DEKADAL TECHNICAL NOTE FOR FIRST DEKAD OF MARCH, 2021
AND PRECIPITATION FORECAST FOR WEEK 1 AND 2

Drafted and Presented by: **Tarekegn Abera**

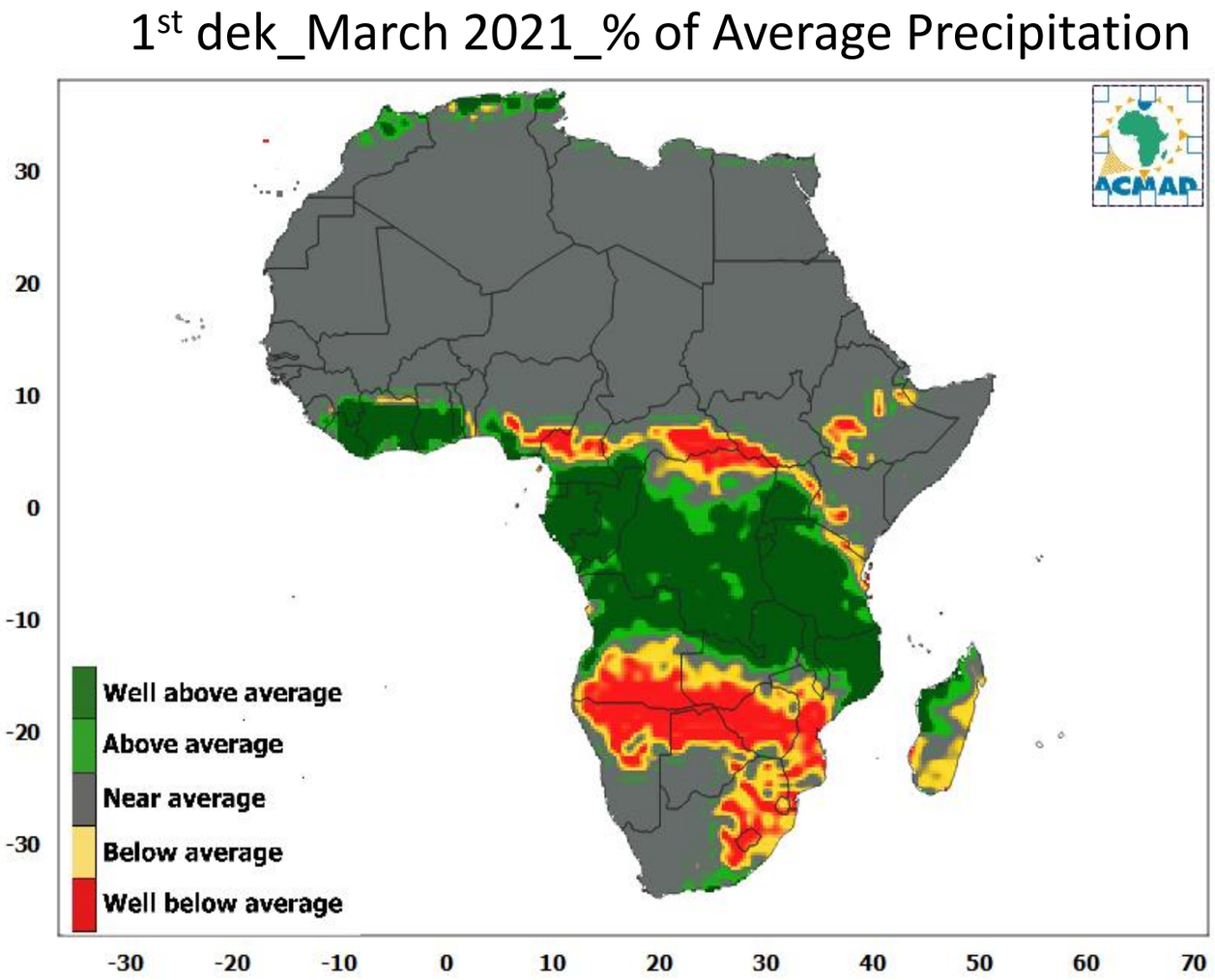
Edited by: **Hubert KABENGELA : Maro Beavogui**

Content of the Technical Note

1. Monitoring Climate Element
   - Percent of Precipitation
   - Temporal variation of precipitation
   - Precipitation deviation
   - RH Anomaly
2. Global driver review and assessment
   - Weekly and monthly SST anomaly assessment
   - Dekadal velocity potential with Mjo, Kelvin and Rossby wave
   - Weekly PWAT observed and outlook
   - Dekadal OLR anomaly
   - MSLP Anomaly
   - Wind anomaly at 850 and 700 hPa
   - Relative humidity anomaly

3. Weekly Climate outlook
   - Monthly MJO forecast
   - Two week wind anomaly and divergent forecast
   - GFS total precip weekly forecast
   - GEFS weekly precip exceedance forecast
   - Weekly wind forecast
   - Monthly tercile prob precip anomaly forecast
   - NCEP/GFS bias corrected ensemble forecast
   - IRI SubX precip forecast
   - Two week climatology
   - Two weeks precip forecast

ESTIMATE CUMULATIVE PRECIPITATION IN PERCENT OF AVERAGE FOR DEKAD 3 FEBRUARY 2021



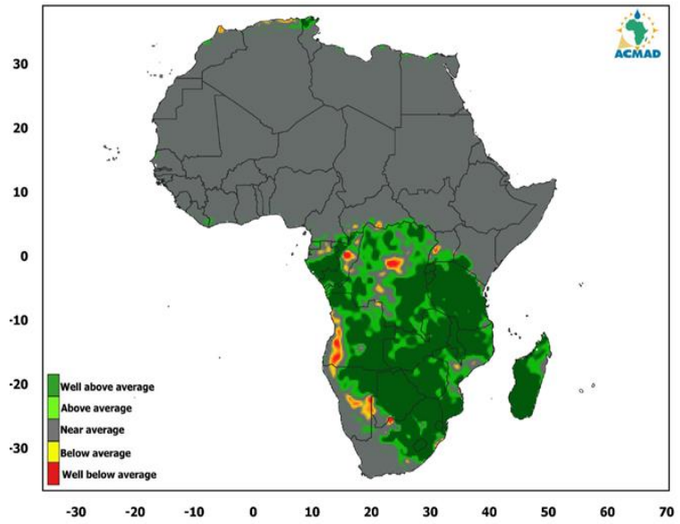
The figure show well above to above average précipitation prevailed over northern, Gulf of Guniea and some parts of central Africa regions.

Figure 1: **This map displays decadal average precipitation in percent of average**

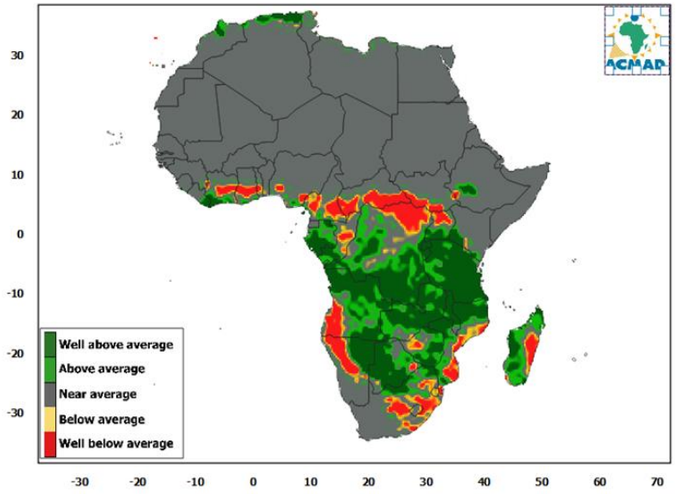
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Temporal and spatial change of per cent of average precip for the last four consecutive dek

1st Dek_Feb_2021_% of Normal RR

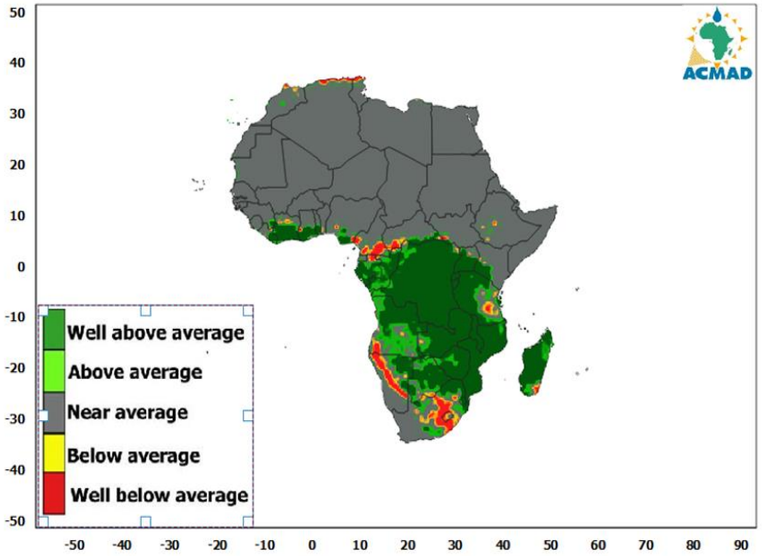


3rd dek_Feb 2021_% of average Precipitation



Spatially, decreasing % of average precipitation was observed across Africa, particularly at the Gulf of Guinea and SADAC countries. the during the last dekad of Feb 2021 if it compared to the last two dekads of the month. This might be due to the decreasing of SST over the south of Indian as well Atlantic Ocean. However, the north of Angola received well above rainfall during 1st dek of March

2nd Dek _Feb_2021_% of Normal Precipitations



1st dek_March 2021_% of Average Precipitation

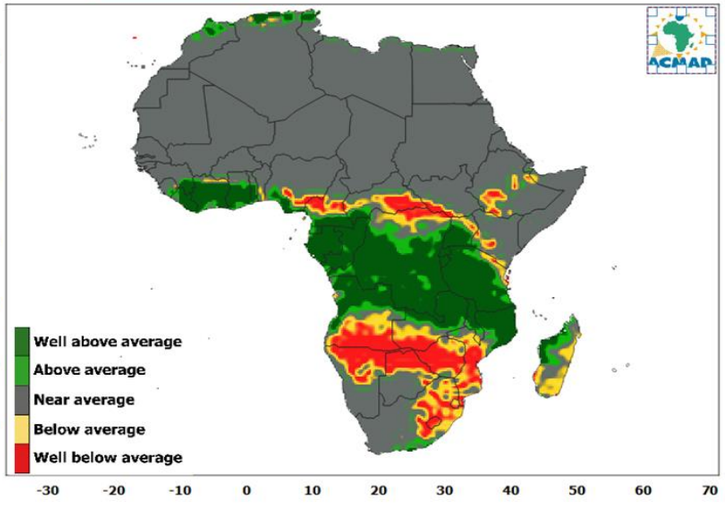
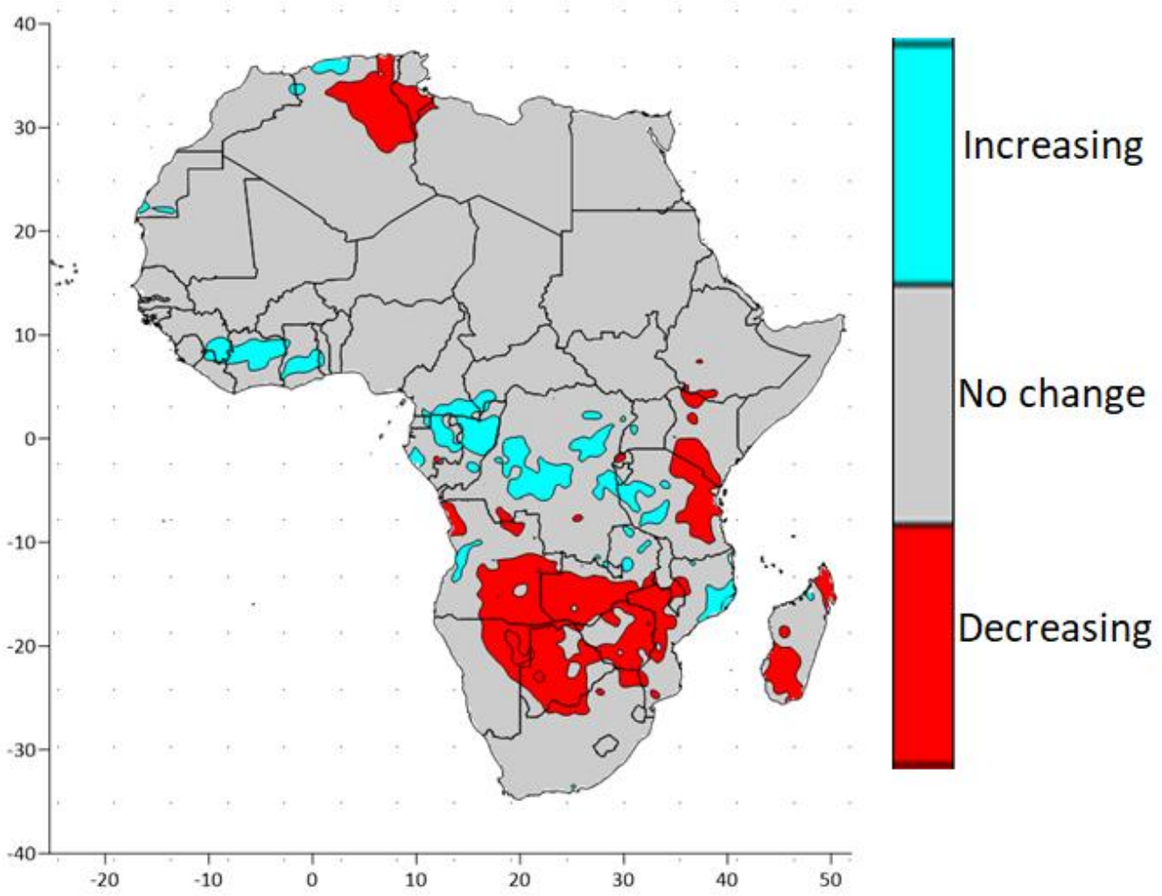


Figure 2: This map displays decadal average precipitation in percent of average

Precipitation deviation

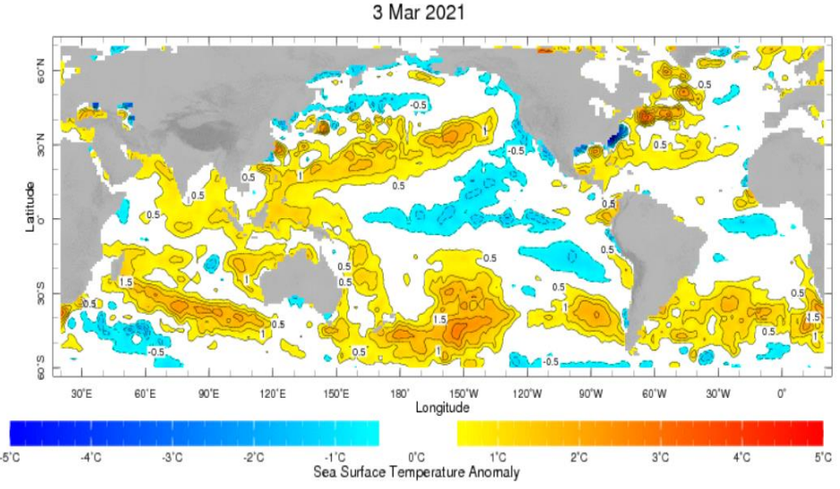


- During the last dekad of February, in most part of central, south-eastern and some of the Gulf of Guinea countries received less rainfall in amount than the prior dekad. However, the northern portion of Algeria, south-eastern of Tanzania and some pocket place in Botswana, Angola and Equatorial Guinea received enhanced moisture.

Figure 3: This map displays decadal precipitation deviation

Weekly Sea Surface Temperature Anomaly

28 Feb – 6 Mar 2021



21-27 Feb 2021

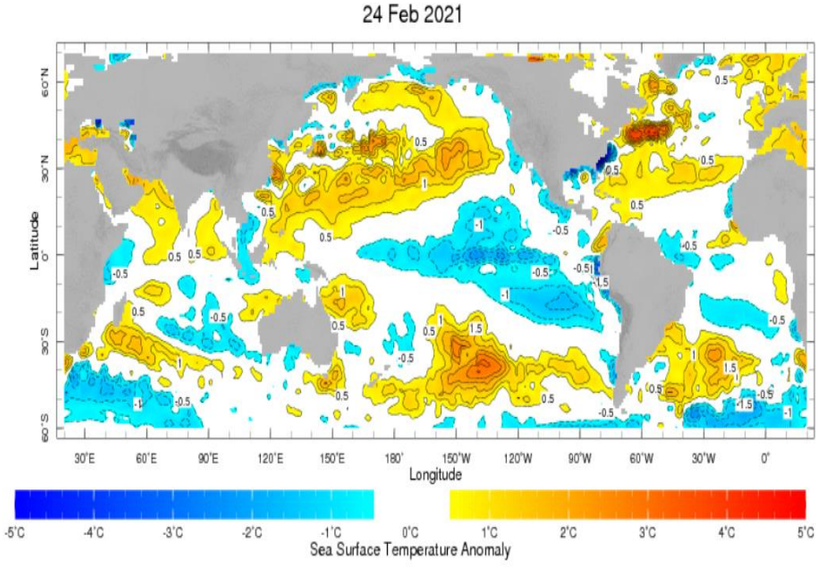
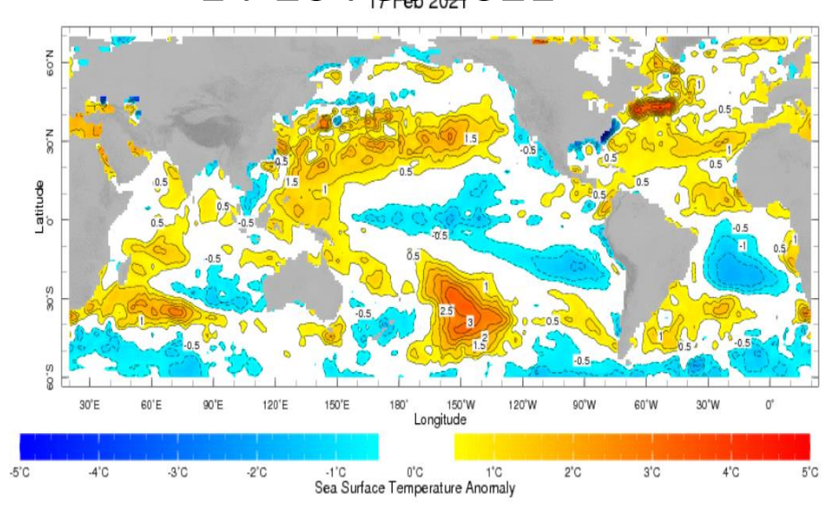
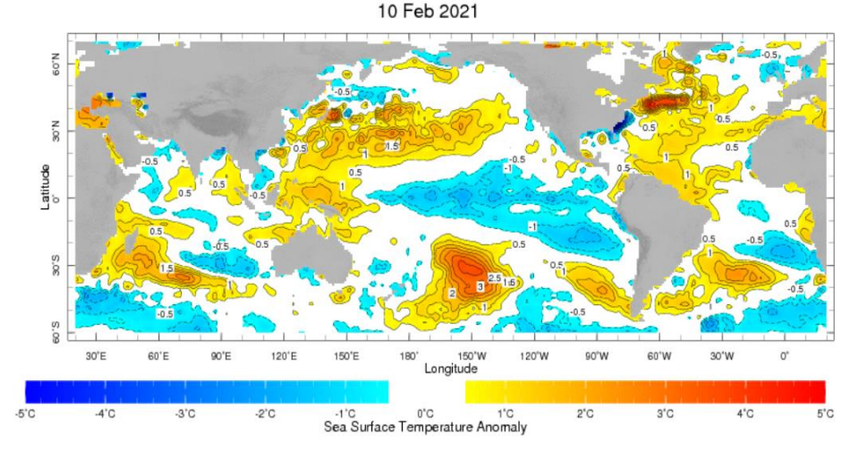


Figure3, these maps display weekly sea surface temperature anomalies for the globe, and they depicts a gradual decreasing of SST observed over the equatorial Pacific, northern Atlantic, and the south-western Indian ocean.

14-20 Feb 2021



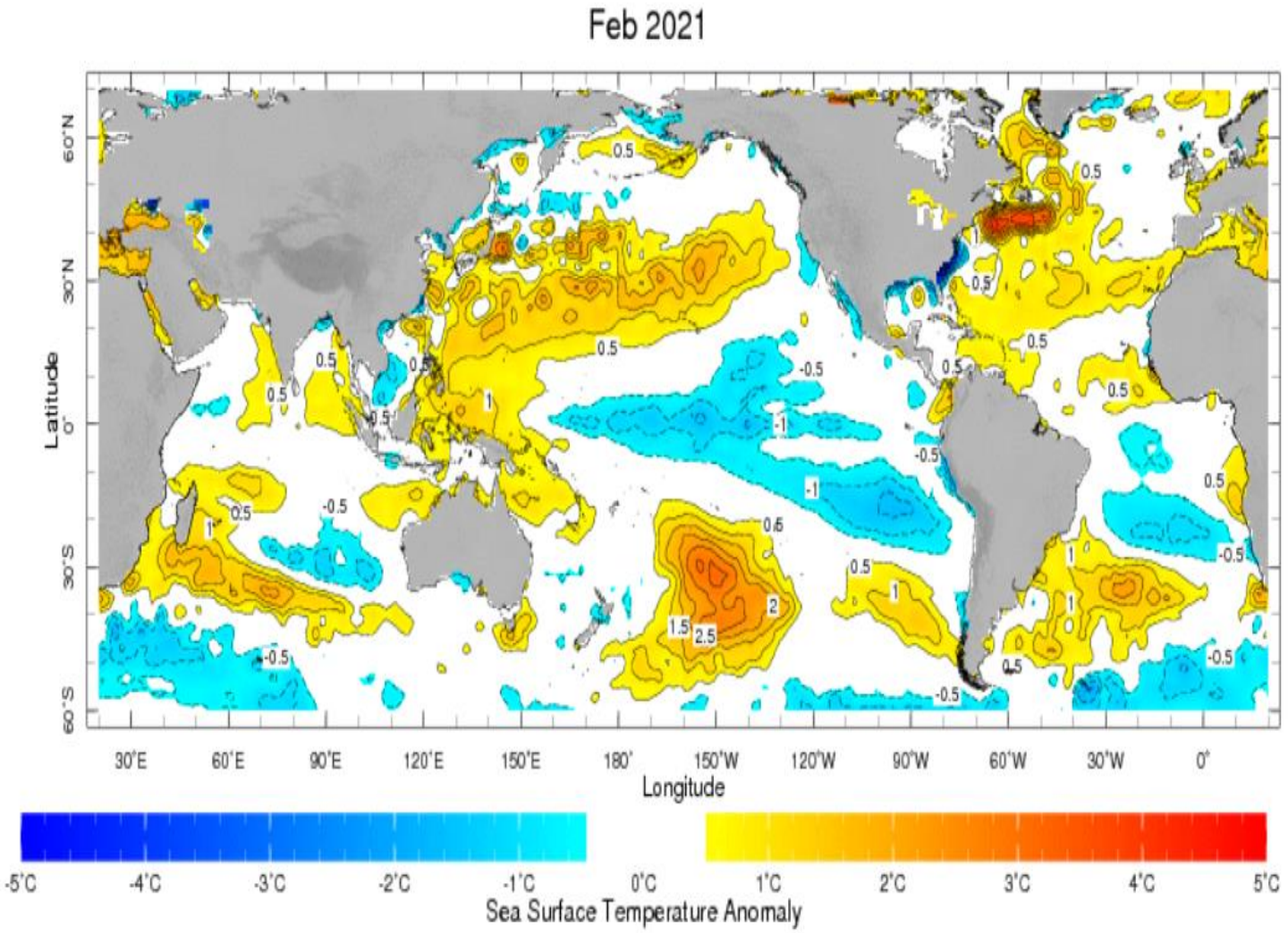
7-13 Feb 2021



http://iridl.ldeo.columbia.edu/maproom/Global/Ocean_Temp/Weekly_Anomaly.html?

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

LAST MONTH SST OBSERVED



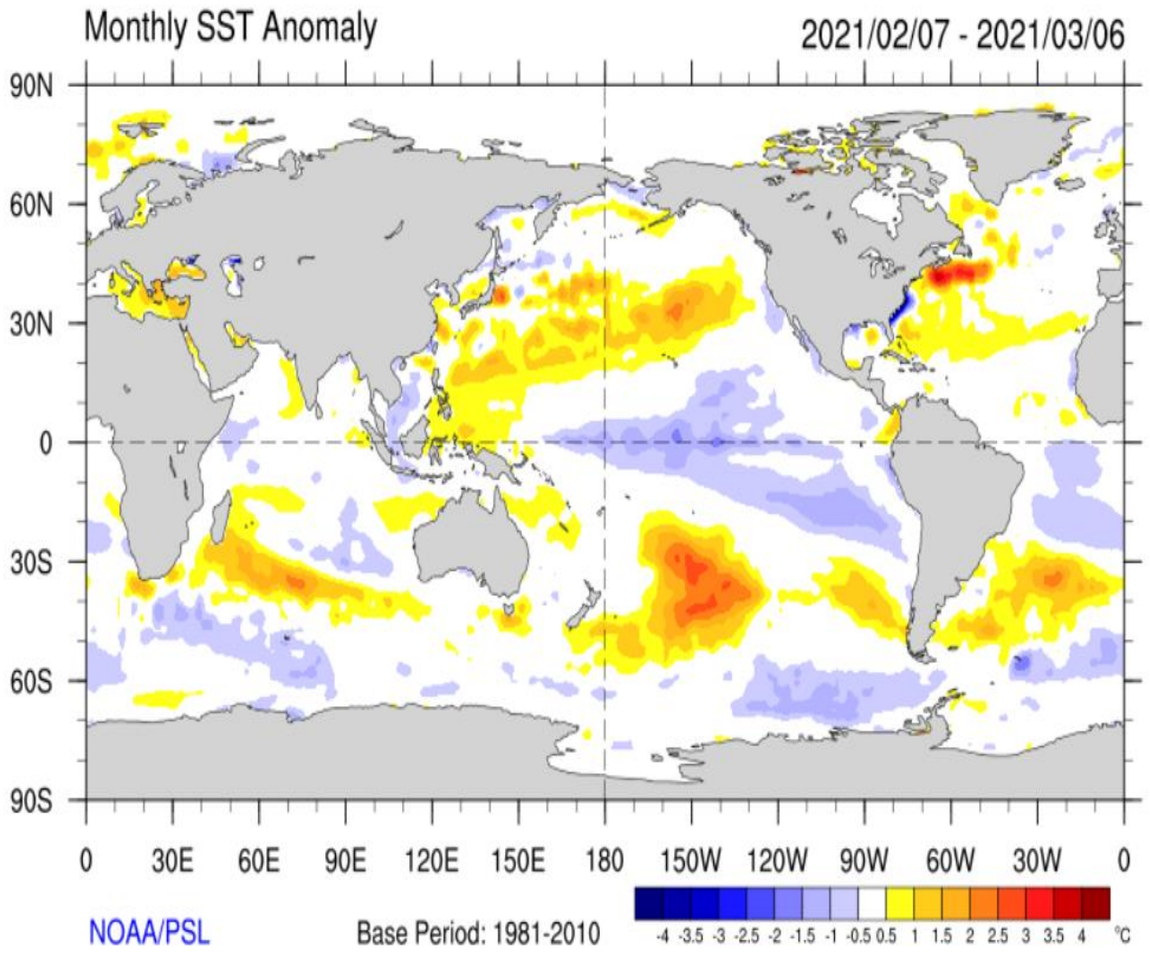


Figure 5 : This map displays monthly sea surface temperature anomalies for the globe.

During January 2021 and last 30 days, the cooling persisted over western Equatorial Pacific, Tropical South Atlantic, and South-Western Indian Ocean,. Source:

http://iridl.ldeo.columbia.edu/maproom/Global/Ocean_Temp/Anomaly.html.

https://psl.noaa.gov/map/clim/sst.shtml

SST OBS AND FCST FOR TWO WEEK

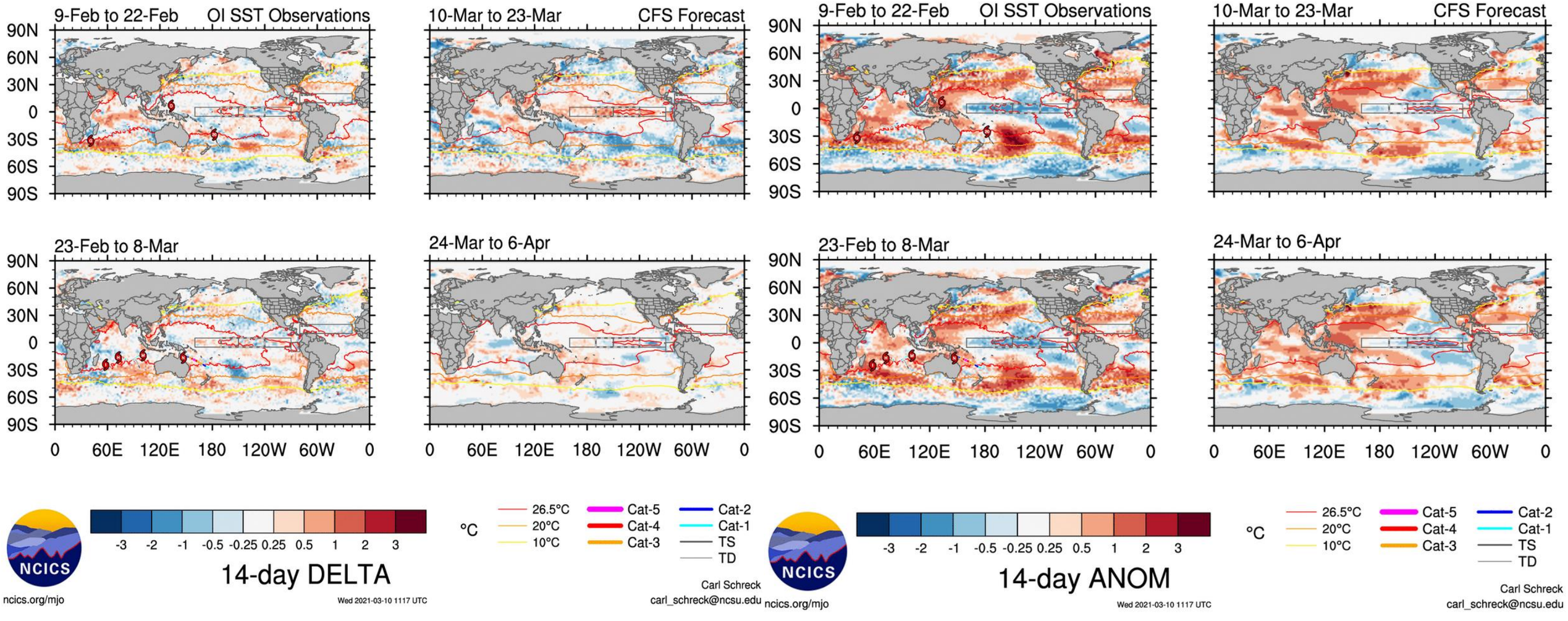


Figure 5: Sea Surface Temperature and FCST for two week

https://ncics.org/pub/mjo/v2/sst/global.delta.14.png;
https://ncics.org/pub/mjo/v2/sst/global.anom.14.png

PAST 4 WEEKS PRECIPITABLE WATER AND OUTLOOKS

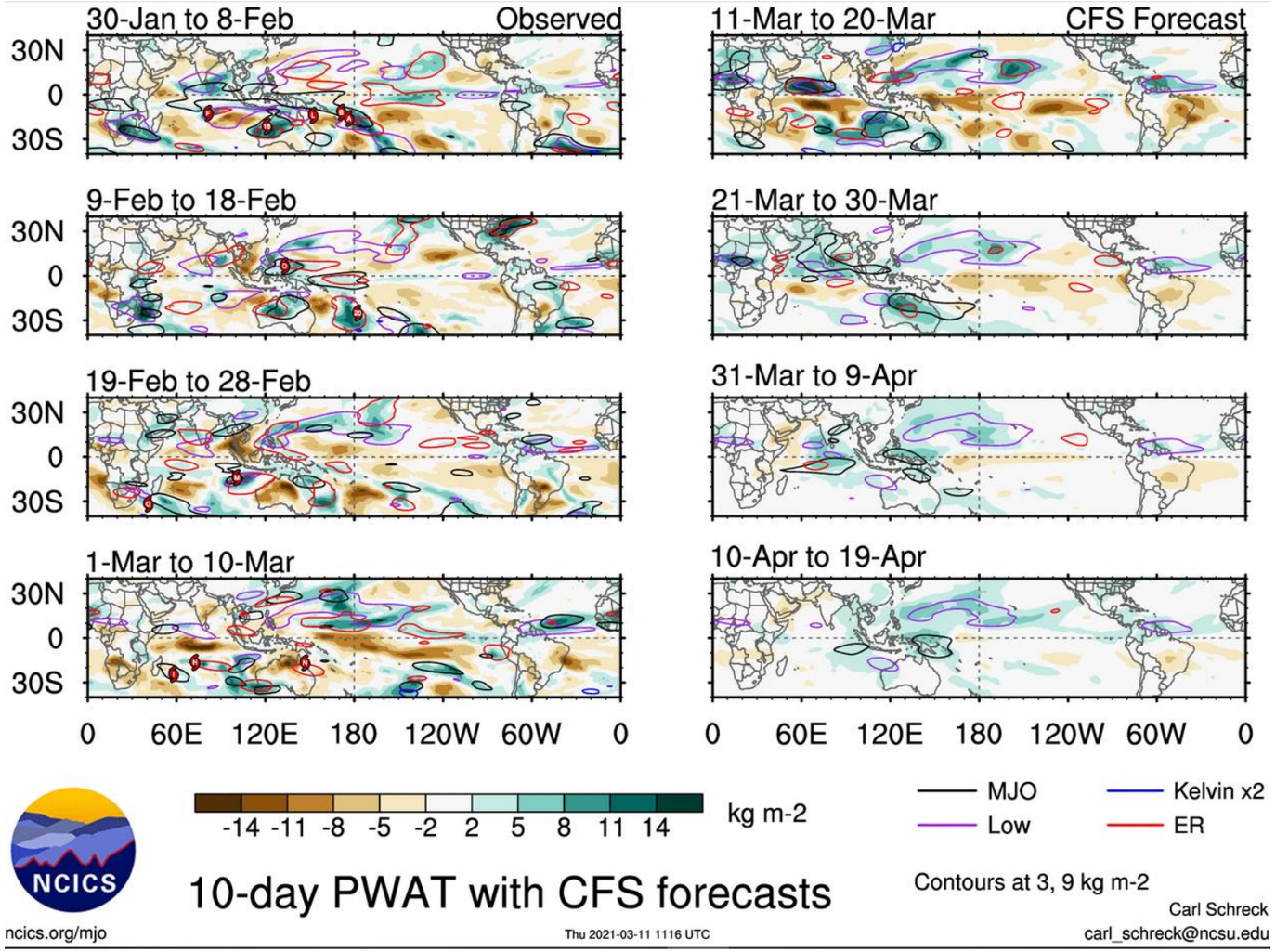
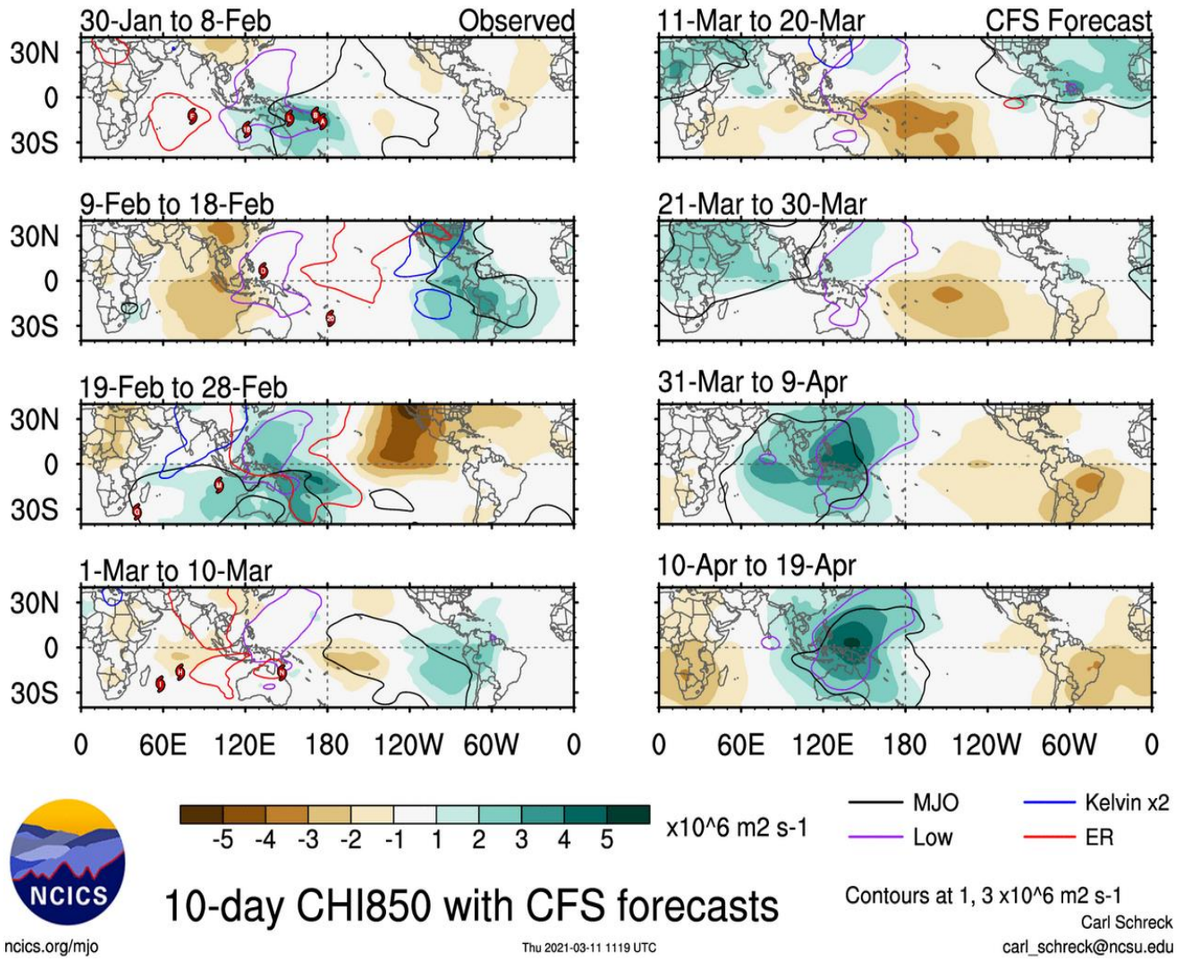


Figure 7: **past 4 week precipitable water and outlooks**

https://ncics.org/pub/mjo/v2/map/pwat.cfs.all.global.10.png

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

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



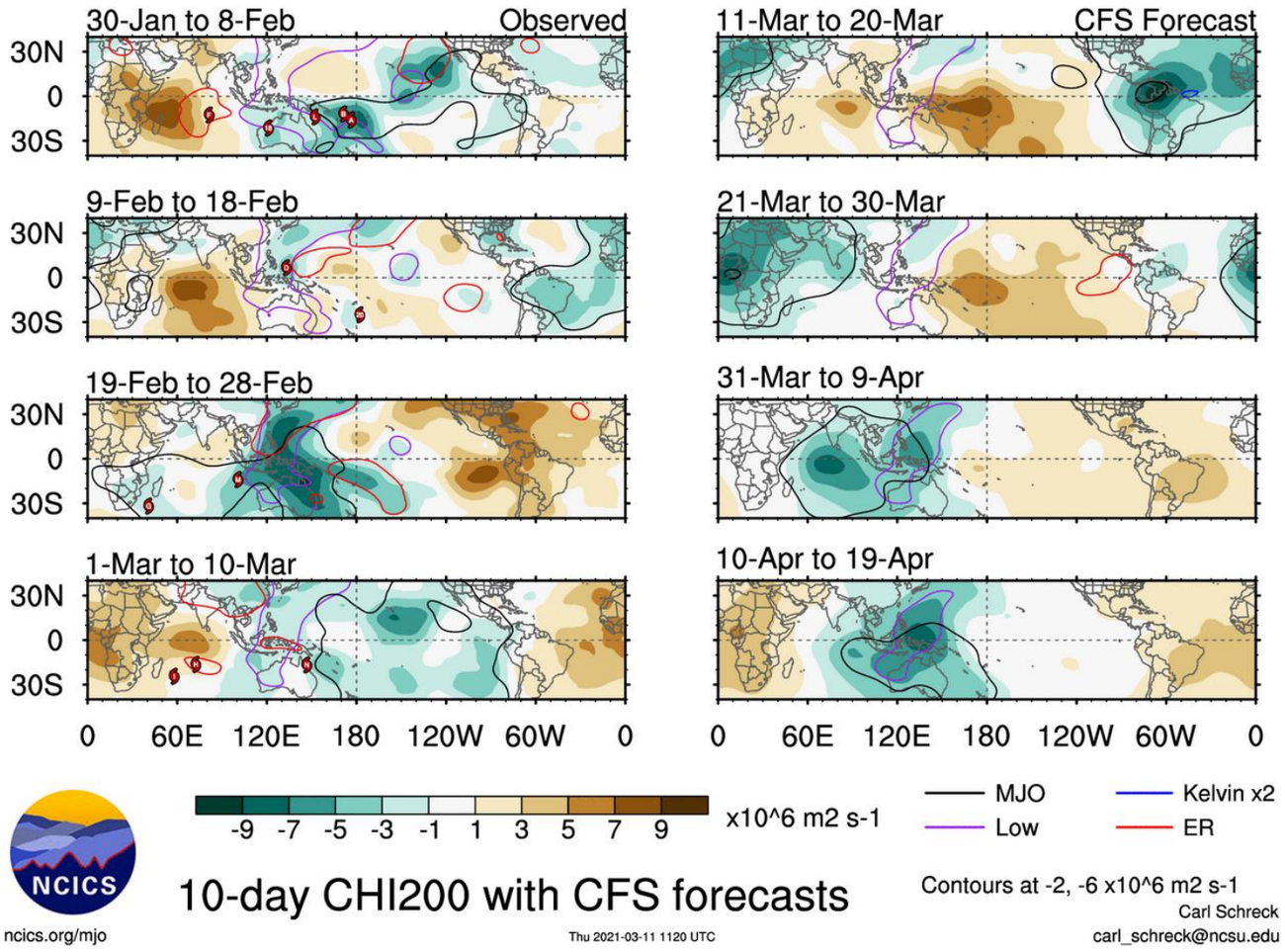
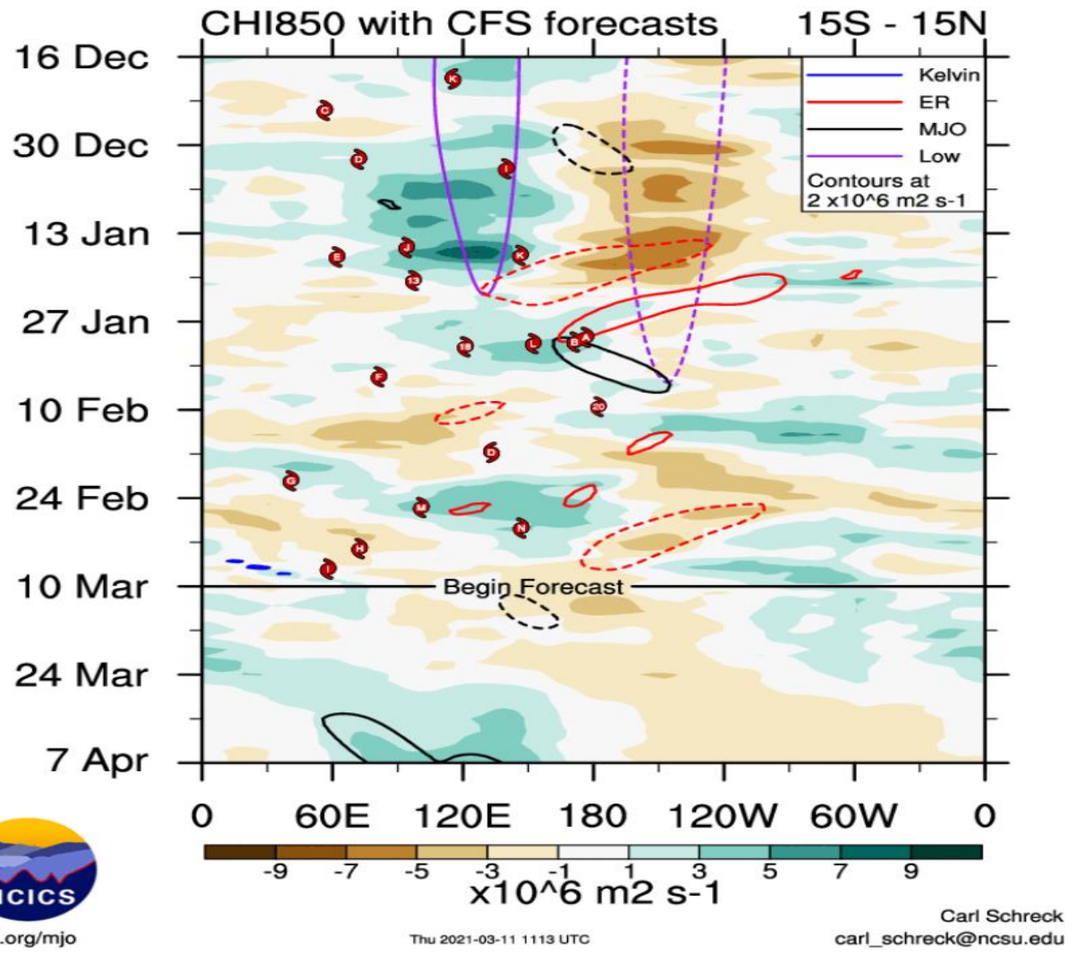


Figure 6a and b: past four week and month velocity potential

https://ncics.org/pub/mjo/v2/map/chi850.cfs.all.global.10.png

https://ncics.org/pub/mjo/v2/map/chi200.cfs.all.global.10.png

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



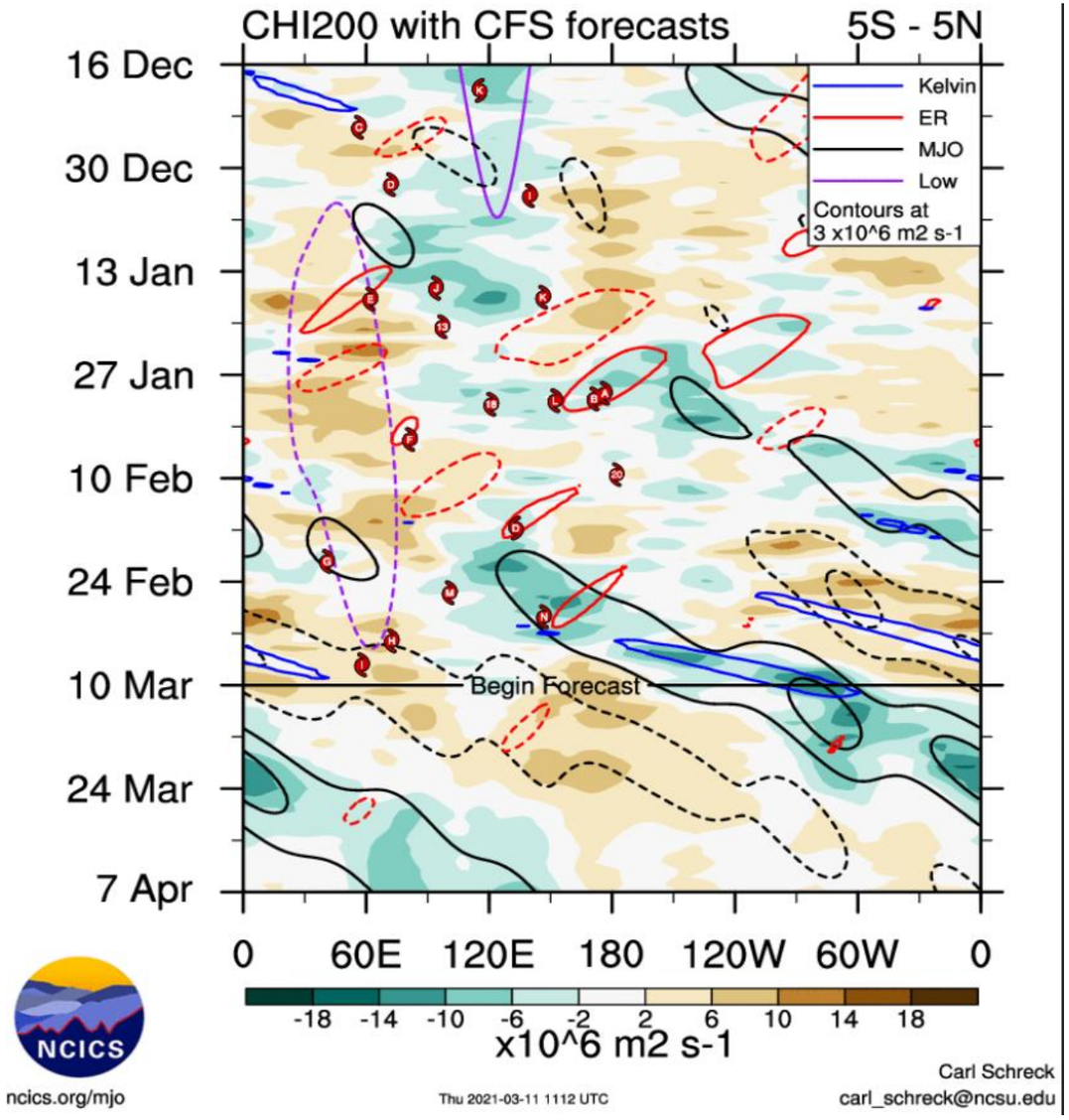
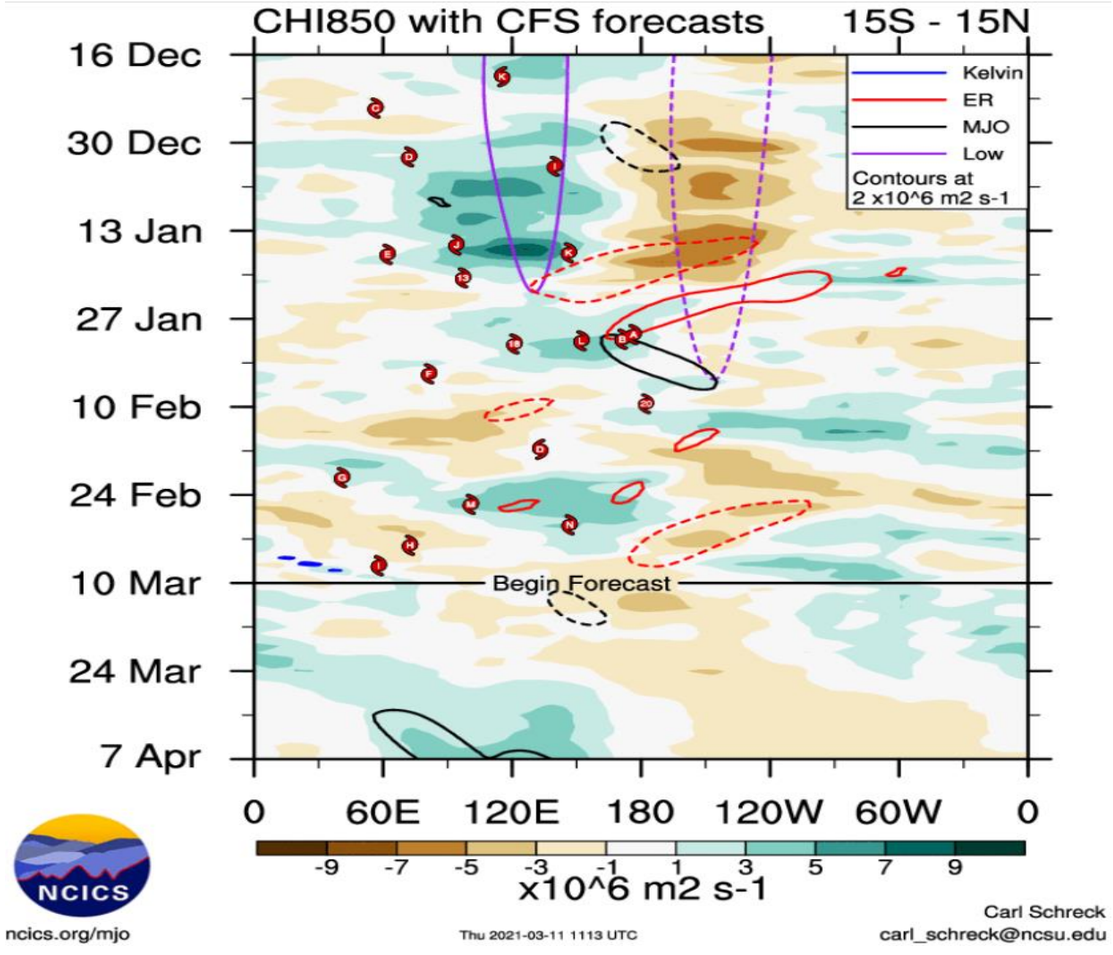


Figure 8: anomalies for 15n-15s with waves overlay including outlooks

https://ncics.org/pub/mjo/v2/hov/chi200.cfs.eqtr.png
https://ncics.org/pub/mjo/v2/hov/chi850.cfs.wide.png

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



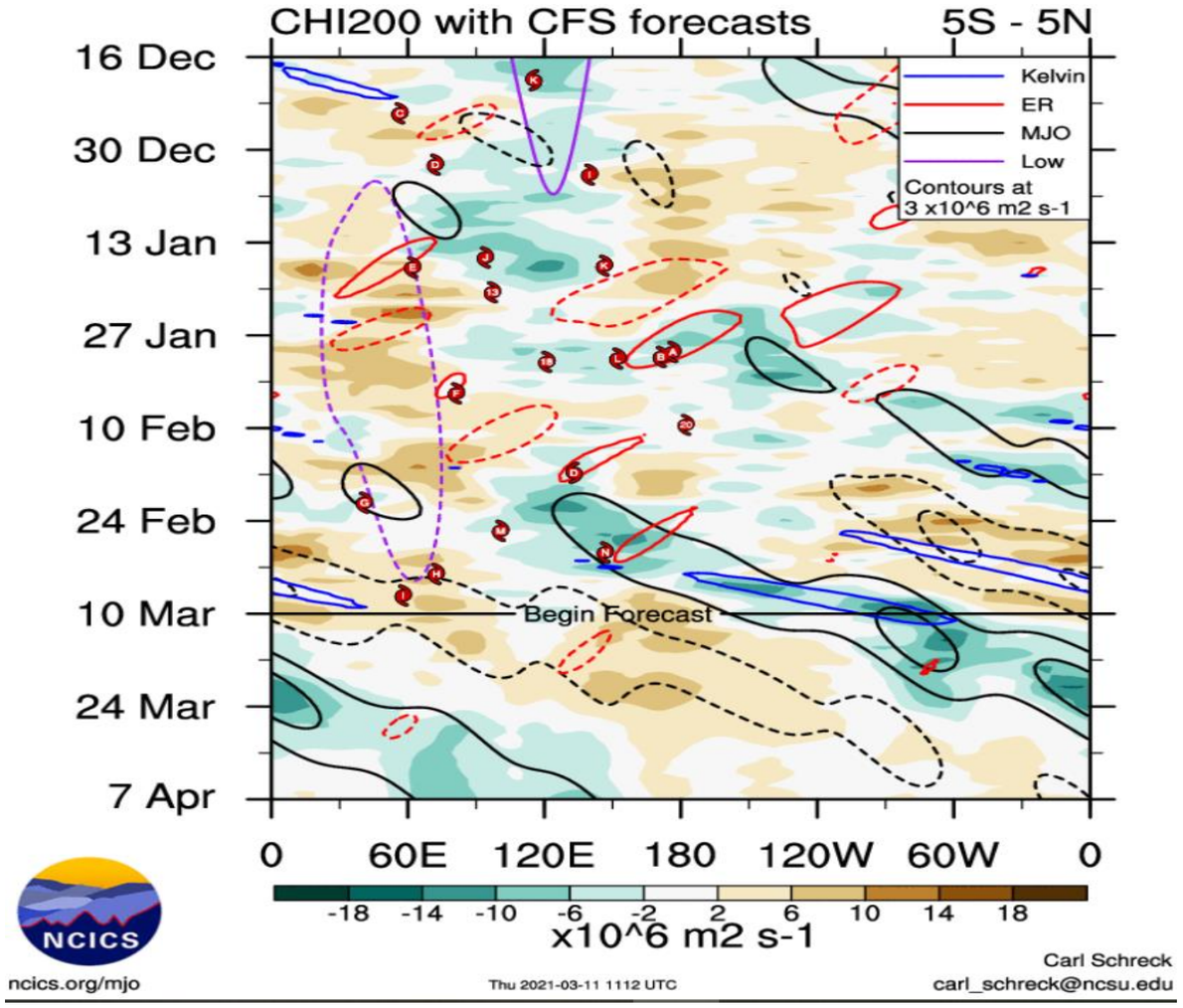
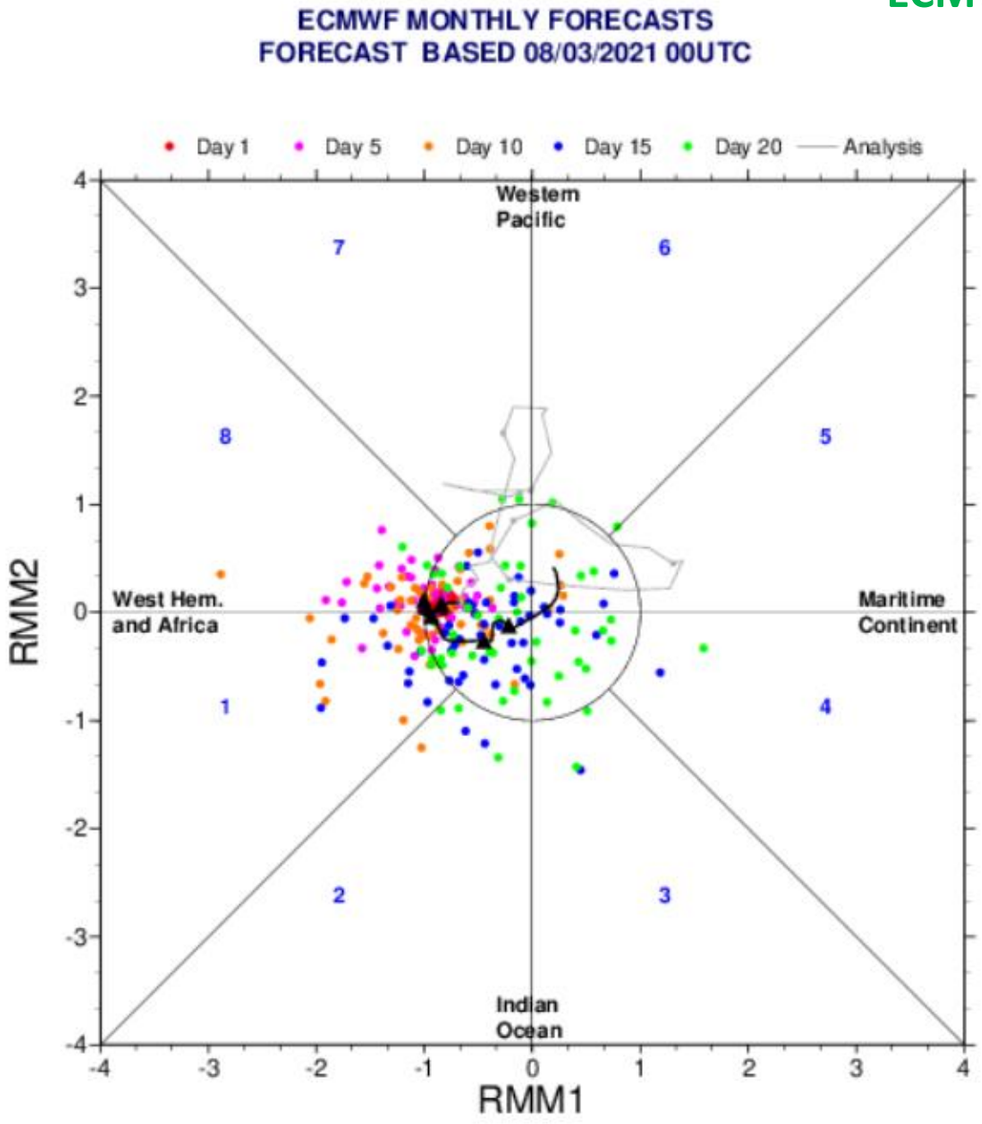


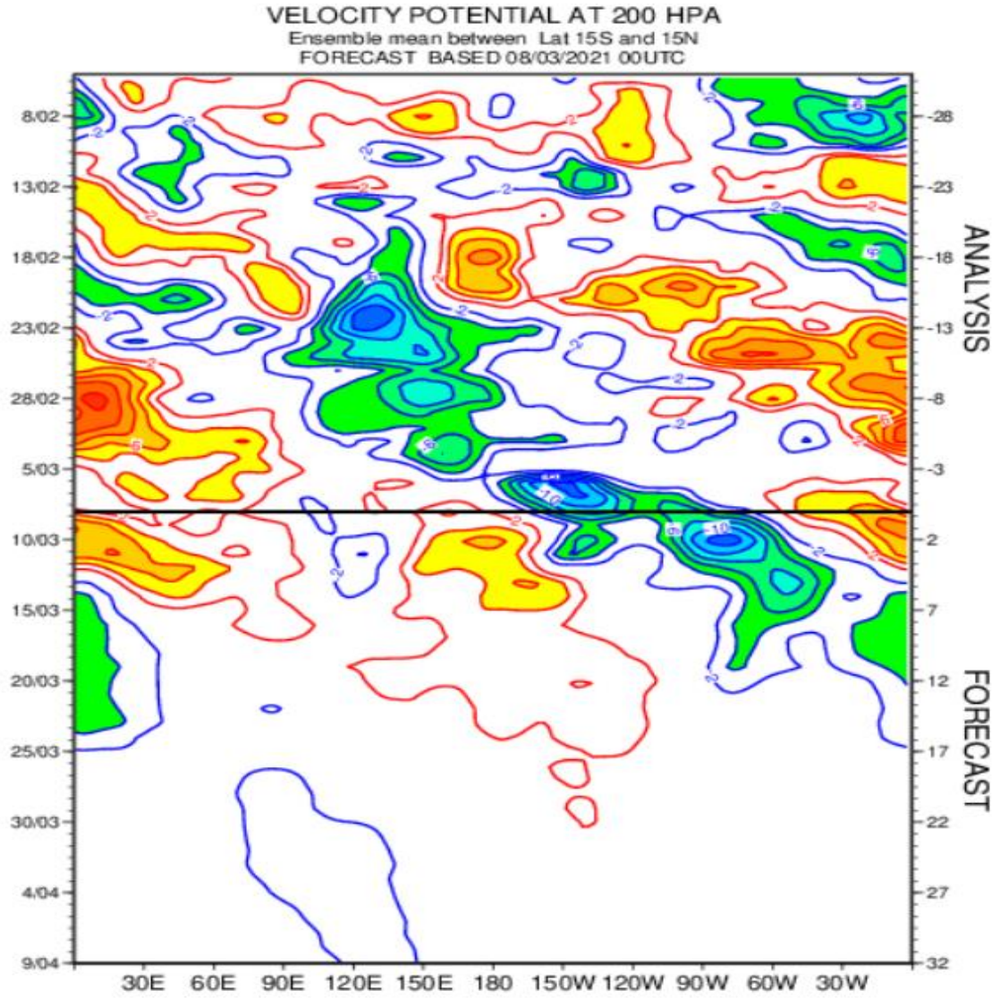
Figure 9: anomalies for 15n-15s with waves overlay including outlooks

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

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

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 4 WEEKS VELOCITY POTENTIAL AND MONTH STREAM FUNCTION ANOMALIES WITH MJO, KELVIN AND ROSSBY WAVE OVERLAID ON GLOBAL MAPS 850 hPa

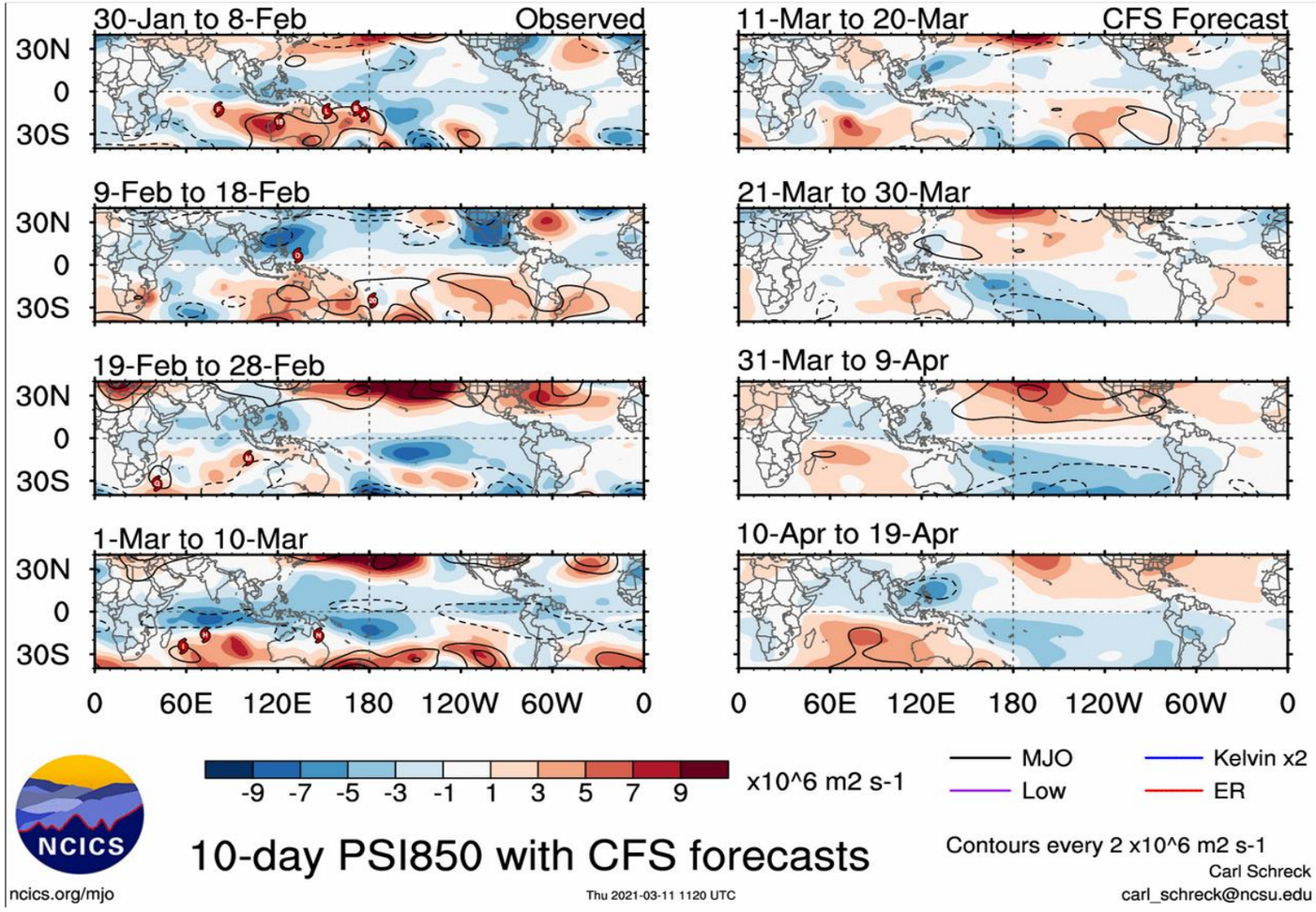


Figure 12: PAST 4 WEEKS VELOCITY POTENTIAL

https://ncics.org/pub/mjo/v2/map/psi850.cfs.mjo.global.10.png

IR IMAGE AND VELOCITY POTENTIAL ANOMALY

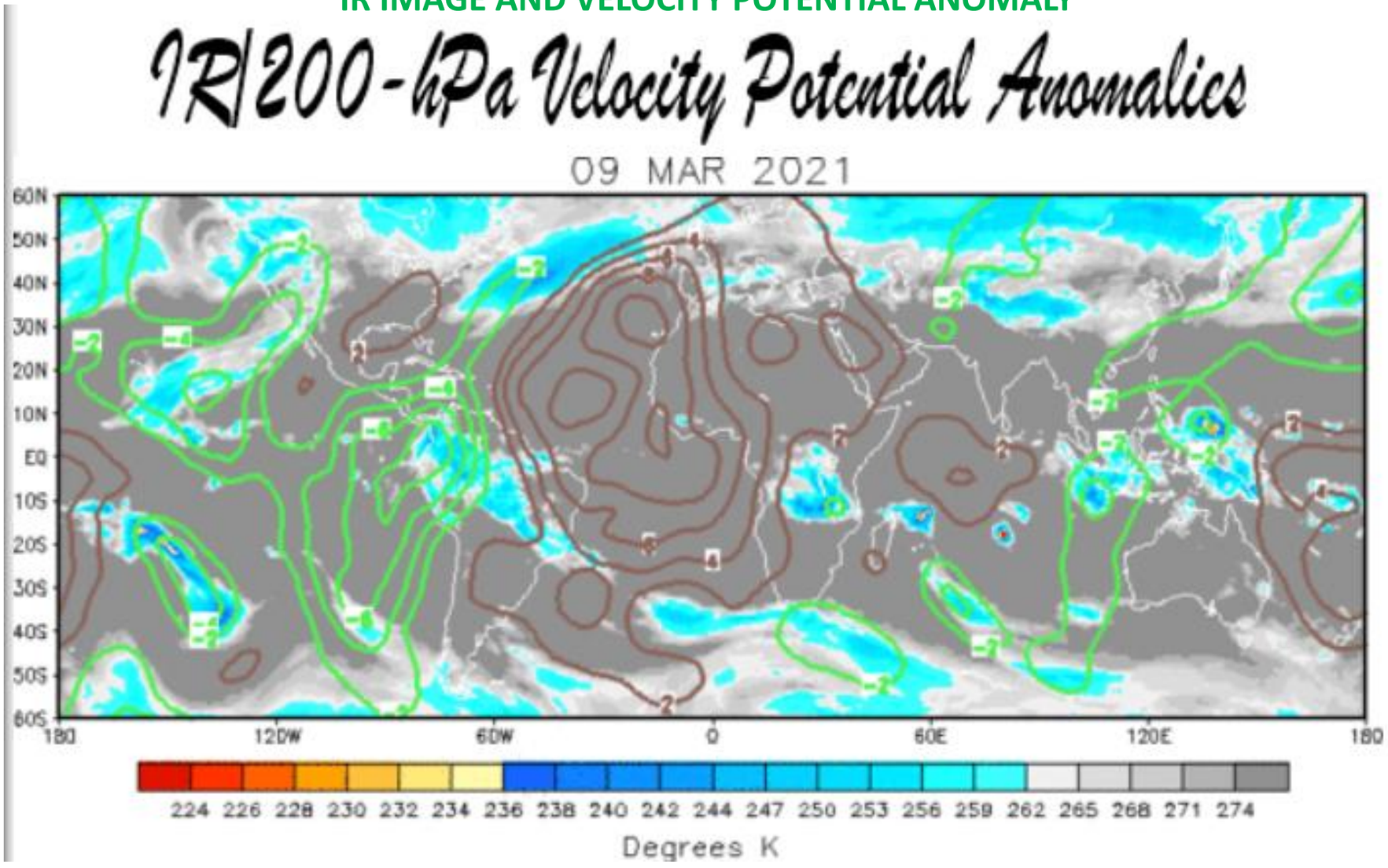


Figure 18: IR image and velocity potential anomaly

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

PAST 3 WEEKS OLR ANOMALIES

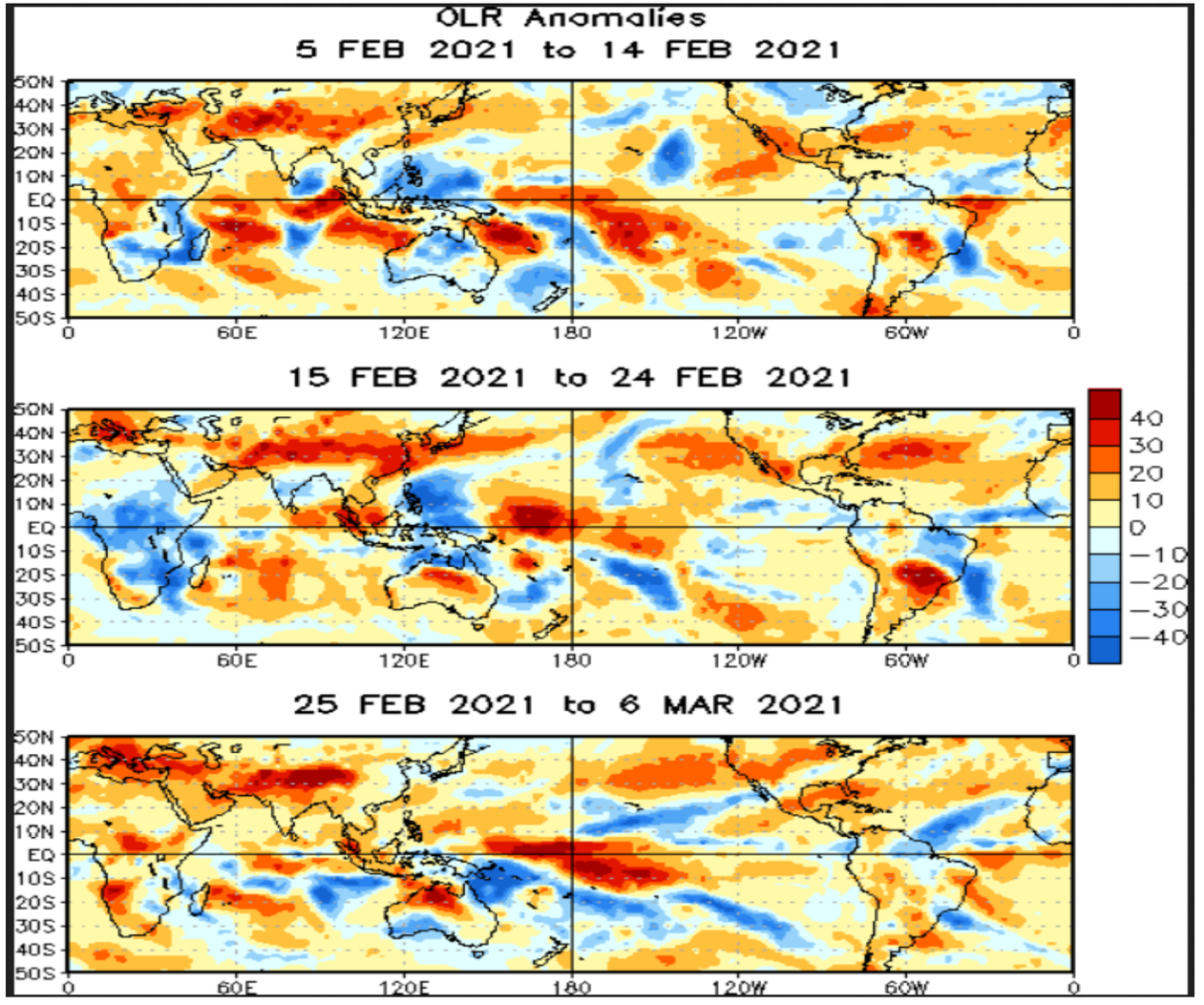


Figure 11: PAST 3 WEEKS OLR ANOMALIES

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

MEAN SEA LEVEL PRESSURE OF THE DEKAD1 MARCH 2021 WITH THE ANOMALIES COMPARED THE AVERAGE 1971-2000

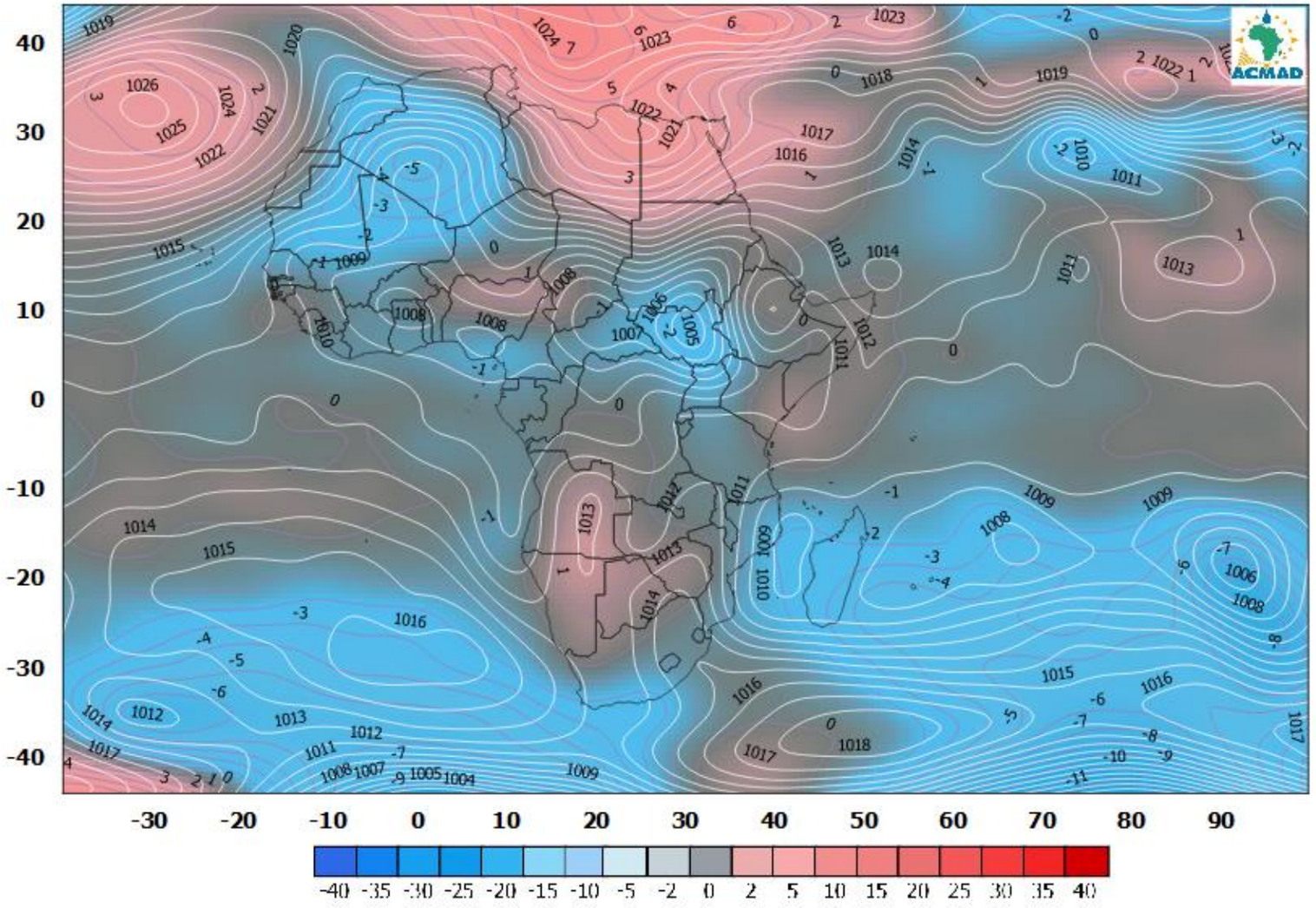


Figure 13: MSLP obs-anom and MSLP-climatology

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

WIND ANOMALIES FOR THE RECENT 10 DAY PERIOD 850 AND 700 hPa

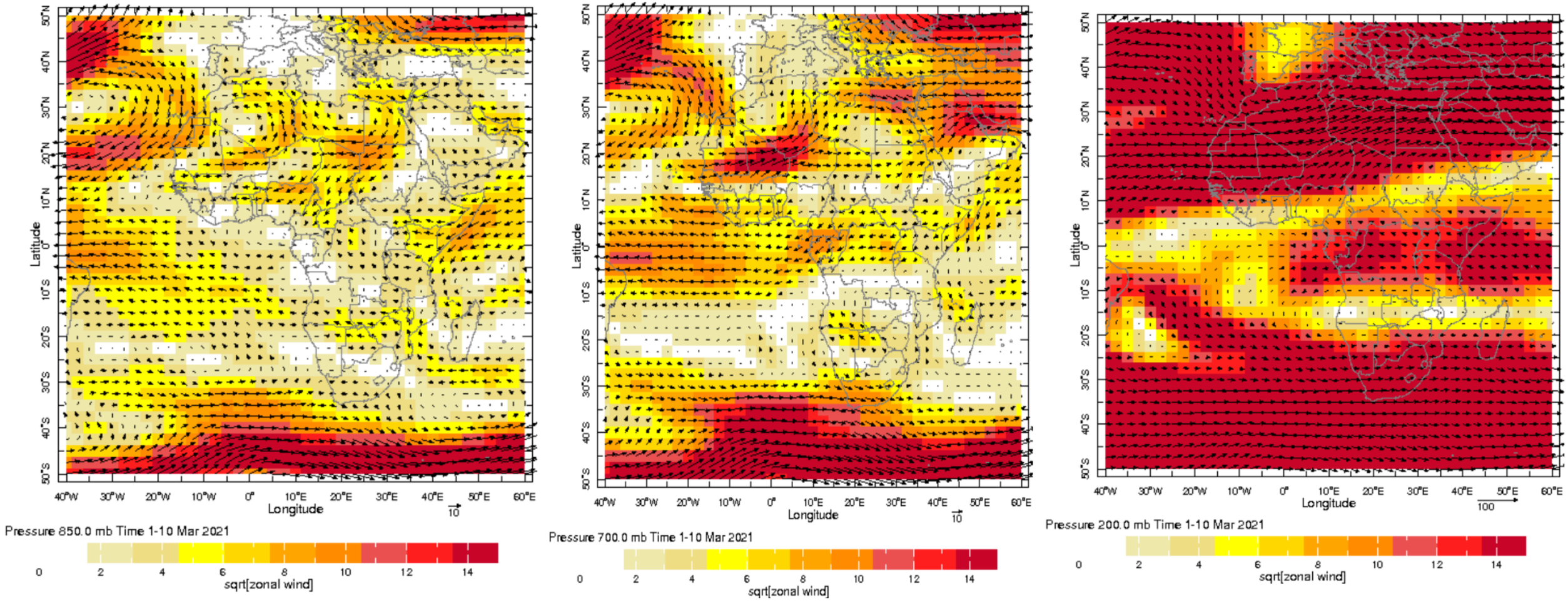
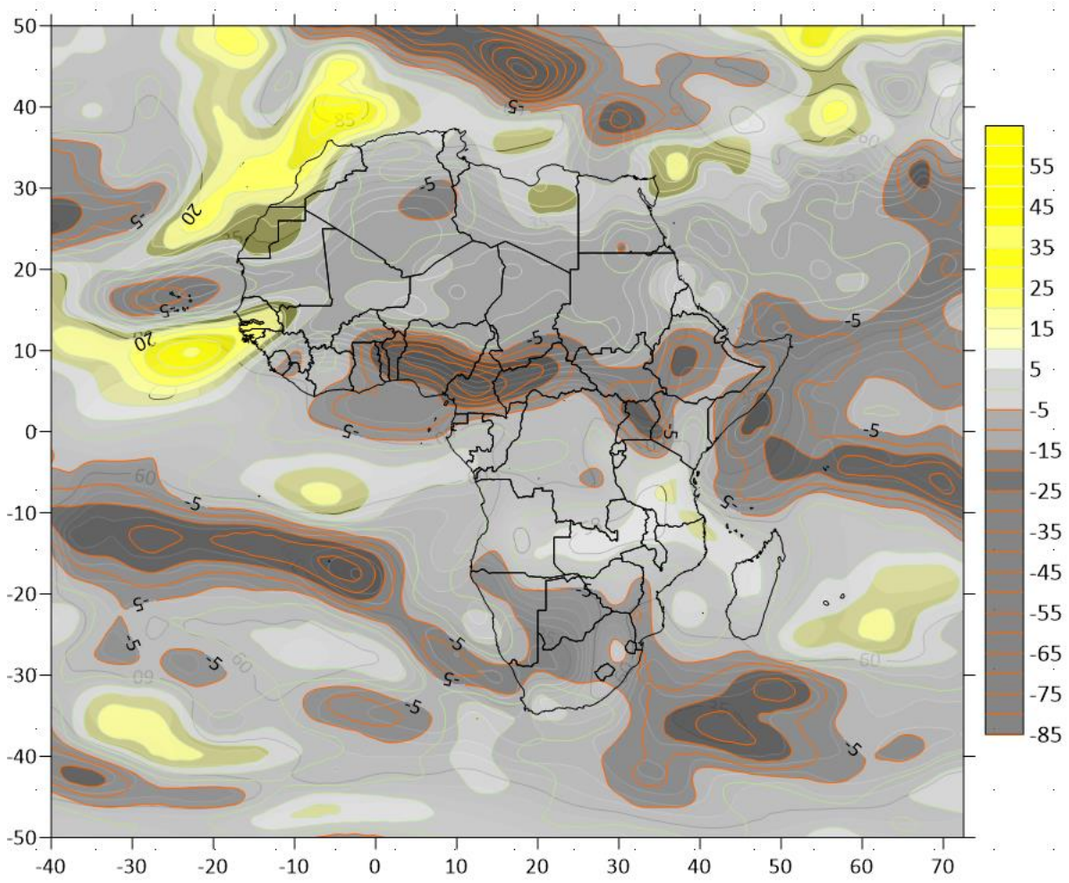


Figure 15: Wind anomalies for 850 and 700hPa

RELATIVE HUMIDITY ANOMALIES at 850 and 700 hPa for DEKAD 3 FEBRUARY 2021

RH Anomaly at 850 hPa during 1st dek of March 2021



RH Anomaly at 700 hPa during 1st dek of March 2021

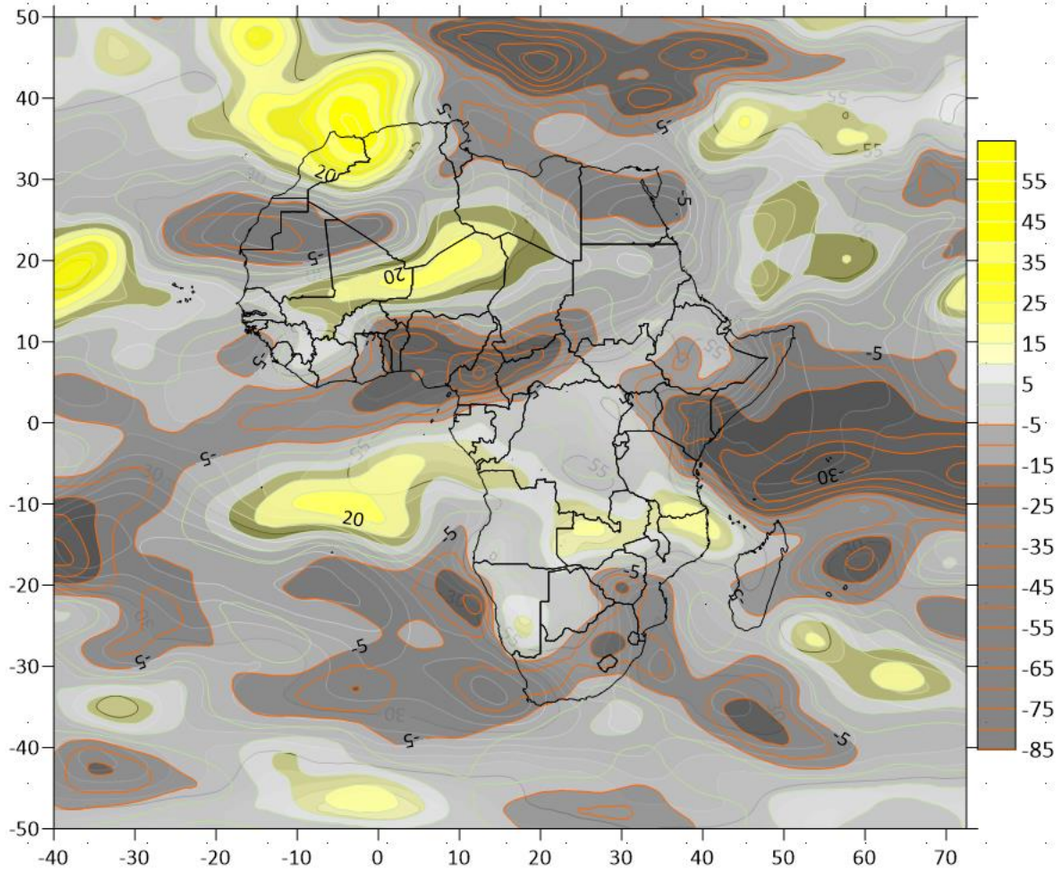
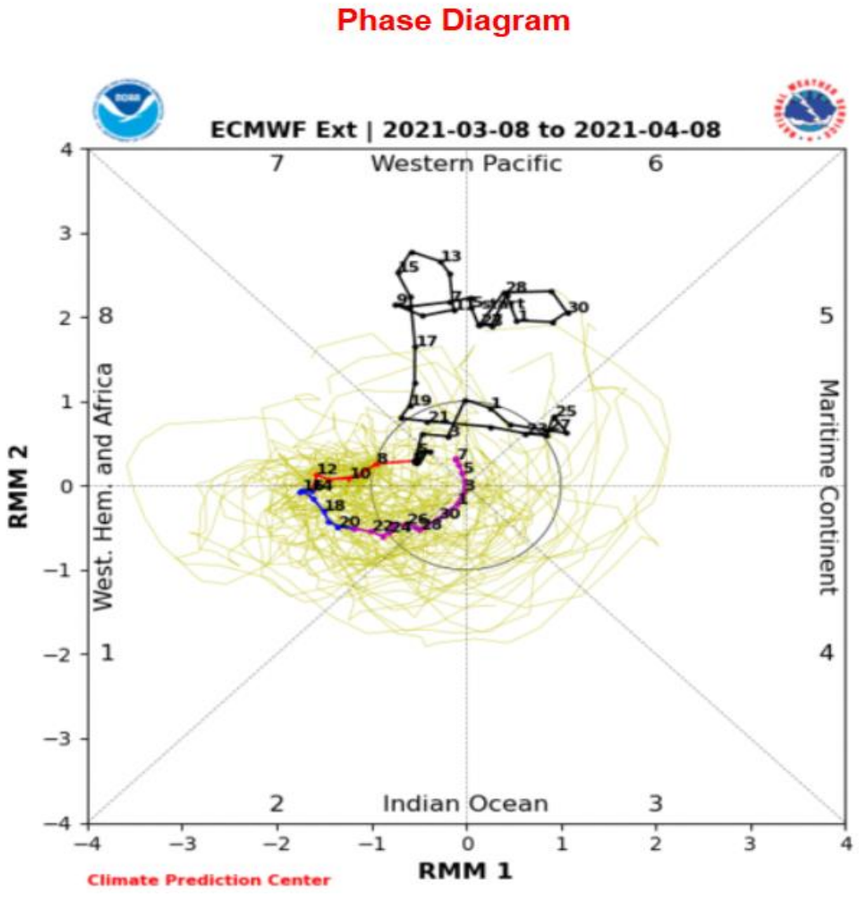


Figure 17 : Relative Anomaly at 850 hPa (left) 700 hPa (right)

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

WEEKLY FORECAST

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



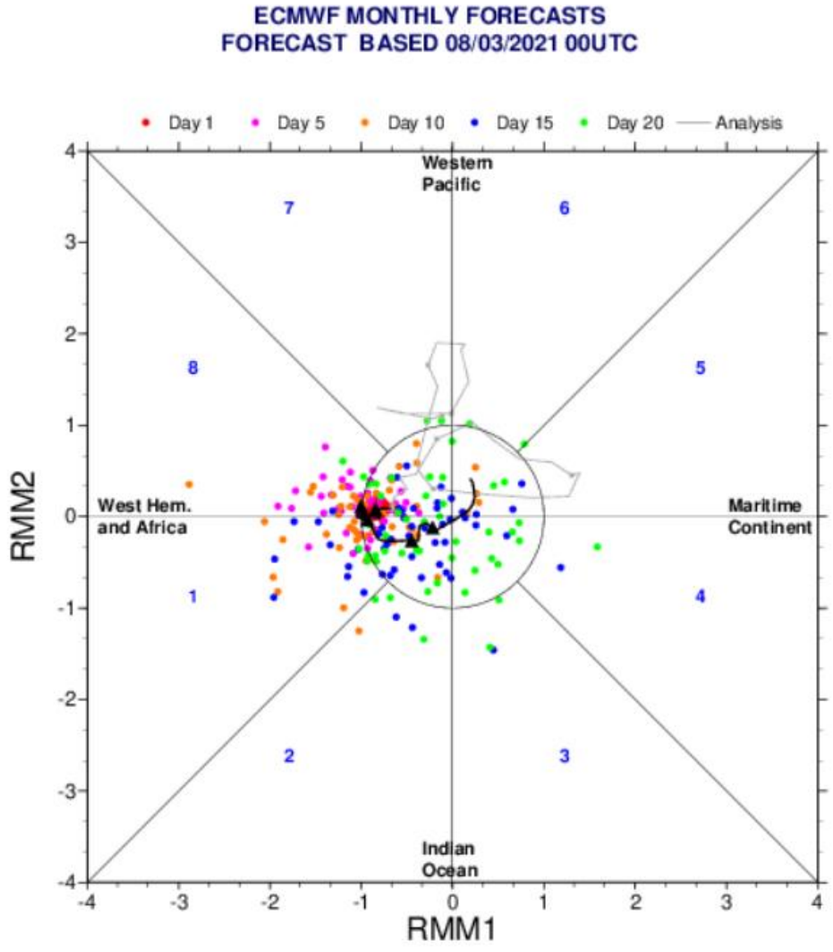


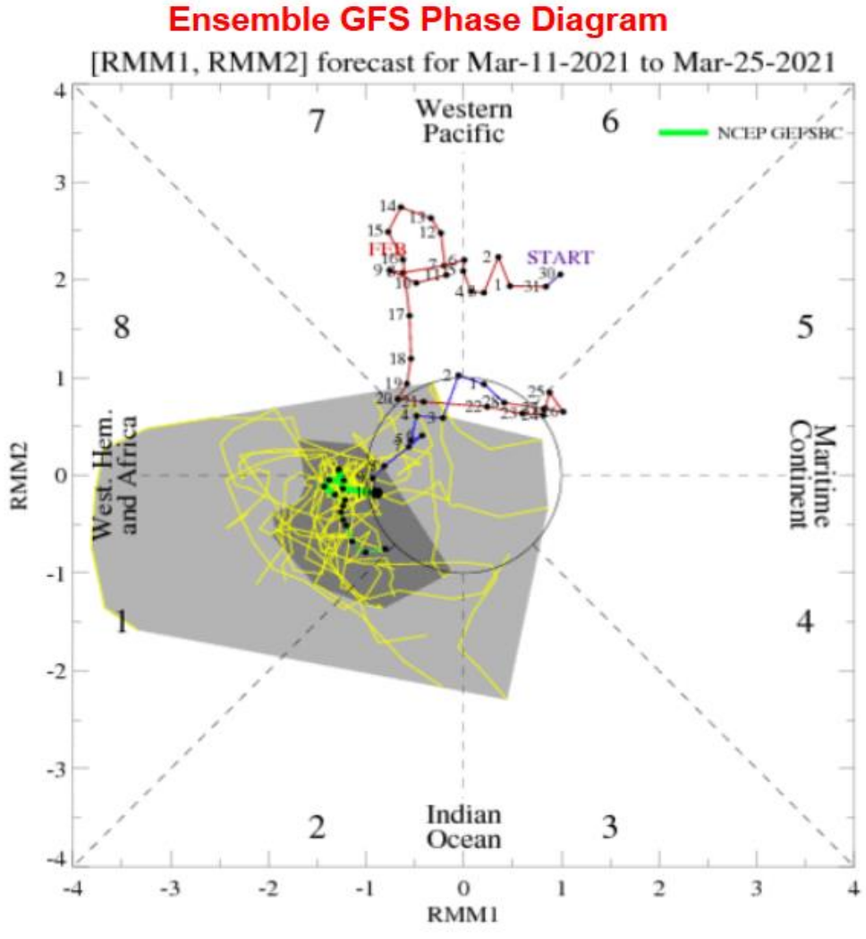
Figure 19:FORECASTS FRO ECWF, NCEP, UK MET OFFICE

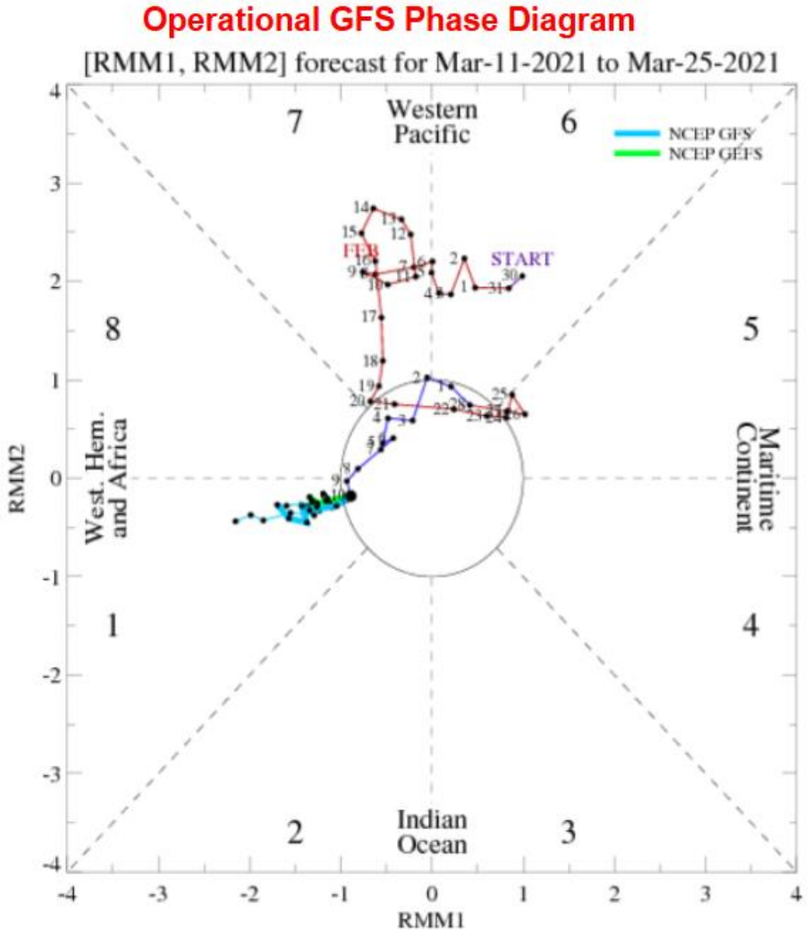
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https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_mjo_family_index?facets=undefined&time=2019081500,0,2019081500

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

MJO FORECAST





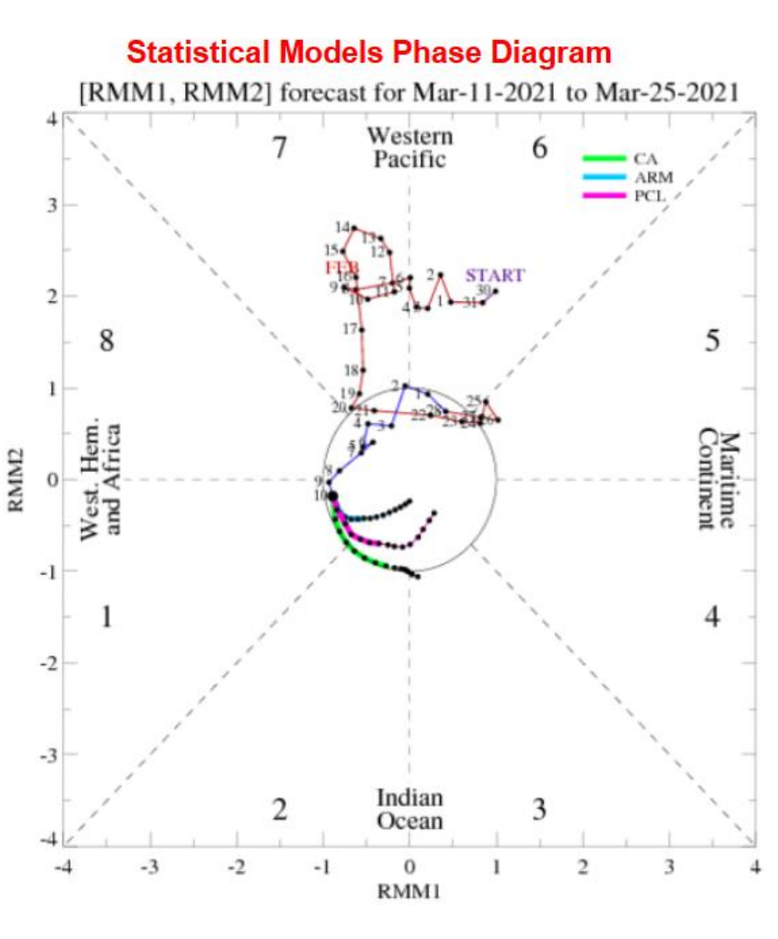


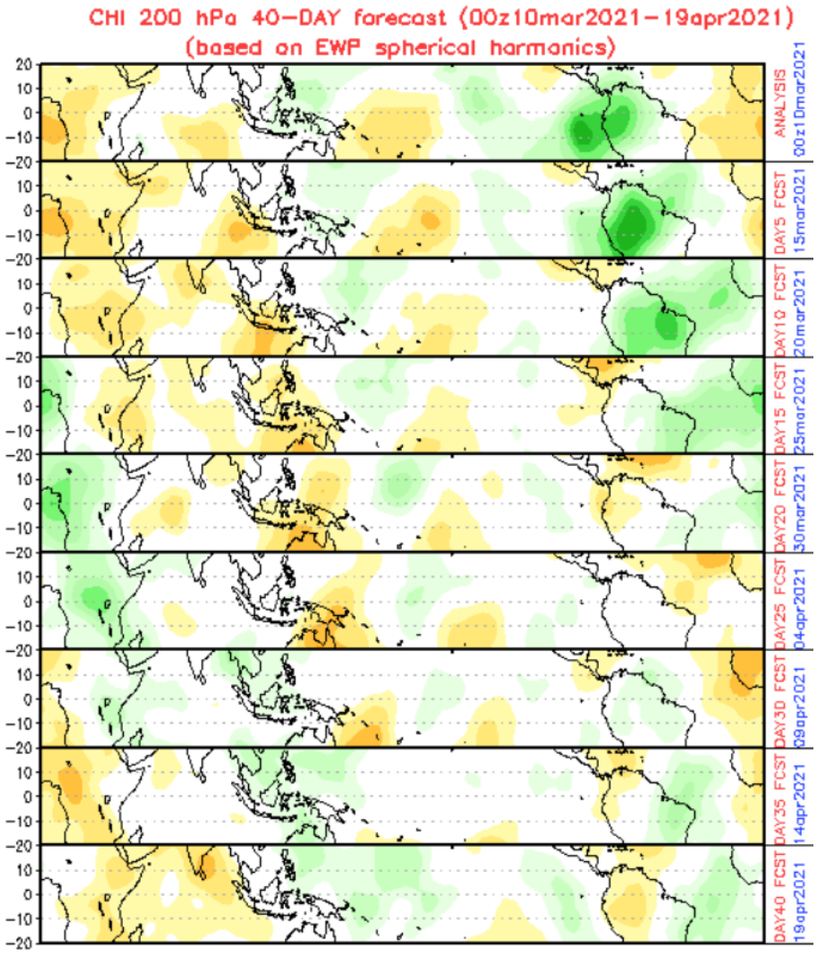
Figure 20: Mjo forecast

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

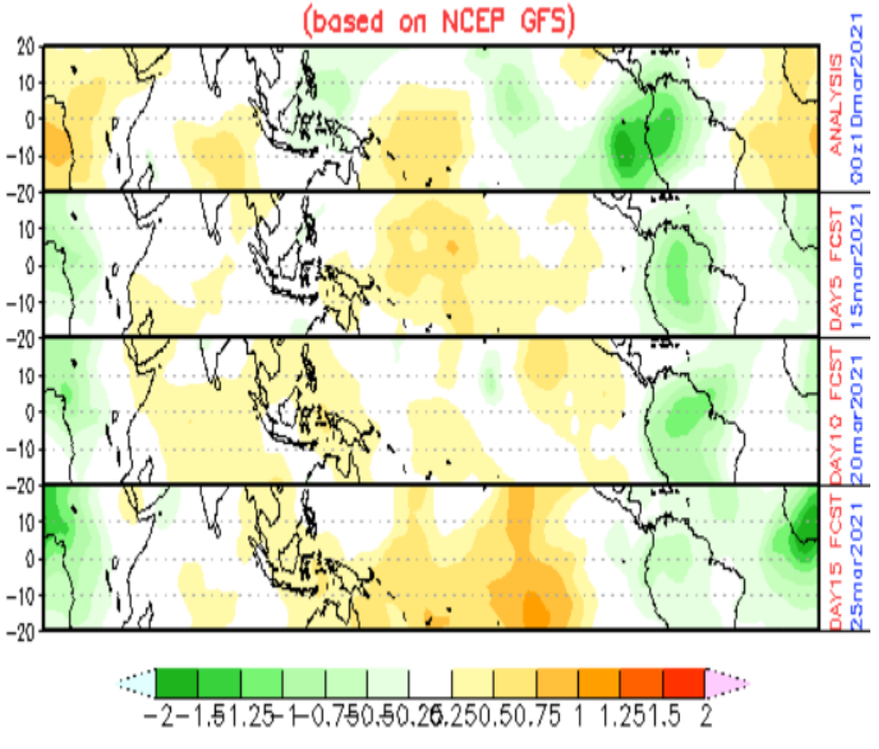
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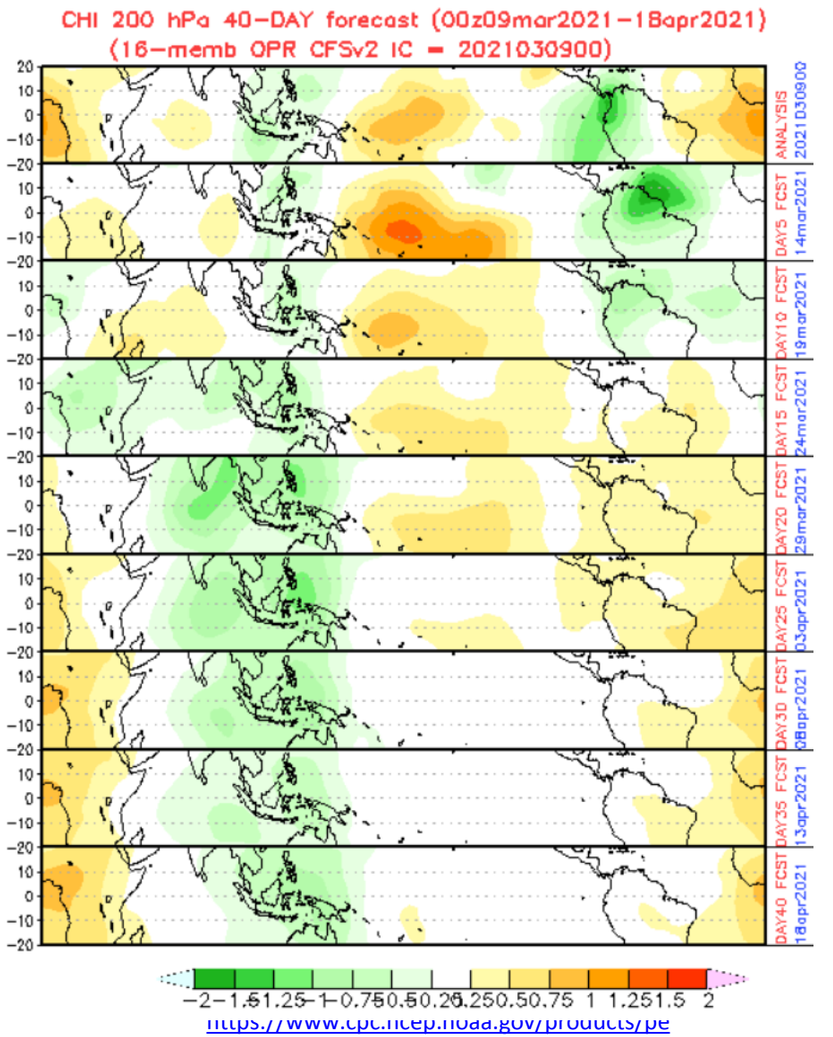
MJO FORECAST



https://www.cpc.ncep.noaa.gov/products/people/wd52qz/mjo/chi/ewp.gif



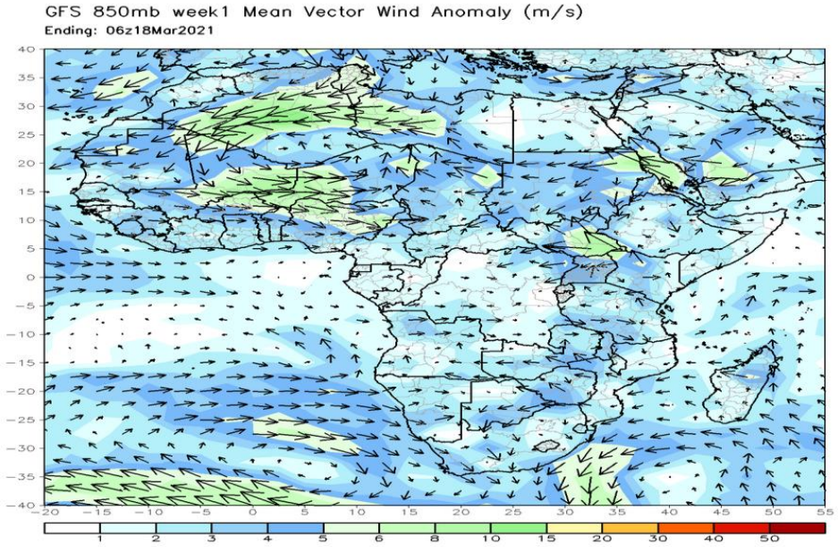
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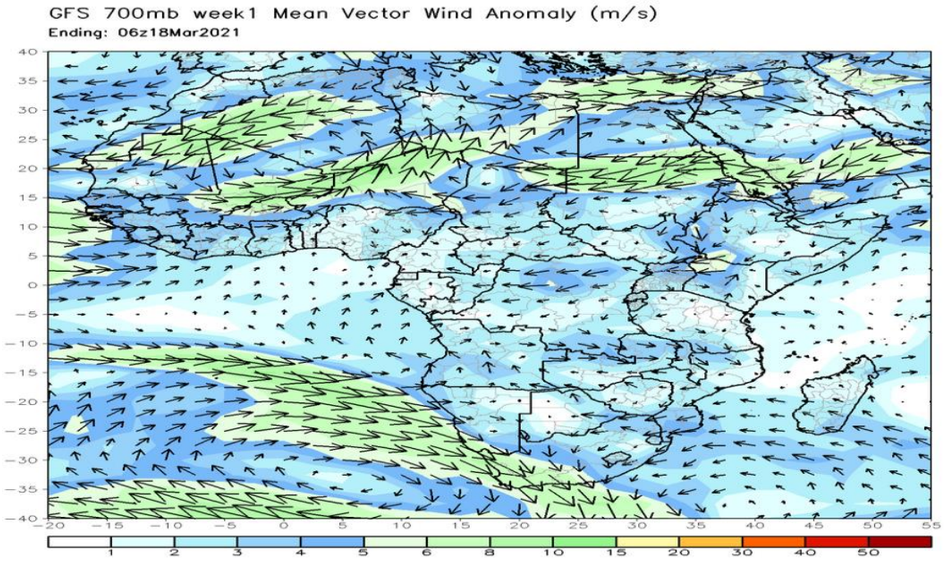


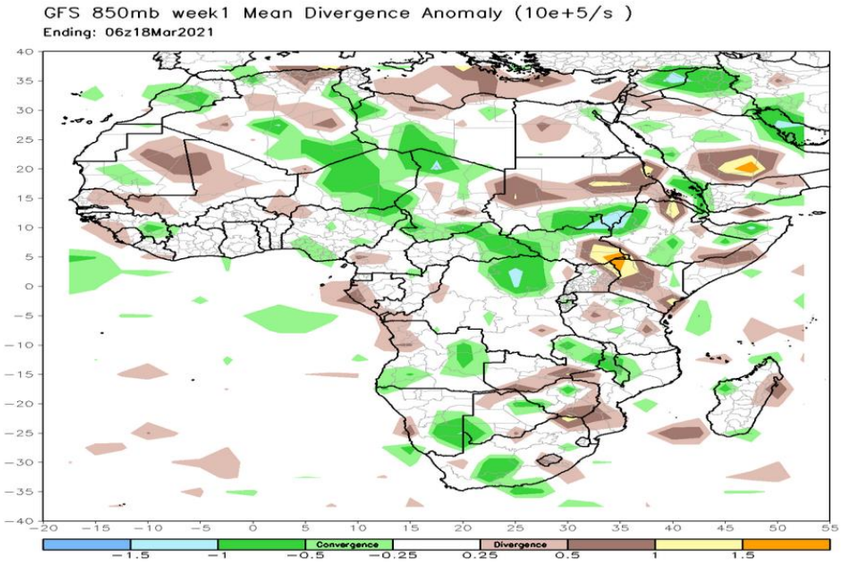
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Figure 21: Mjo forecast

WIND ANOMALY AND DIVERGENCE FORECAST FROM GFS WEEK1: 3-09 Mar 2021







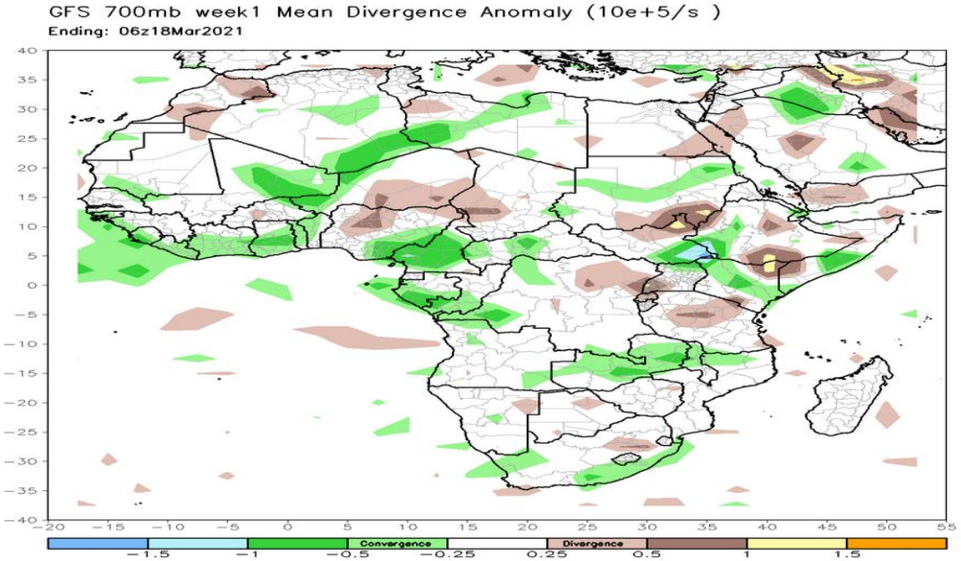
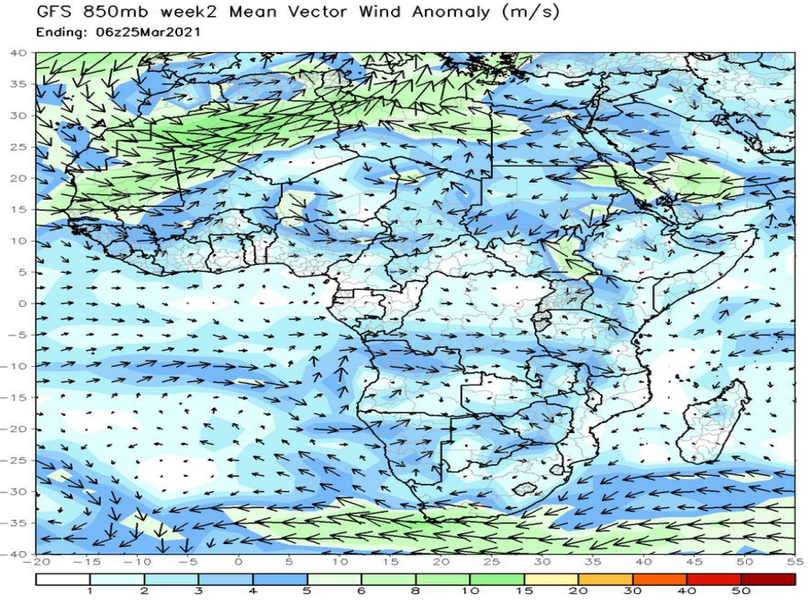
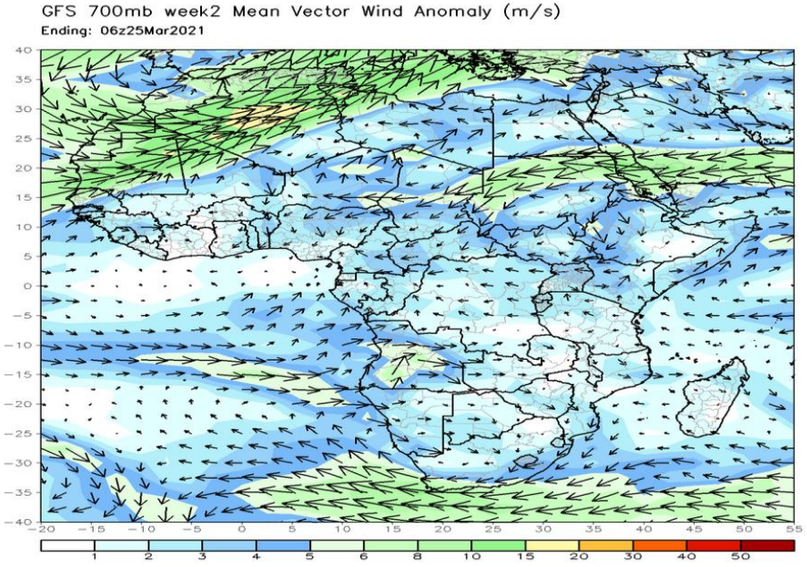


Figure 22 : Forecast from GFS

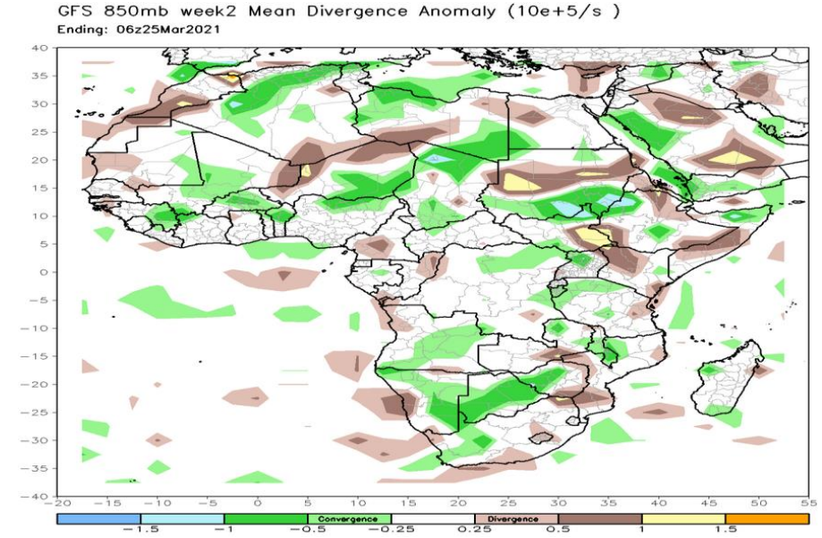
https://www.cpc.ncep.noaa.gov/products/international/africa/africa.shtml

WIND ANOMALY AND DIVERGENCE FORECAST FROM GFS WEEK2: 10-16 Mar 2021





For the forecast of the divergent wind, for the first week at the 850 the wind is converging over the whole area of Africa as well as the 700



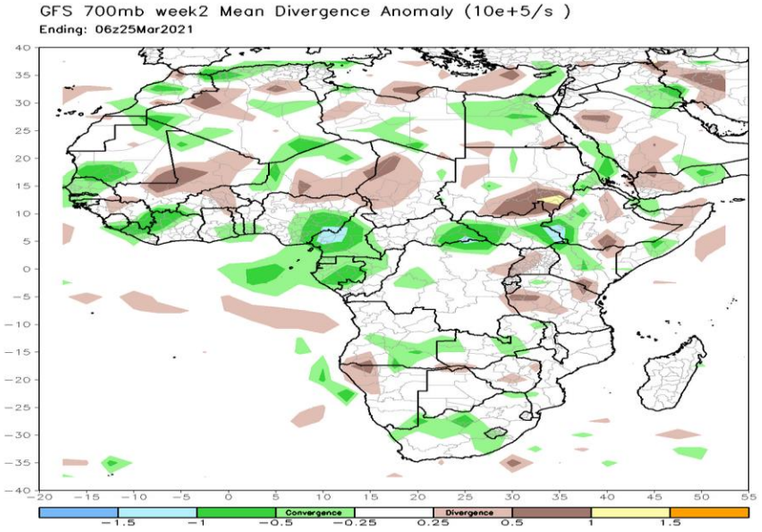
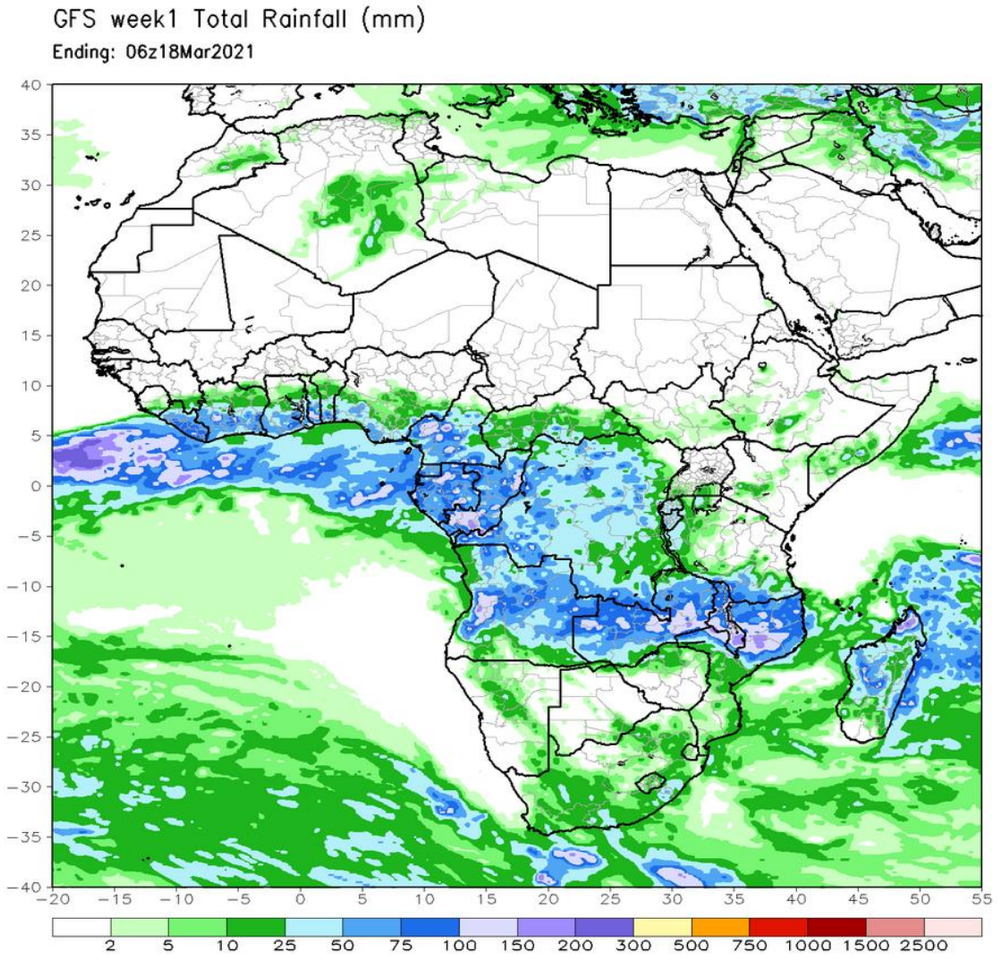


Figure 23 : Gfs divergence forecast, https://www.cpc.ncep.noaa.gov/products/international/africa/africa.shtml

GFS WIND ANOMALY AND DIVERGENCE FORECAST Week1: 11 – 18 Mar 2021



The map indicate the low to moderate precipitation over southern of Guinea gulf countries, western of Central Africa region.

The moderate to heavy precipitation over southern East Africa region countries and eastern parts of SADC region

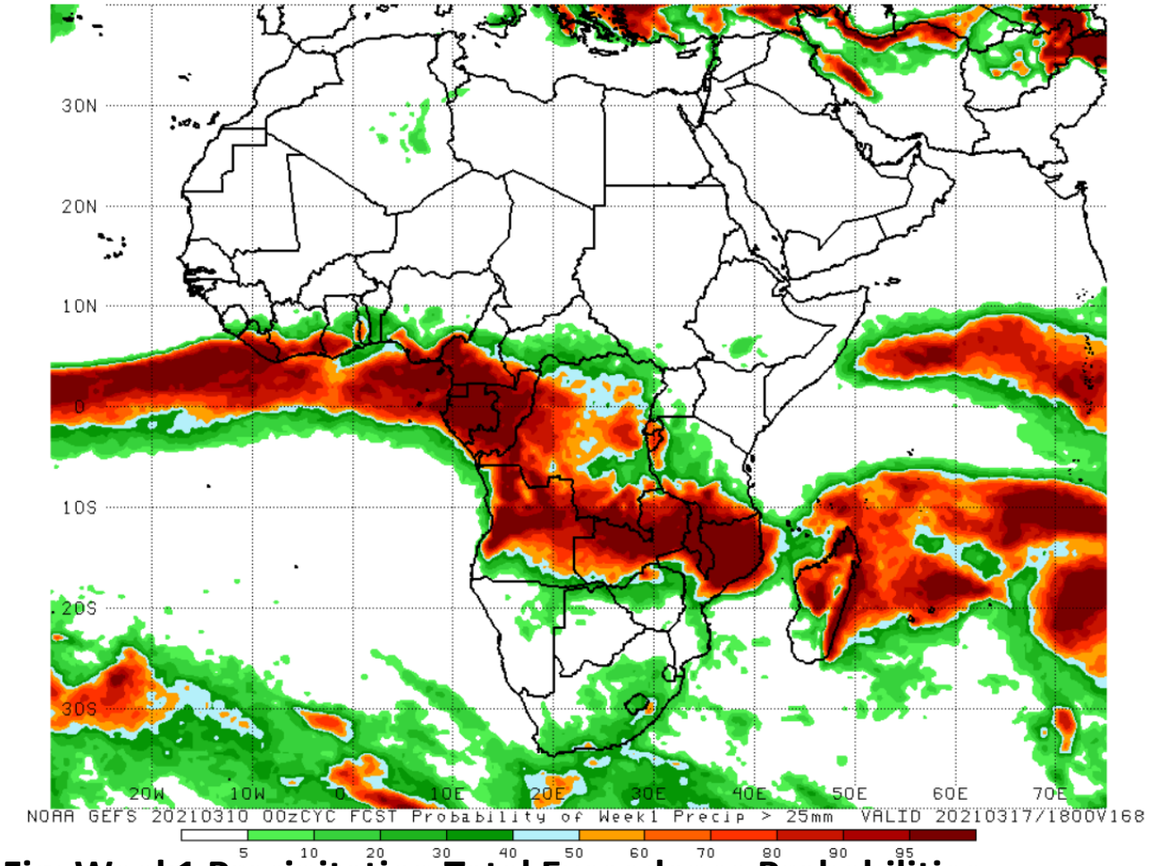
Figure 24 : Gfs total precipitation forecast week1

https://www.cpc.ncep.noaa.gov/products/international/gfs/gfs_week1_af_precip_obs.gif

https://www.cpc.ncep.noaa.gov/products/international/gfs/gfs_week2_af_precip_obs.gif

Probability of week-1 precip > 25 and 50mm

Week-1 Precip > 25 mm10-17 Mar 2021



Week-1 Precip > 50 mm10-17 Mar 2021

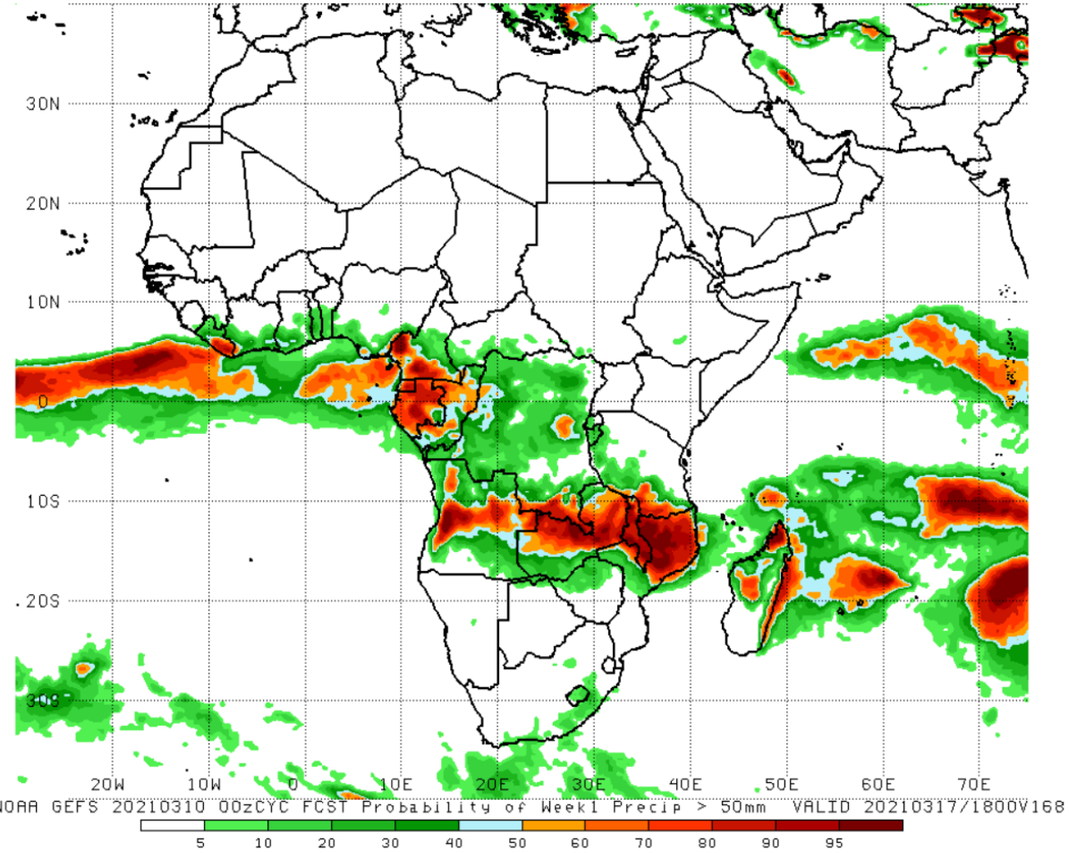


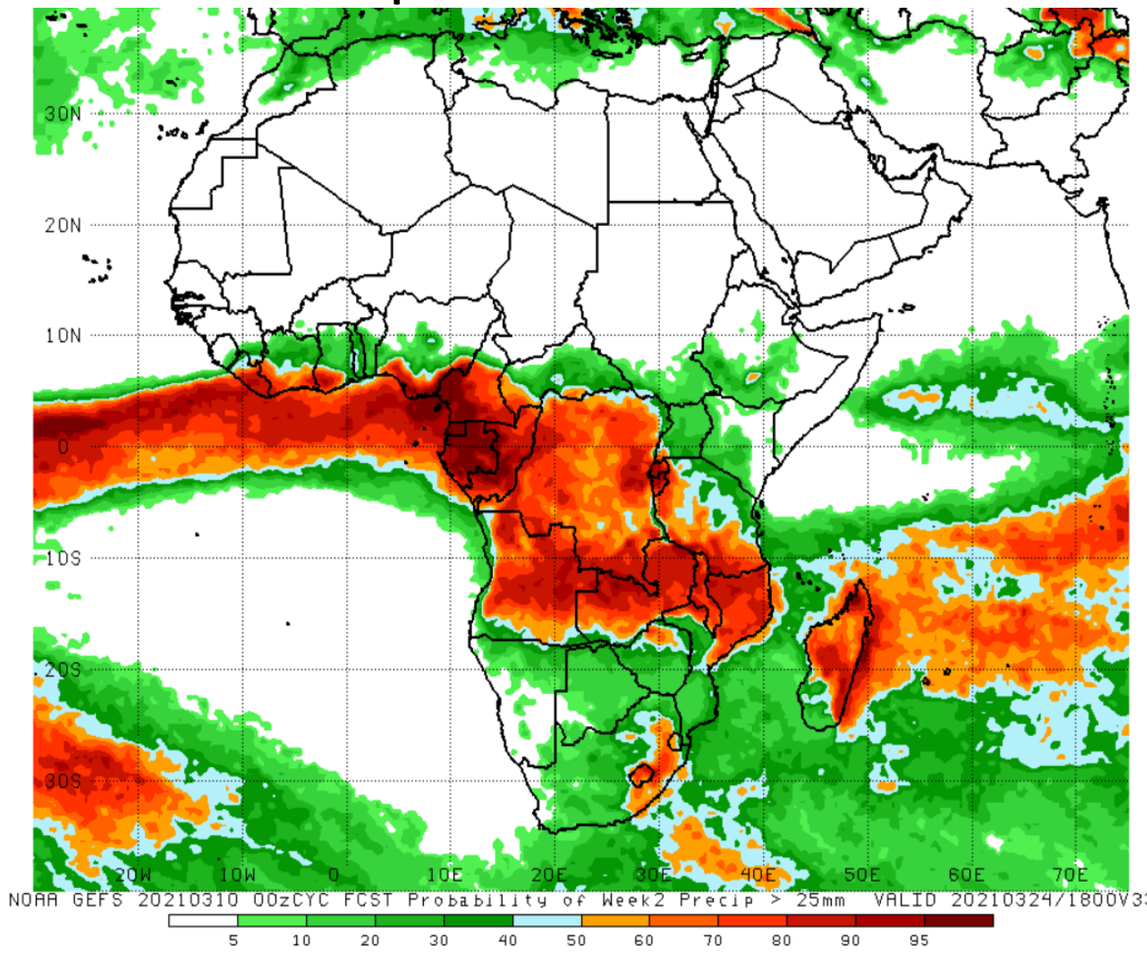
Fig: Week1 Precipitation Total Exceedance Probabilities

https://www.cpc.ncep.noaa.gov/products/international/cpci/data/18/fcsts_africa.shtml

https://www.cpc.ncep.noaa.gov/products/international/cpci/data/18/gefs_wk1_precip50mm_prob_africa.html

Probability of week-2 precip > 25 and 50mm

Week-2 Precip > 25 mm18-24 Mar 2021



Week-2 Precip > 50 mm18-24 Mar 2021

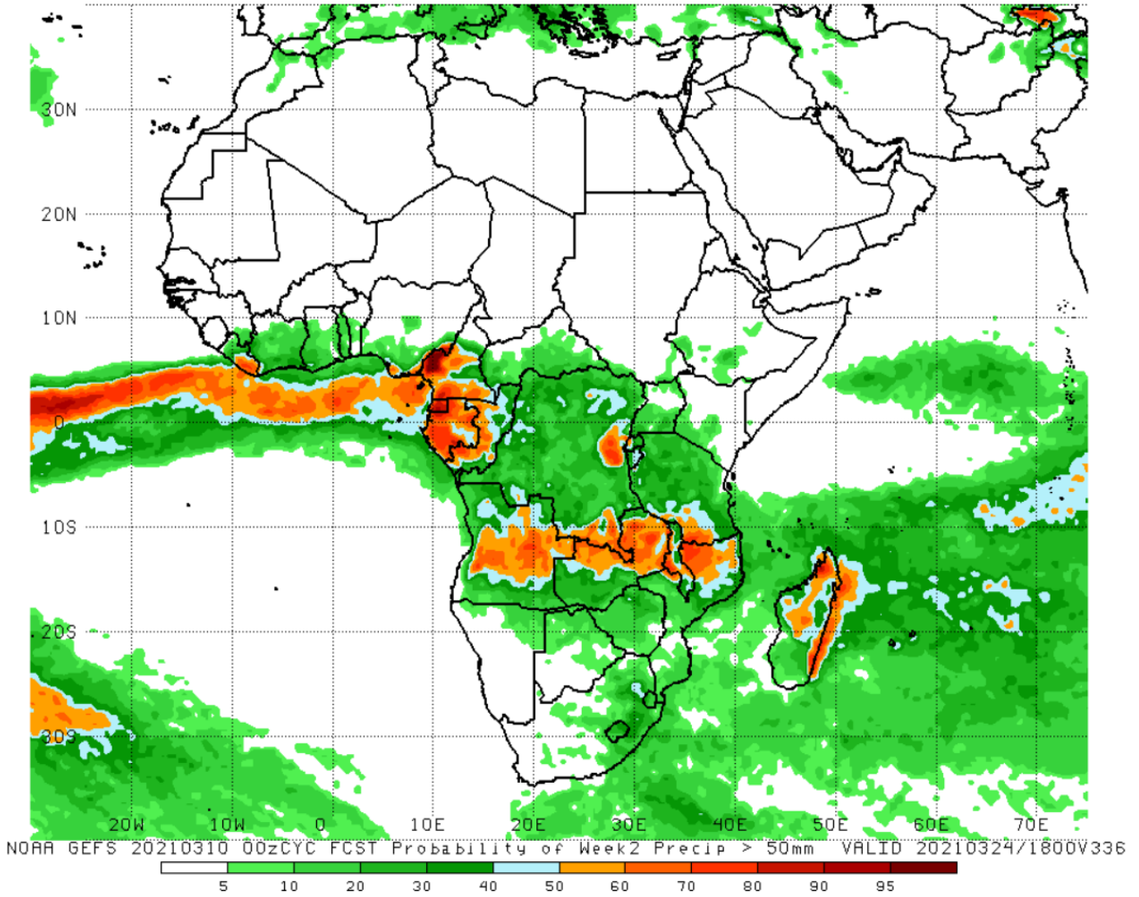
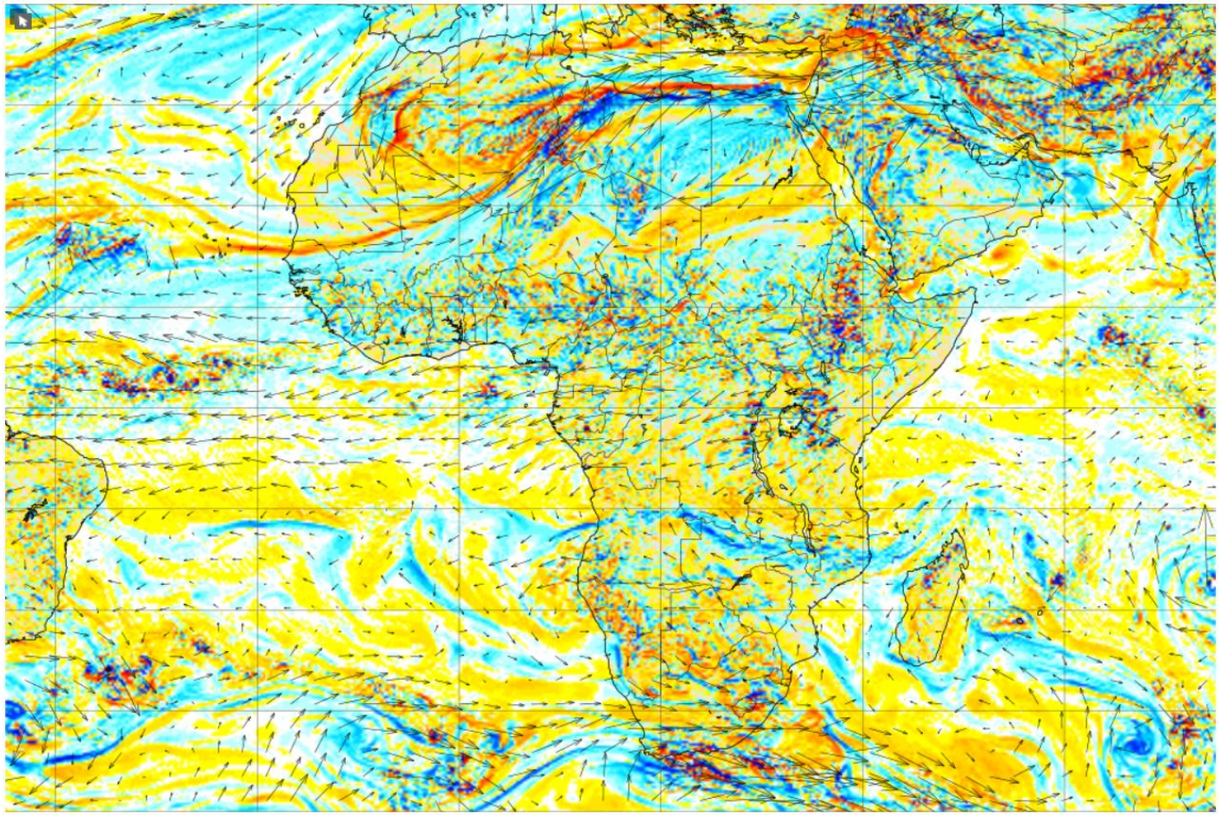


Fig: Week2 Precipitation Total Exceedance Probabilities

https://www.cpc.ncep.noaa.gov/products/international/cpci/data/18/fcsts_africa.shtml

https://www.cpc.ncep.noaa.gov/products/international/cpci/data/18/gefs_wk1_precip50mm_prob_africa.html

WEEK 1 (12-18 Mar 2021) AT 700 hPa RELATIVE VORTICITY AND DIVERGENCE WIND FORECAST FROM CFS ECMWF



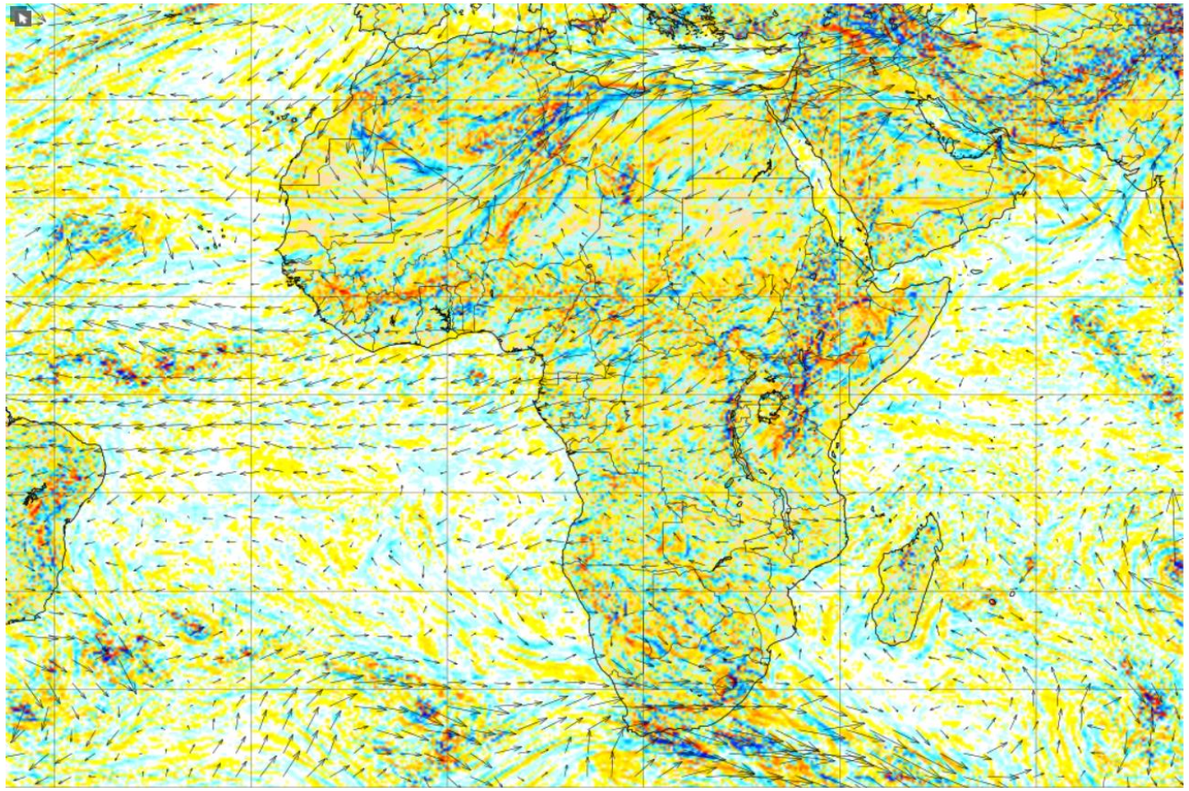


Figure 25: Relative vorticity forecast from cfs ECMWF,

Black wind arrows

Wind

-200 -100 -75 -50 -30 -20 -15 -13 -11 -9 -7 -5 -3 -1 1 3 5 7 9 11 13 15 20 30 50 75 100 200

Relative vorticity

For the forecast we see that there is an intense forecast in Kenya, Tanzania, Namibia, and South Arica

https://www.ecmwf.int/en/forecasts/charts/catalogue/medium-rv-div-uv?facets=undefined&time=2019102300,144,2019102900&projection=africa&layer_name=rv_custo

MONTHLY FORECAST FROM WMO LEAD CENTRE MULTI-MODEL ENSEMBLE

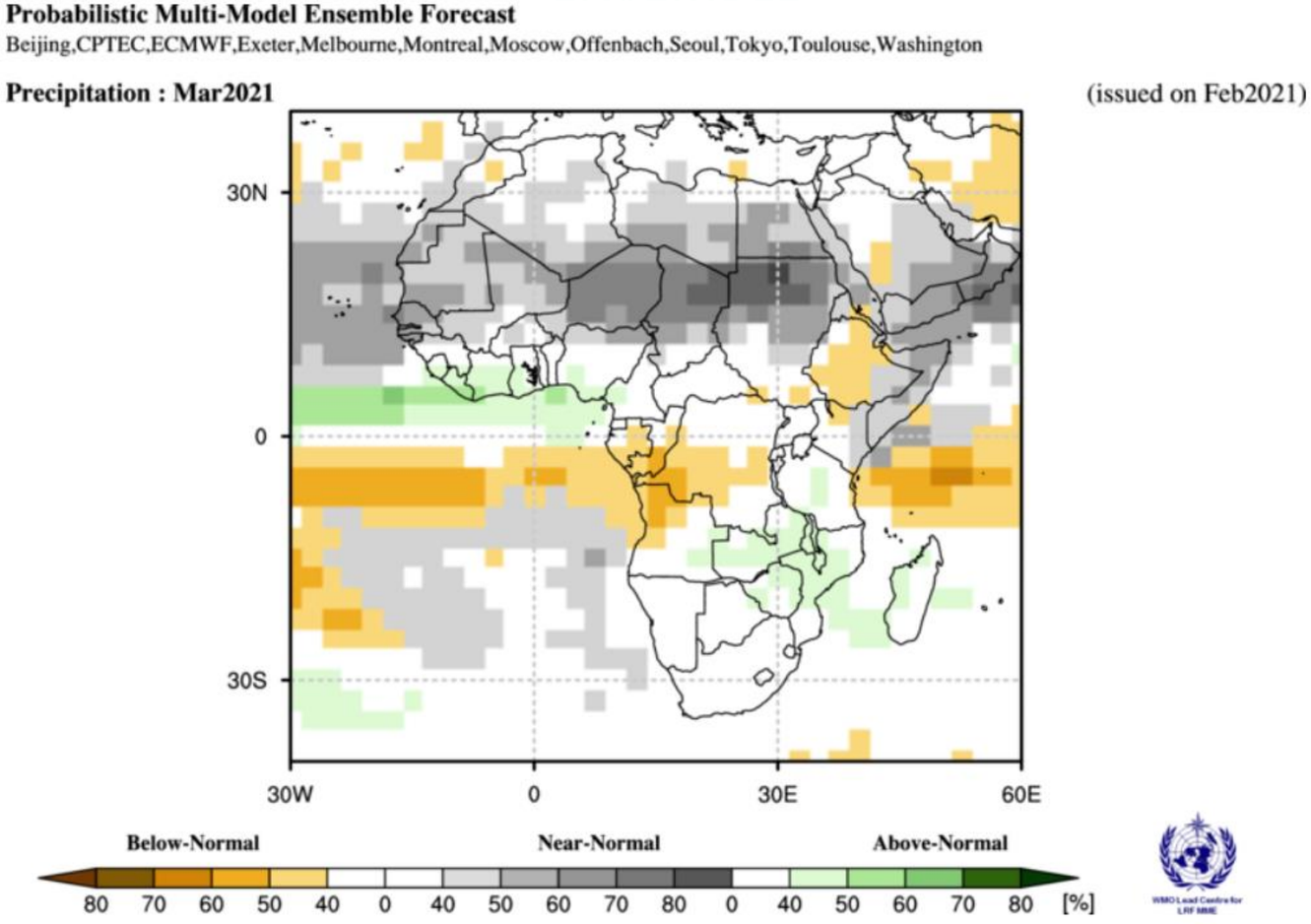
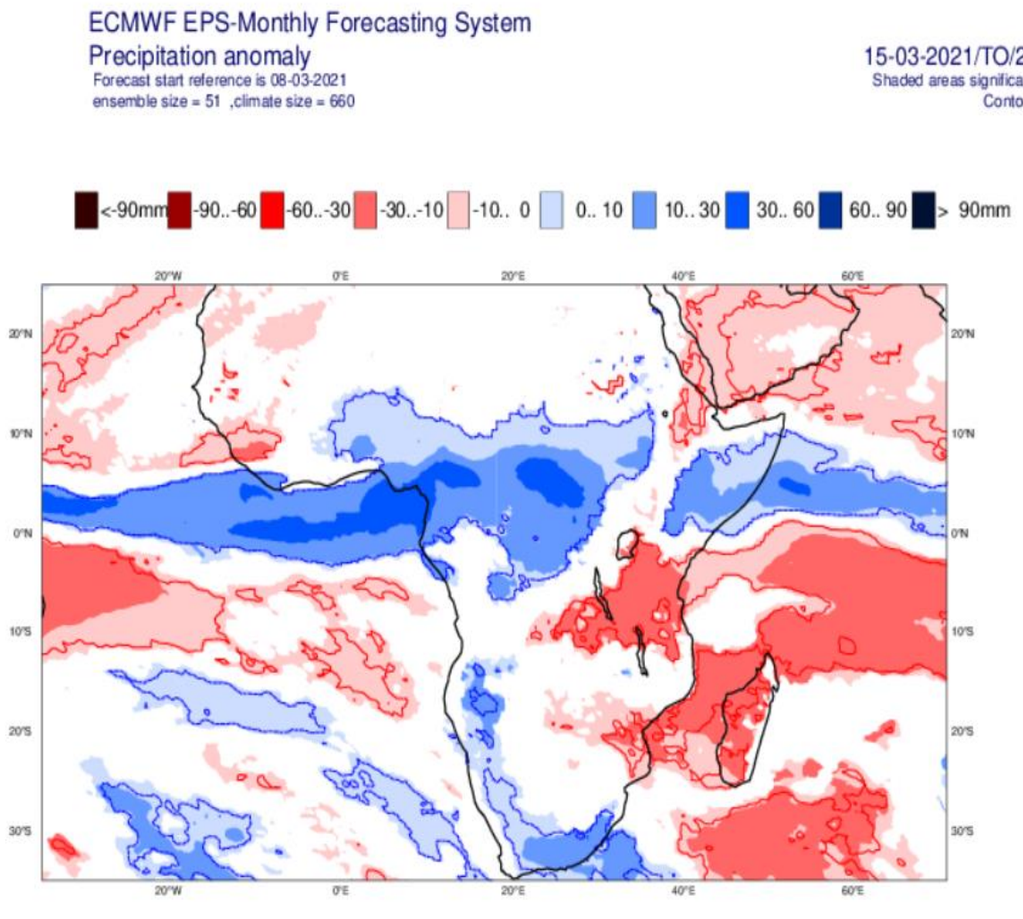


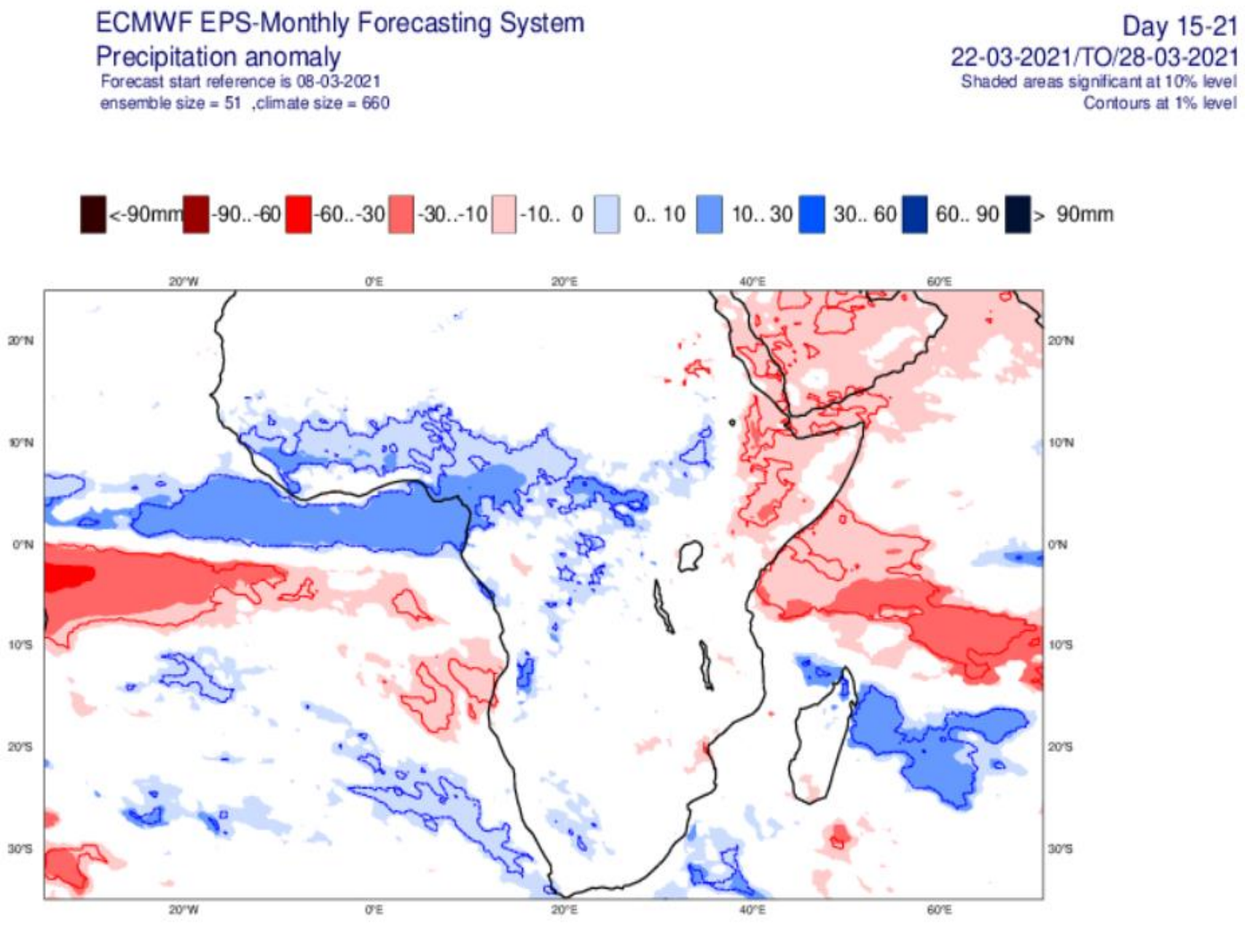
Figure 27: Monthly forecast

The LOMM-level model set tells us that part of the Africa region will have higher than normal rainfall.

https://www.wmolc.org/seasonPmmeUI/view?winName=PlotView1566209968309

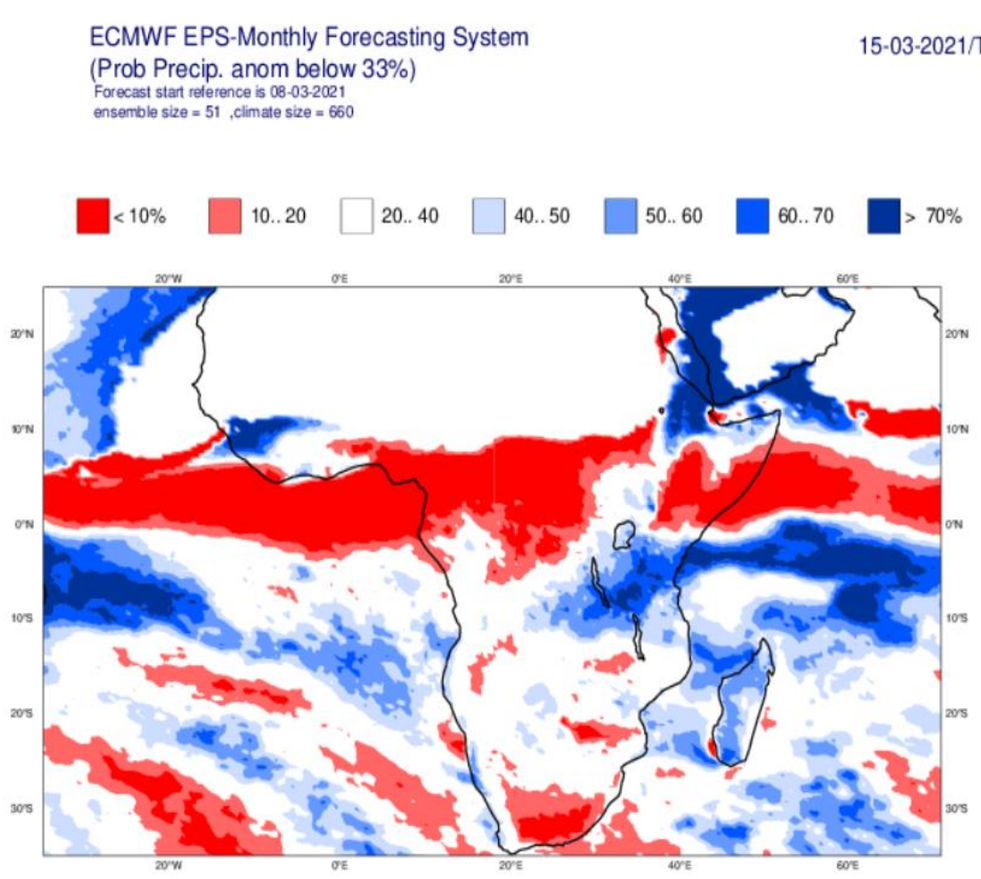
PRECIPITATION FORECASTS FROM ECMWF FOR WEEK 1 & 2





https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_anomaly?facets=undefined&time=2019081500,408,2019090100&parameter=precipitation&area=Global

PROBABILITY PRECIPITATION FORECASTS FROM ECMWF FOR WEEK 1:
Weekly Tercile at below 33% and above 66%



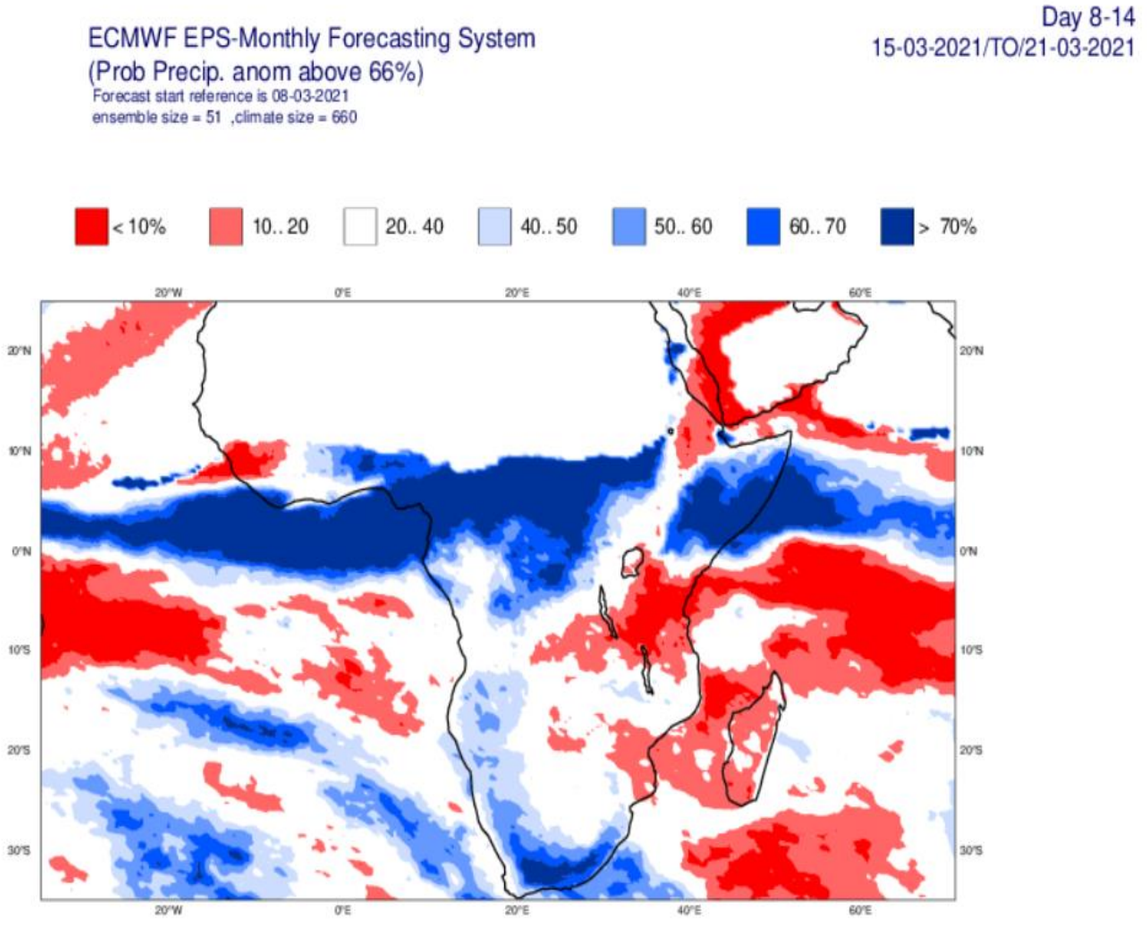
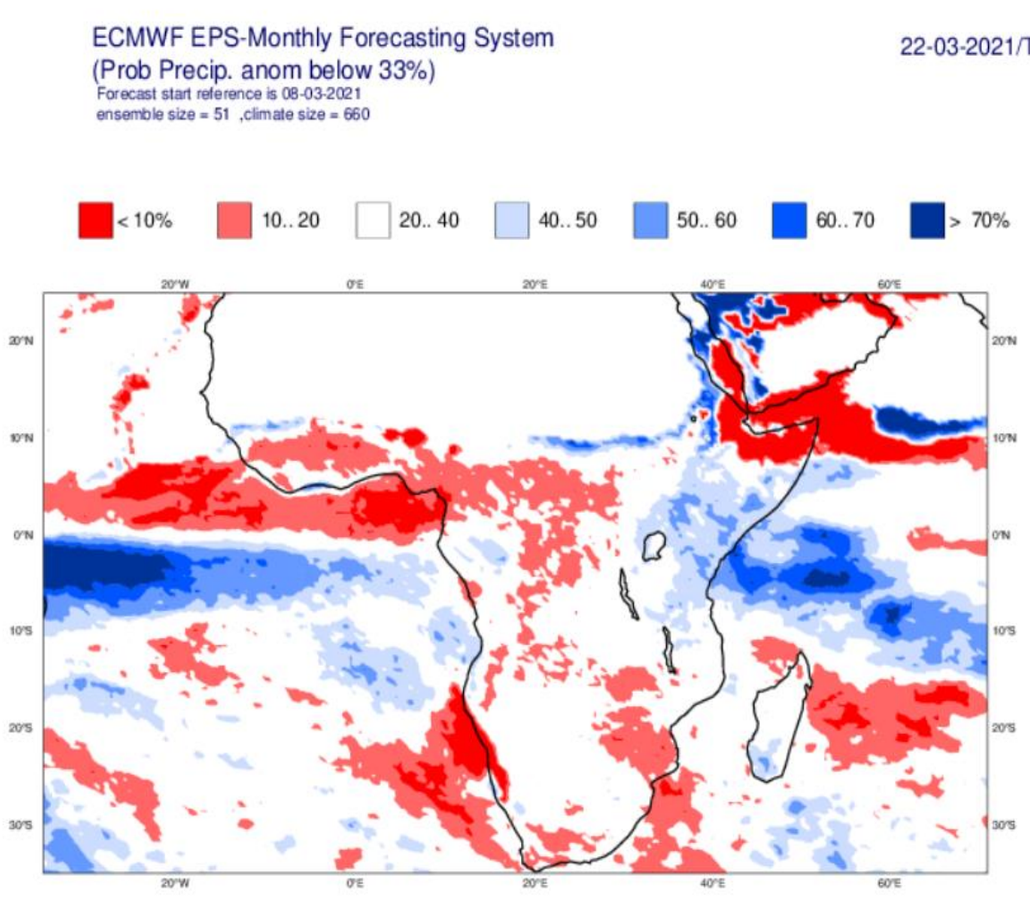


Figure 29: weekly tercil probability forecast below 33%(left) and above 66%(right)

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

PROBABILITY PRECIPITATION FORECASTS FROM ECMWF FOR WEEK 2: Weekly Tercile at below 33% and above 66%



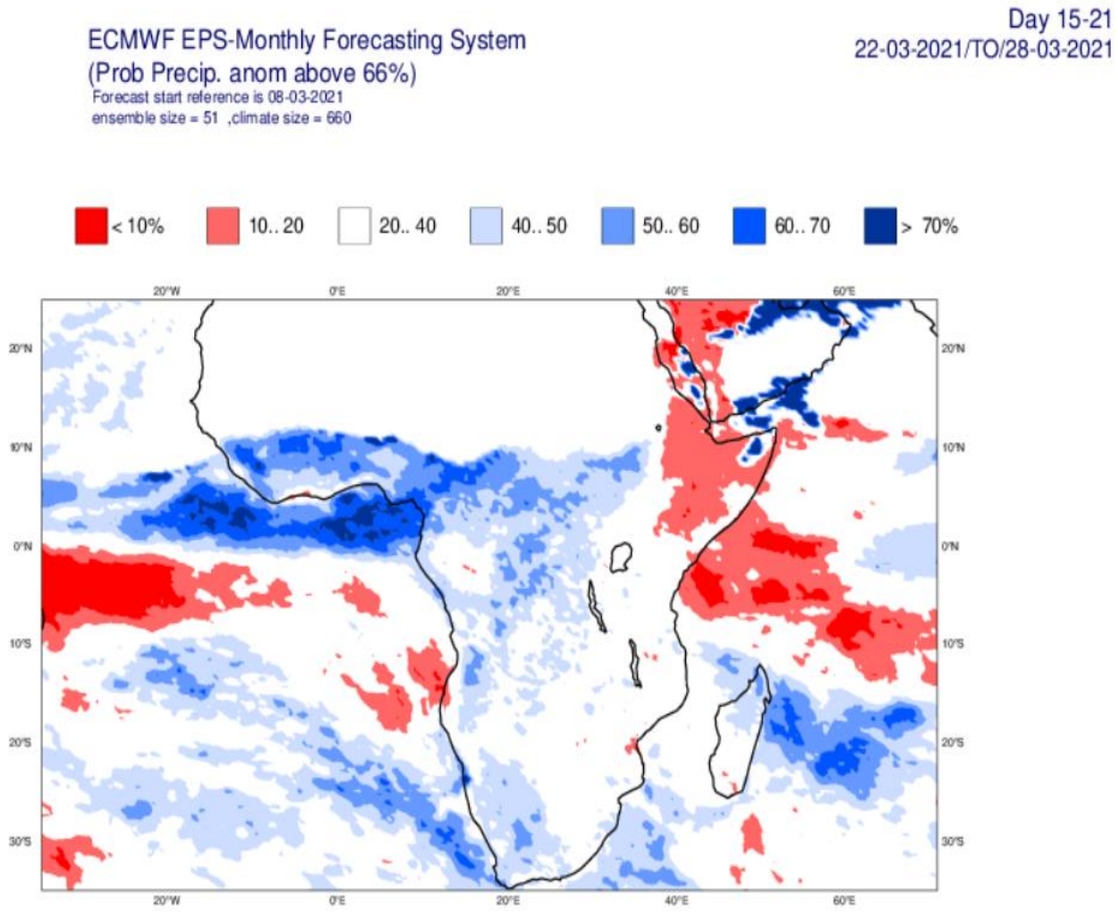
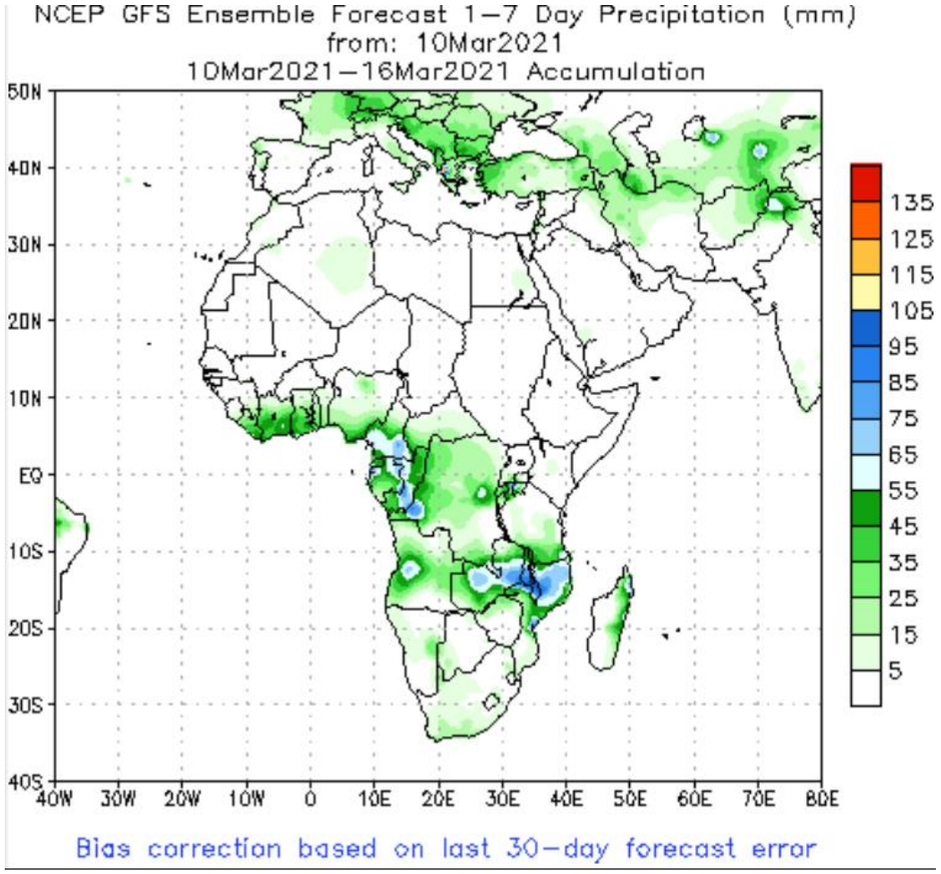


Figure 30: weekly tercil probability forecast below 33%(left) and above 66%(right)

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

African Precipitation

NCEP/GFS Bias-Corrected precipitation and anomaly Forecasts for week one



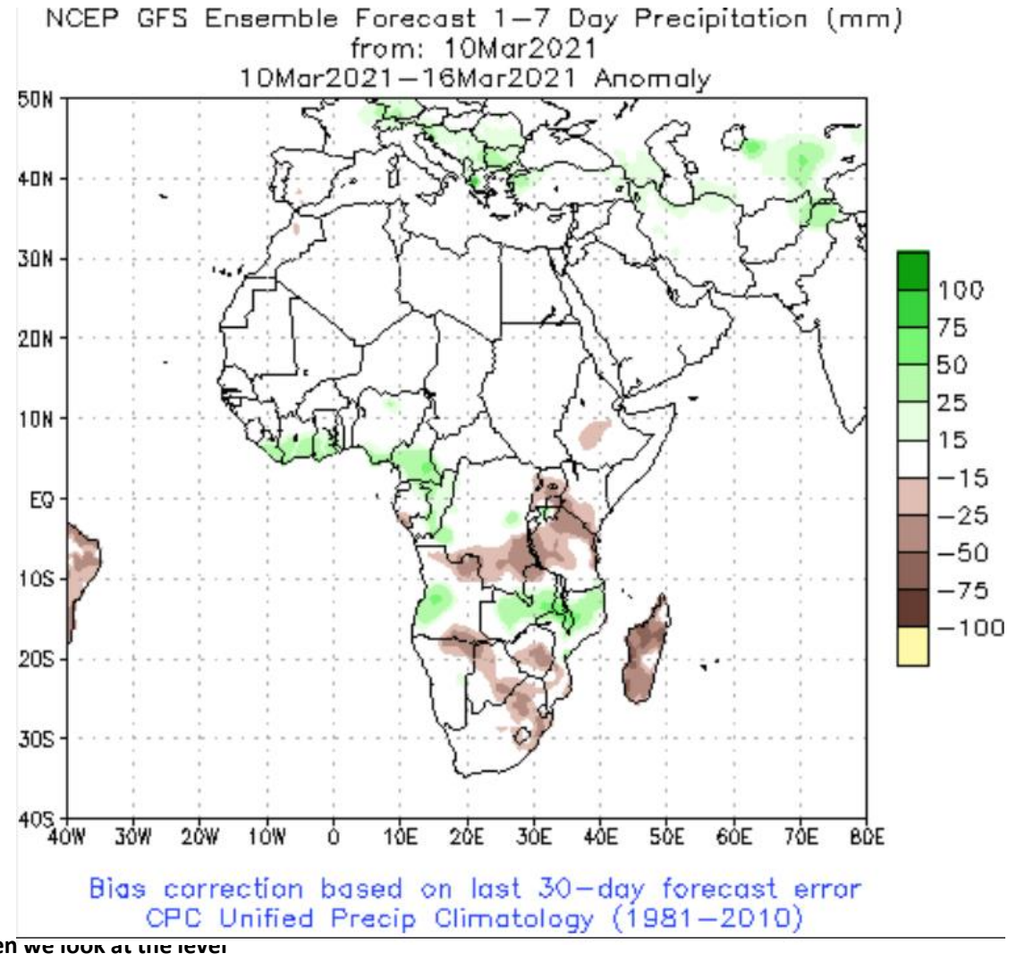


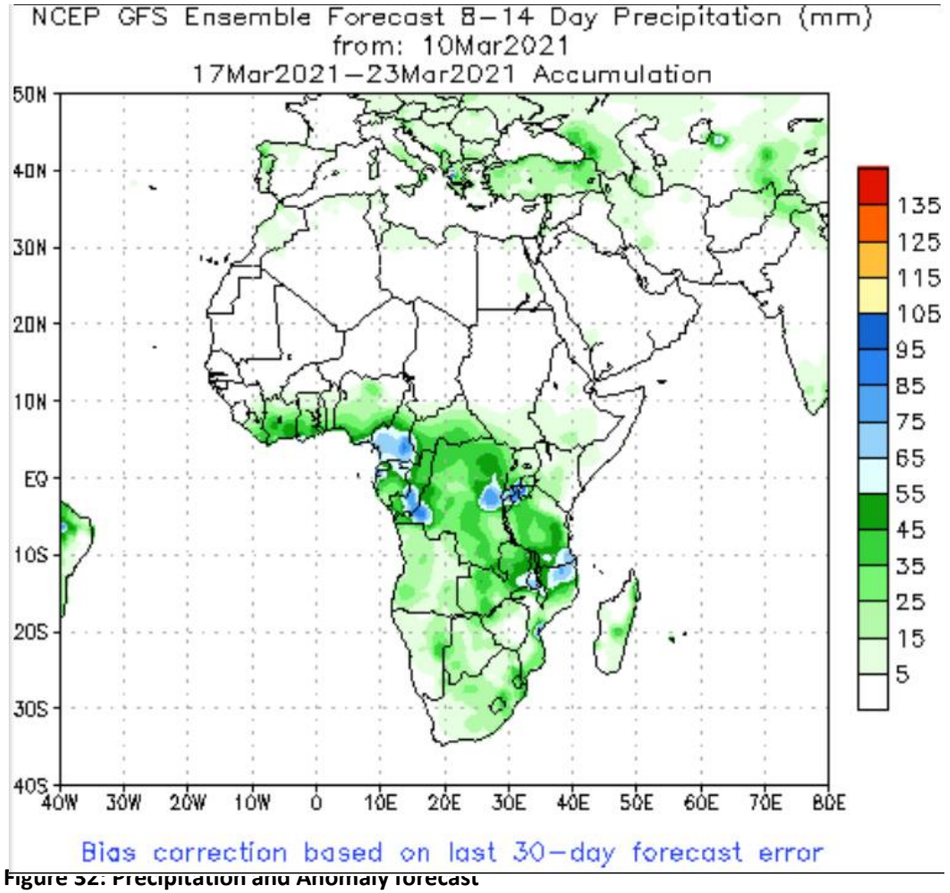
Figure 31- Précipitation and Anomaly forecast

Precipitation of anomalies for the first week will generate more precipitation at the level of East Africa when we look at the level of the anomaly finds that this area is always in surplus.

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

African Precipitation NCEP/GFS Bias-Corrected precipitation and anomaly forecasts for week two



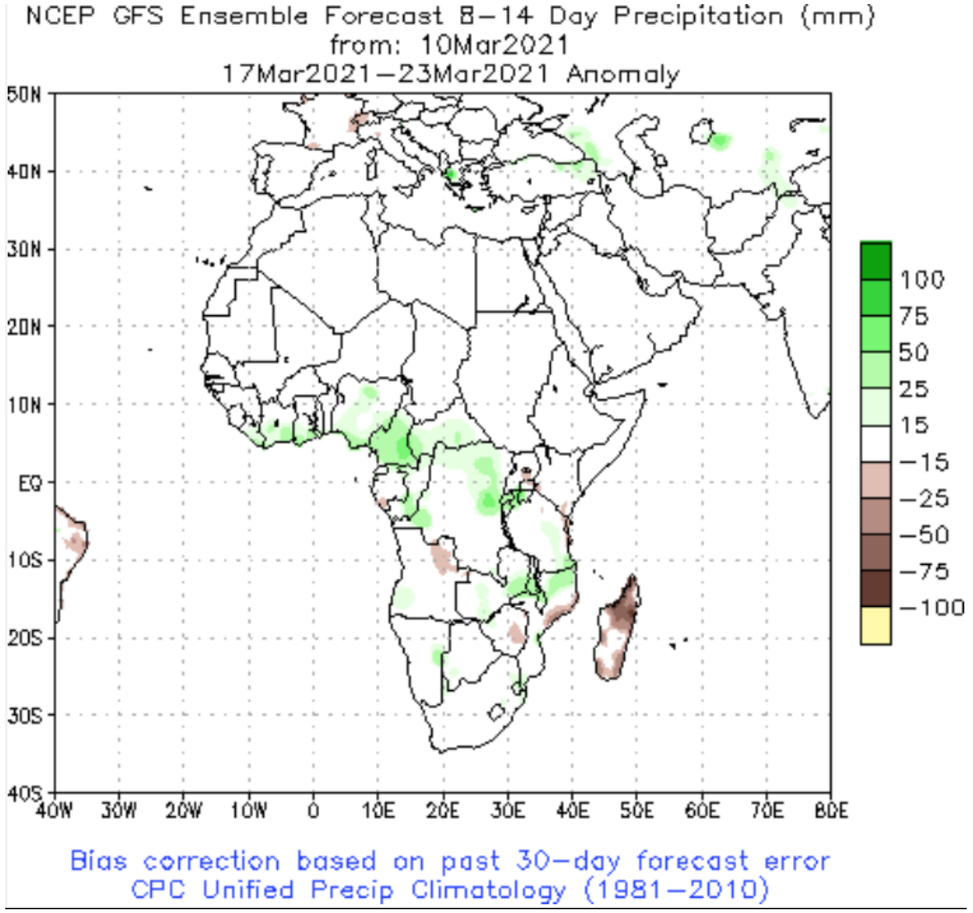


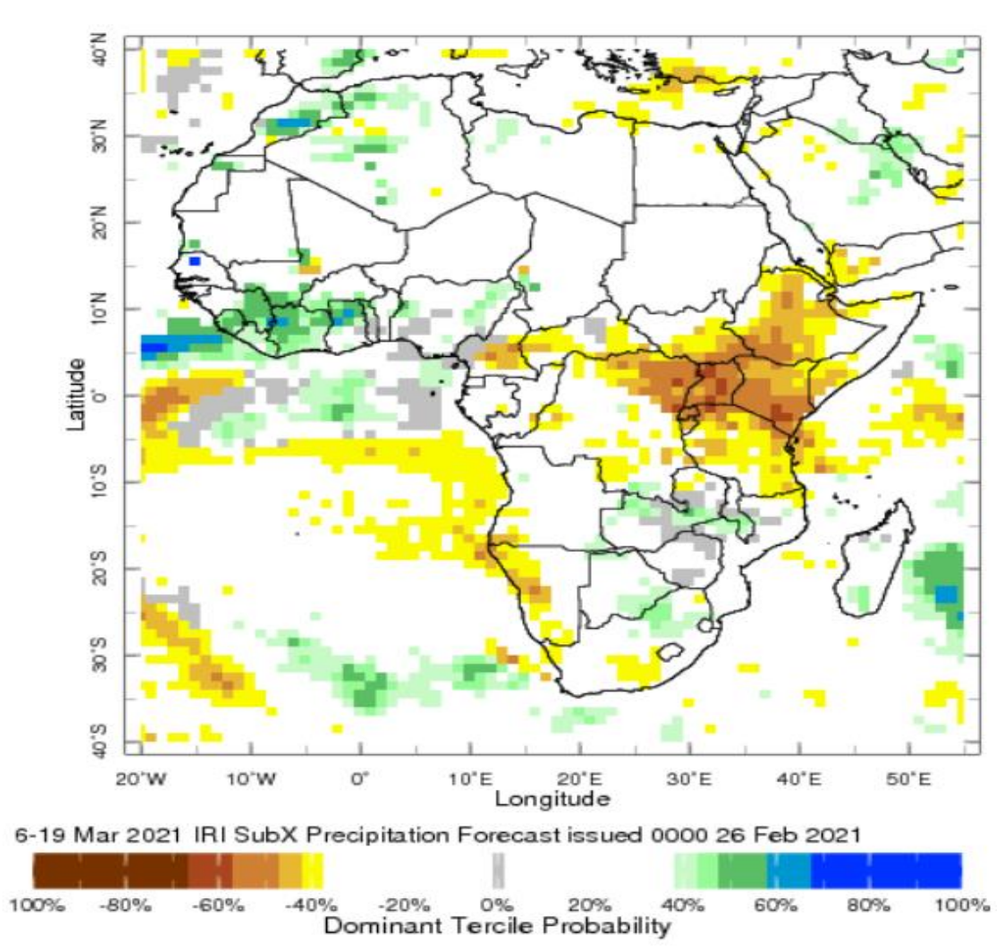
Figure 32: Precipitation and Anomaly forecast

Precipitation of anomalies for the first week will generate more precipitation at the level of East Africa when we look at the level of the anomaly finds that this area is always in surplus.

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

PRECIPITATION PROBABILITY FORECAST 6 – 26 Mar 2021



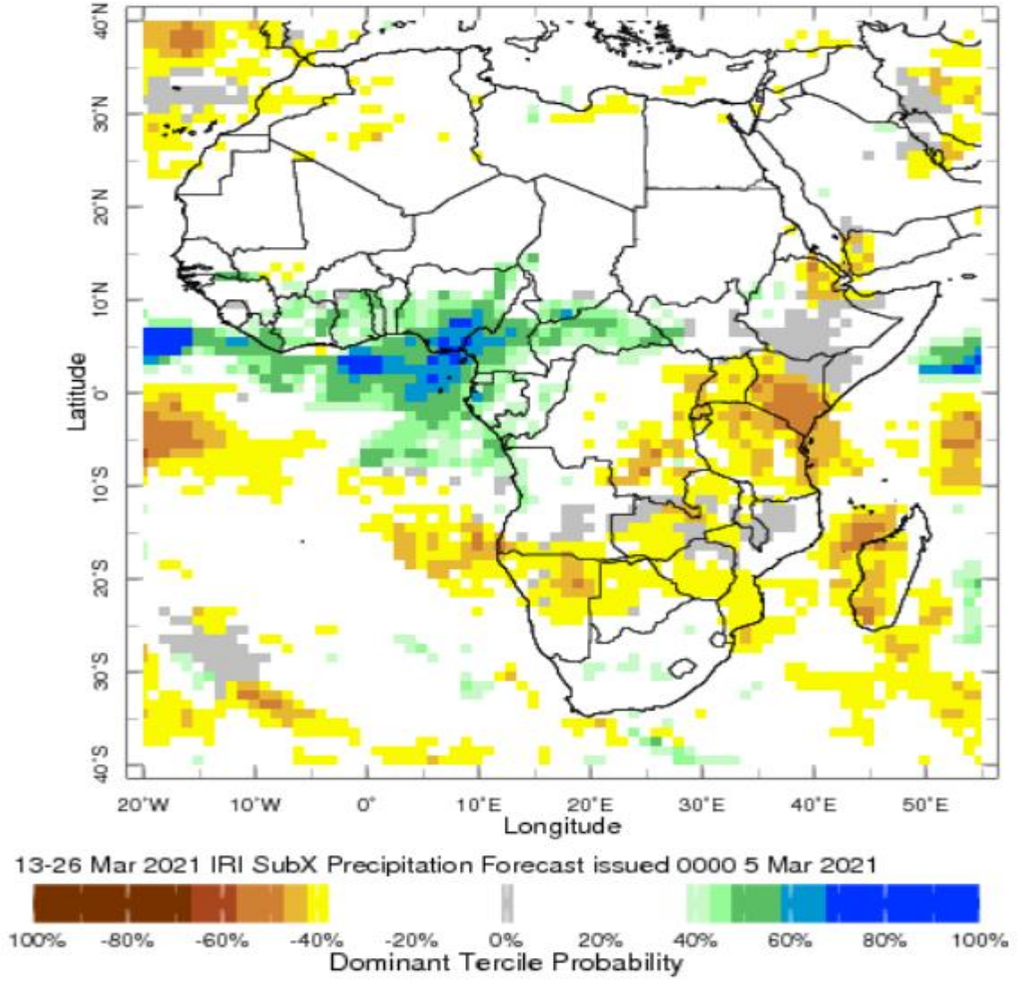


Figure 34- Précipitation and Anomaly forecast

https://iridl.ldeo.columbia.edu/maproom/Global/ForecastsS2S/precip_subx.html?Set-Language=en&bbox=bb%3A-20%3A-40%3A55%3A40%3Abb&S=0000%205%20Feb%202021&region=bb%3A-2%3A30%3A-1%3A31%3Abb

CLIMATOLOGY OF PRECIPITATIONS FOR UPCOMING WEEK 1 & 2

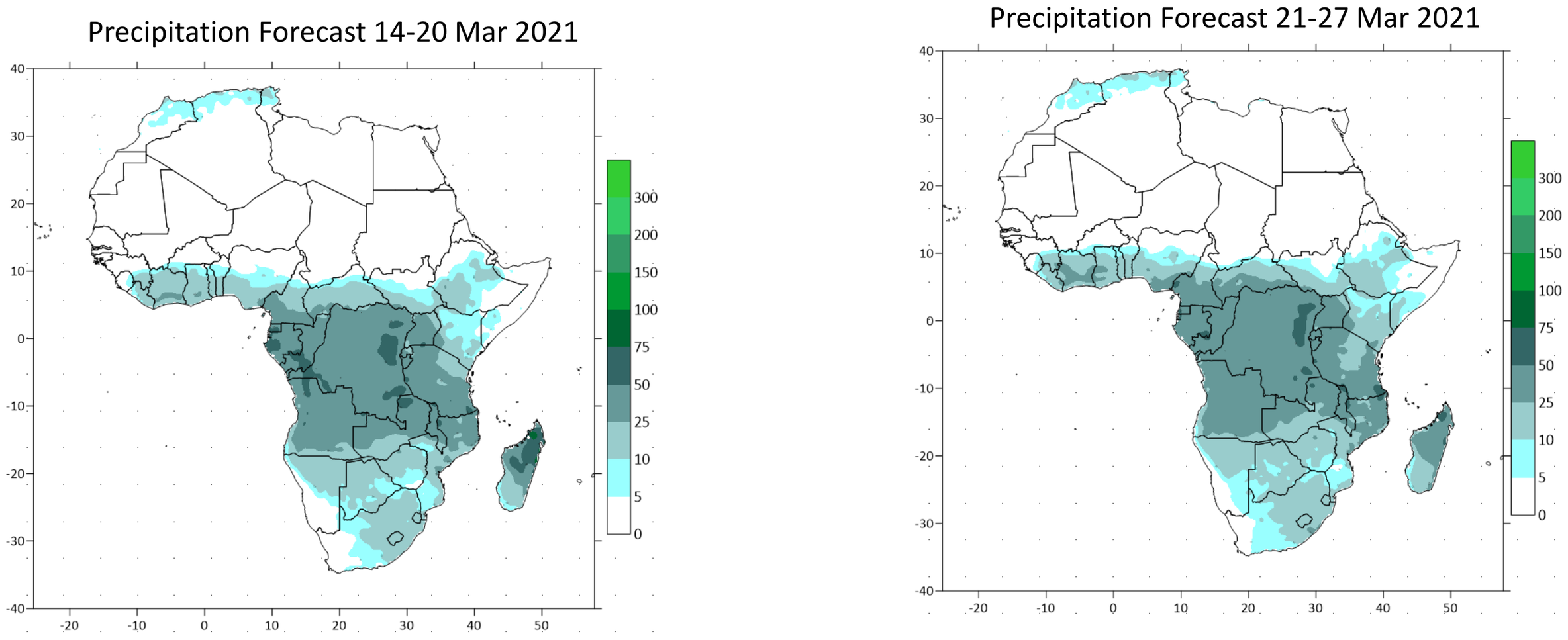
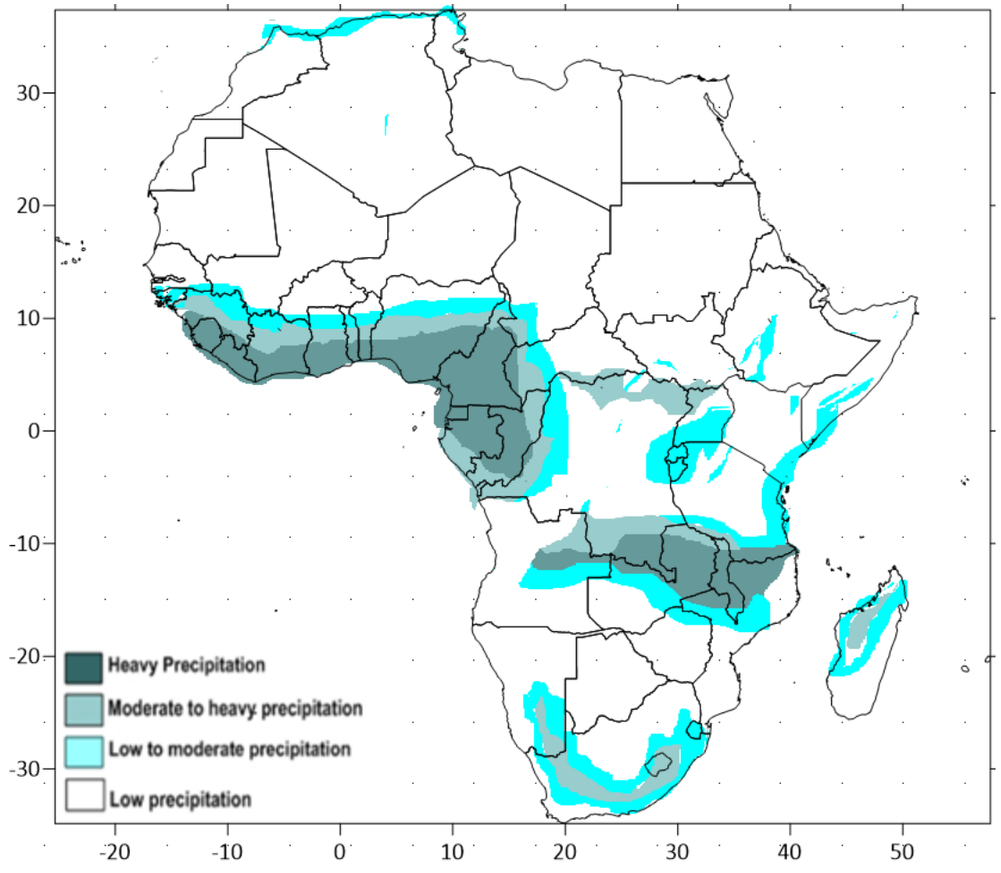


Figure 34: Climatology of Precipation for week-1(left panel) and week-2 (right panel)

PRECIPITATION FORECAST FOR THE COMING TWO CONSECUTIVE WEEKS

Precipitation Forecast 14-20 Mar 2021



Precipitation Forecast 21-27 Mar 2021

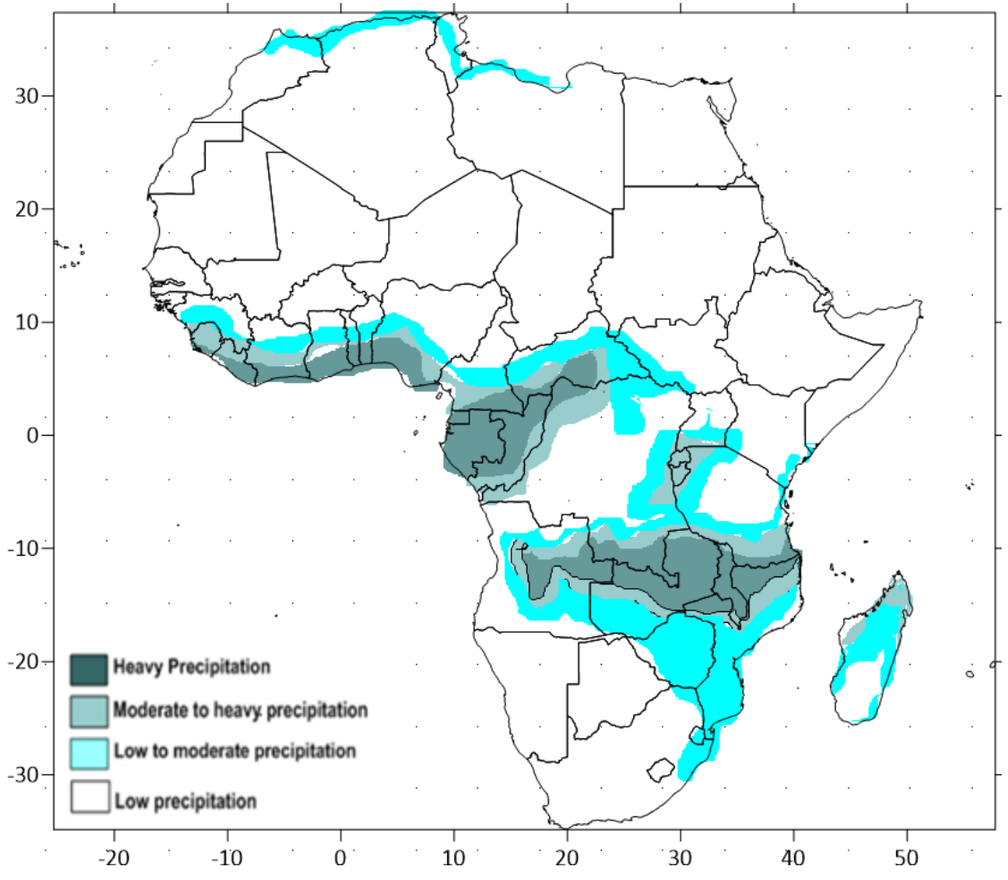


Figure 35: Precipation forecast Analysis