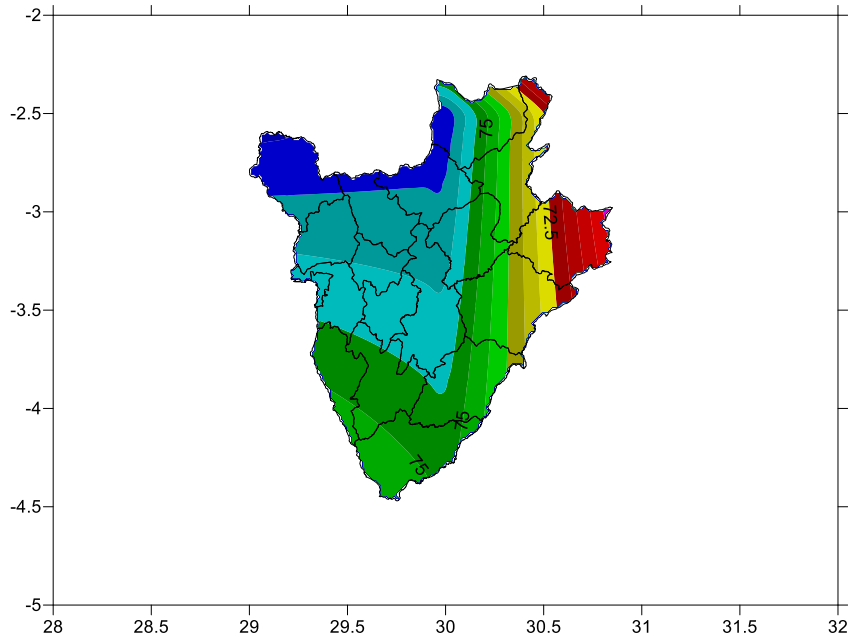


Figure 15: Wind anomalies for 850 and 700hPa

For the wind, a low intensity anomaly have prevailed at the 850 hpa level during the third dekad of December 2020 over all of the continent. The moderates to strong wind were observed at the 700 hpa over at north Sahel, in the gulf Guinea, at North Africa region and southern of the Austral Africa. The strong wind were observed at the 200hpa level of this second dekad December over across most region.

RELATIVE HUMIDITY AND ANOMALIES, CLIMATOLOGY 850 HPA FOR DEKAD 1 OF JANUARY 2021

HUMIDITE RELATIVE 850HPA DEK1 JAN 2021



ANOMALIE D'HUMIDITE RELATIVE 850HPA DEK1 JAN 2021

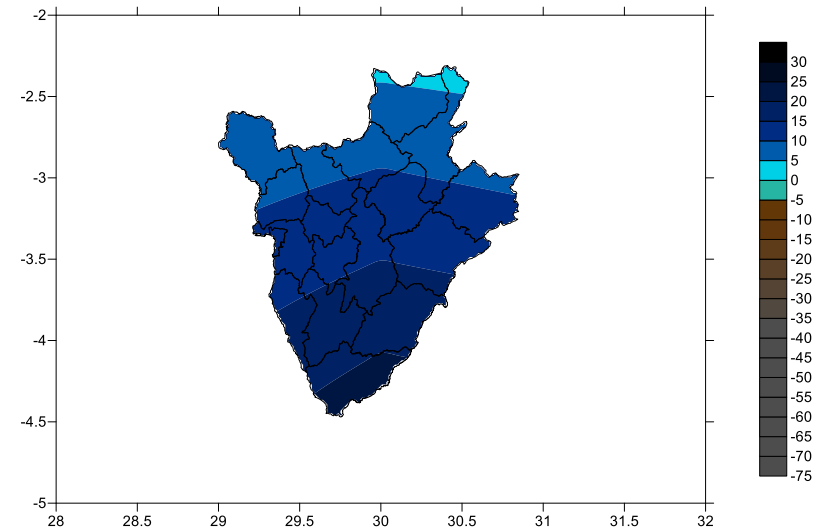


Figure 16a, b and : Relative humidity, Anomaly and climatology cards

<http://iridl.ldeo.columbia.edu/expert/SOURCES/.NOAA/.NCEP-NCAR/.CDAS-1/.DAILY/.Intrinsic/.PressureLevel/.rhum>

RELATIVE HUMIDITY AND ANOMALIES, CLIMATOLOGY 700 HPA FOR DEKAD 1 OF JANUARY 2021

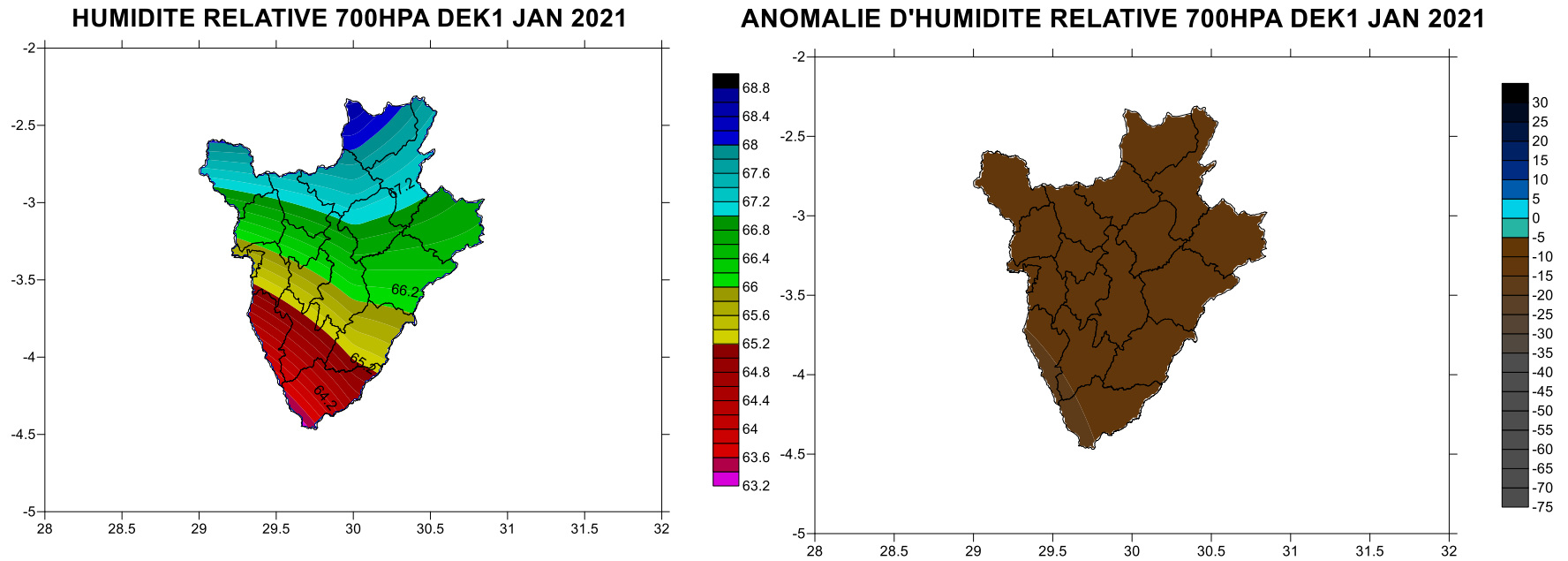


Figure 17a, b and : Relative humidity, Anomaly and climatology cards

<http://iridl.ldeo.columbia.edu/expert/SOURCES/.NOAA/.NCEP-NCAR/.CDAS-1/.DAILY/.Intrinsic/.PressureLevel/.rhum>

IR IMAGE AND VELOCITY POTENTIAL ANOMALY

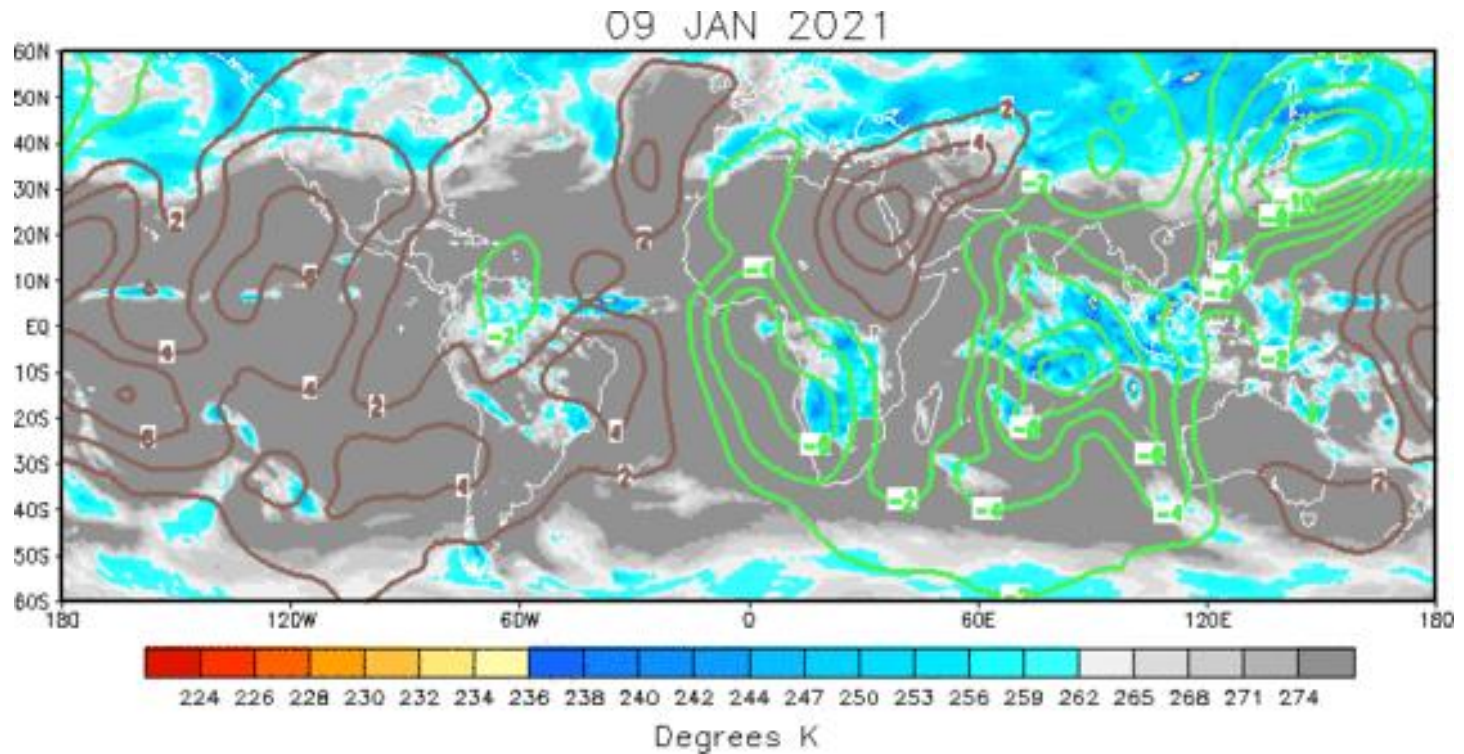


Figure 18: IR image and velocity potential anomaly

https://www.cpc.ncep.noaa.gov/products/precip/CWlink/ir_anim_monthly.shtml

EXTREMES EVENTS TABLE RECORDED DURING THE DEKAD 2 OF MARCH 2020 IN AFRICA AND SOCIO ECONOMIC IMPACTS

Category of observed extreme weather or climate event/Type de phénomène	Date of the occurrence of the event/date	Physical Characteristics	Geographical extent/étendue	Severity	Duration/intensité	Casualties /dégats	Socio-economic impacts	sources of information	Other impacts /autres impacts
	18-Mar-20	Tanzania		severe	floods		several houses and farms were washed away by the floods	floodlist.com	
Rainfall / floods	18-Mar-20	Angola		Sévère			several houses were completely destroyed and others damaged.	floodlist.com	
Drought/sécheresse	13-Mar-20	Egypt			floods	5 death	lightning strikes and flooding	floodlist.com	
Drought/sécheresse	11-Mar-20	Zambia			flods			floodlist.com	
Others/autres.....	11-Mar-20	Burundi		Sévère	weather	1 death	several people have been affected, some displaced, homes destroyed and others damaged.	floodlist.com	
	11-Mar-20	Rwanda			Heavy rain	2 death		floodlist.com	

MJO MONITORING AND FORECASTS FRO ECWF, NCEP, UK MET OFFICE ... FROM MJO WORKING GROUP WEBSITE

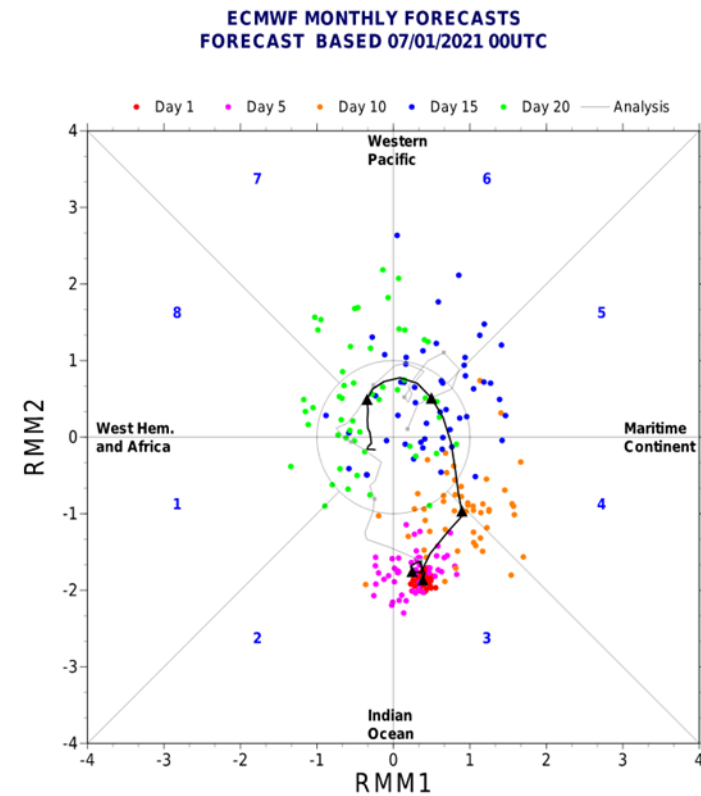
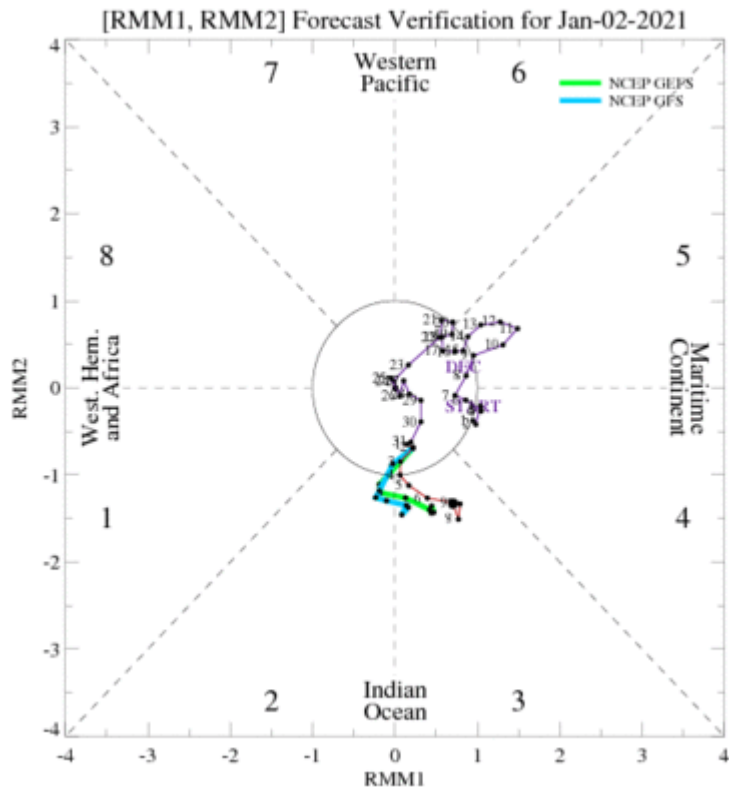


Figure 19:FORECASTS FRO ECWF, NCEP, UK MET OFFICE

<https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/emon.shtml>

https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_mjo_family_index?facets=undefined&time=2019081500,0,2019081500

<https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/jman.shtml>

WEEKLY FORECAST

MJO FORECAST

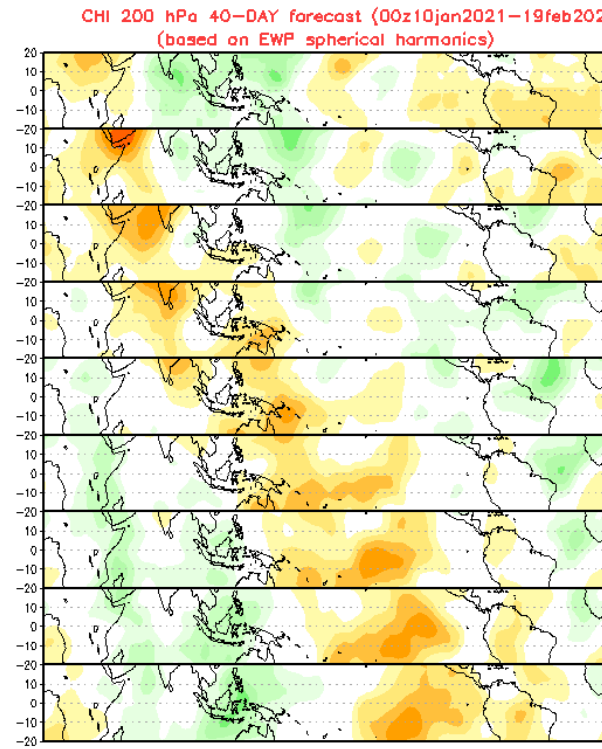
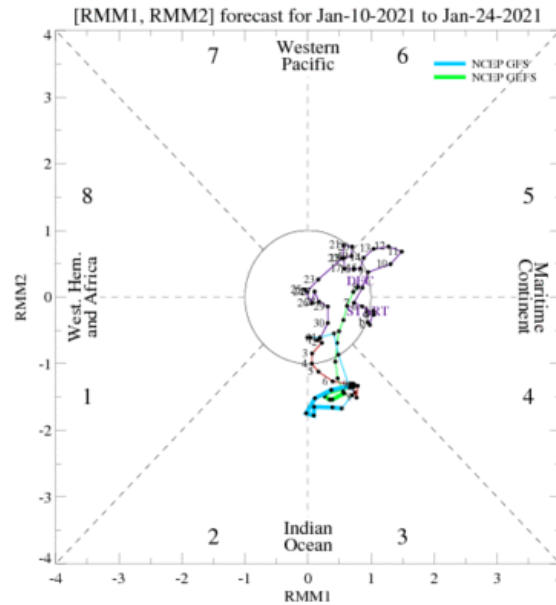
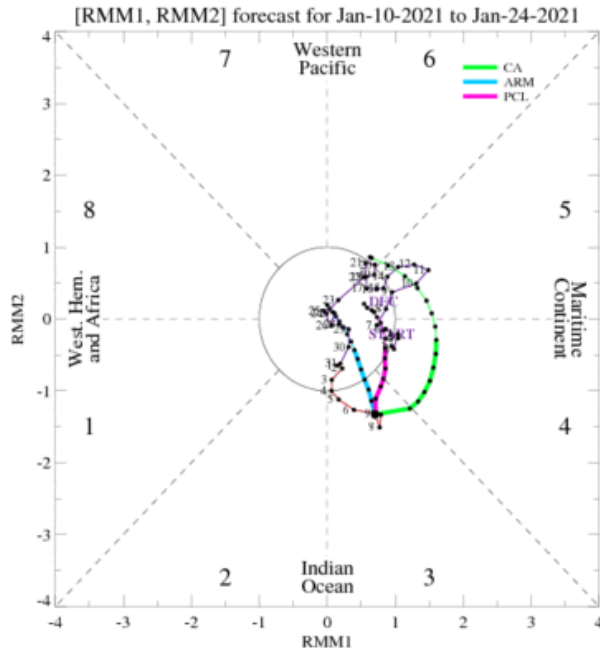


Figure 20: Mjo forecast

<https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/foroper.shtml>

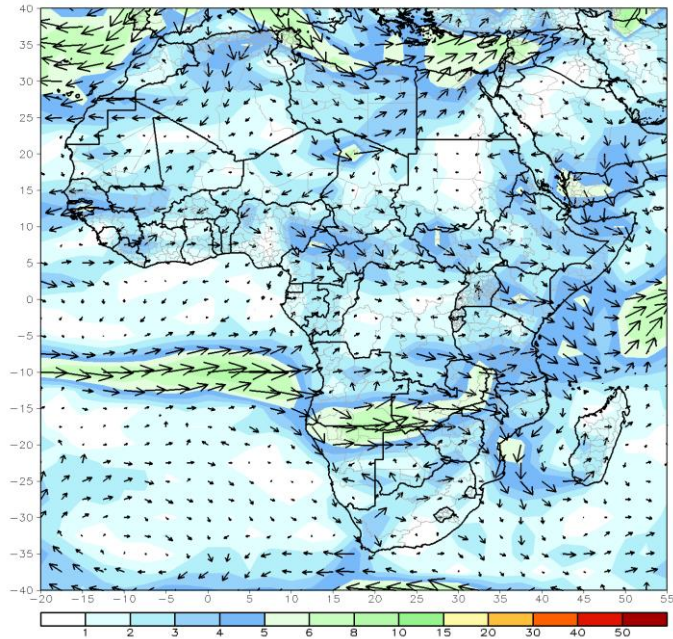
<https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/forca.shtml>

<https://www.cpc.ncep.noaa.gov/products/people/wd52qz/mjo/chi/cfs.gif>

WIND ANOMALY FORECAST FROM GFS

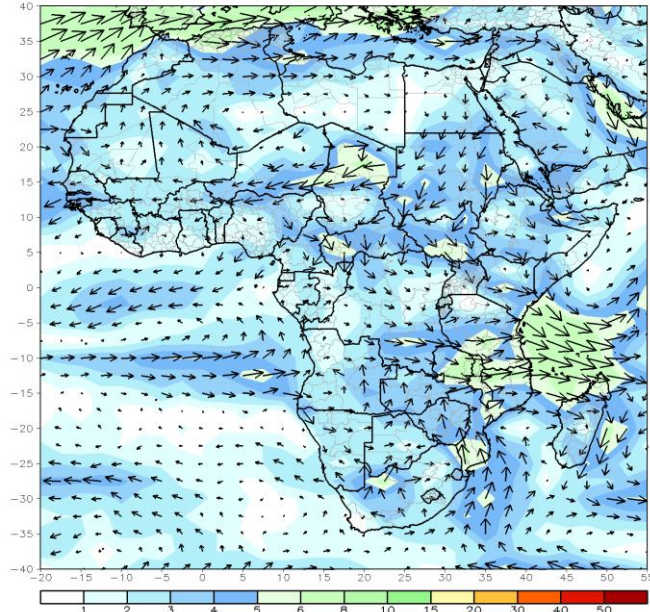
GFS 850mb week1 Mean Vector Wind Anomaly (m/s)

Ending: 00z18Jan2021



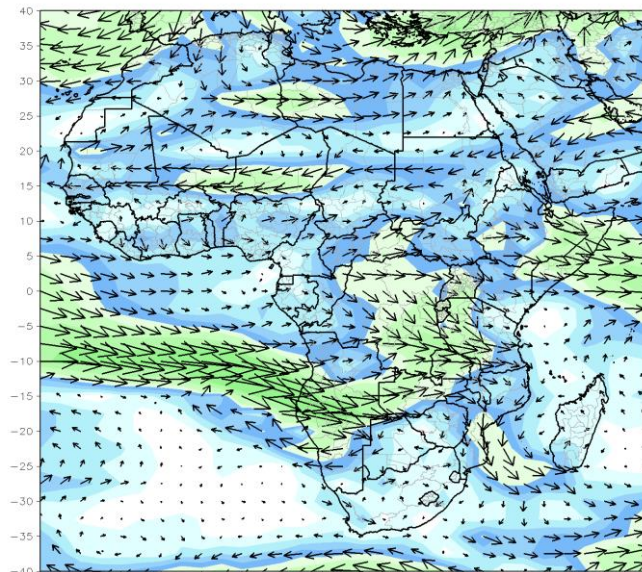
GFS 850mb week2 Mean Vector Wind Anomaly (m/s)

Ending: 00z25Jan2021



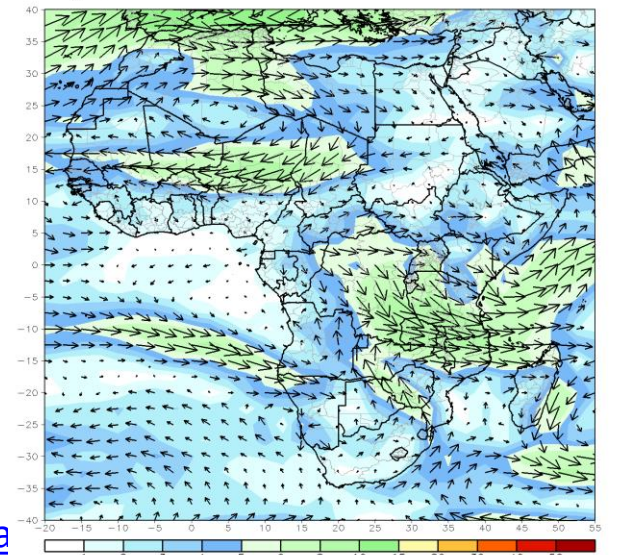
GFS 700mb week1 Mean Vector Wind Anomaly (m/s)

Ending: 00z18Jan2021



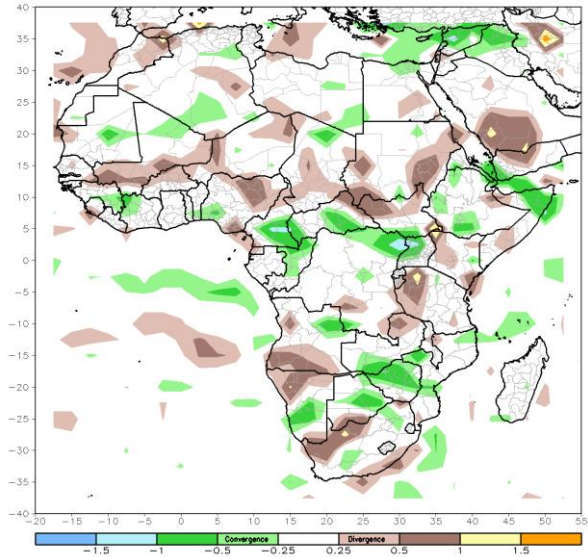
GFS 700mb week2 Mean Vector Wind Anomaly (m/s)

Ending: 00z25Jan2021

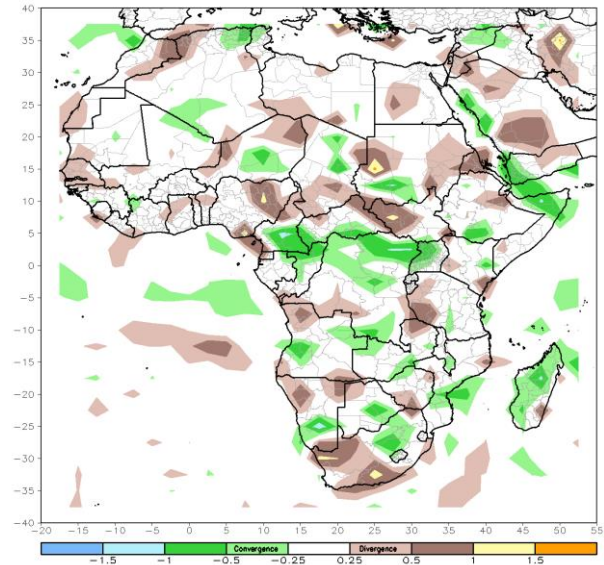


GFS DIVERGENCE FORECAST

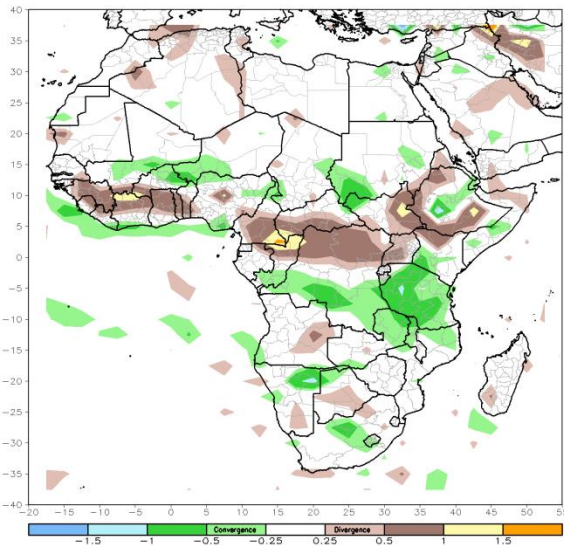
GFS 850mb week1 Mean Divergence Anomaly ($10e+5/s$)
Ending: 00z18Jan2021



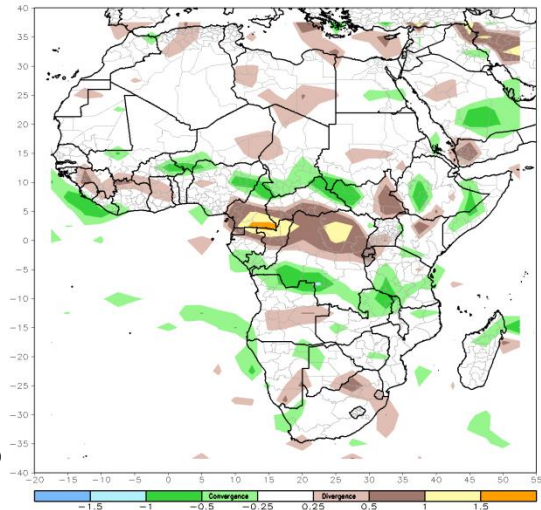
GFS 850mb week2 Mean Divergence Anomaly ($10e+5/s$)
Ending: 00z25Jan2021



GFS 700mb week1 Mean Divergence Anomaly ($10e+5/s$)
Ending: 00z18Jan2021



GFS 700mb week2 Mean Divergence Anomaly ($10e+5/s$)
Ending: 00z25Jan2021



F
th

f the divergent wind, for the first w
ca as well as the 700

<https://www.cpc.ncep.noaa.gov/products/international/africa/africa.shtml>

http://www.cpc.ncep.noaa.gov/products/international/gfs/gfs_week1_af_700divg_anom.gif

PRECIPITATION FORECASTS FROM ECMWF FOR WEEK 1: 04-11 January 2021; Week 2: 11-18 January 2021

ECMWF EPS-Monthly Forecasting System
 Precipitation anomaly
 Forecast start reference is 31-12-2020
 ensemble size = 51 , climate size = 660

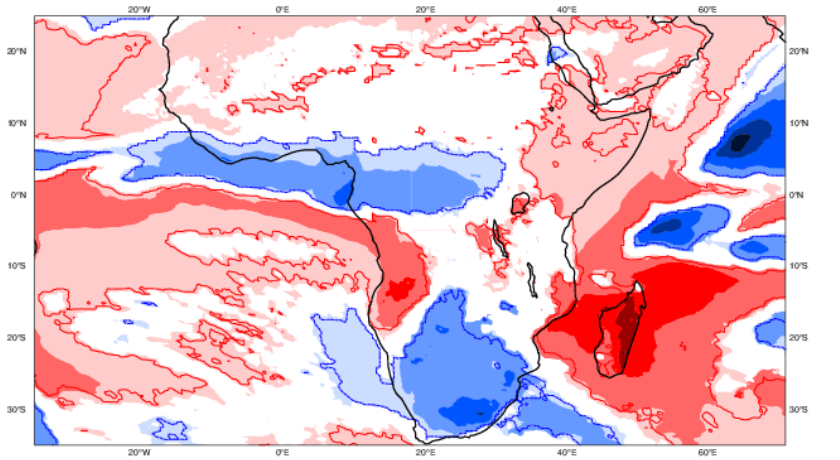
Day 5-11
 04-01-2021/TO/10-01-2021
 Shaded areas significant at 10% level
 Contours at 1% level

ECMWF EPS-Monthly Forecasting System
 Precipitation anomaly
 Forecast start reference is 31-12-2020
 ensemble size = 51 , climate size = 660

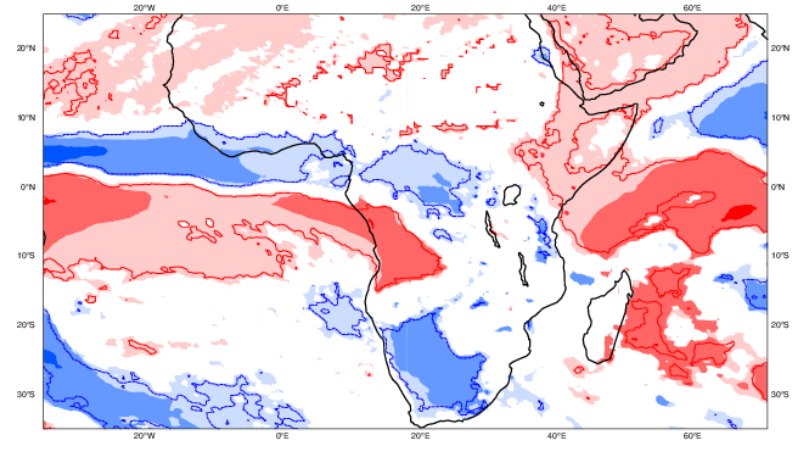
Day 12-18
 11-01-2021/TO/17-01-2021
 Shaded areas significant at 10% level
 Contours at 1% level

Legend for Week 1: <90mm, -90..-60, -60..-30, -30..-10, -10.. 0, 0.. 10, 10.. 30, 30.. 60, 60.. 90, > 90mm

Legend for Week 2: <90mm, -90..-60, -60..-30, -30..-10, -10.. 0, 0.. 10, 10.. 30, 30.. 60, 60.. 90, > 90mm



Week1



Week2

Figure 26: Precipitation forecast: During weeks 1 and 2, rainfall amounts greater than 90 mm are likely in the Gulf of Guinea, South Africa, northern and central parts of Central African Region, Lesotho, SADEC. Precipitation below 90 mm is very likely in the East Africa region, Angola, the southern coastal area of the Central African Region and Madagascar.

CENTILES 33 AND 66 PRECIPITATION FORECASTS FROM ECMWF FOR WEEK 1: 04-11 January 2021

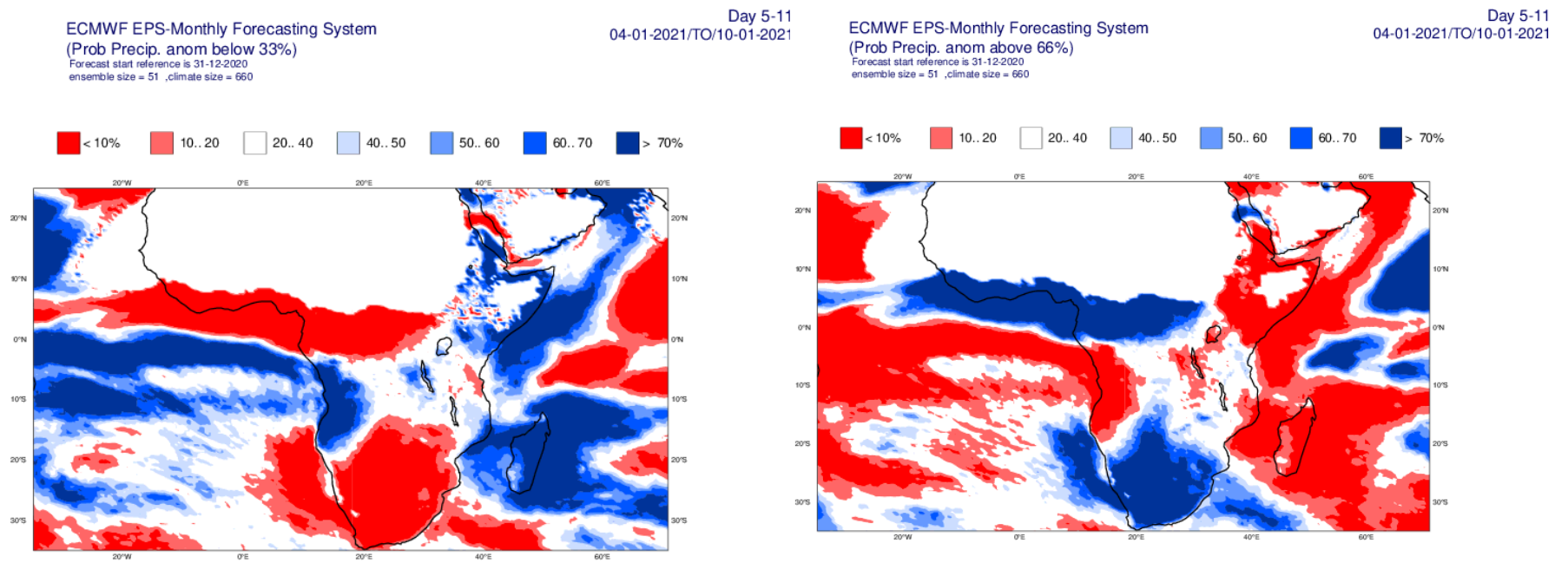


Figure 27a: Monthly forecasting system Week1 : The maps show high probability of below average precipitation in Angola, Somalia, Kenya, Madagascar, in the great lake region. Above average precipitation is very likely in the Gulf Guinea, southern Namibia, South Africa, Lesotho, and northern parts of Central Africa region.

Figure 27: Monthly forecasting system Week1

https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_anomaly?facets=undefined&time=2019112100,408,2019120800¶meter=precipitation&area=Global

PRECIPITATION FORECASTS FROM ECMWF FOR WEEK 2: 11-18 January 2021

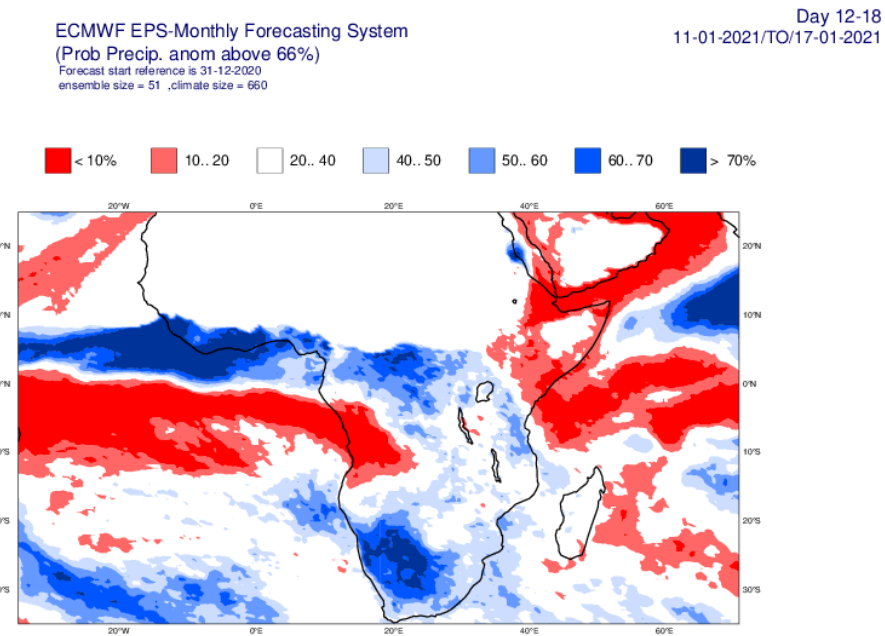
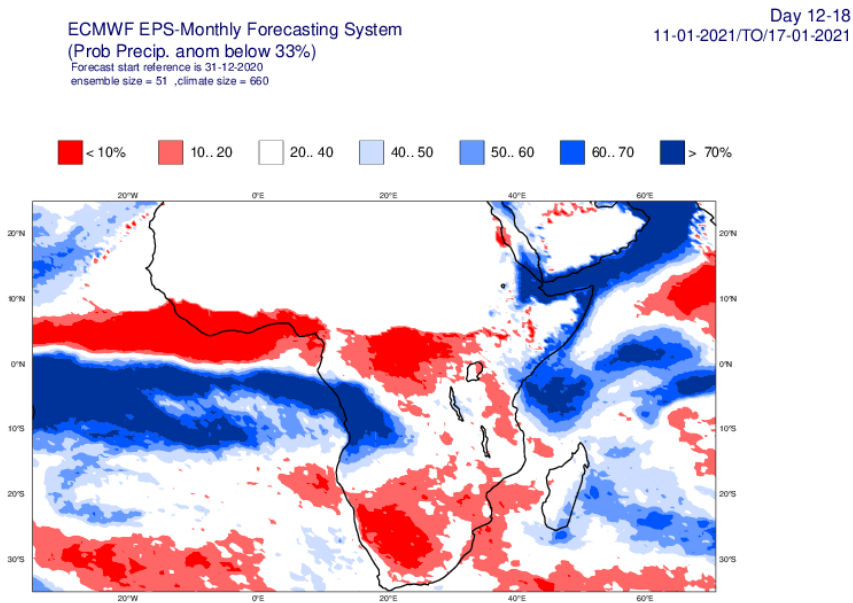
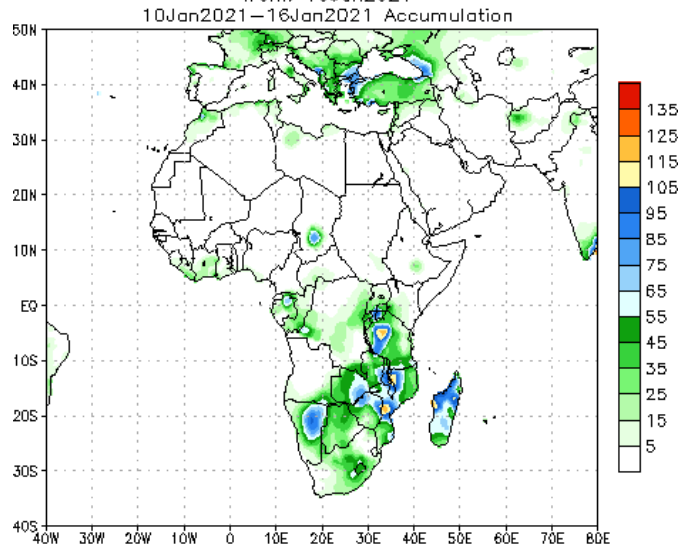


Figure 27b: Monthly forecasting system Week2 : The maps show high probability of below average precipitation in Angola, Somalia, coastal Kenya and east of Madagascar. Above average precipitation is very likely in the Gulf Guinea, southern Namibia, western South Africa, Central and northern parts of Central Africa region.

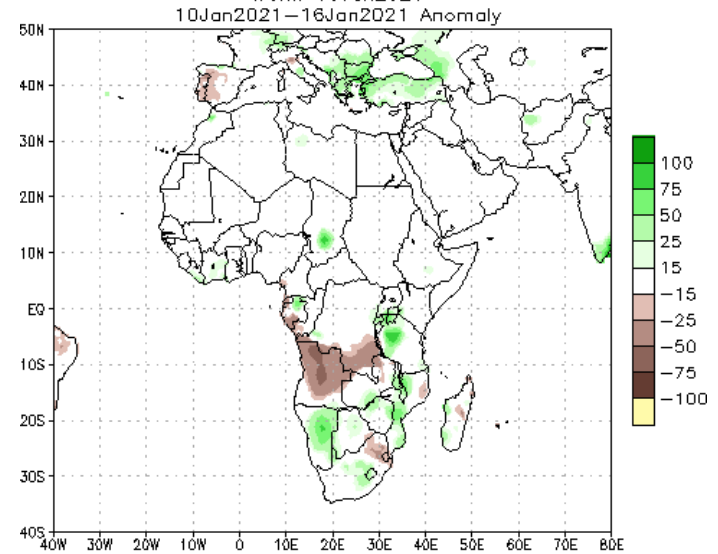
PRECIPITATION AND ANOMALY FORECAST: Week1: 2-8 January 2021; Week2: 9-15 January 2021

NCEP GFS Ensemble Forecast 1-7 Day Precipitation (mm)
from: 10Jan2021



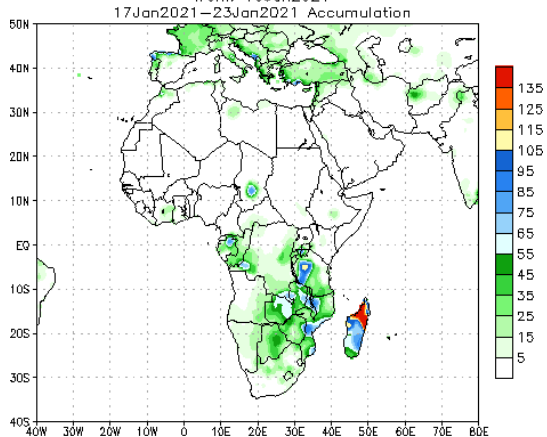
Bias correction based on last 30-day forecast error

NCEP GFS Ensemble Forecast 1-7 Day Precipitation (mm)
from: 10Jan2021



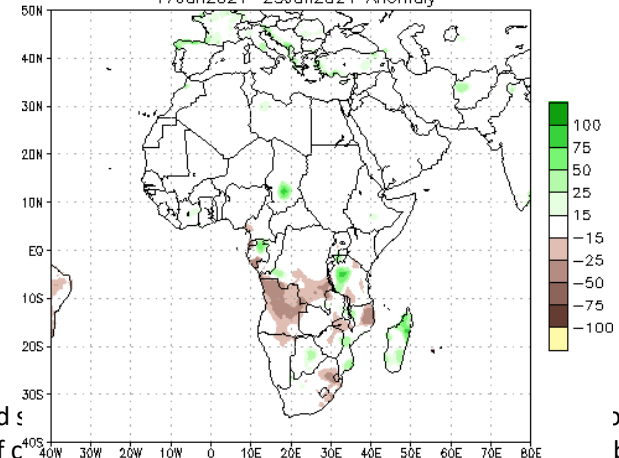
Bias correction based on last 30-day forecast error
CPC Unified Precip Climatology (1981-2010)

NCEP GFS Ensemble Forecast 8-14 Day Precipitation (mm)
from: 10Jan2021



Bias correction based on last 30-day forecast error

NCEP GFS Ensemble Forecast 8-14 Day Precipitation (mm)
from: 10Jan2021



Bias correction based on past 30-day forecast error
CPC Unified Precip Climatology (1981-2010)

Figure 28: Precipitation and Anomaly forecast: The maps indicate that in the first and second week, there is a significant increase in precipitation in Madagascar, southern country of central Africa region, northern Morocco and Algeria, the south of Madagascar, and the south of Madagascar. In the second week, the increase is more pronounced in Madagascar in week 1 and north of Angola in week 2.

https://www.cpc.ncep.noaa.gov/products/Global_Monsoons/African_Monsoons/gfs_model.shtml

http://www.cpc.ncep.noaa.gov/products/people/wwang/gfs_precip/gfs_wk1.gif

S2S PRODUCTS FROM THE HAZARD CENTER OF UNIVERSITY OF CALIFORNIA AT SANTA BARBARA

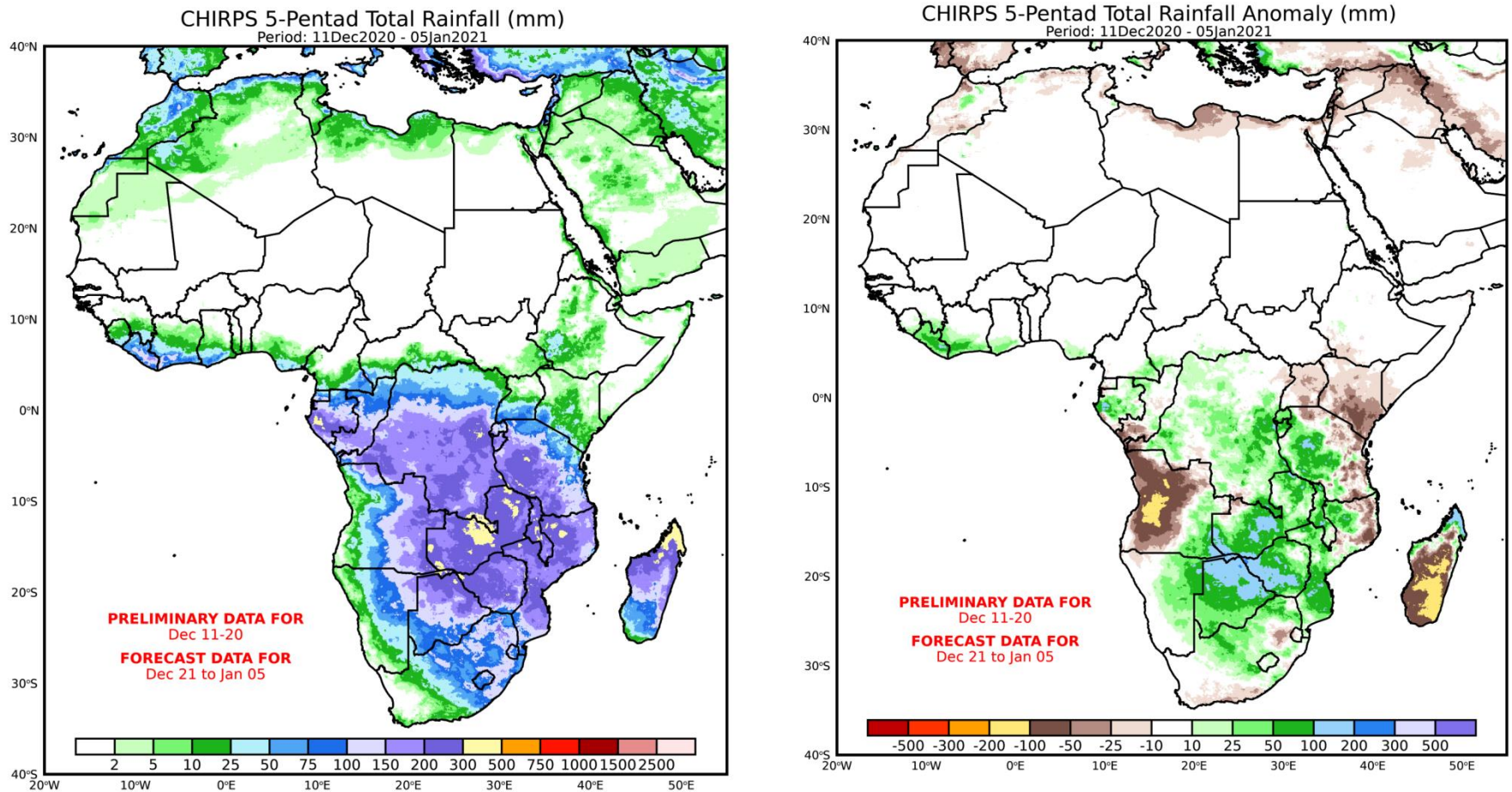


Figure 29: S2S Forecast data

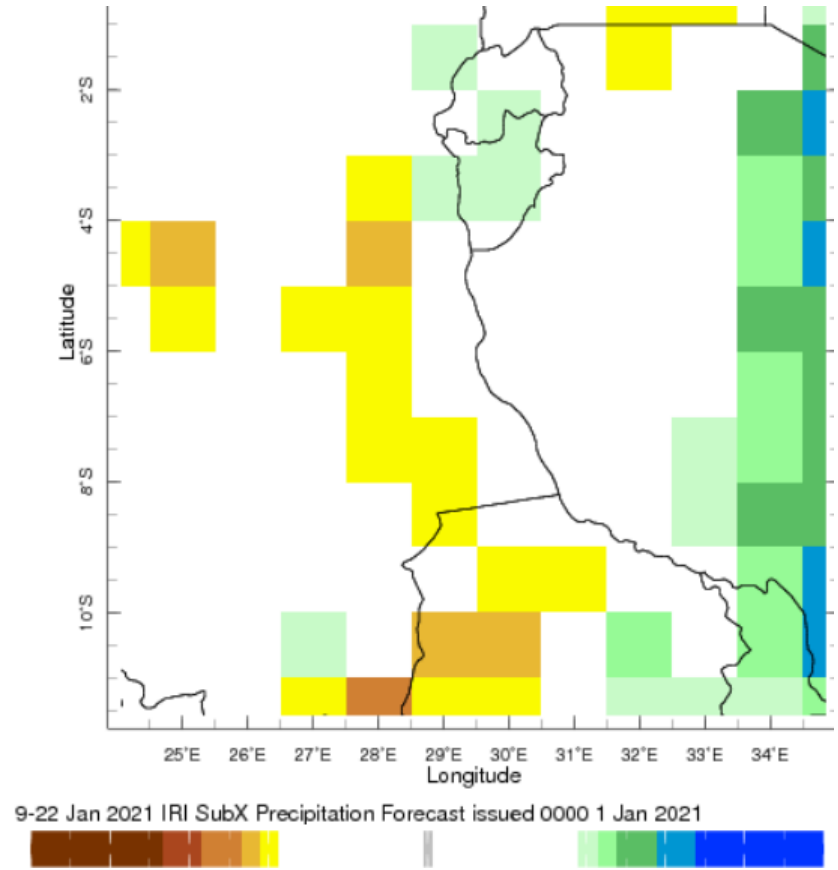
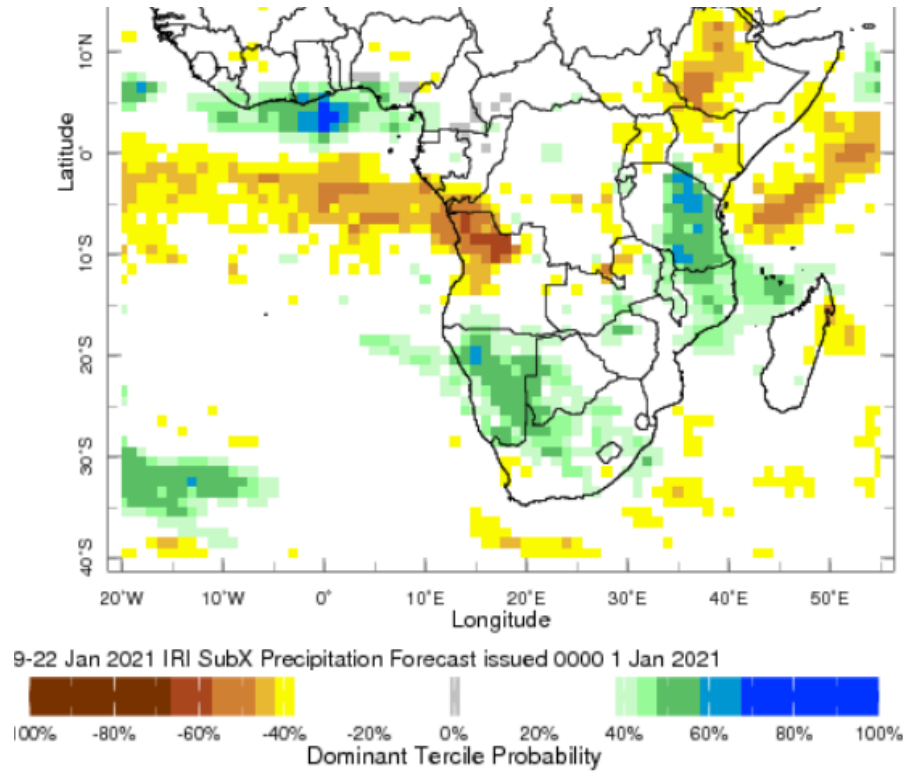
The Santa Barbara model shows us that there is more intense rainfall in East Africa. The anomaly effectively defines precipitation for this area.

<https://www.chc.ucsb.edu/monitoring/early-estimates>

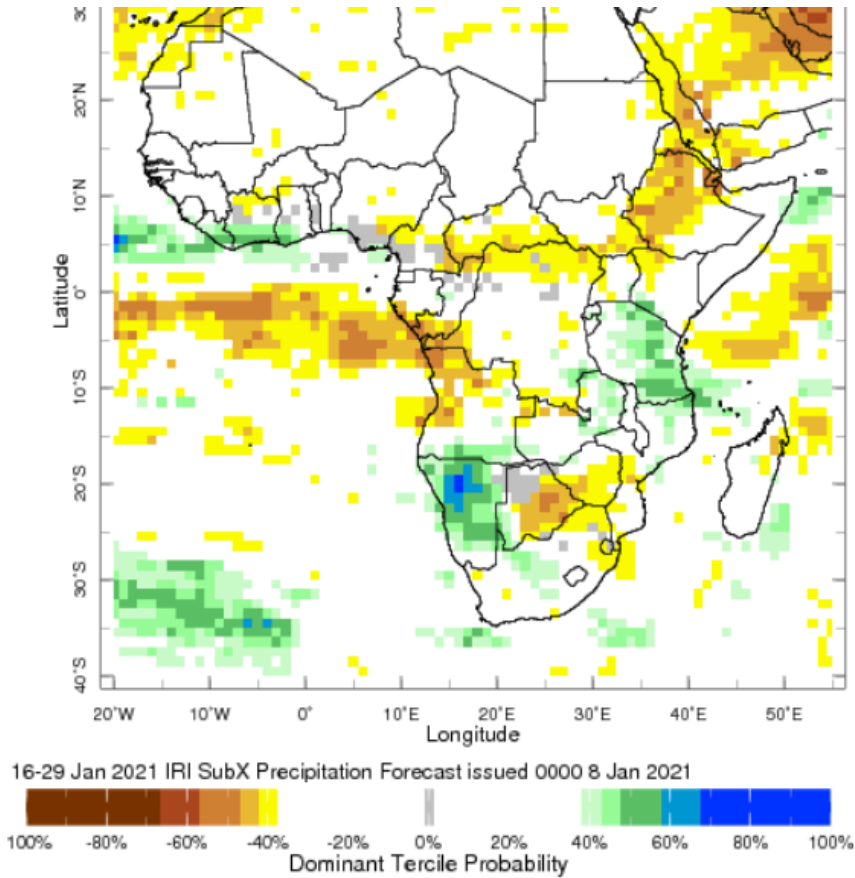
http://ewxtest.chc.ucsb.edu/images/CHC_latest/CHCEE/Africa/TotalPrecip_05PentAccum_Current.png

http://ewxtest.chc.ucsb.edu/images/CHC_latest/CHCEE/Africa/Anomaly_05PentAccum_Current.png

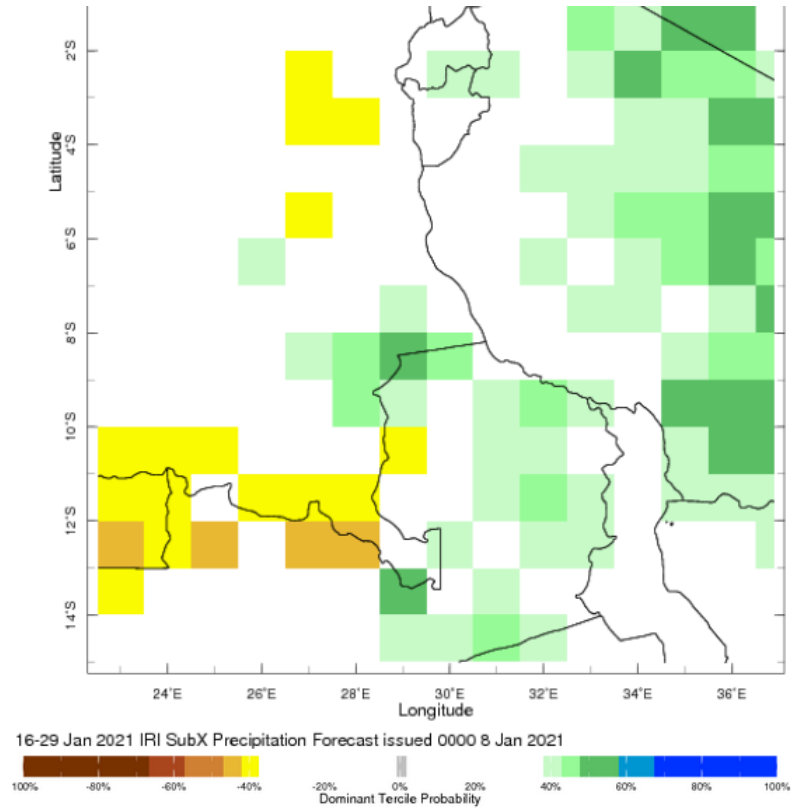
PRECIPITATION PROBABILITY FORECAST subx



PRECIPITATION PROBABILITY FORECAST subx



DU 02-15 JANUARY 2021



DU 09-22 JANUARY 2021

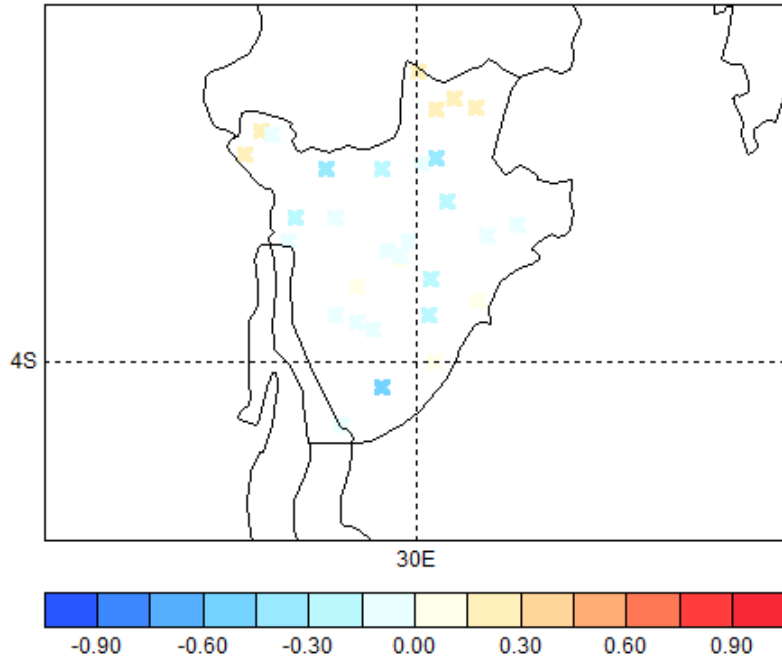
Figure 31: Precipitation forecast subx

For the forecast model, this model defines nearly 50% of rain observed in southern Sudan Kenya Rwanda and Burundi.

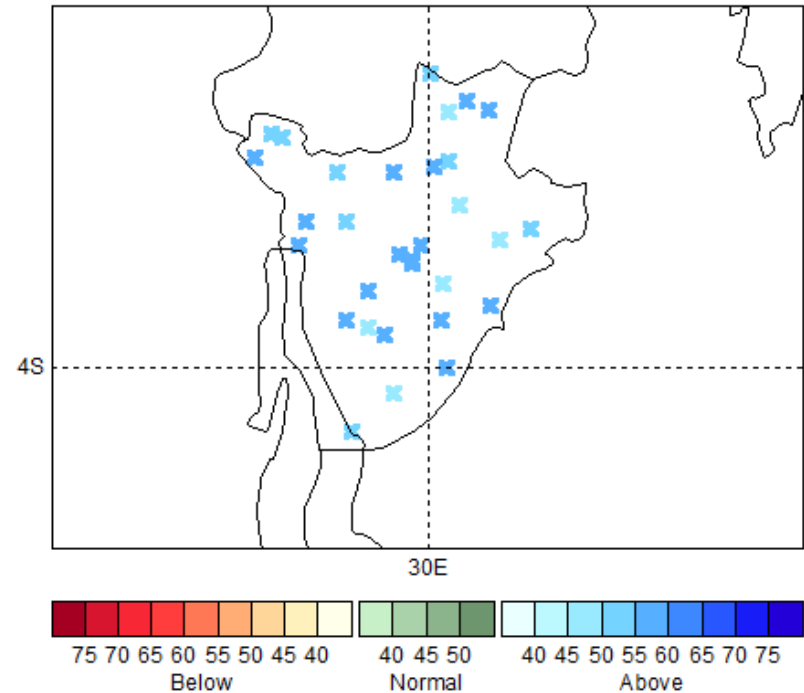
https://iridl.ideo.columbia.edu/maproom/Global/ForecastsS2S/precip_subx.html?Set-Language=en&bbox=bb%3A-20%3A-40%3A55%3A40%3Abb&S=0000%201%20Nov%202019®ion=bb%3A-20%3A-40%3A55%3A40%3Abb

CFSv2_FCST_WK_13-20_JAN_2021

Skill_map_sst_cfsv2_feb_jan_2021_ic_wk_13-20_jan_clim

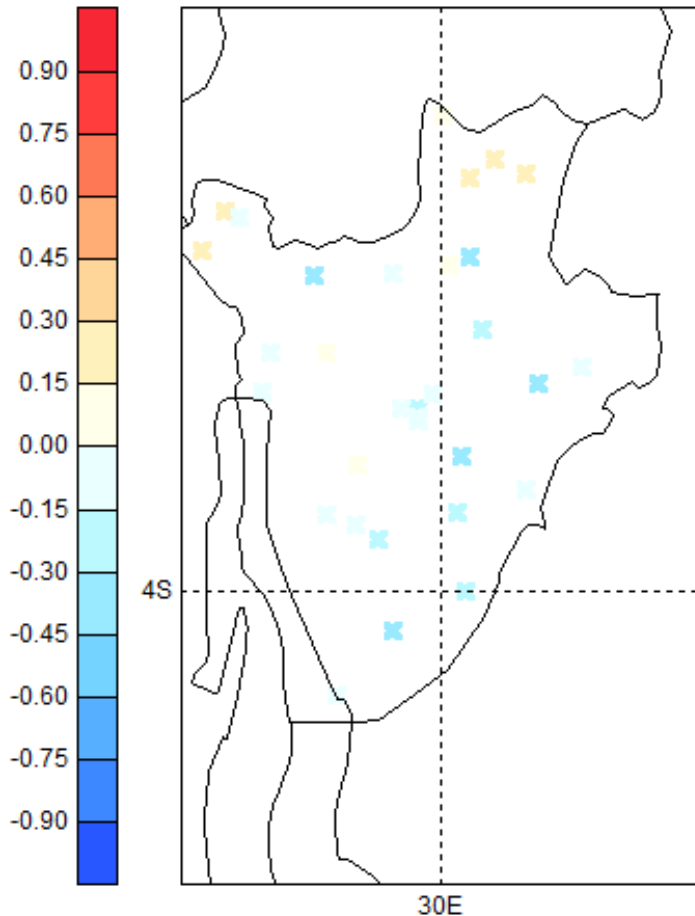


Probabilistic forecasts

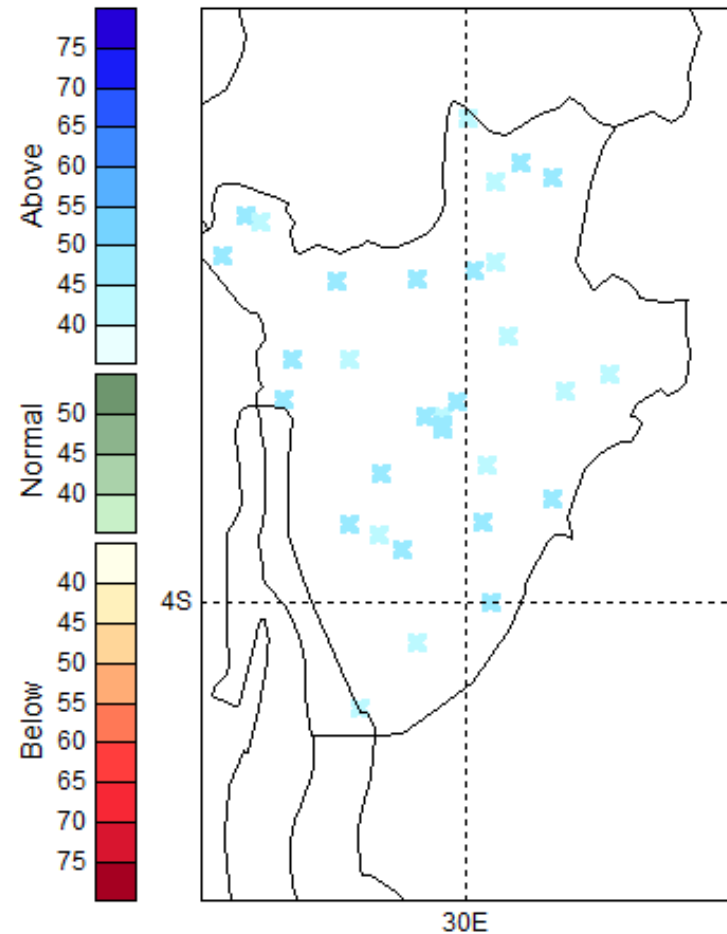


SST_OBS_FCST_WK_13-20_JAN_2021

Skill_map_sst_obs_jan_2021_ic_jan1982-2012

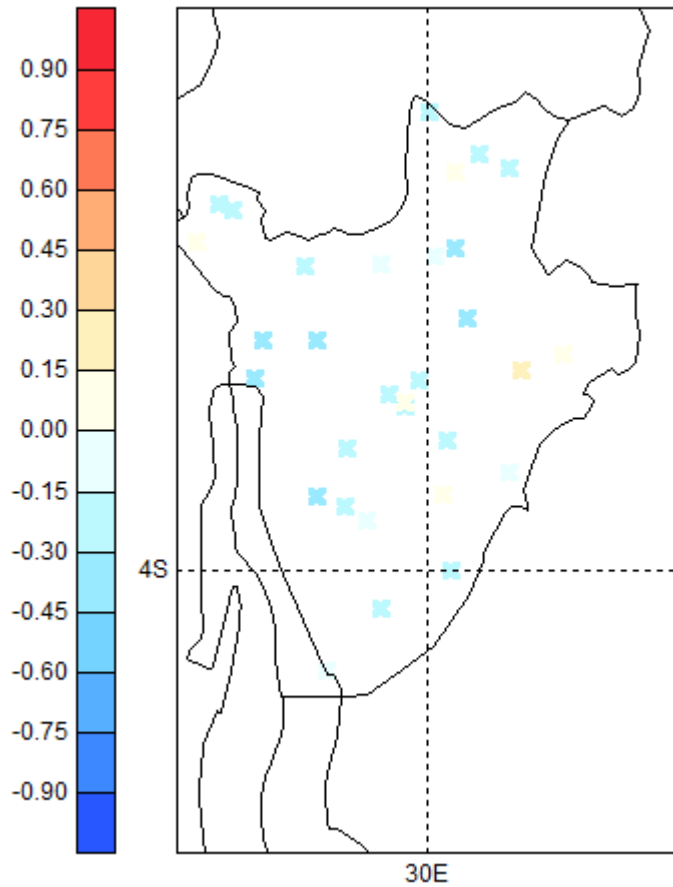


Probabilistic forecasts

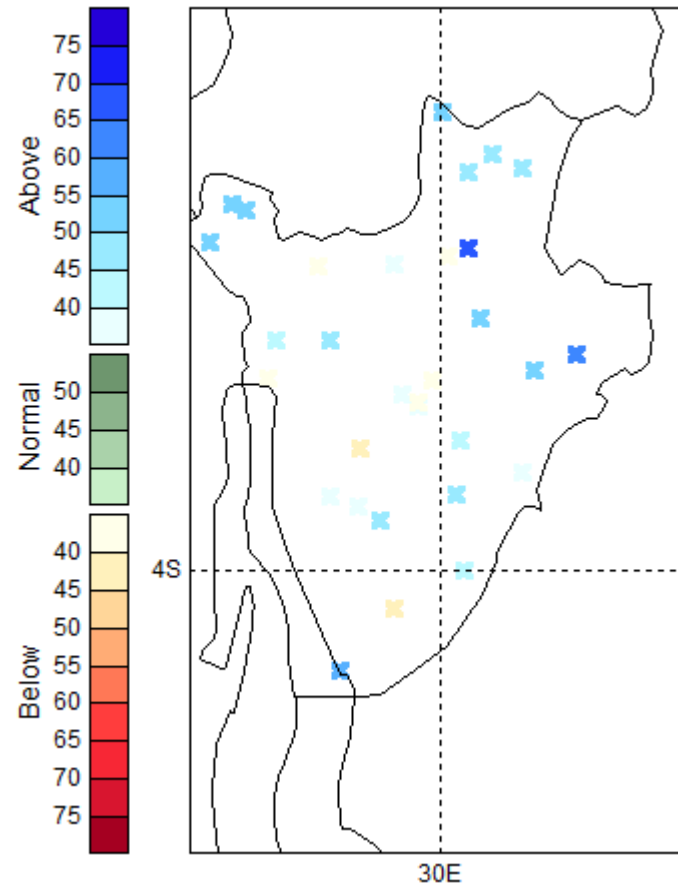


CMC2_FCST_WK_13-20_JAN_2021

Skill_map_sst_cmc2_jan_2021_feb_1983-2011

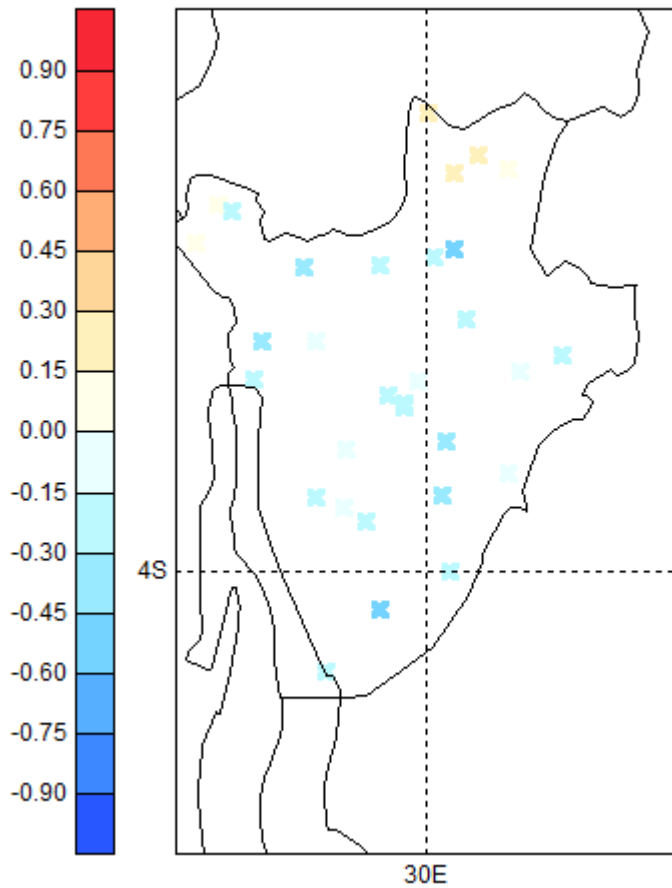


Probabilistic forecasts

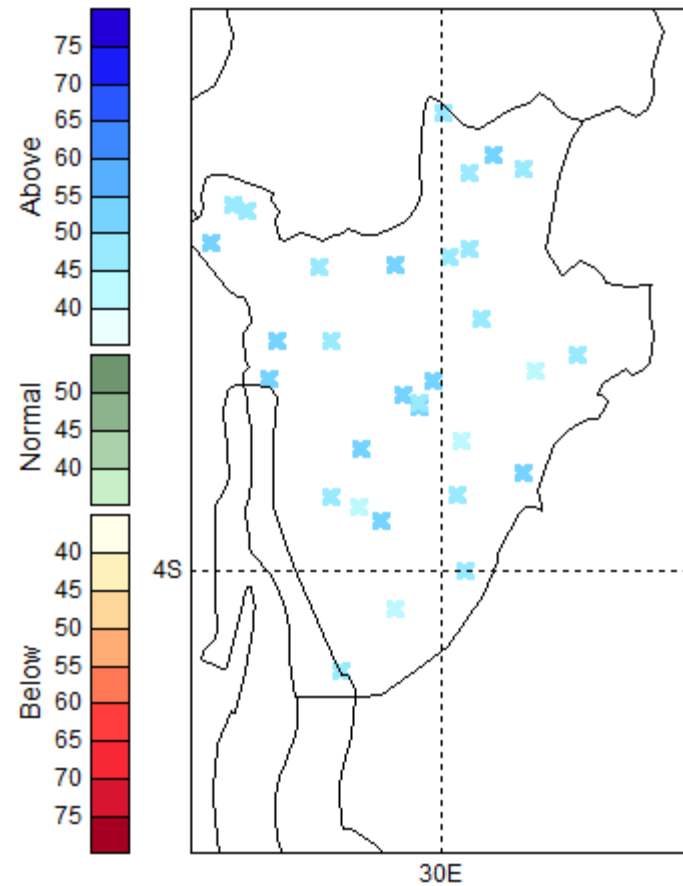


NMME_FCST_WK_13-20_JAN_2021

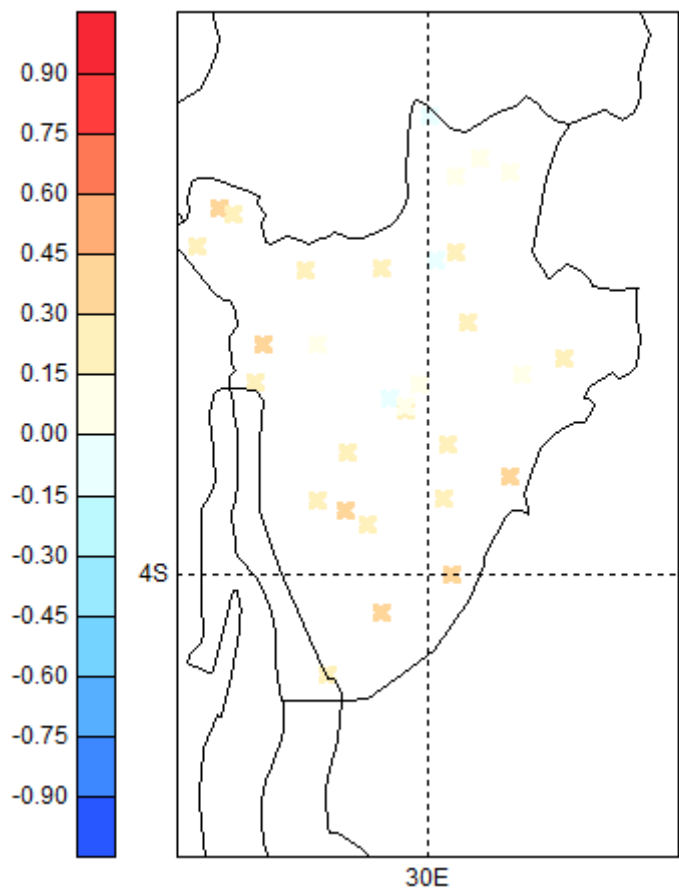
Skill_map_sst_nmme_jan_2021_ic_feb_1983-2011



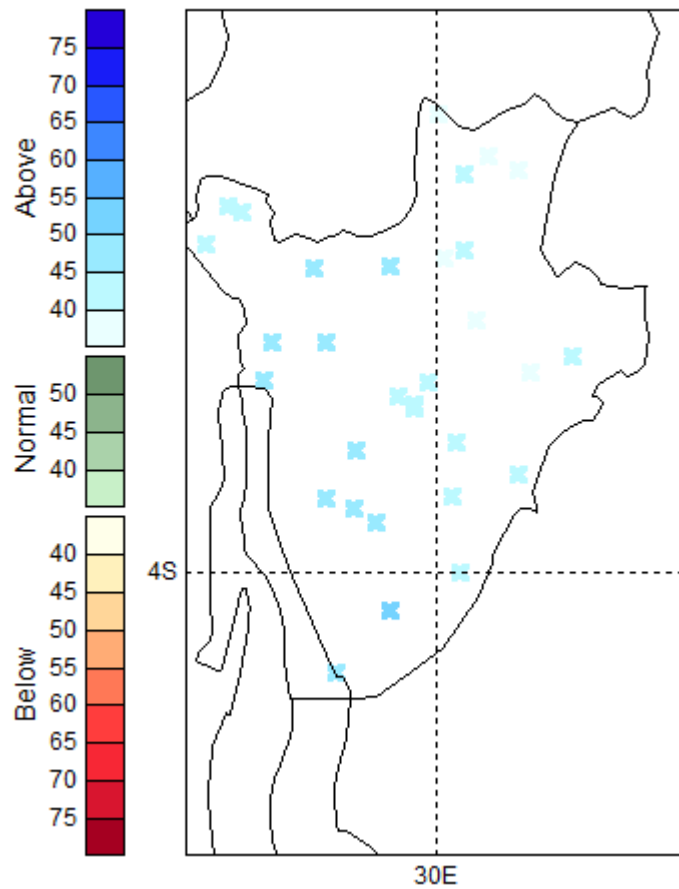
Probabilistic forecasts



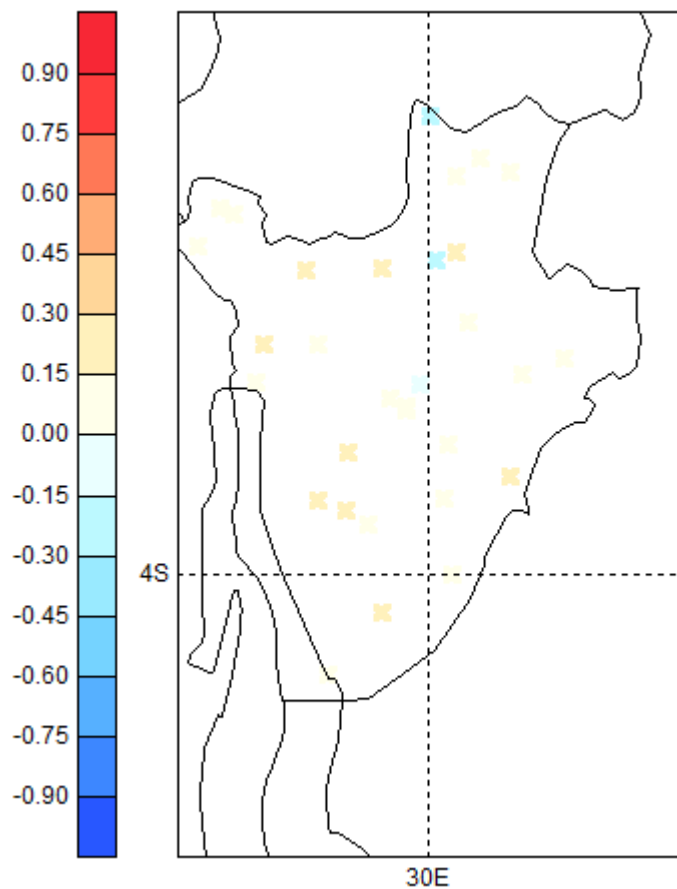
Skill_map_sstcfsv2_jan_2021_ic_feb_1983-2011



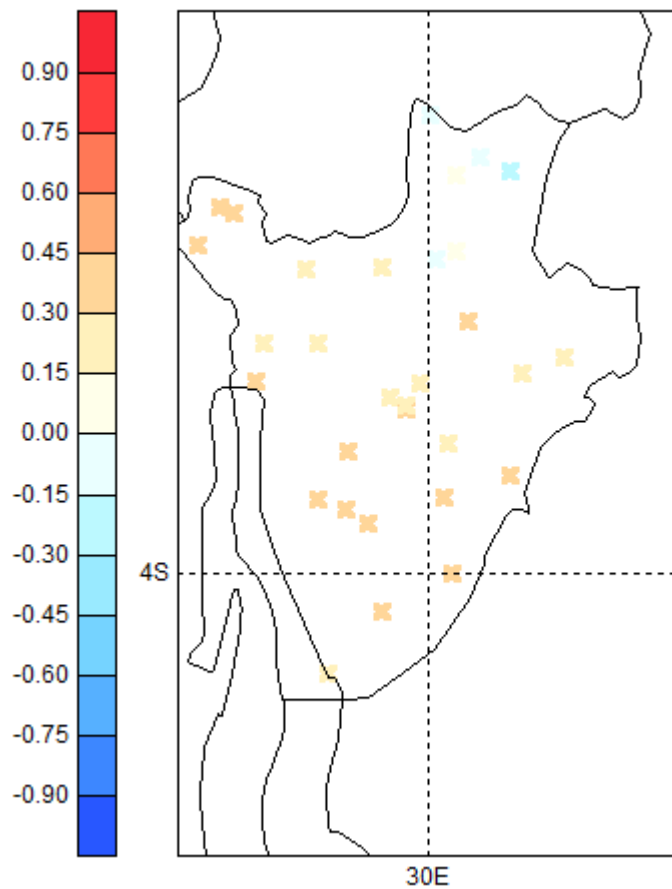
Probabilistic forecasts



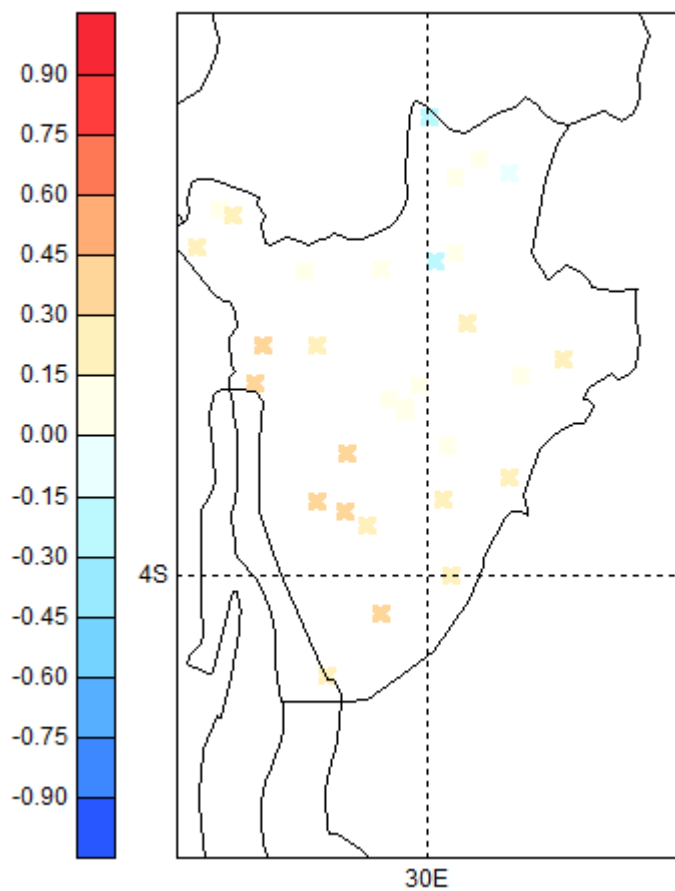
Skill_map_sst_cmc2_jan_2021_ic_feb_1983-2011



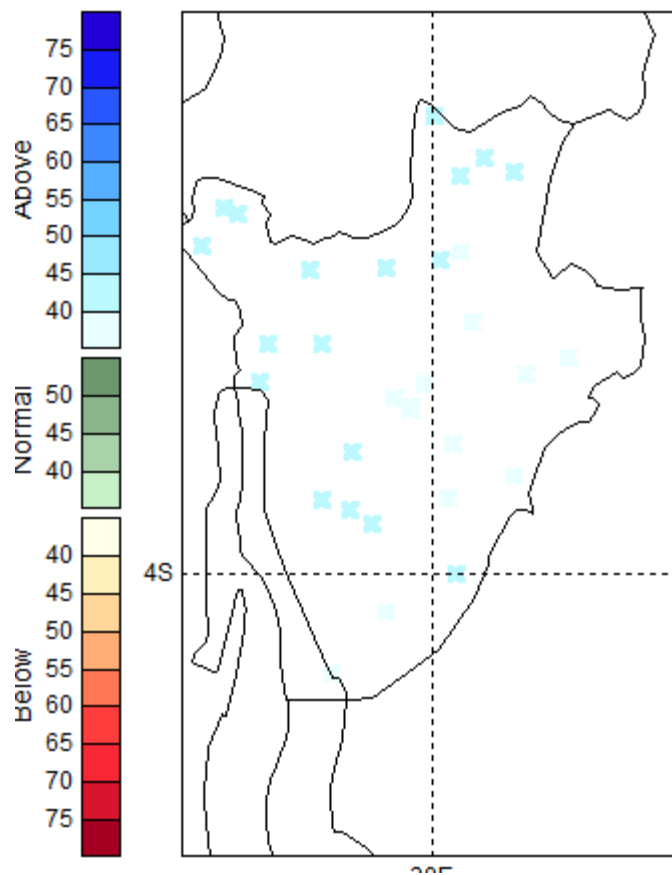
Skill_map_sst_nmme_jan_2021_ic_feb_1983-2011



Skill_map_sst_obs_jan_2021_ic_jan_1982-2012

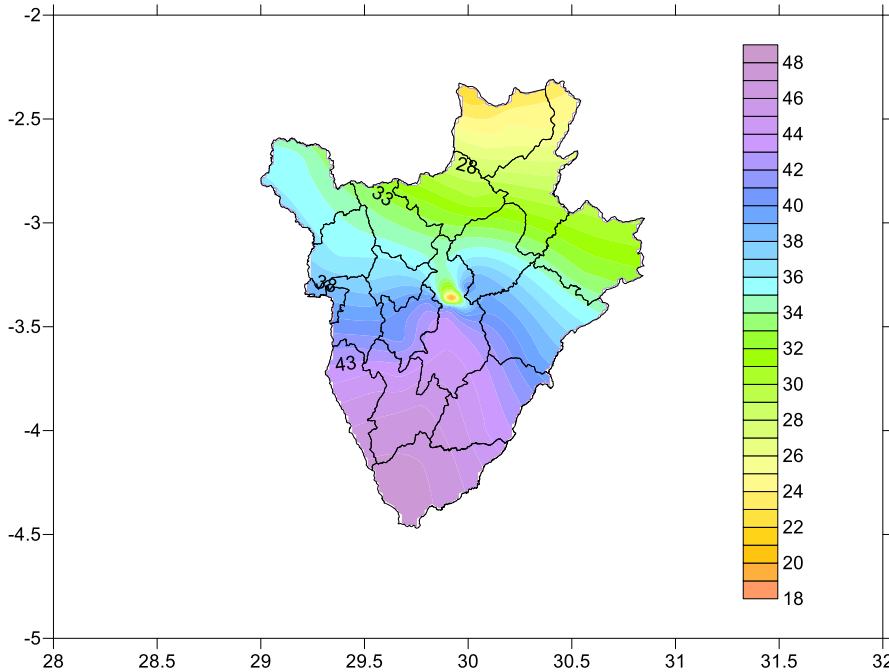


Probabilistic forecasts



CLIMATOLOGY OF PRECIPITATIONS FOR UPCOMING WEEK 1 AND 2

MOYENNE DE CUMULE DE PRECIPITATION SEMAINE 13-20 JANVIER



MOYENNE DE CUMULE DE PRECIPITATION SEMAINE 21-27 JANVIER

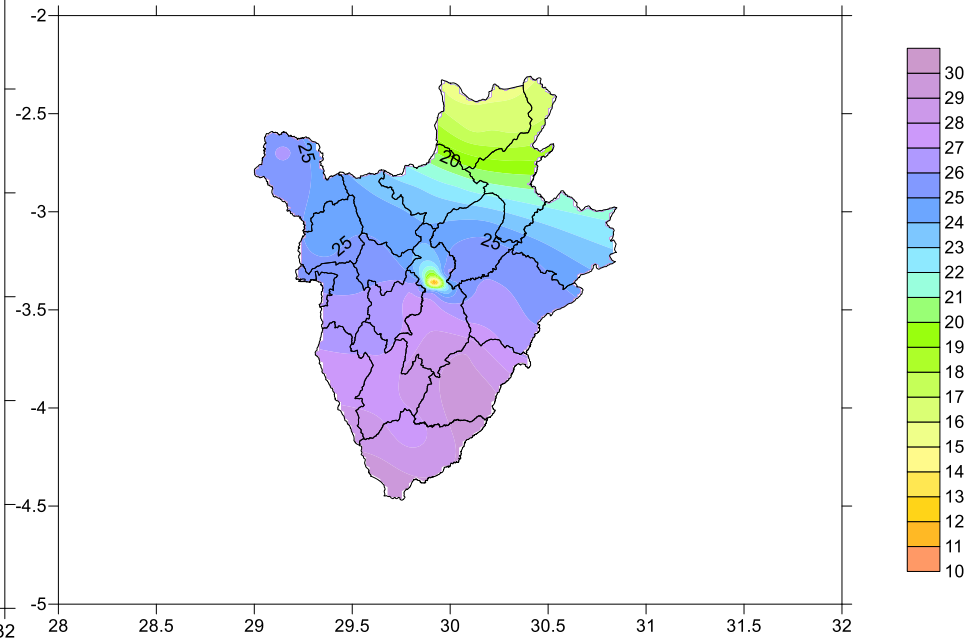


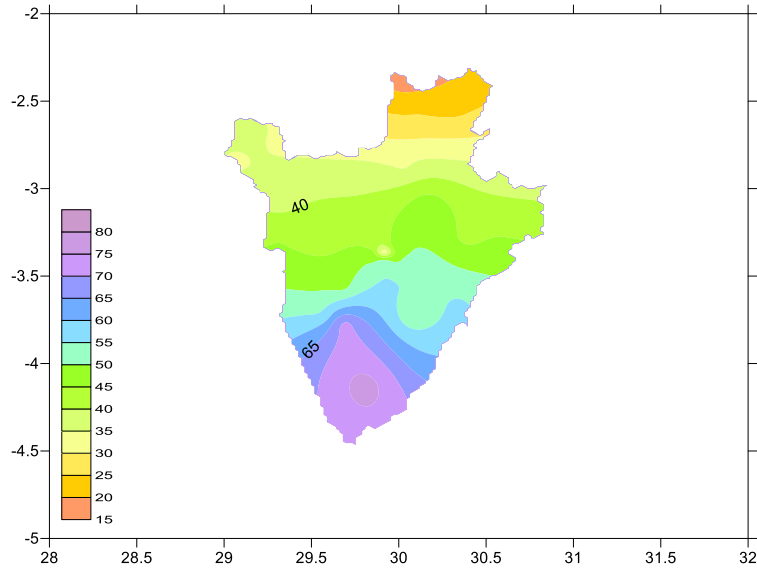
Figure 32: Climatology of Precipitation

CUMULATIVE PRECIPITATION FORECAST

FORECAST WEEK1 : 13-20 January 2021

FORECAST WEEK2 : 21-27 January 2021

PREVISION DE CUMULE DE PRECIPITATION
SEMAINE 13-20 JANVIER 2021



PREVISION DE CUMULE DE PRECIPITATION
SEMAINE 21-27 JANVIER 2021

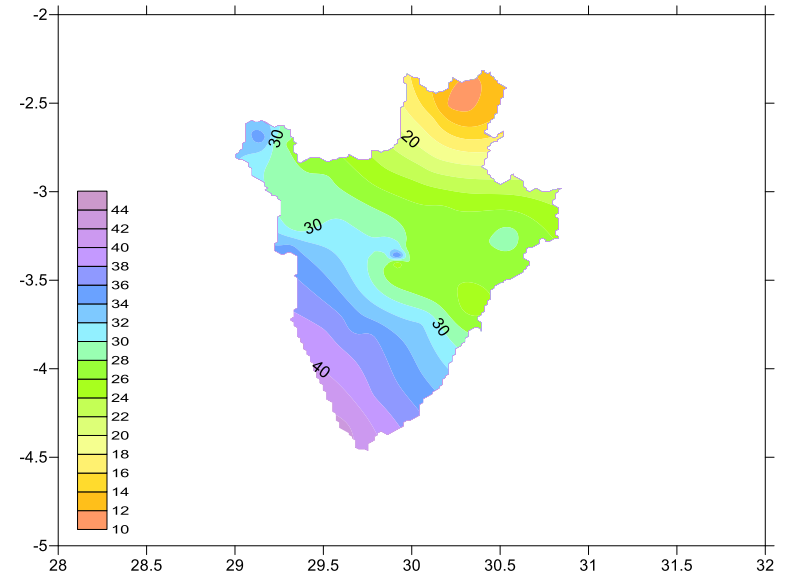


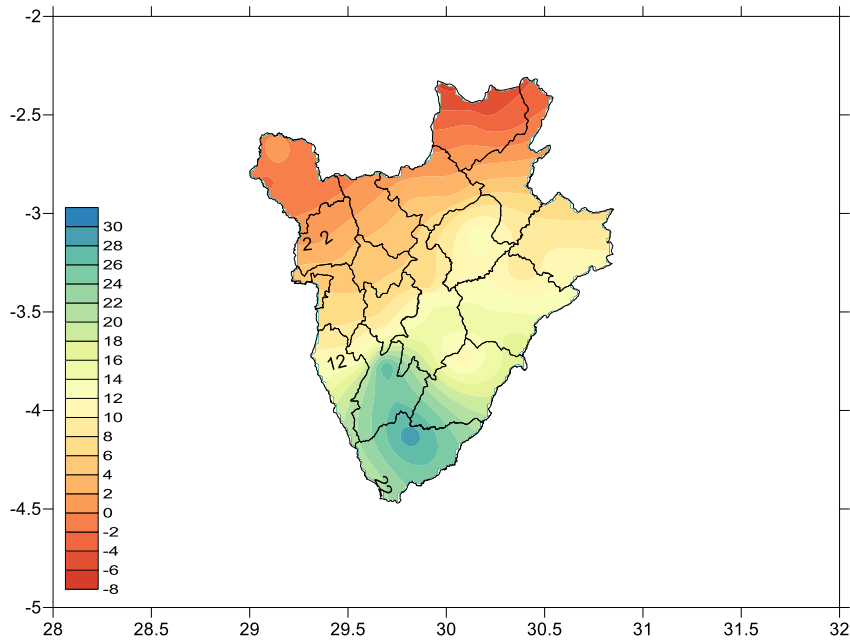
Figure 33: Precipitation forecast Analysis

ANOMALIES PRECIPITATION FORECAST ANALYSIS

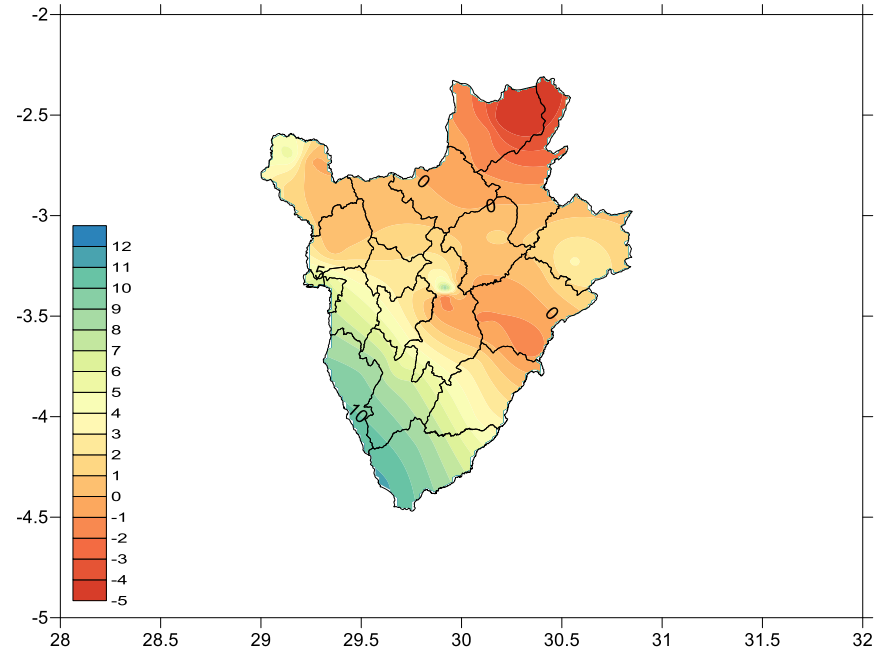
FORECAST WEEK1 : 13-20 January 2021

FORECAST WEEK2 : 21-27 January 2021

**PREVISION D'ANOMALIES PRECIPITATIONS
SEMAINE 13-20 JANVIER 2021**



**PREVISION D'ANOMALIES PRECIPITATIONS
SEMAINE 21-27 JANVIER 2021**

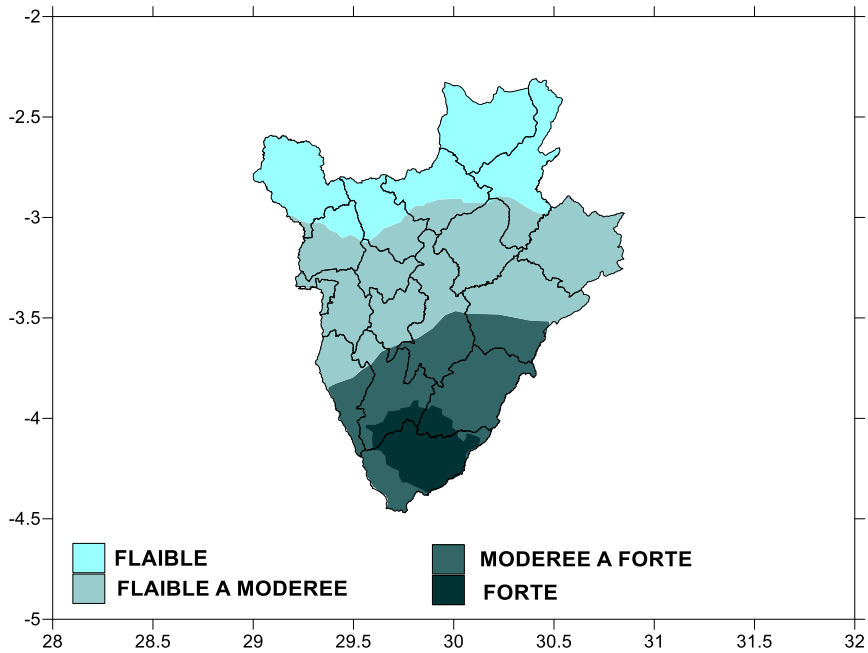


PRECIPITATION FORECAST ANALYSIS

FORECAST WEEK1 : 13-20 January 2021

FORECAST WEEK2 : 21-27 January 2021

PREVISION D'ALERTE AUX PRECIPITATIONS
SEMAINE 13-20 JANVIER 2021



PREVISION D'ALERTE AUX PRECIPITATIONS
SEMAINE 21-27 JANVIER 2021

