DEKADAL TECHNICAL NOTE FOR THIRD DEKAD OF JUNE, 2021
AND PRECIPITATION FORECAST FOR WEEK 1 AND 2

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Edited by: **Hubert KABENGELA**

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   - Weekly and monthly SST anomaly assessment
   - Dekadal velocity potential with MJO, Kelvin and Rossby Wave
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3. Weekly Climate outlook
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   - Two week climatology
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Estimated Cumulative Precipitation in % of average for the Third Dekad of June 2021

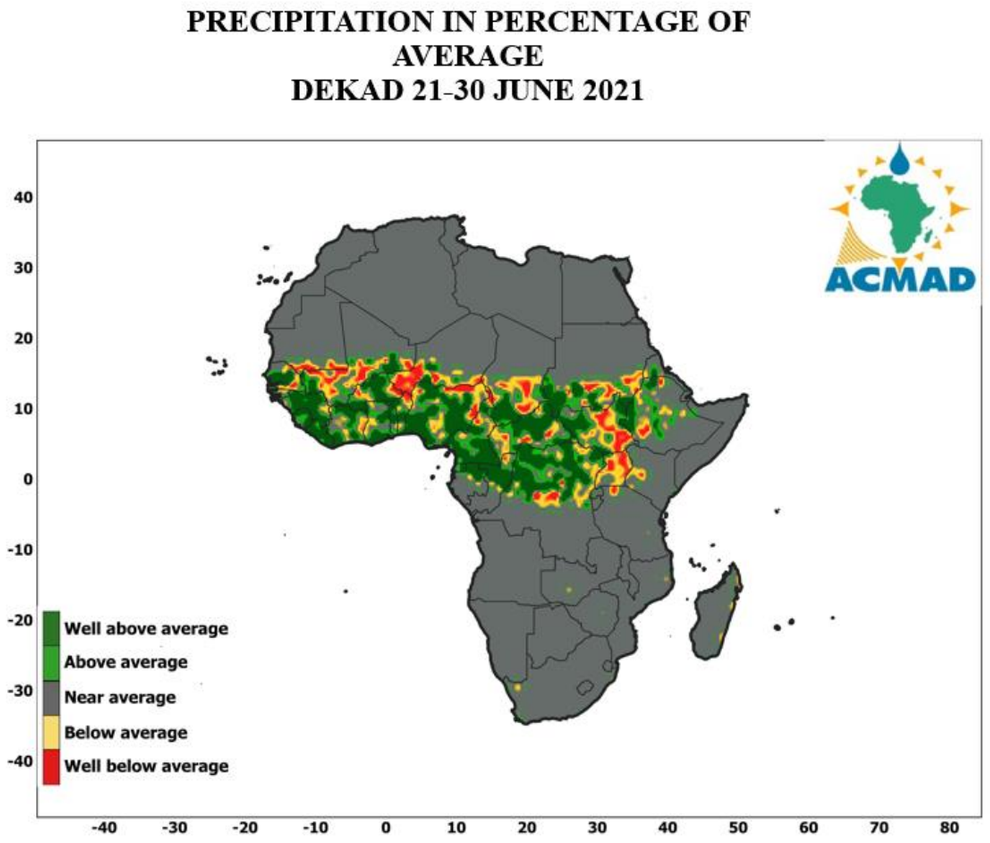
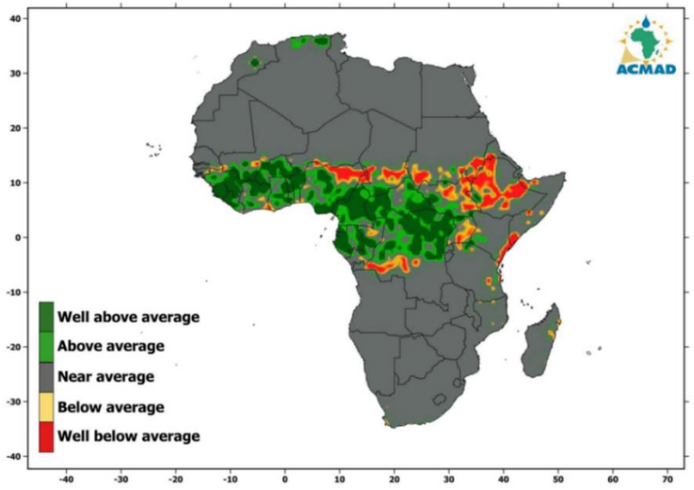


Figure 1: **This map displays dekadal average precipitation in percent of average**

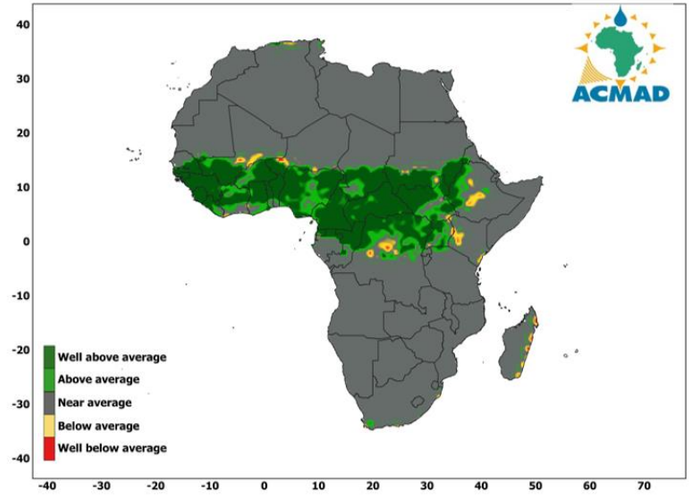
The figure shows that below average to well below average précipitation was observed over the Sahel, western Uganda and South Sudan while countries to the Gulf of Guinea observed above average to well above average precipitation. Eastern Ethiopia and Uganda had near average rainfall during the 3rd Dekad of June 2021.

Data : SOURCES/.NOAA/.NCEP/.CPC/.FEWS/.Africa/.DAILY/.ARC2/.daily/.est_prcp/X/-20/0.5/70/GRID/Y/-40/0.5/40/GRID/T/%2821-31%20Jul%202014%20%29RANGE/T/SUM/

Temporal and Spatial Change of % of Average Precip for the Last Four Dekads

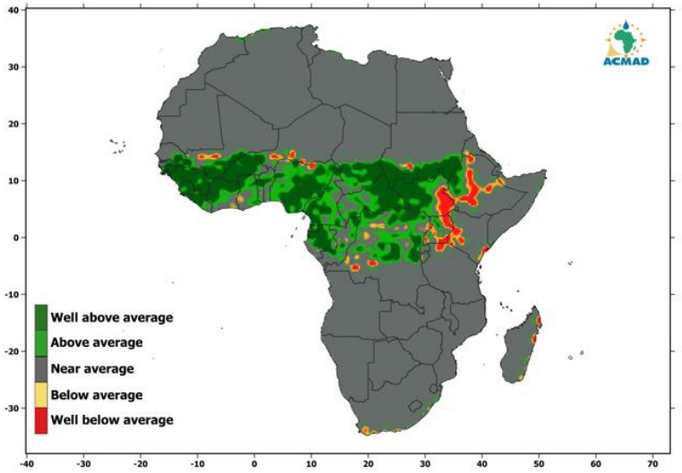


2nd Dekad of June 2021 % of Average Precipitation



The maps displayed show the rainfall situation worsened during the third dekad of May over eastern parts of Africa, whereby all the countries experienced well below normal rainfall. Central African and Gulf of Guinea Countries continued to experience above to well above average rainfall. The first dekad of June shows that well above to above-average précipitation was observed over the countries around the equator, while western Ethiopia and eastern Uganda and Sudan received well below average rainfall. There was an improvement in areas that observed rainfall deficit in the first dekad of June. No country observed well below average rainfall condition during the second dekad of June. The third dekad experienced below average to well below average précipitation over the Sahel, western Uganda and South Sudan while countries to the Gulf of Guinea observed above average to well above average precipitation. Eastern Ethiopia and Uganda had near average rainfall during the dekad under review.

1st Dekad of June 2021 % of average of Precipitation



3rd Dekad of June 2021 % of Average Precipitation

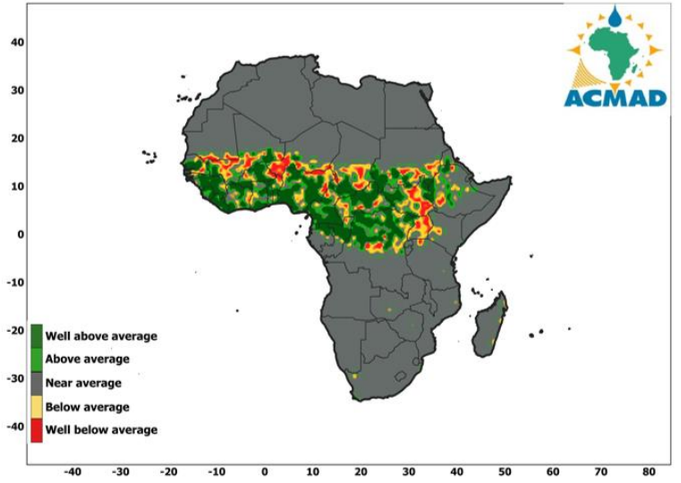
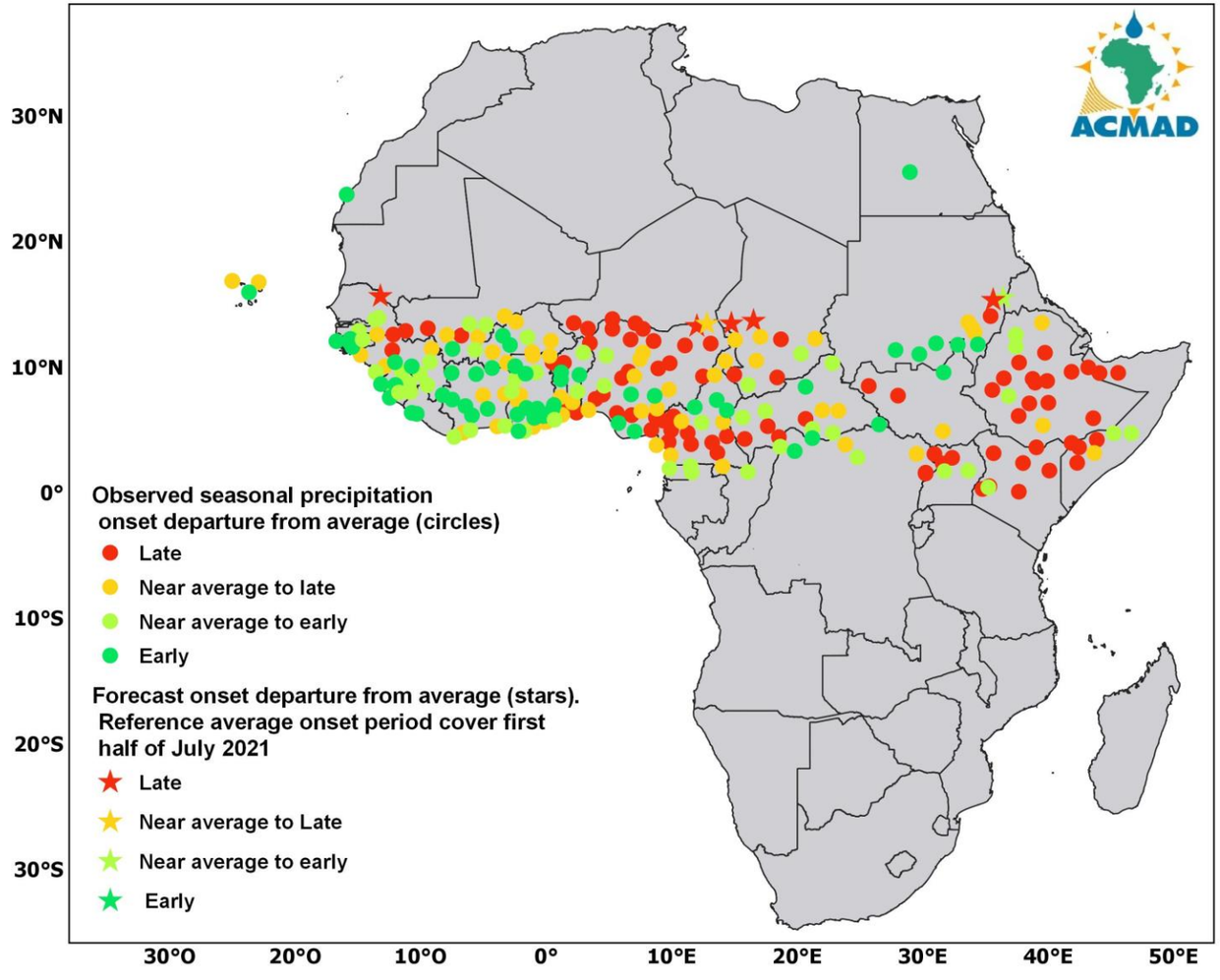
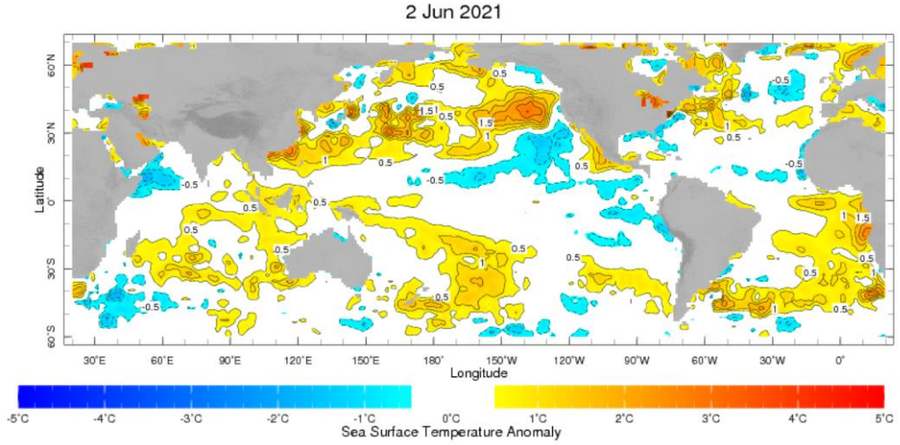


Figure 2: **This maps display decadal average precipitation in percent of average**

PRECIPITATION ONSET OBSERVATION AND OUTLOOK VALID FOR THE NEXT 2 WEEKS: JULY 01 TO 15, 2021.
ISSUED: JULY 01, 2021

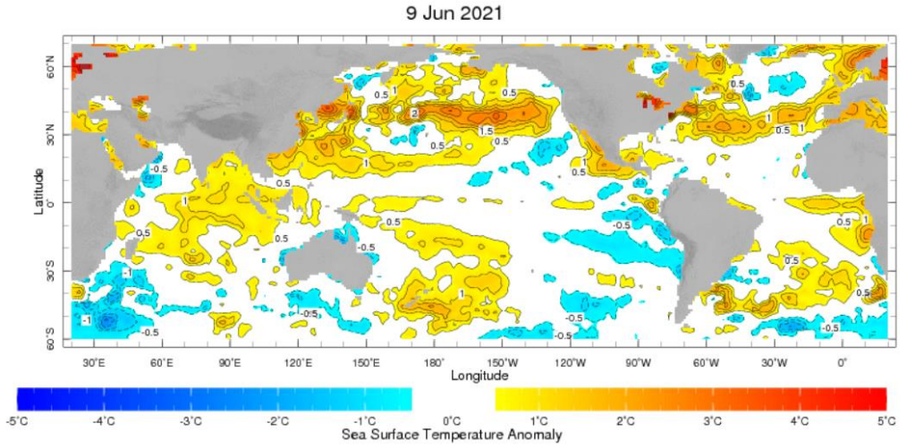


Weekly Sea Surface Temperature Anomaly

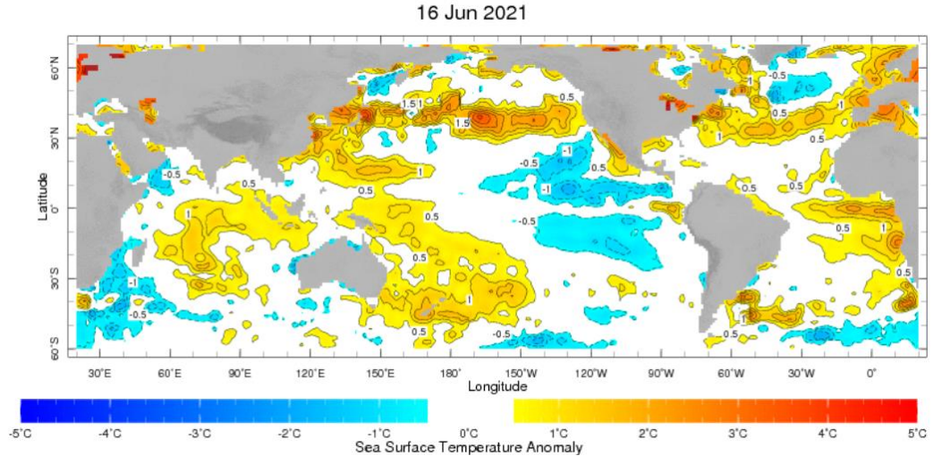


These maps display weekly sea surface temperature anomalies over the globe, and they depict mostly normal to cooling conditions over the equatorial Pacific with warm SSTs observed over northern and southern Atlantic and cooling over the south-western Indian ocean.

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



11 June – 20 June 2021 http://iridl.ldeo.columbia.edu/maproom/Global/Ocean_Temp/Weekly_Anomaly.html?



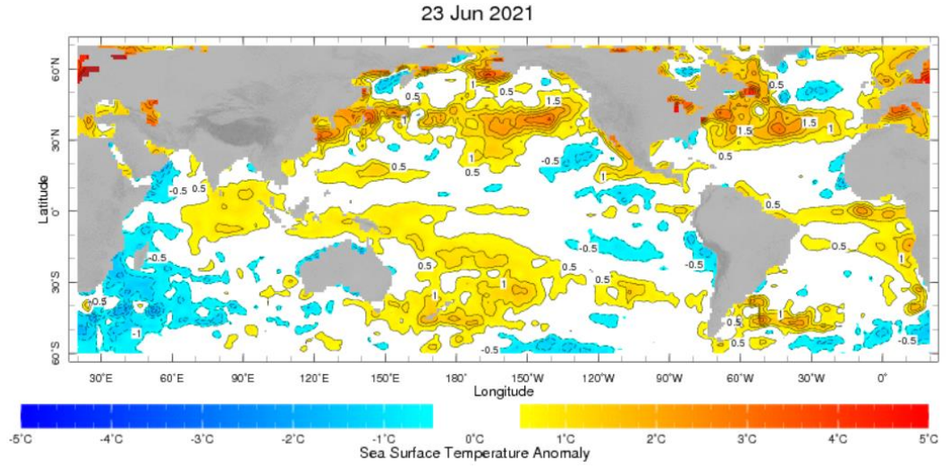
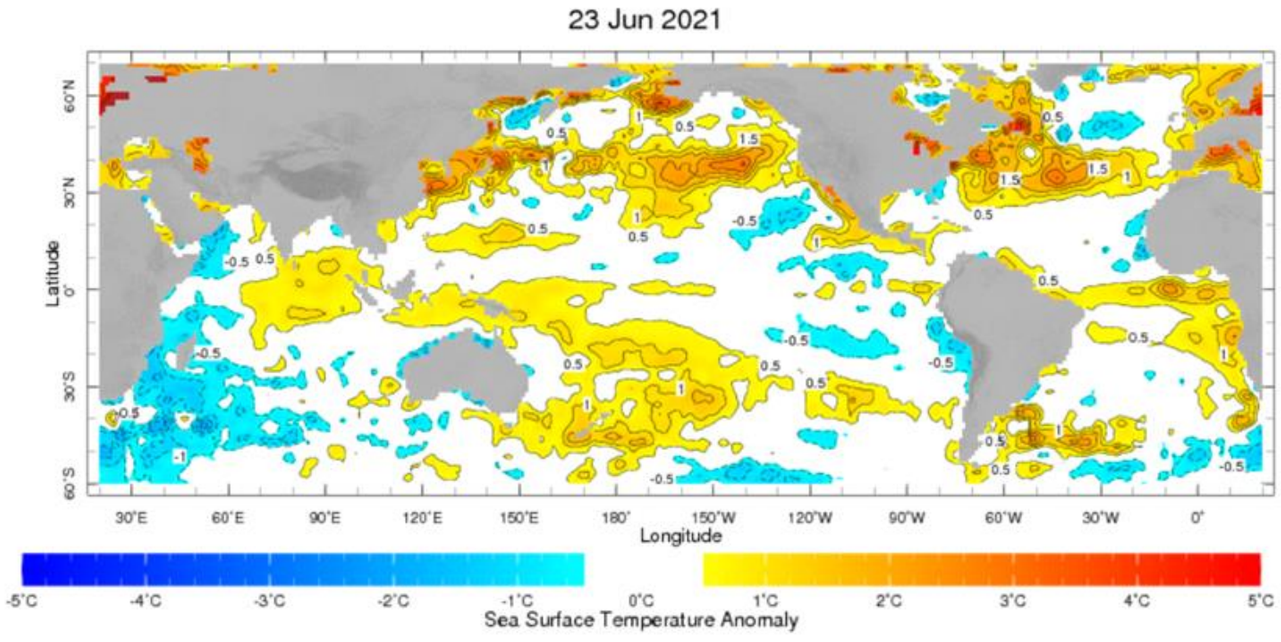
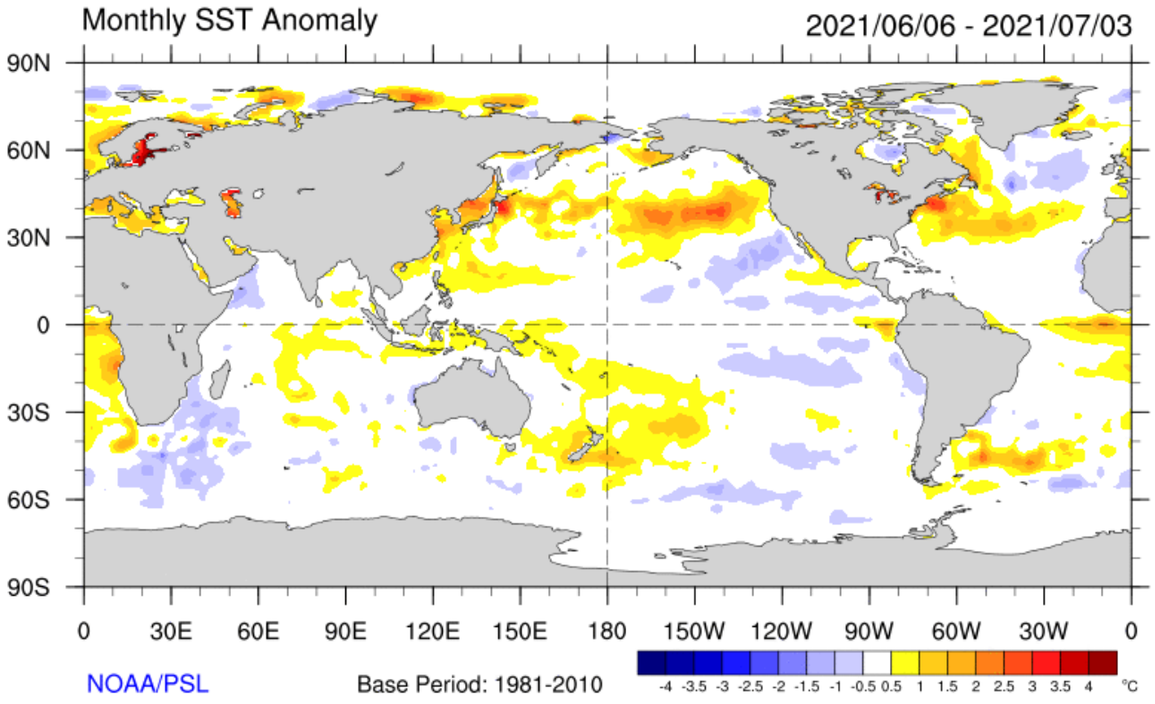


Figure 3: Maps display weekly sea surface temperature anomalies over the globe for last four weeks

Last Month's Sea SurfaceTemperatures (SST) Observed





During 6th of June to 3rd of July 2021, the cooling persisted over eastern Equatorial Pacific, and the South-Western Indian Ocean, whereas the Tropical South Atlantic, and western pacific continued warming.

Figure 4 : Maps display monthly sea surface temperature anomalies over the globe.

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

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

SST OBS AND FCST FOR TWO WEEKS

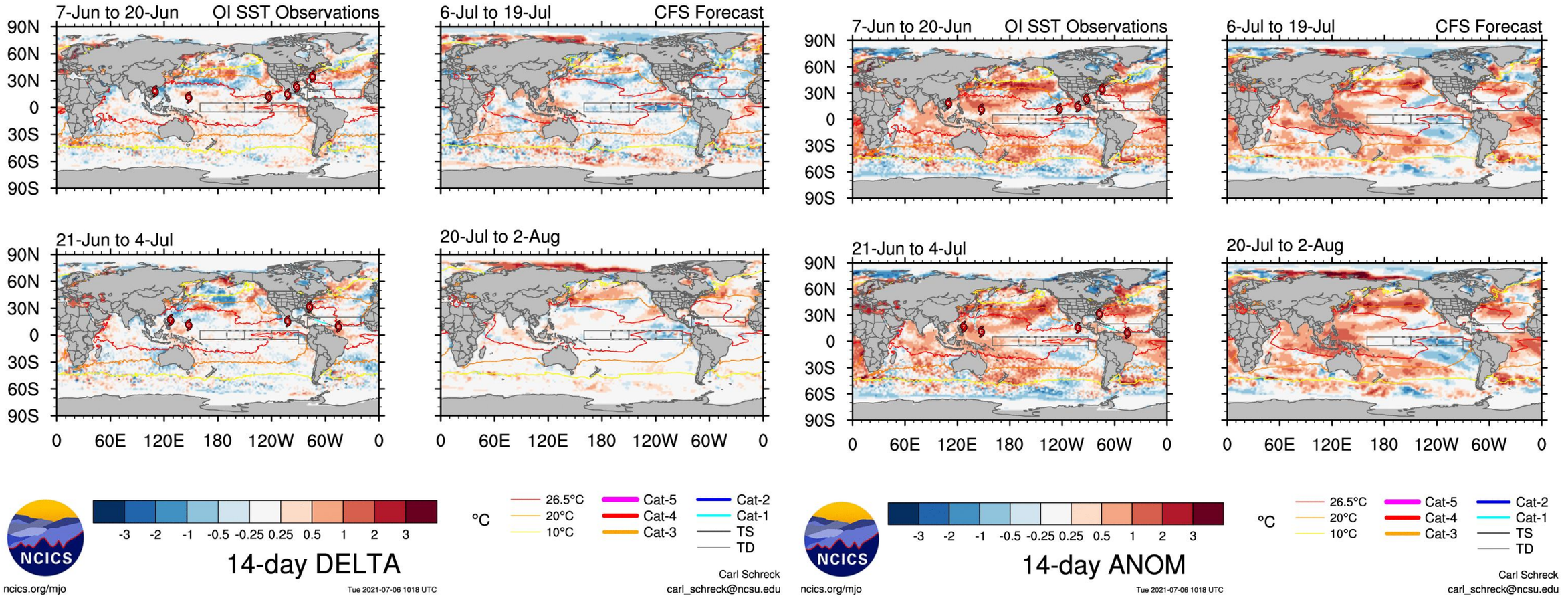


Figure 5: Sea Surface Temperature and FCST for two week

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 for Africa and Globally

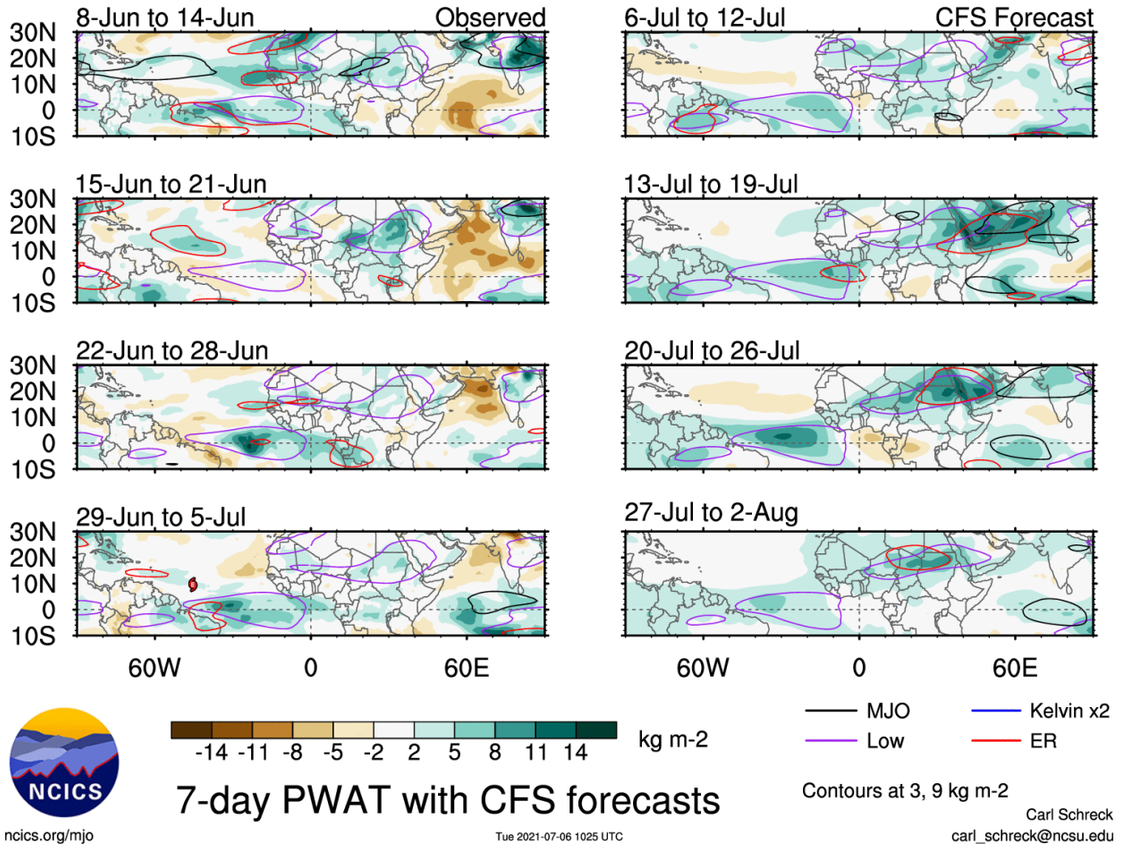


Figure 7a: Africa

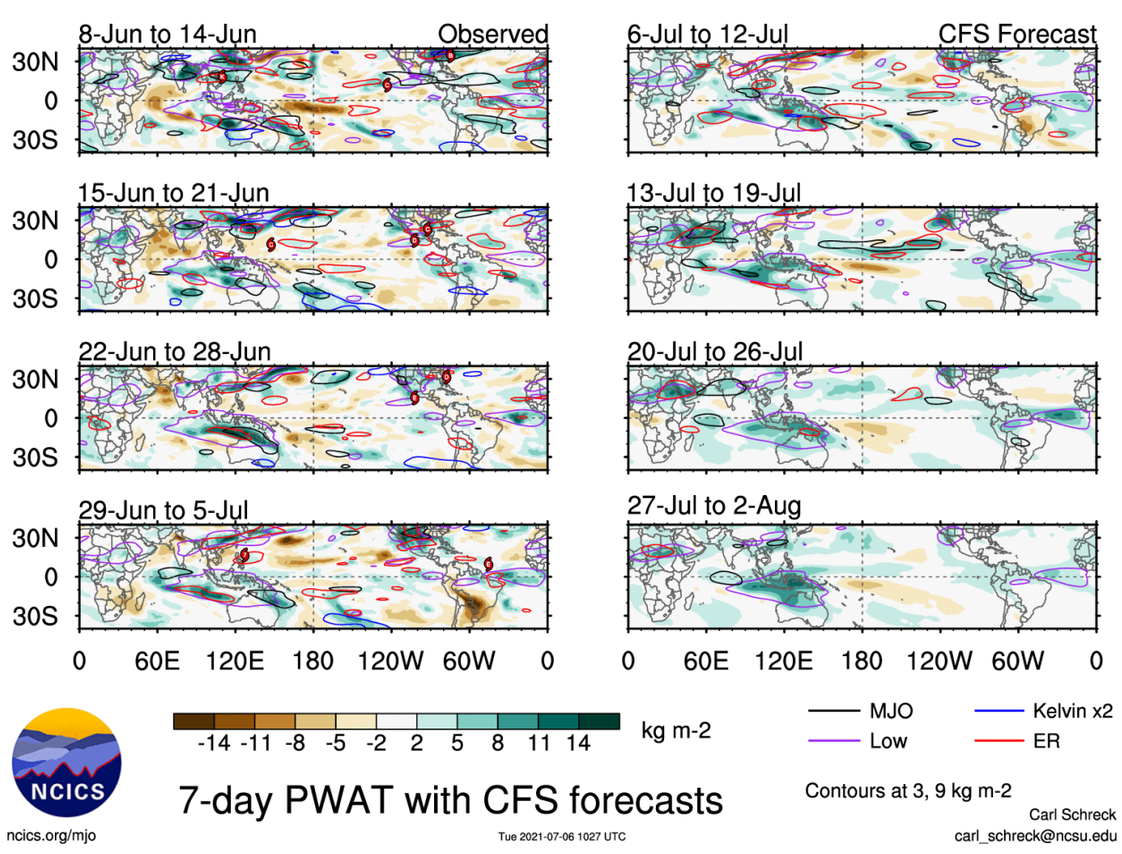


Figure 7b: Global

Figure 6: Past four week Precipitable Water and Outlooks

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

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

Past Four Weeks Velocity Potential with MJO, Kelvin and Rossby Wave overlaid on Global Maps at 850mb and 200mb

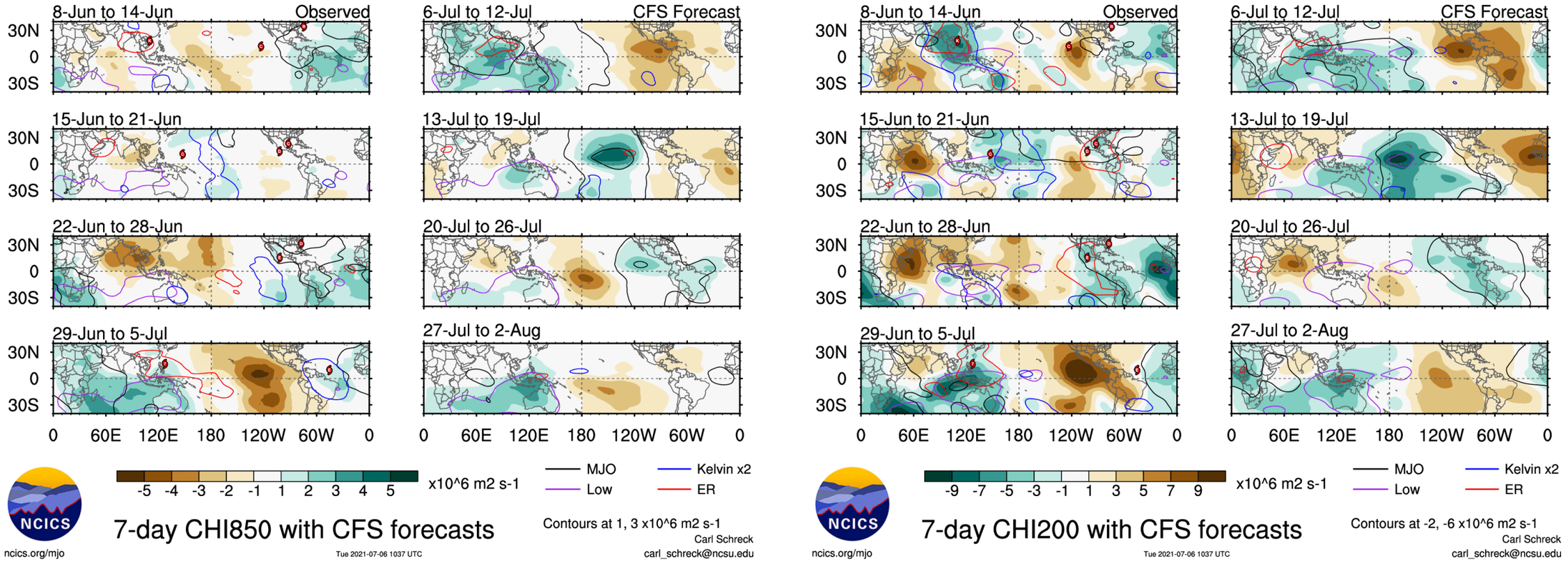
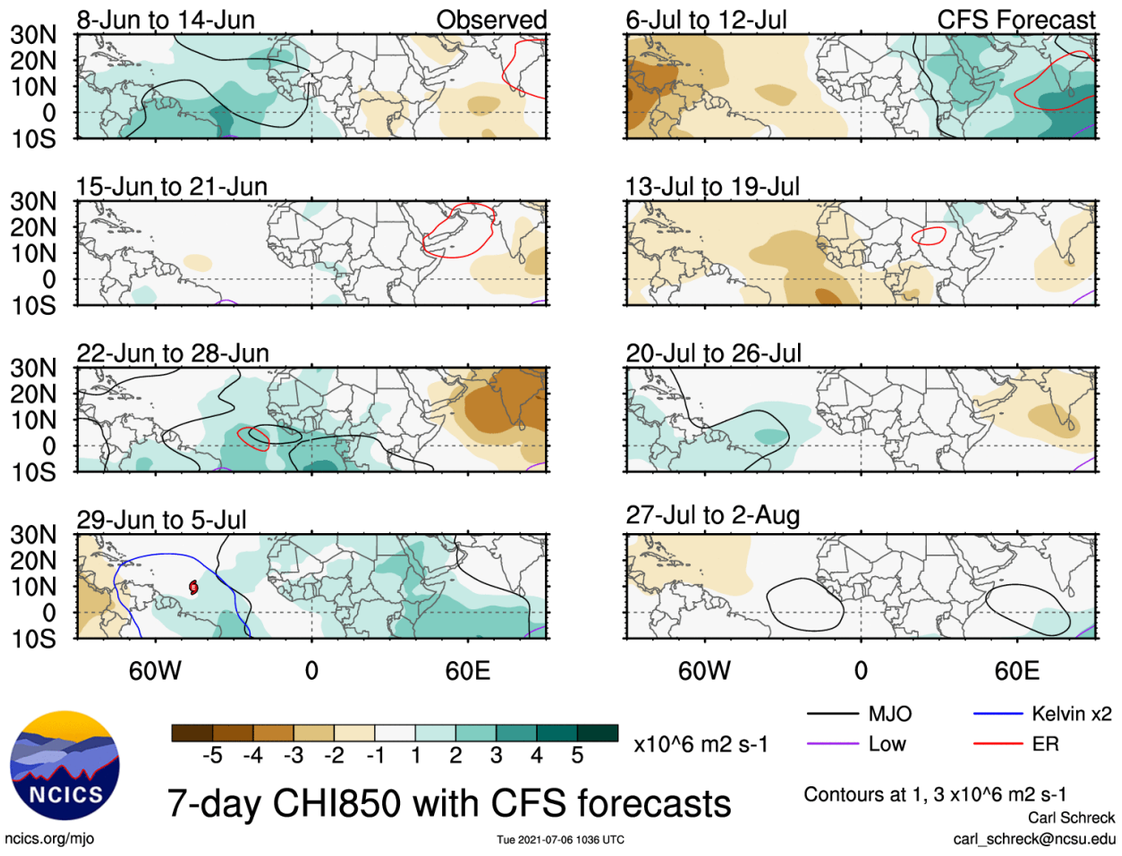


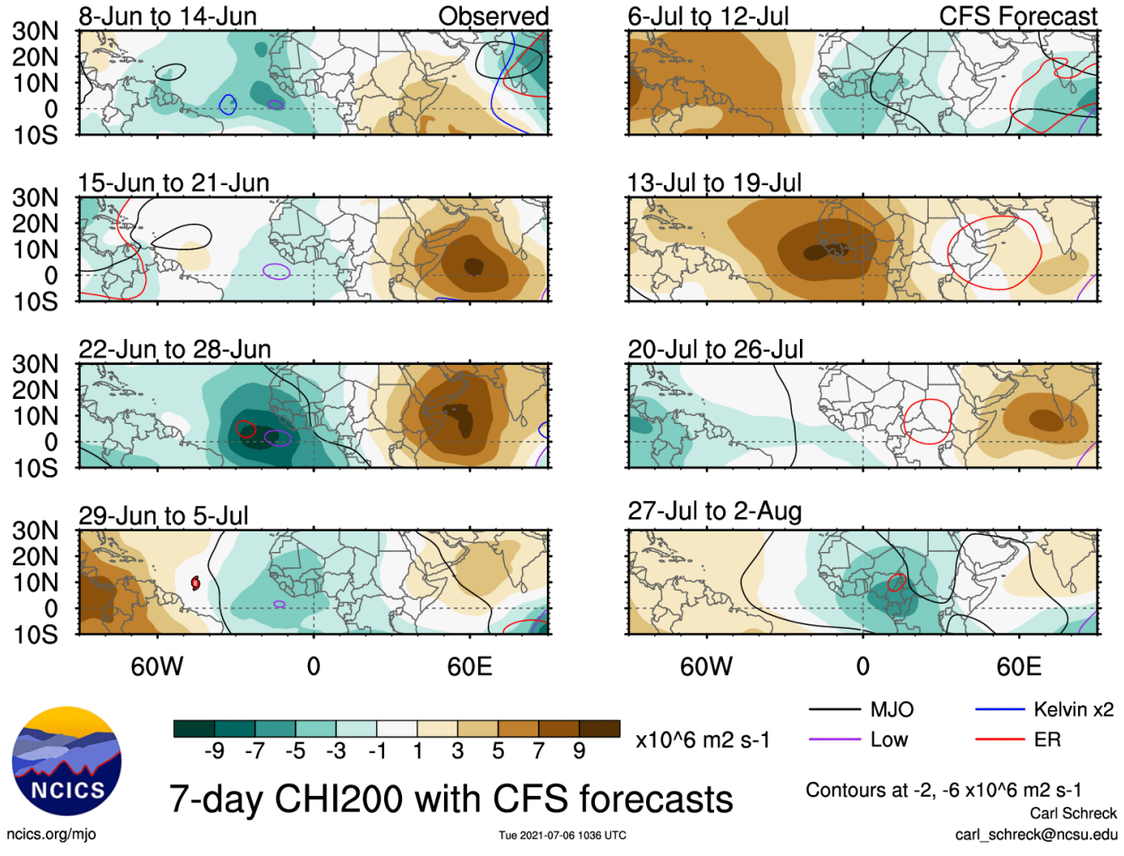
Figure 7a and b: Past four week and month velocity potential

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

Past Four Weeks Velocity Potential with MJO, Kelvin and Rossby Wave overlaid on Africa Maps at 850mb and 200mb



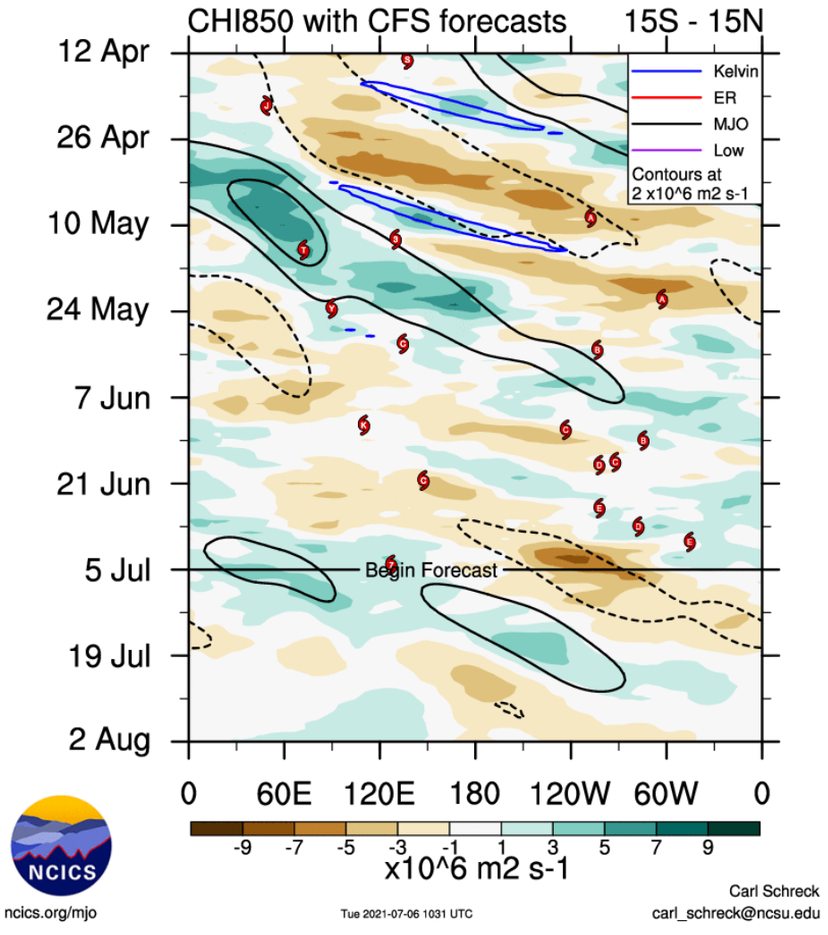


https://ncics.org/pub/mjo/v2/map/chi850.cfs.all.africa.10.png

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

Figure 8a and b: Past four week and month velocity potential

Hovmoller diagram of Velocity Potential, Anomalies for 15N-15S with Waves overlay including Outlook



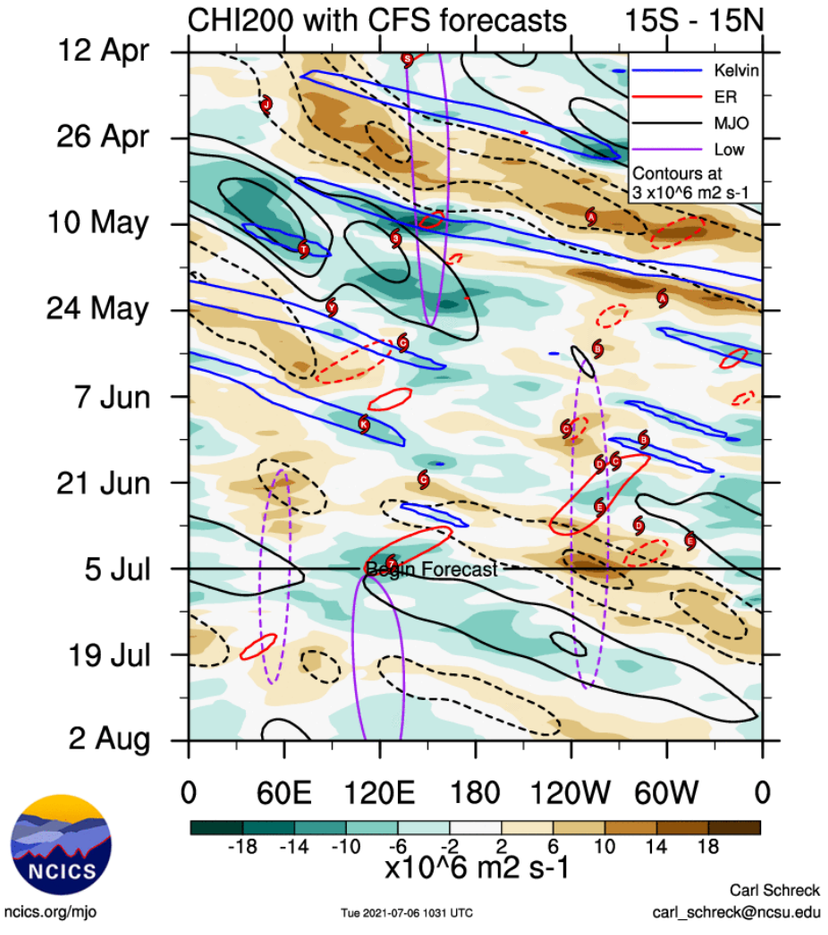
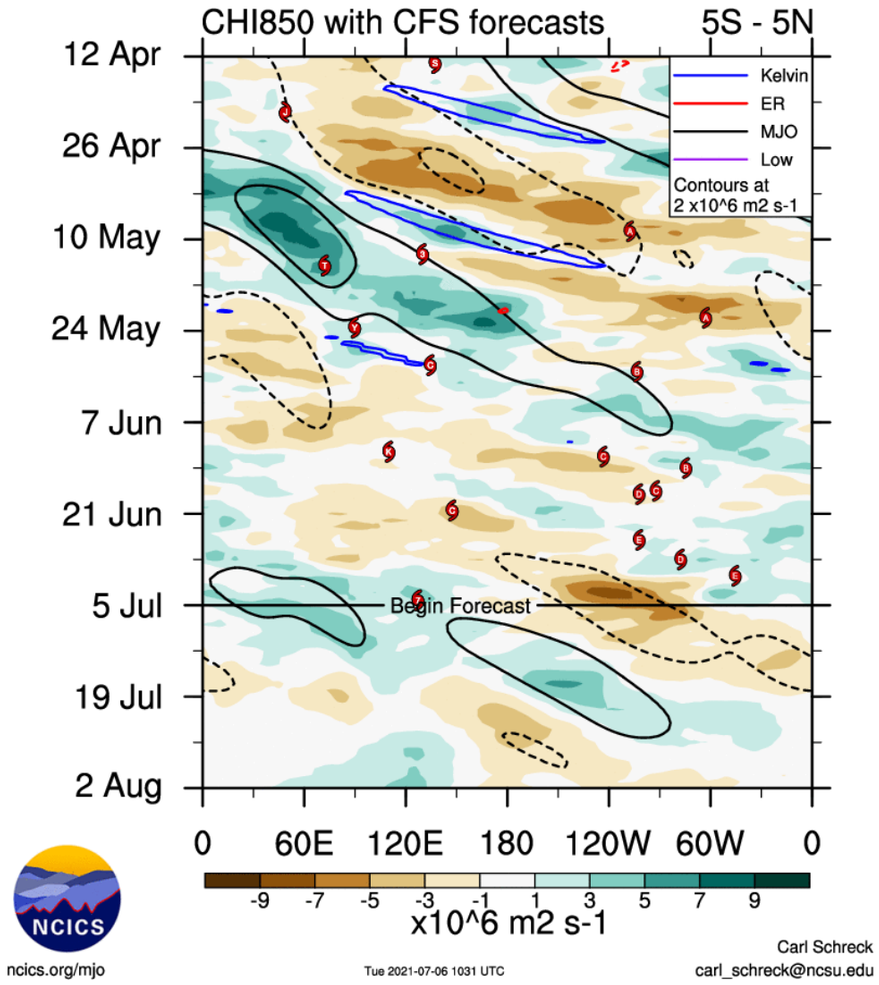


Figure 9: **Anomalies for 15n-15s with waves overlay including outlooks**

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

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

Hovmoller diagram of Velocity Potential, anomalies for 5n-5s with waves overlay including outlooks



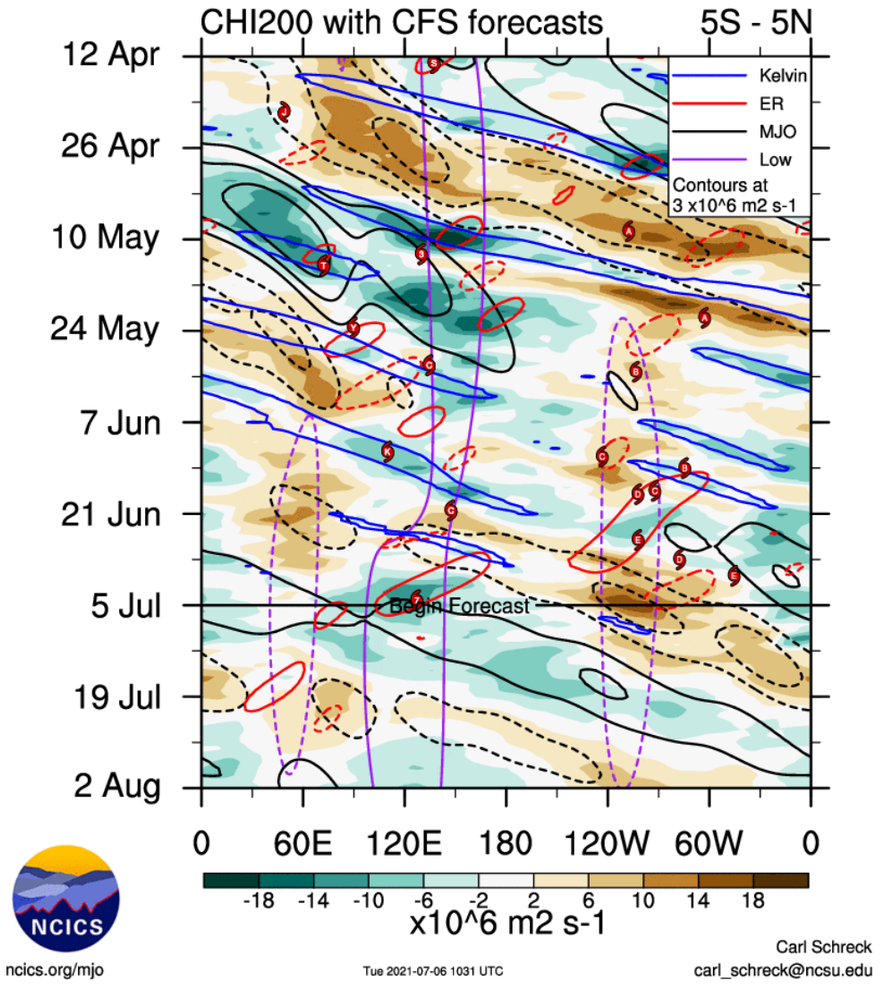
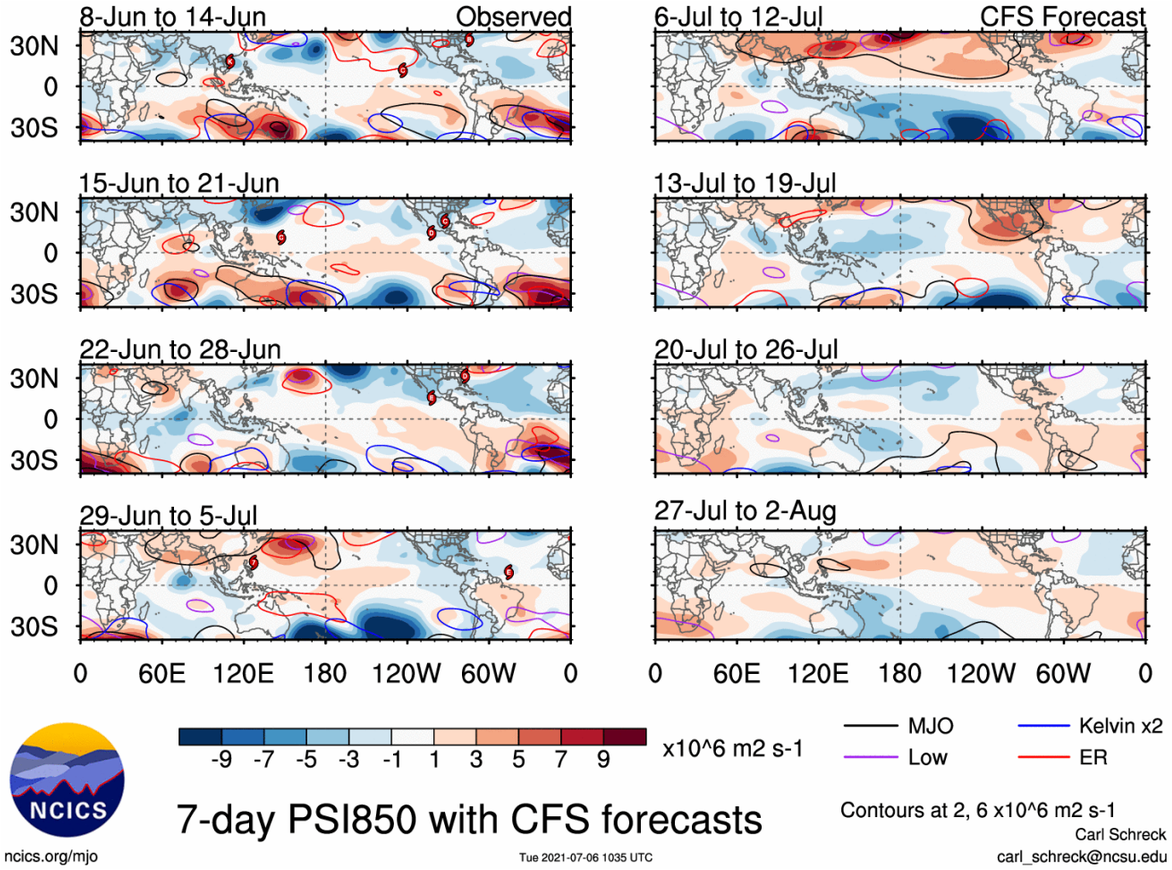


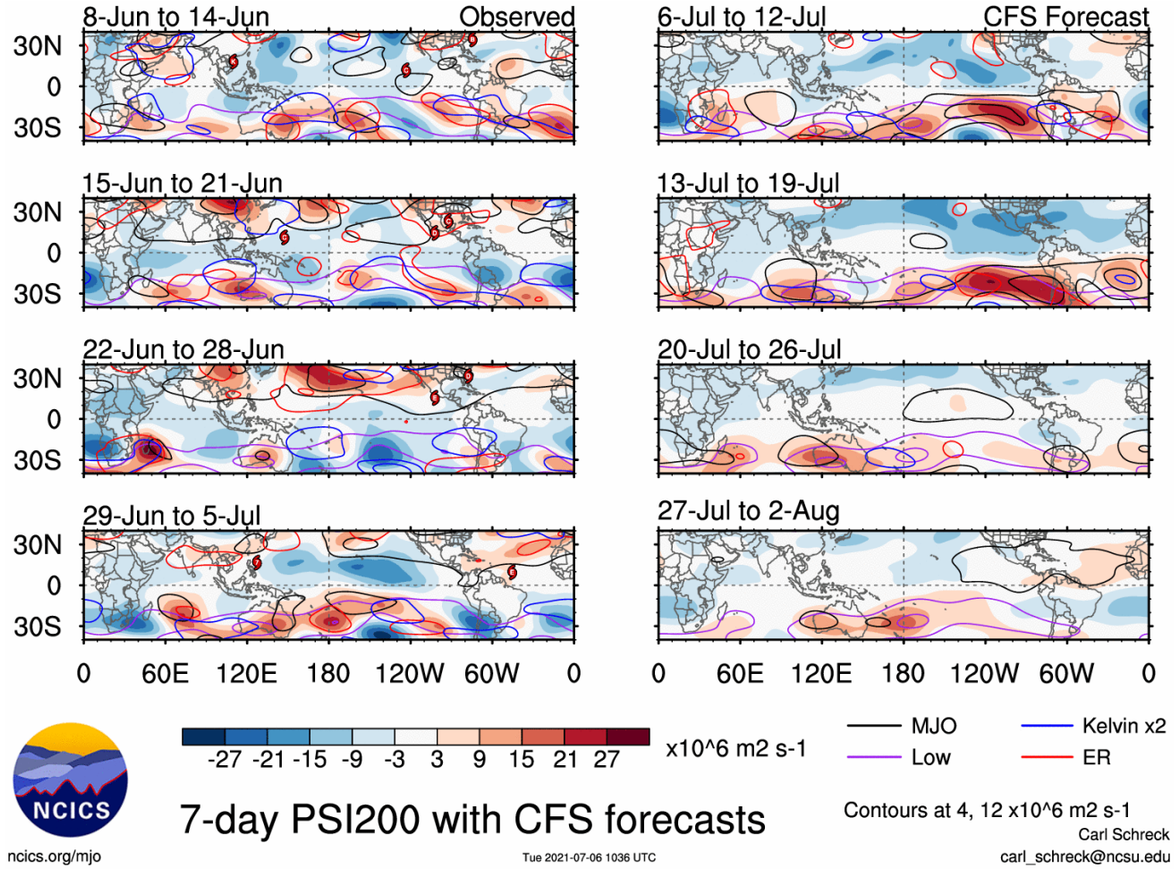
Figure 10: **Anomalies for 5N-5S with waves overlay including outlooks**

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

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

Past 4 Weeks Stream Function Anomalies with MJO, Kelvin and Rossby wave overlaid on Global Maps 850hpa and 200hpa



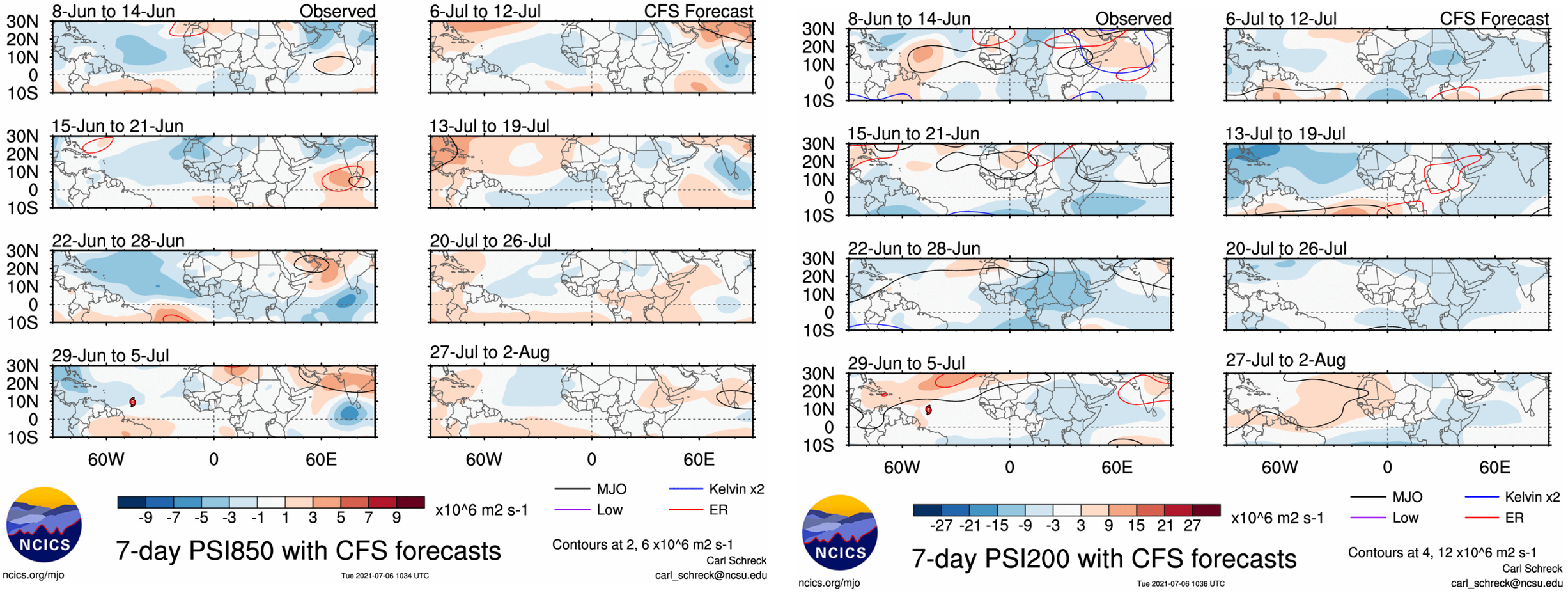


https://ncics.org/pub/mjo/v2/map/psi200.cfs.mjo.global.10.png

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

Figure 11: **Past 4 weeks stream function anomalies with MJO, Kelvin & Rossby wave on Global Maps**

Past 4 weeks Stream Function Anomalies with MJO, Kelvin and Rossby wave overlaid on Africa Maps 850hpa and 200hpa

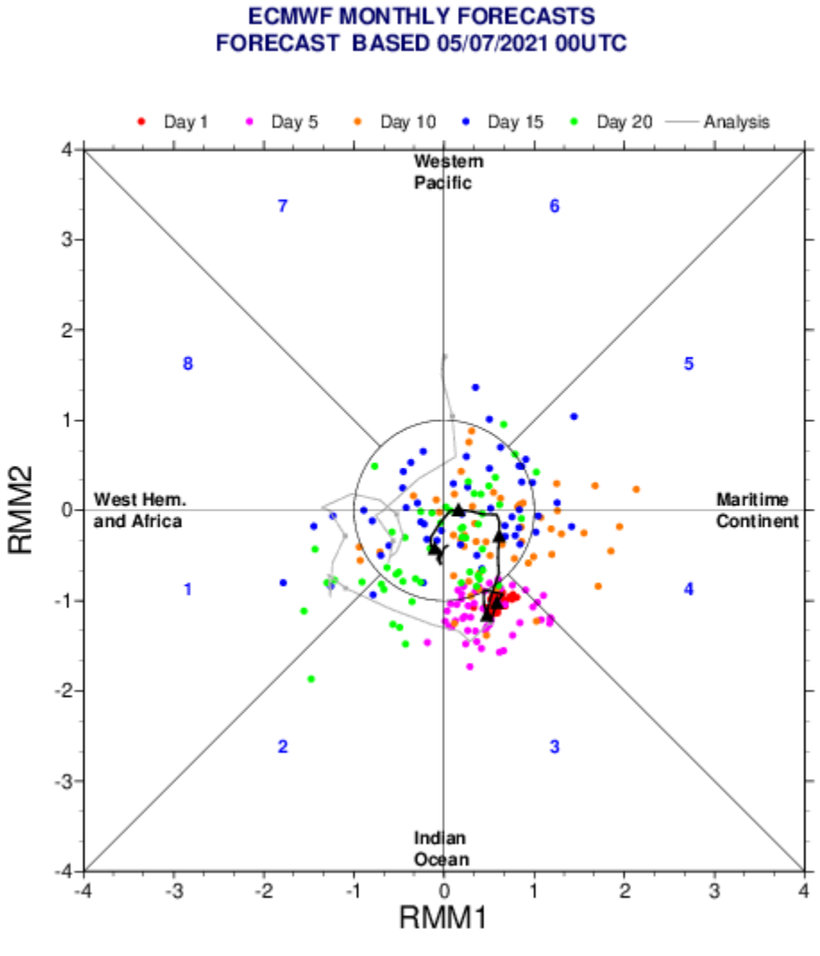


https://ncics.org/pub/mjo/v2/map/psi200.cfs.mjo.africa.10.png

Figure 12: **Past 4 weeks stream function anomalies with MJO, Kelvin & Rossby wave on Africa maps**

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

ECMWF Madden-Julian-Oscillation (MJO) Forecast



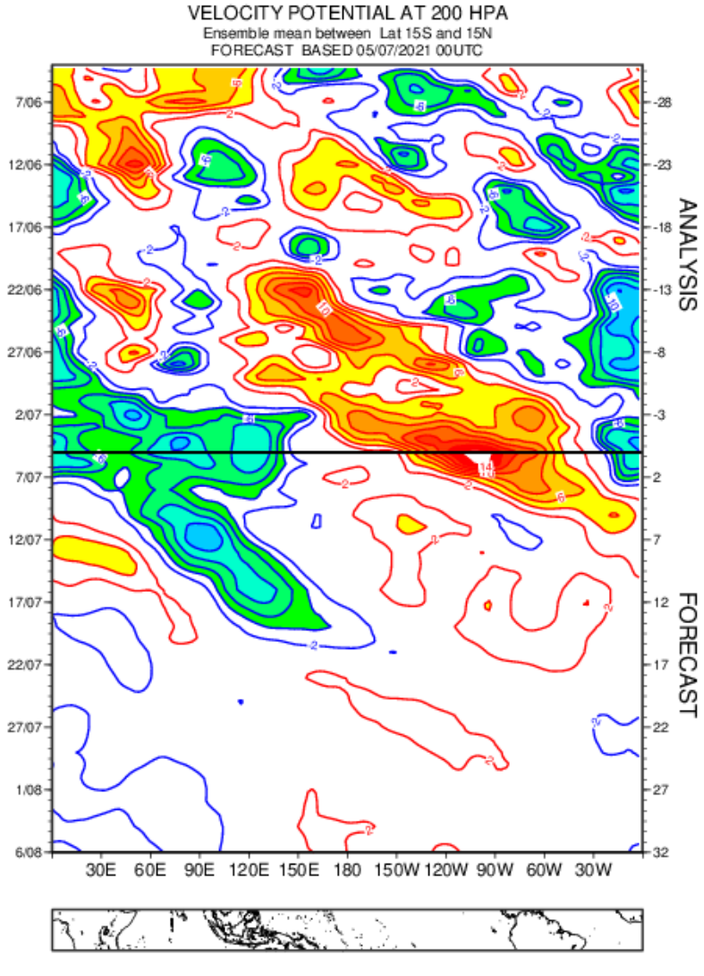
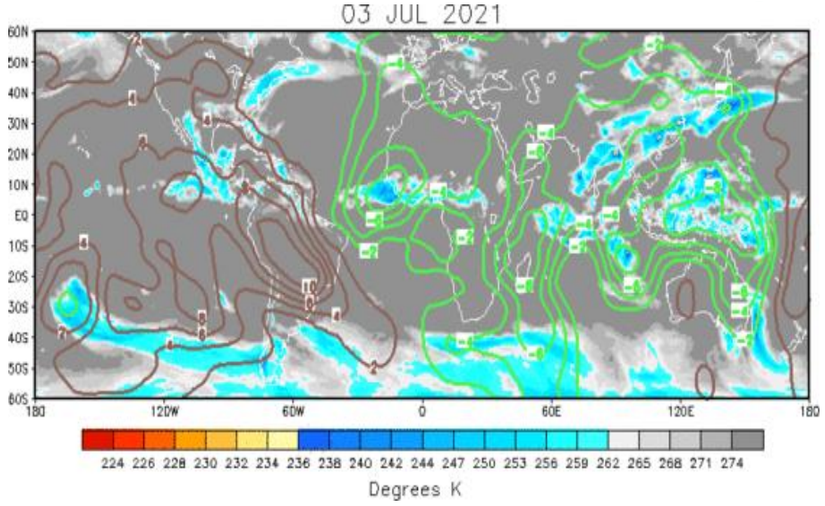


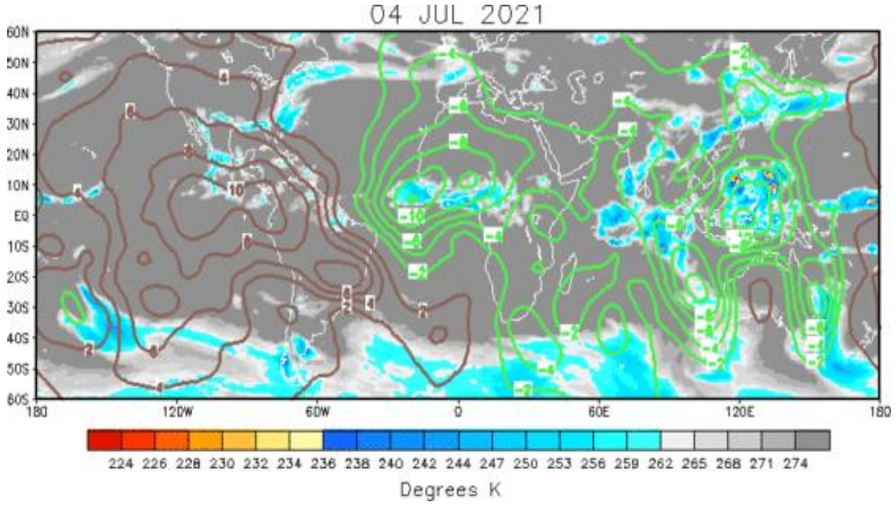
Figure 13: **ECMWF MJO Forecast**

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

3-Days Infra-Red (IR) and Velocity Potential Anomaly





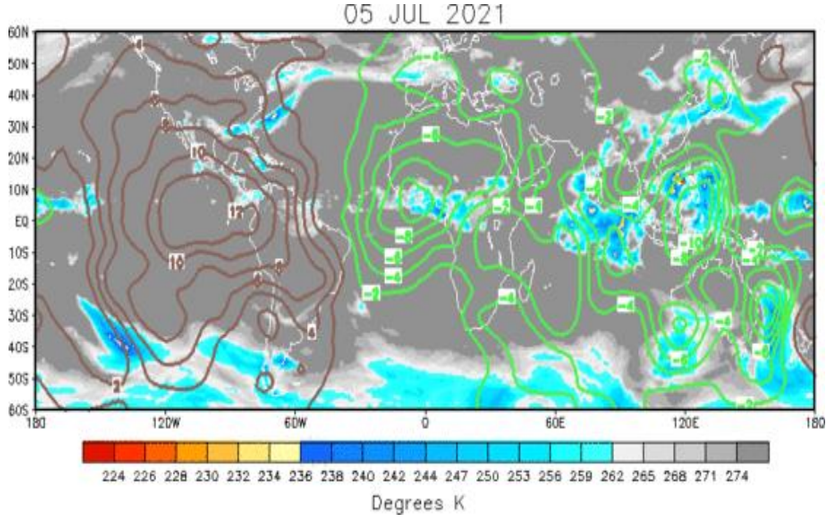


Figure 14: **IR image and Velocity Potential anomalies**

CPC - Climate Weather Linkage: Madden - Julian Oscillation (noaa.gov)

PAST 3 DEKADS OLR ANOMALIES

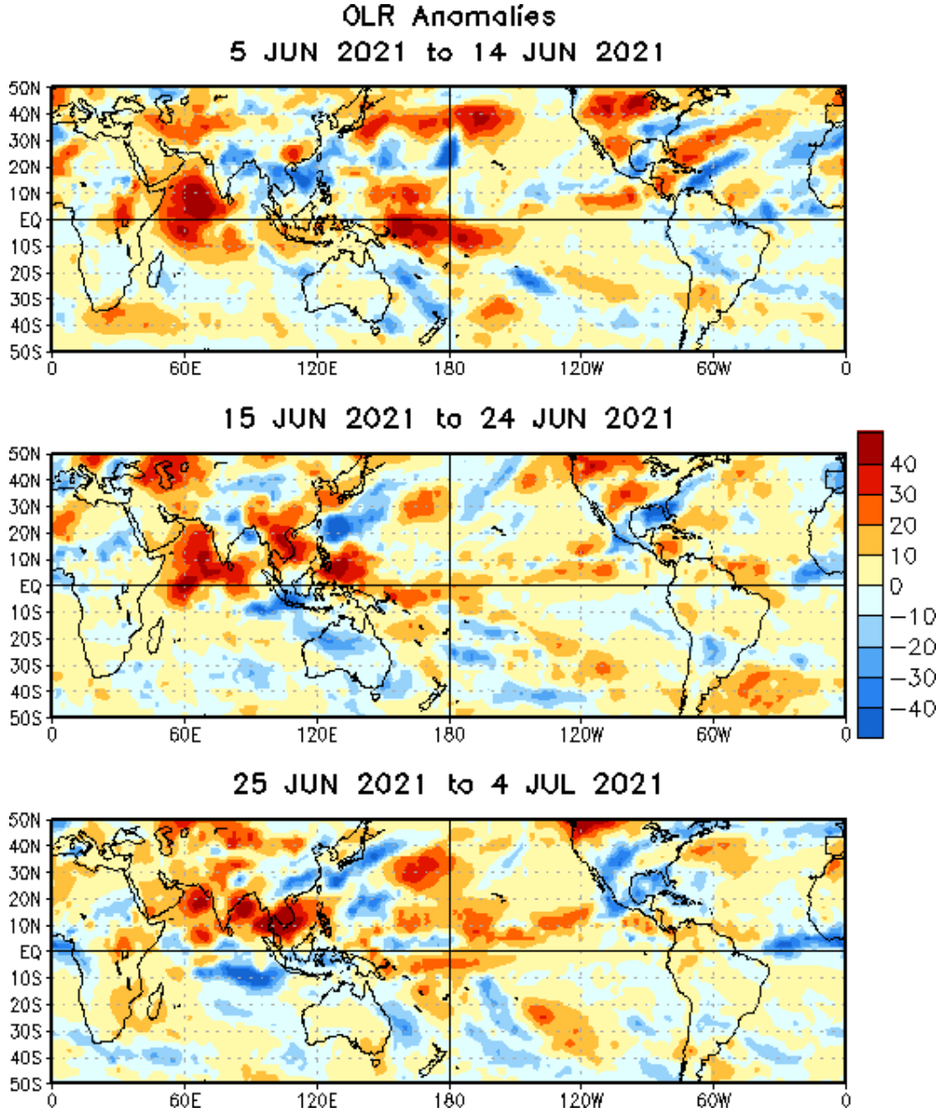


Figure 15: **Past 3 weeks OLR anomalies**

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

Mean Sea Level Pressure (MSLP) for the 3rd Dekad of June 2021 and its anomalies (1991-2020)

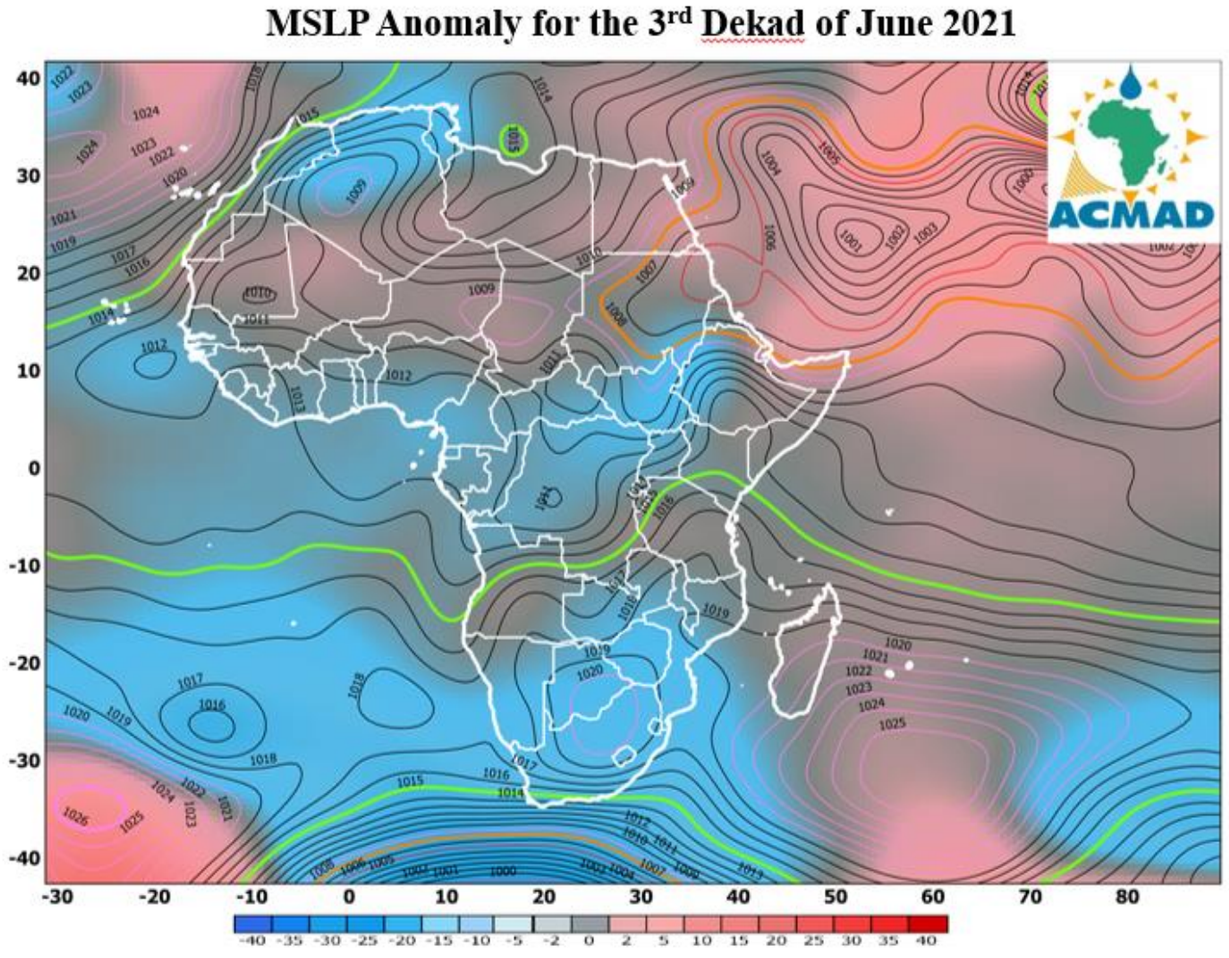


Figure 16: **MSLP observation versus anomaly** **Data source: http://iridl.ldeo.columbia.edu/expert/SOURCES/.NOAA/.NCEP-NCAR/.CDAS-1/.DAILY/.Intrinsic/.MSL/.pressure**

Wind Anomalies for the Third Dekad of June 2021 @ 850hpa and 700hpa

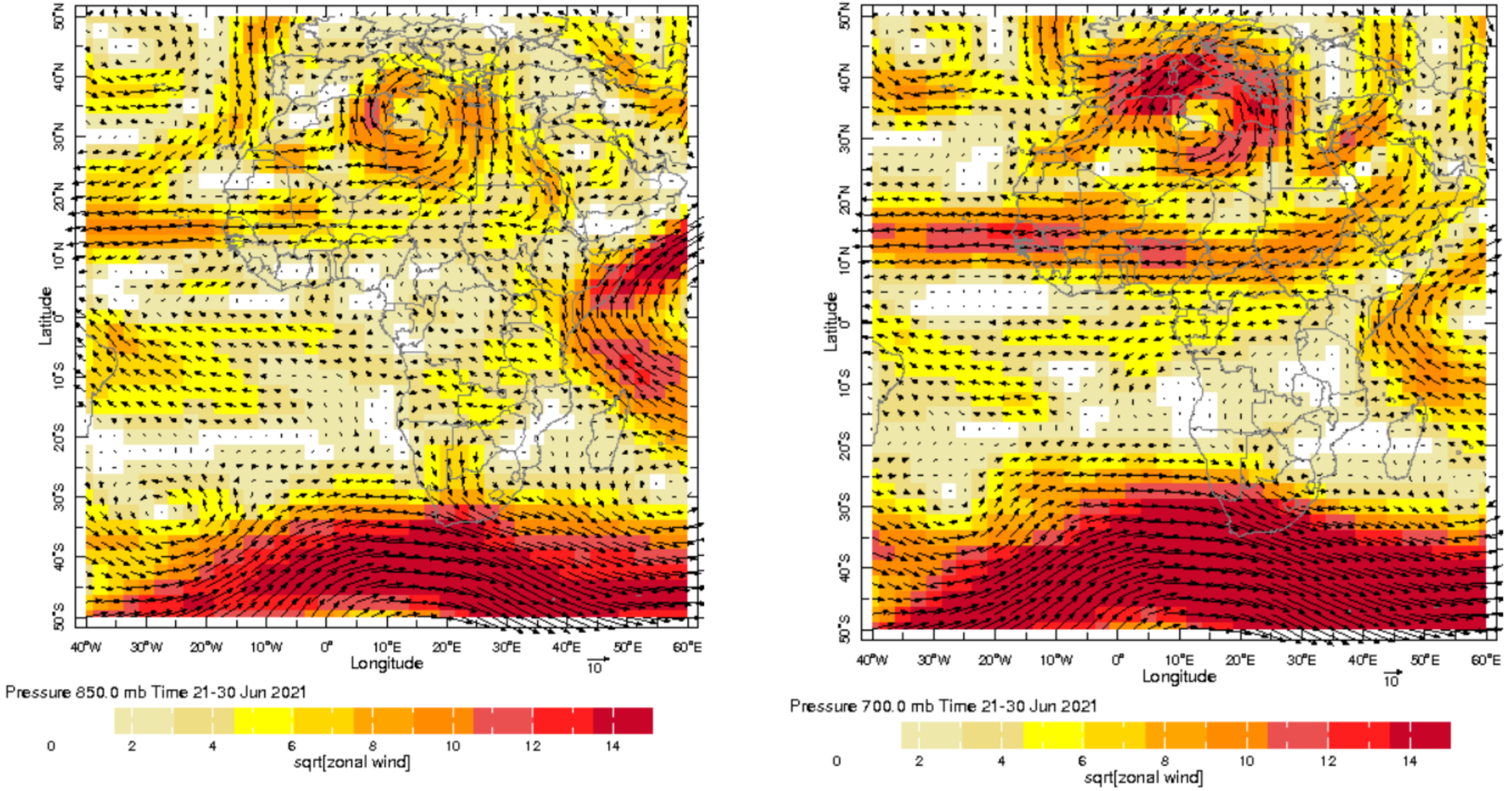


Figure 17: **Wind anomalies for 850hpa and 700hPa**

Wind Anomalies for the last 7 day period 850hpa, 700hpa and 200hpa

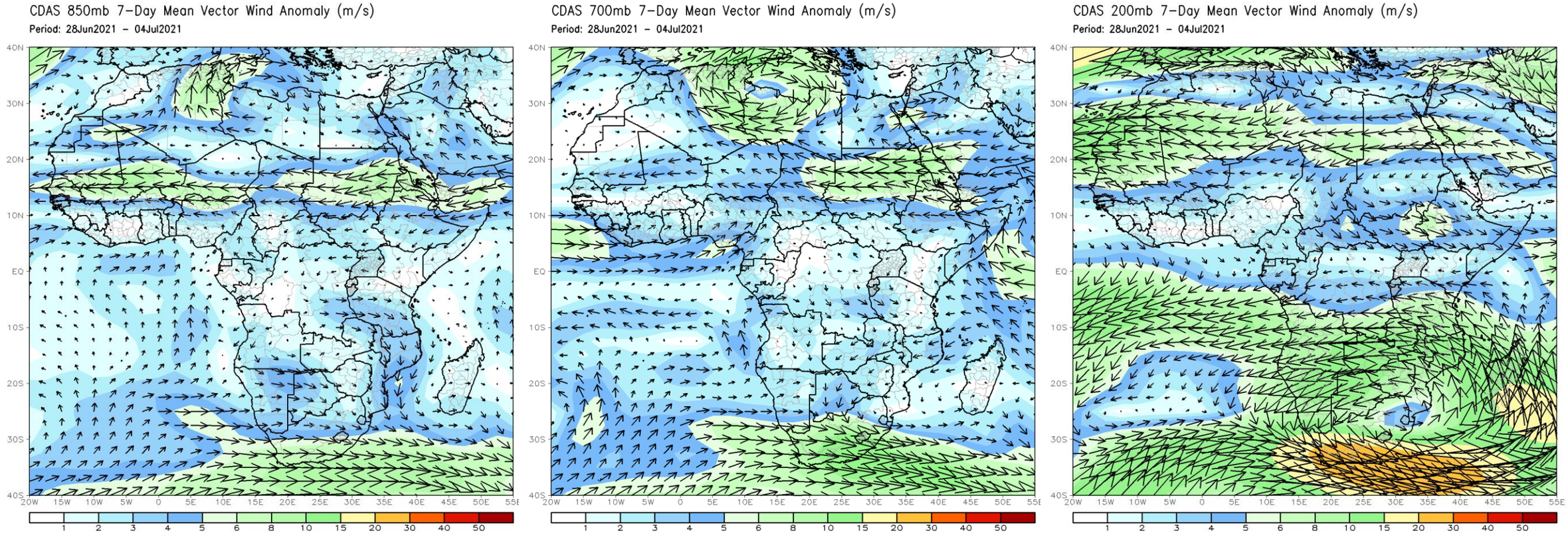


Figure 18: **Wind anomalies for 850hpa, 700hPa and 200hpa**

Climate Prediction Center - African Desk: SWFDP GFS FORECASTS (noaa.gov)

Relative Humidity (RH) Anomalies at 850hpa and 700hpa for the 3rd dekad of May 2021

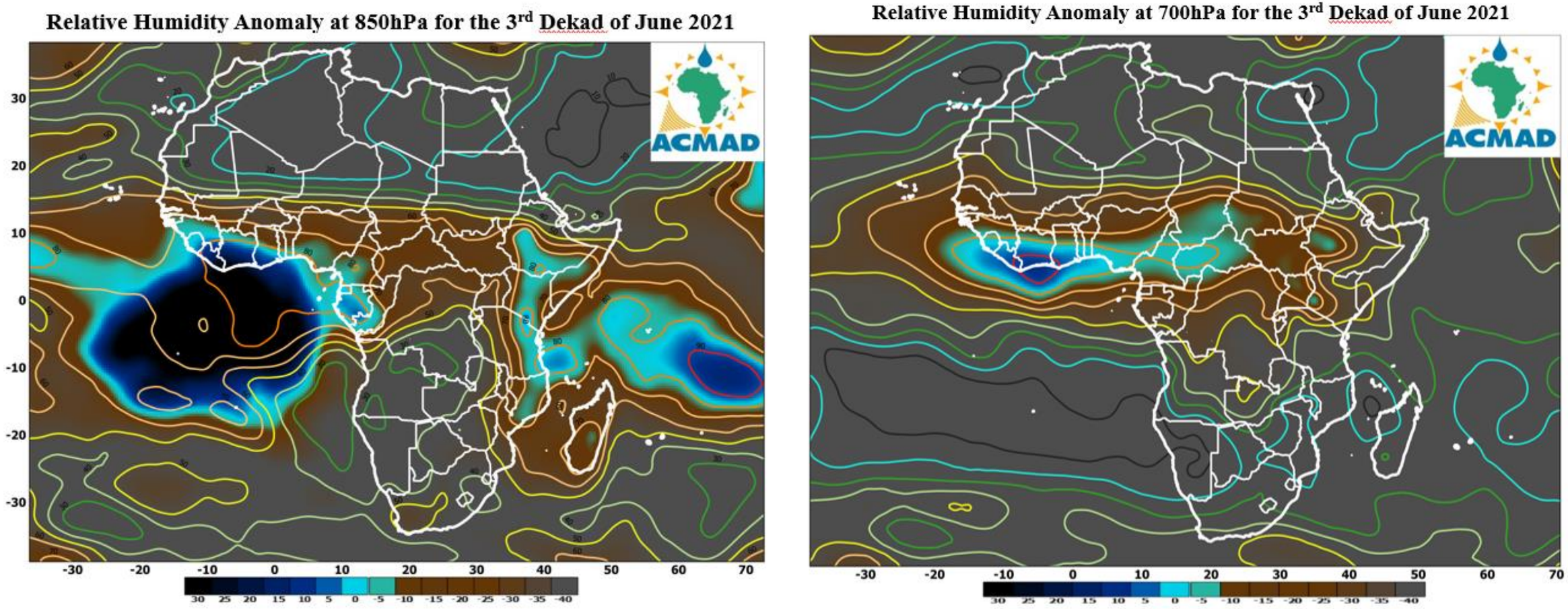


Figure 19: **Relative Humidity Anomaly at 850hPa (left) and 700hPa (right)**

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

WEEKLY FORECAST

MJO monitoring and forecasts for ECMWF, NCEP and UK Met Office from MJO working group website

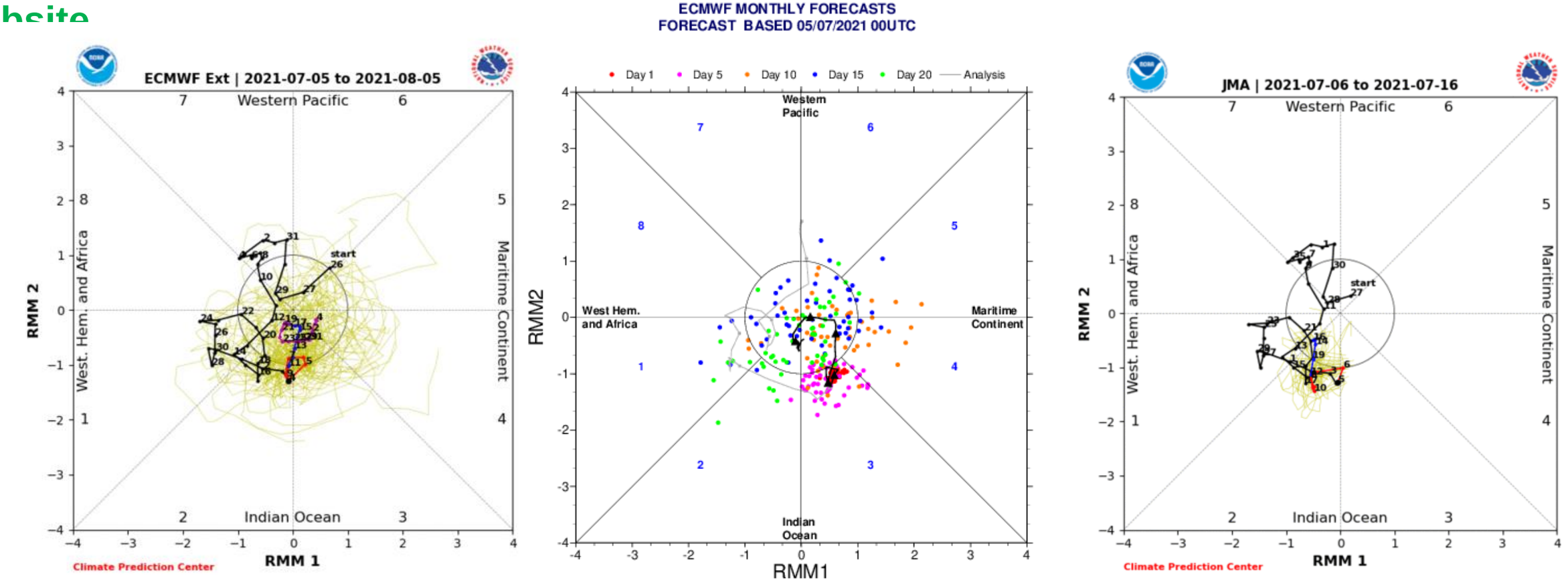


Figure 20: Forecasts for ECMWF, NCEP and UK Met Office

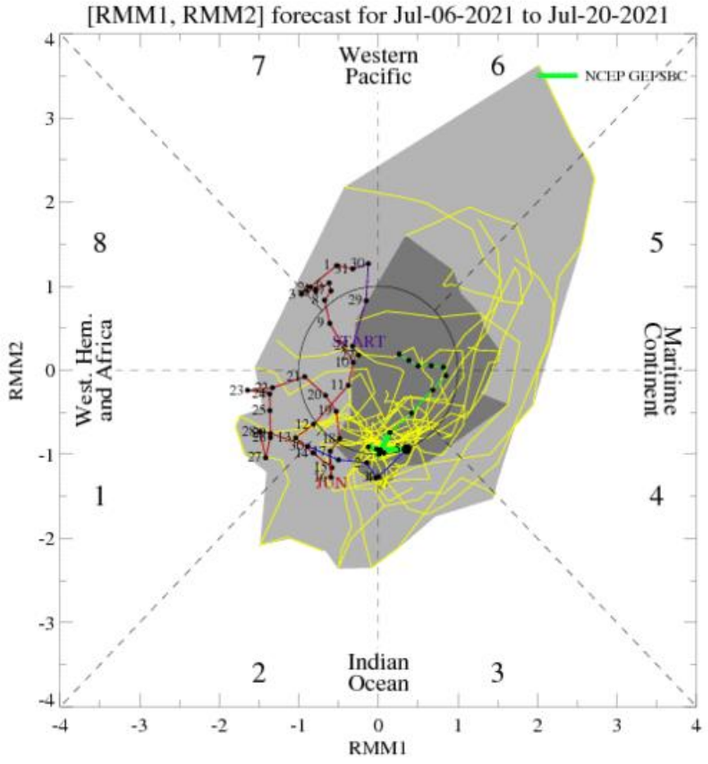
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/emon.shtml

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

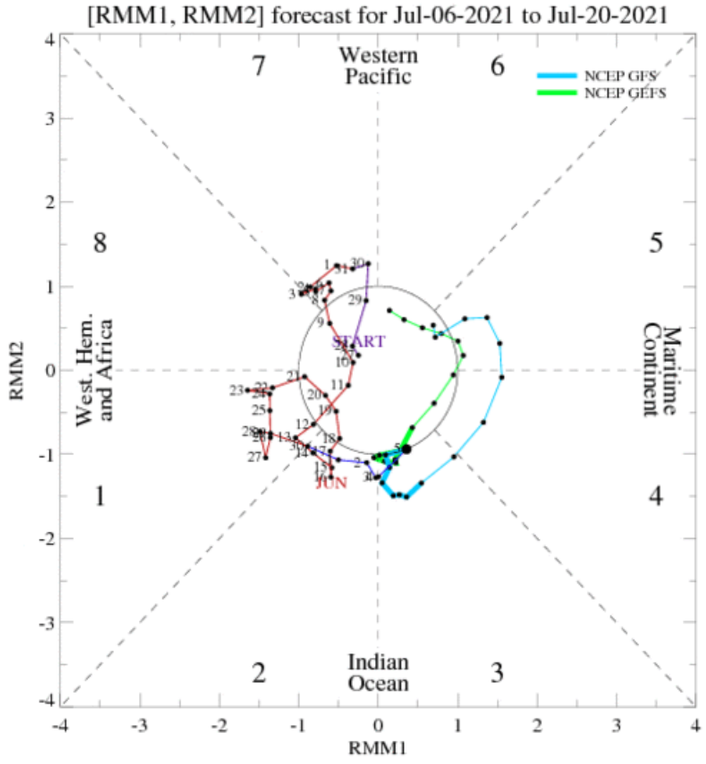
https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_mjo_family_index?facets=undefined&time=2019081500,0,2019081500

MJO FORECAST

Ensemble GFS Phase Diagram



Operational GFS Phase Diagram



Statistical GFS Phase Diagram

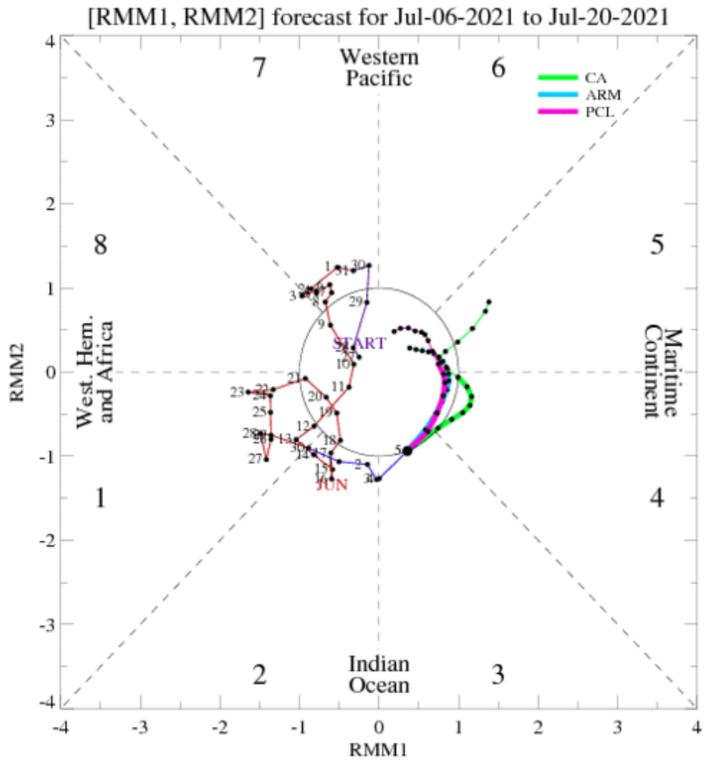


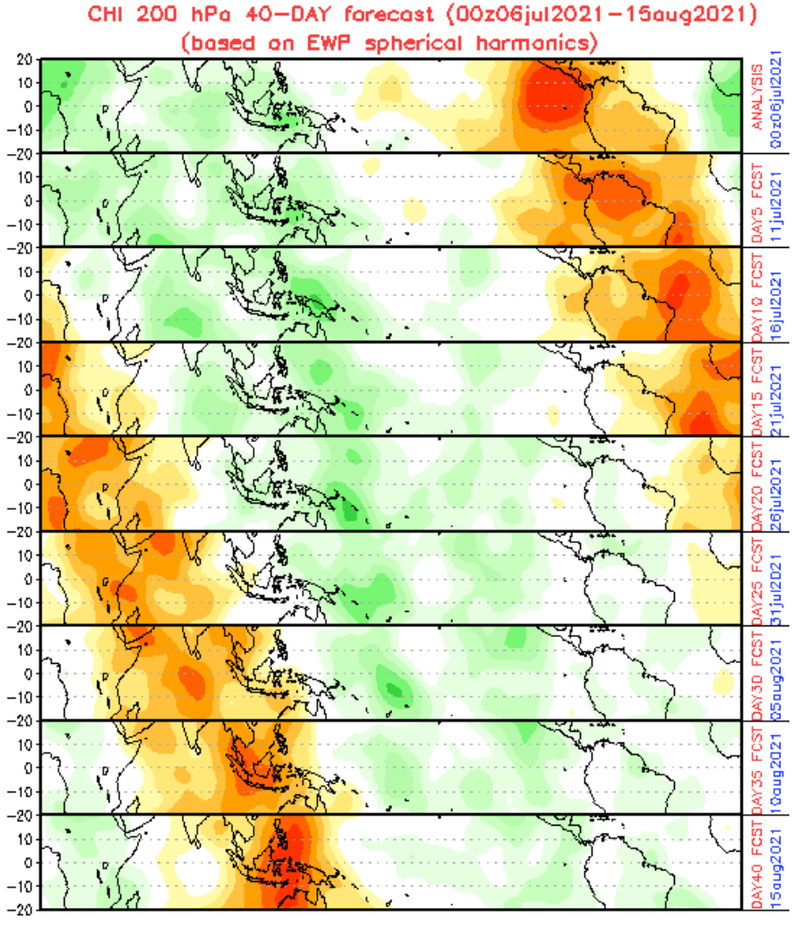
Figure 21: MJO forecast

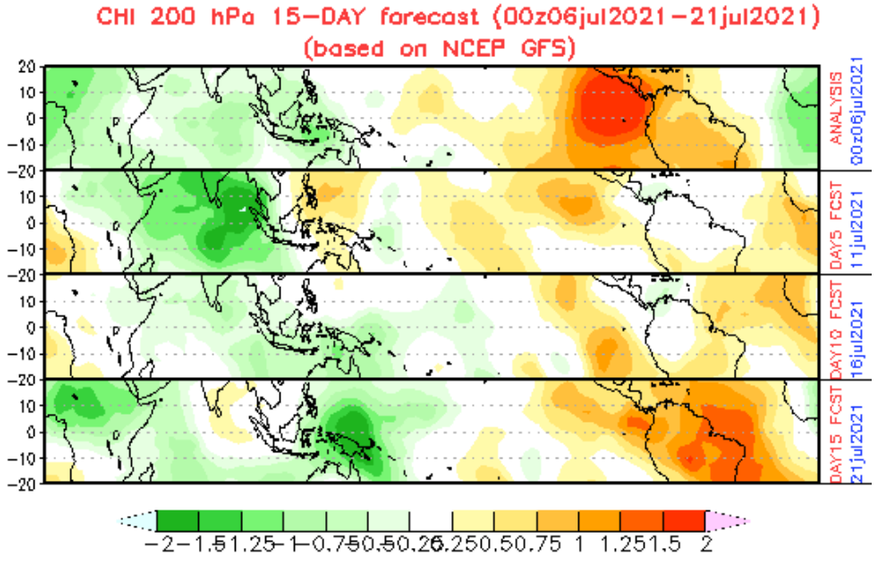
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/foregfs.shtml

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

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

The EWP, NCEP/GFS and CFSv2 models Predicting the MJO 40 day Forecast





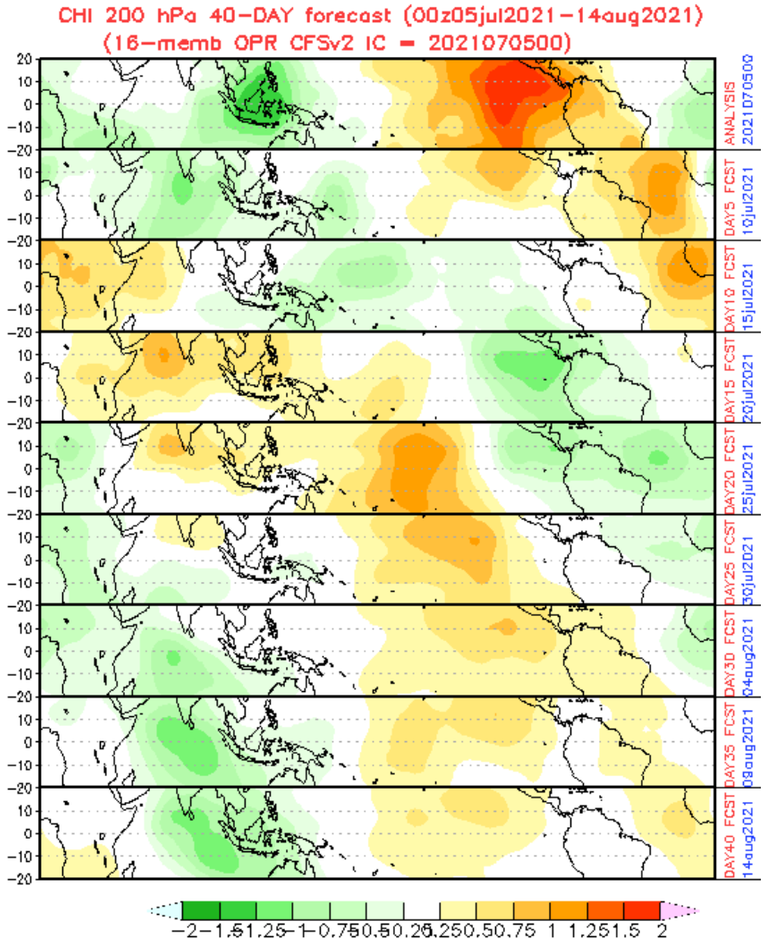


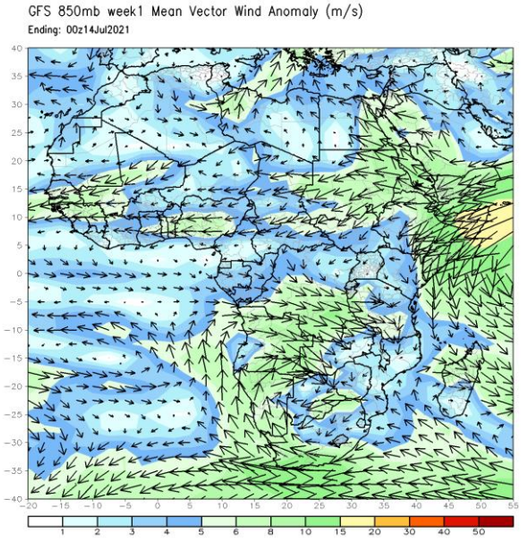
Figure 22: MJO forecast

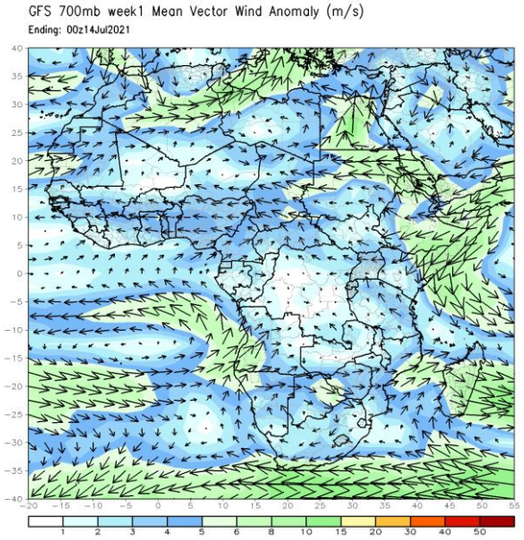
https://www.cpc.ncep.noaa.gov/products/people/wd52qz/mjo/chi/ewp.gif

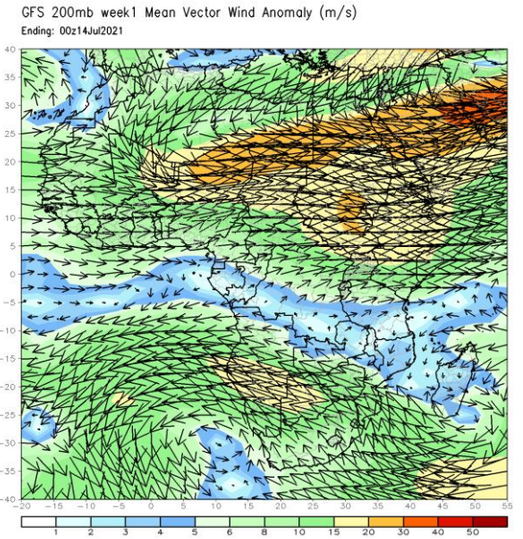
https://www.cpc.ncep.noaa.gov/products/people/wd52qz/mjo/chi/gfs.gif

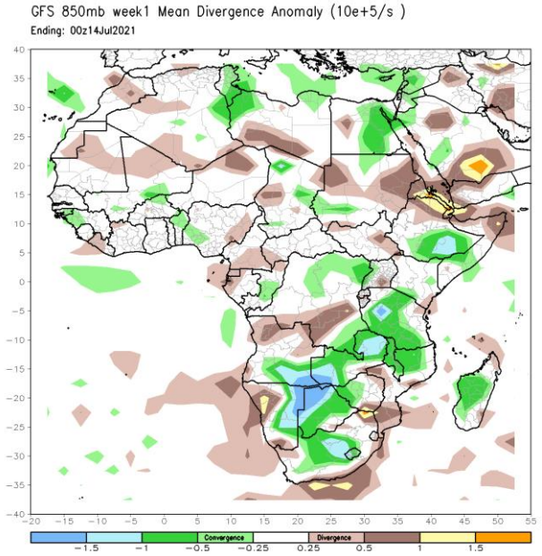
https://www.cpc.ncep.noaa.gov/products/people/wd52qz/mjo/chi/cfs.gif

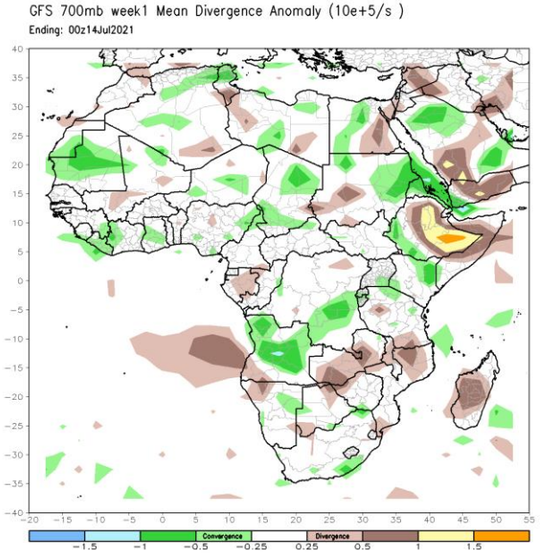
Wind Anomaly and Divergence Forecast from GFS week1











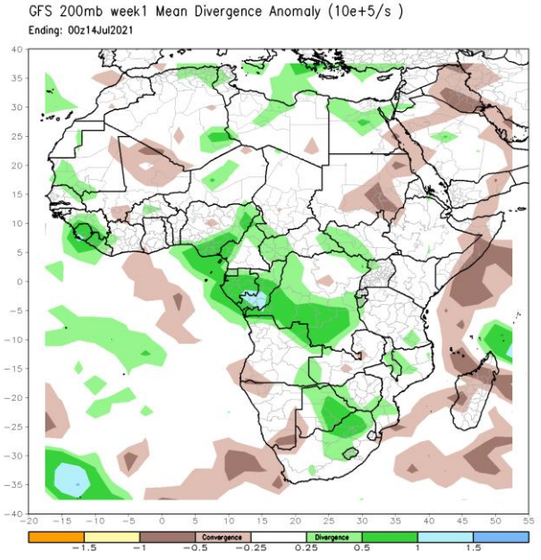
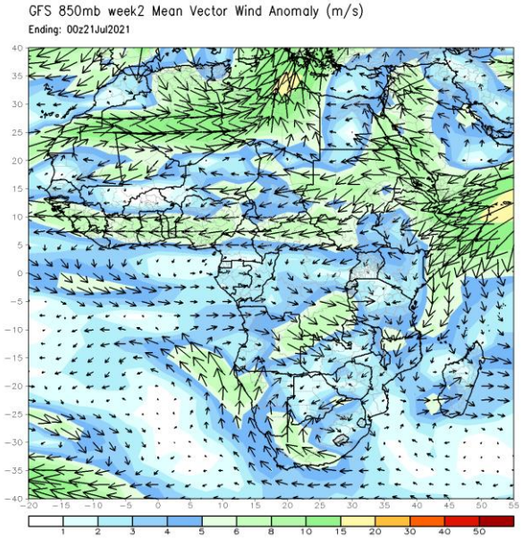
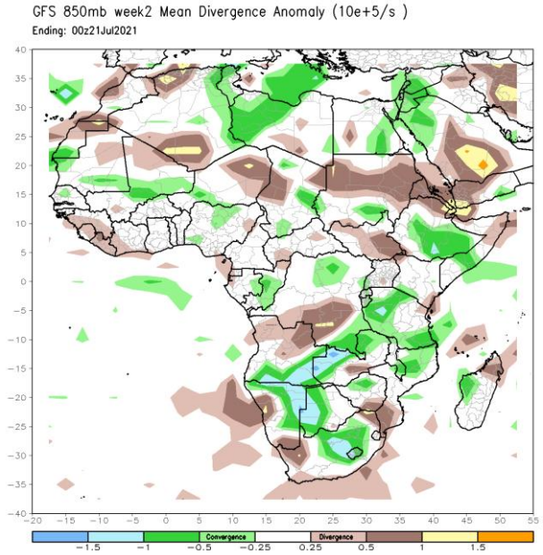


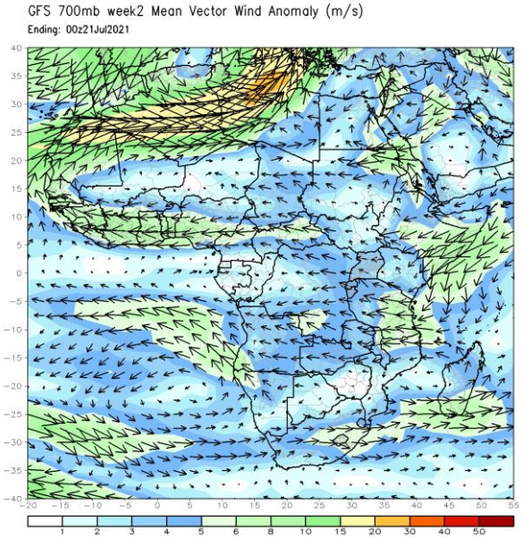
Figure 23 : Forecast from GFS

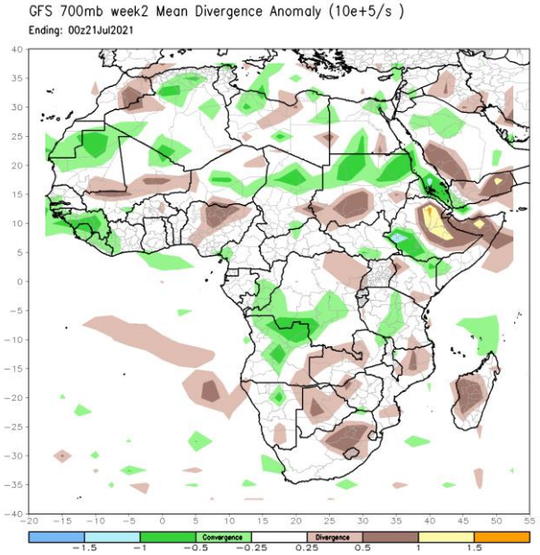
https://www.cpc.ncep.noaa.gov/products/international/africa/africa.shtml

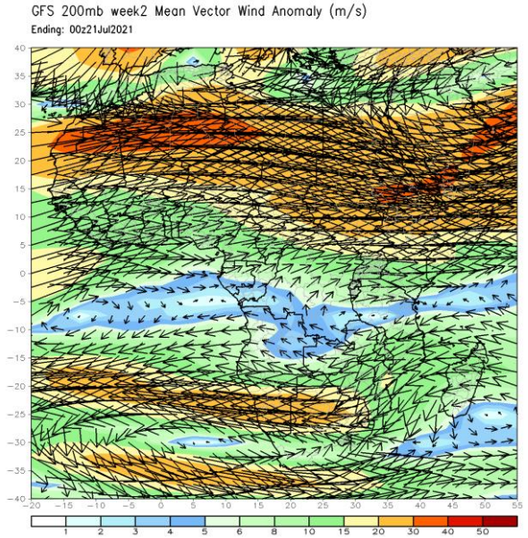
Wind Anomaly and Divergence Forecast from GFS week2











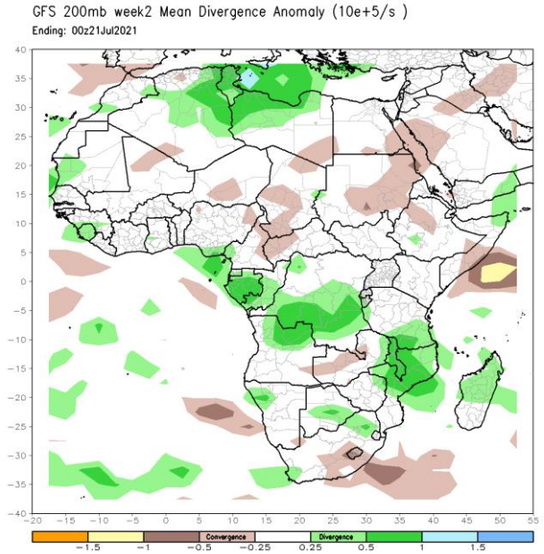
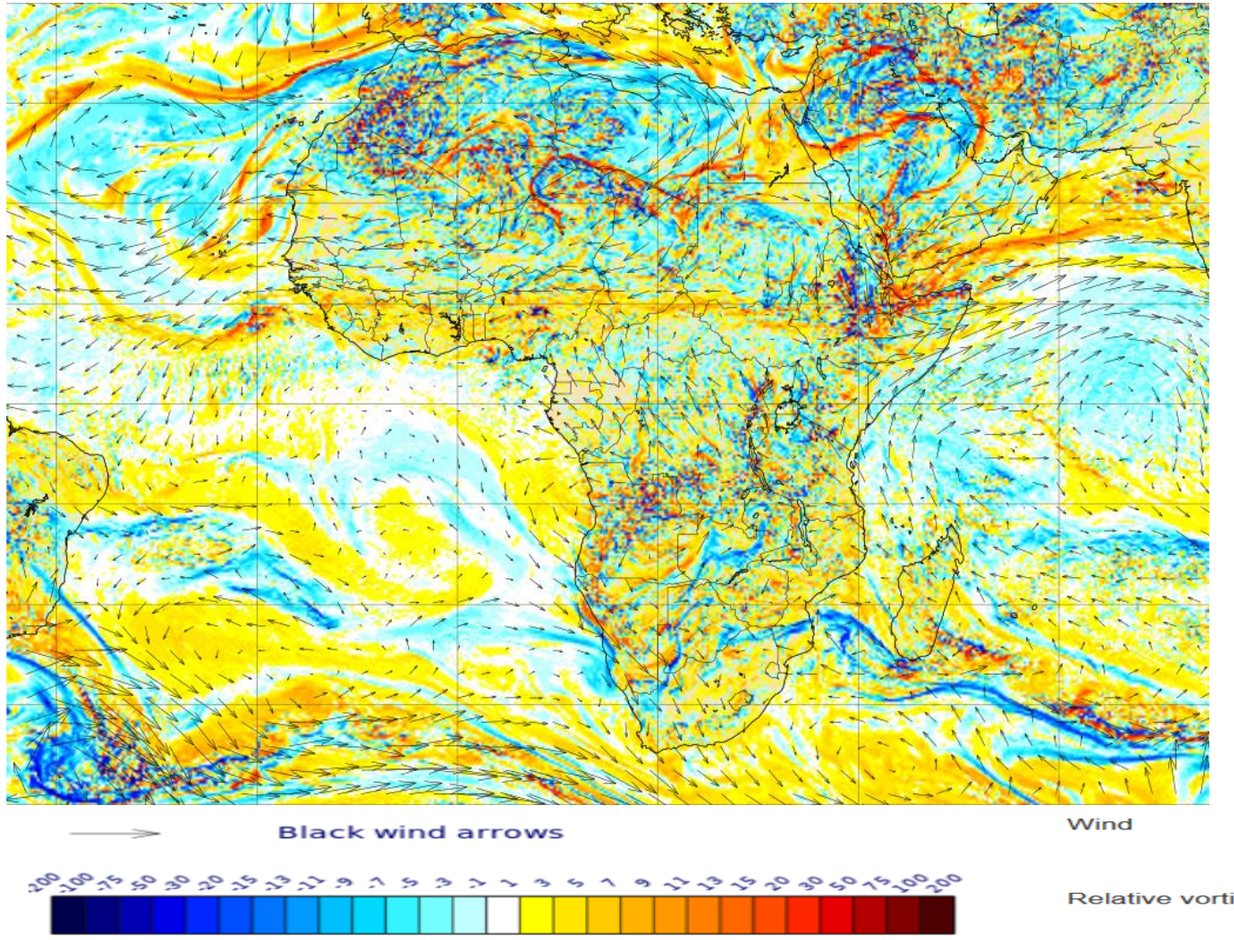


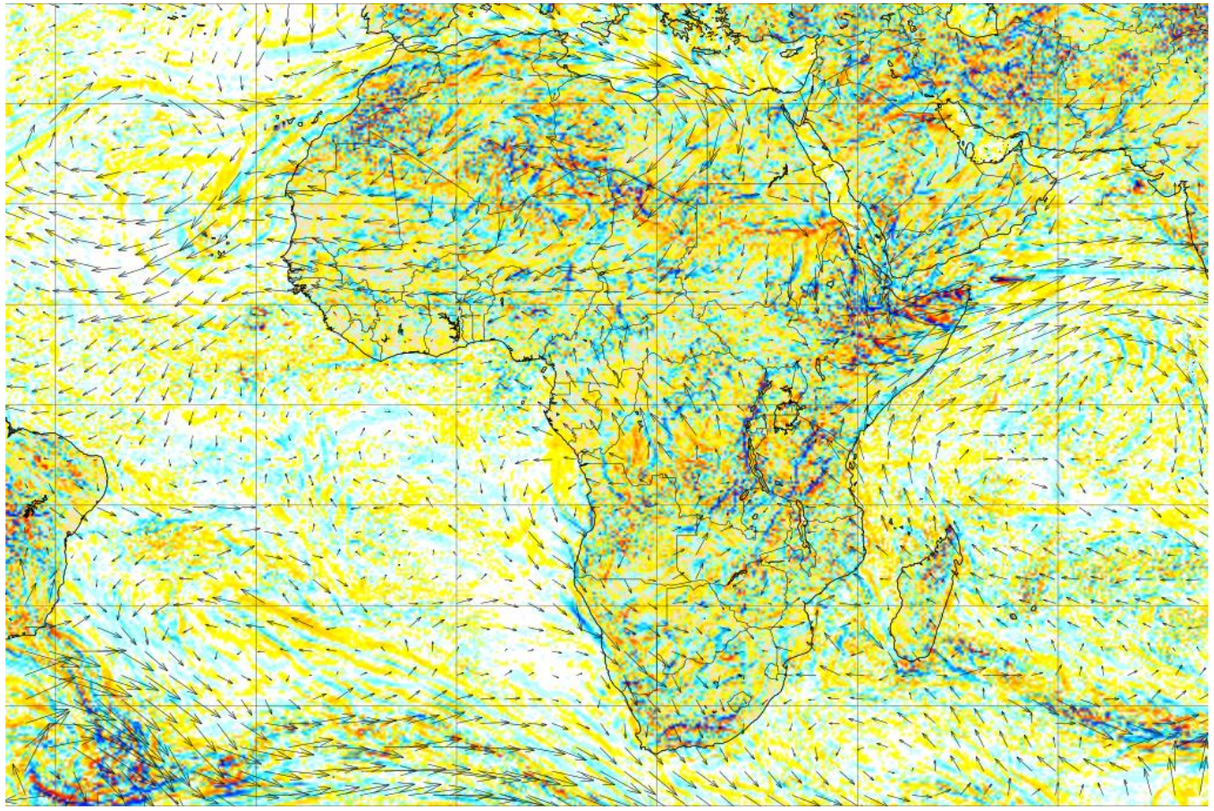
Figure 24: GFS divergence forecast

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

Week 1 at 700hpa Relative Vorticity and Divergence Wind Forecast from CFS and ECMWF

Relative vorticity at 700hPa / Wind at 700hPa
Wednesday 7 Jul, 00 UTC T+108 Valid: Saturday 17 Jul, 12 UTC



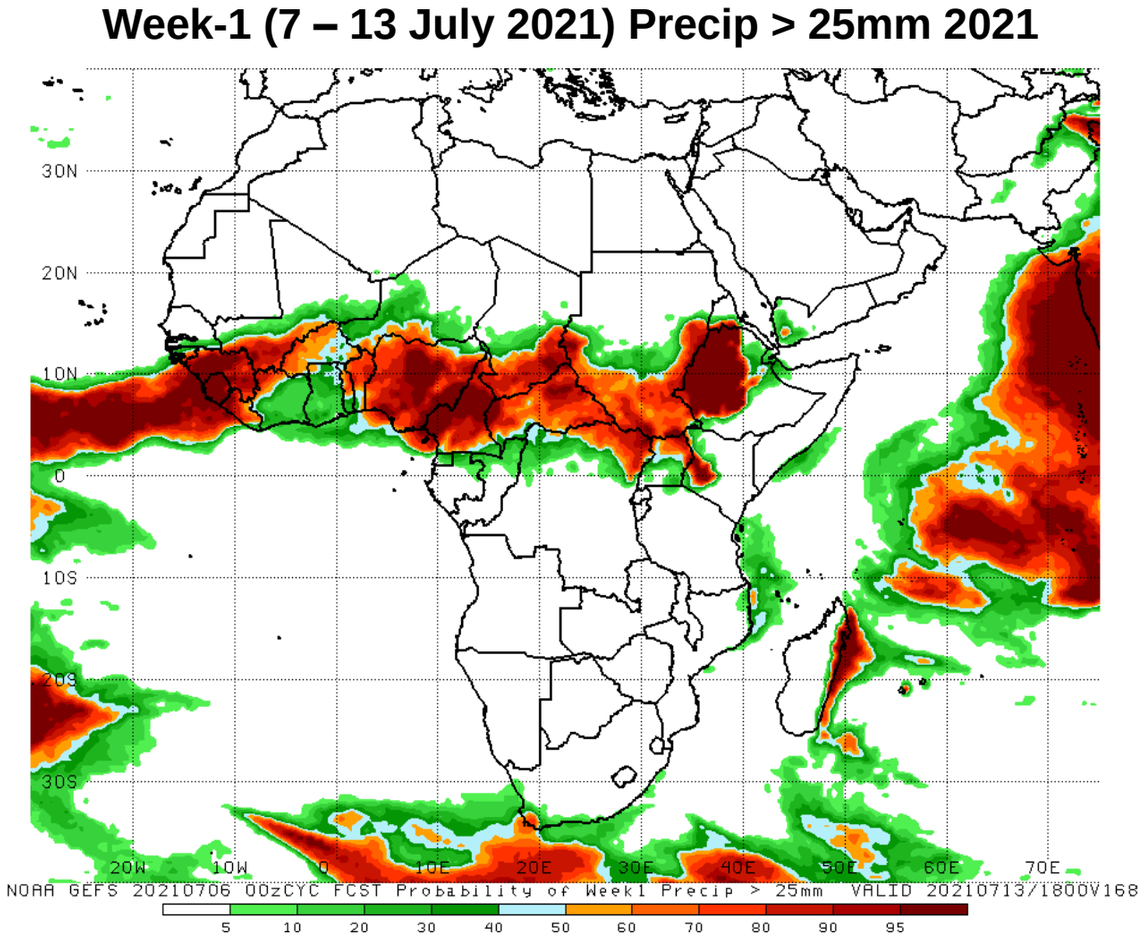


Divergence at 700hPa / Wind at 700hPa
Wednesday 7 Jul, 00 UTC T+180 Valid: Saturday 17 Jul, 00 UTC

Figure 25: Relative Vorticity and Divergence forecast from CFS and ECMWF

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

Probability of week-1 precip > 25 (left) and 50mm(right)



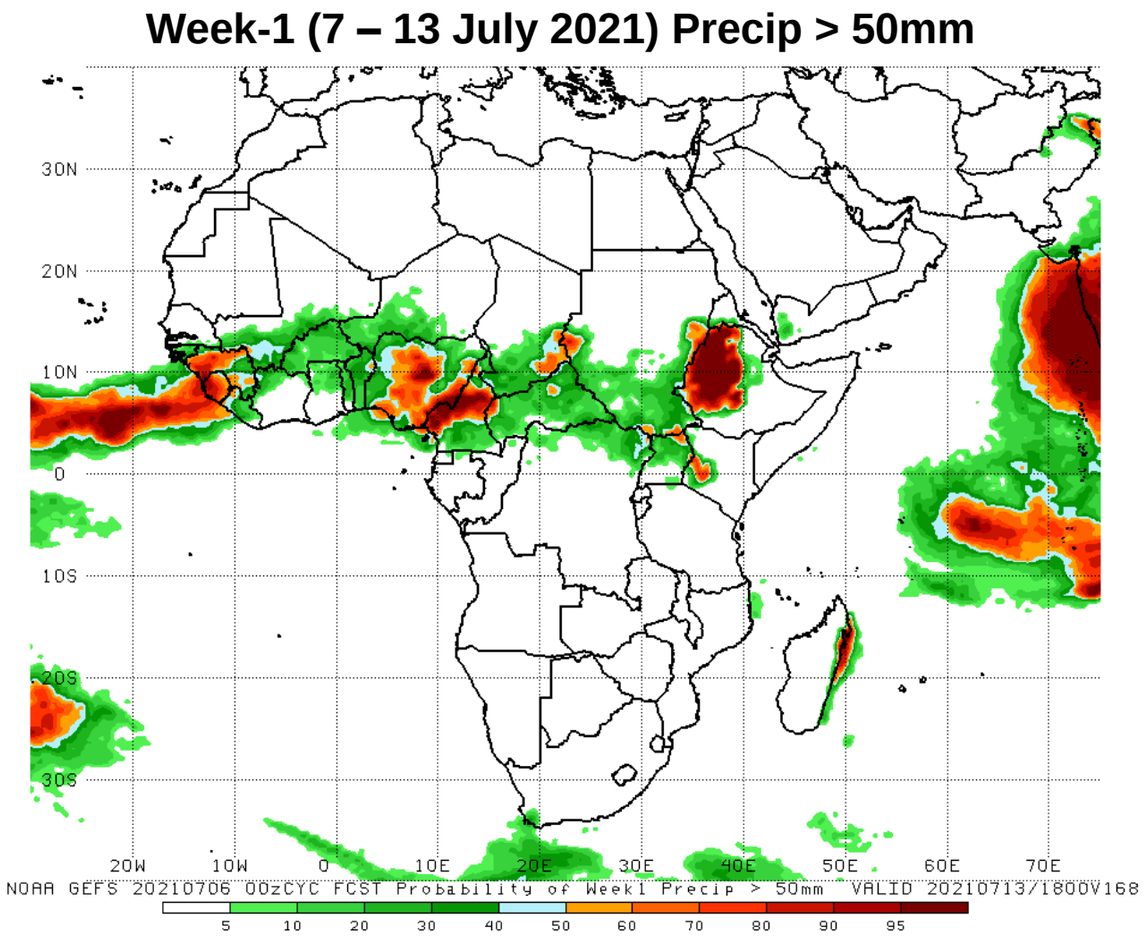
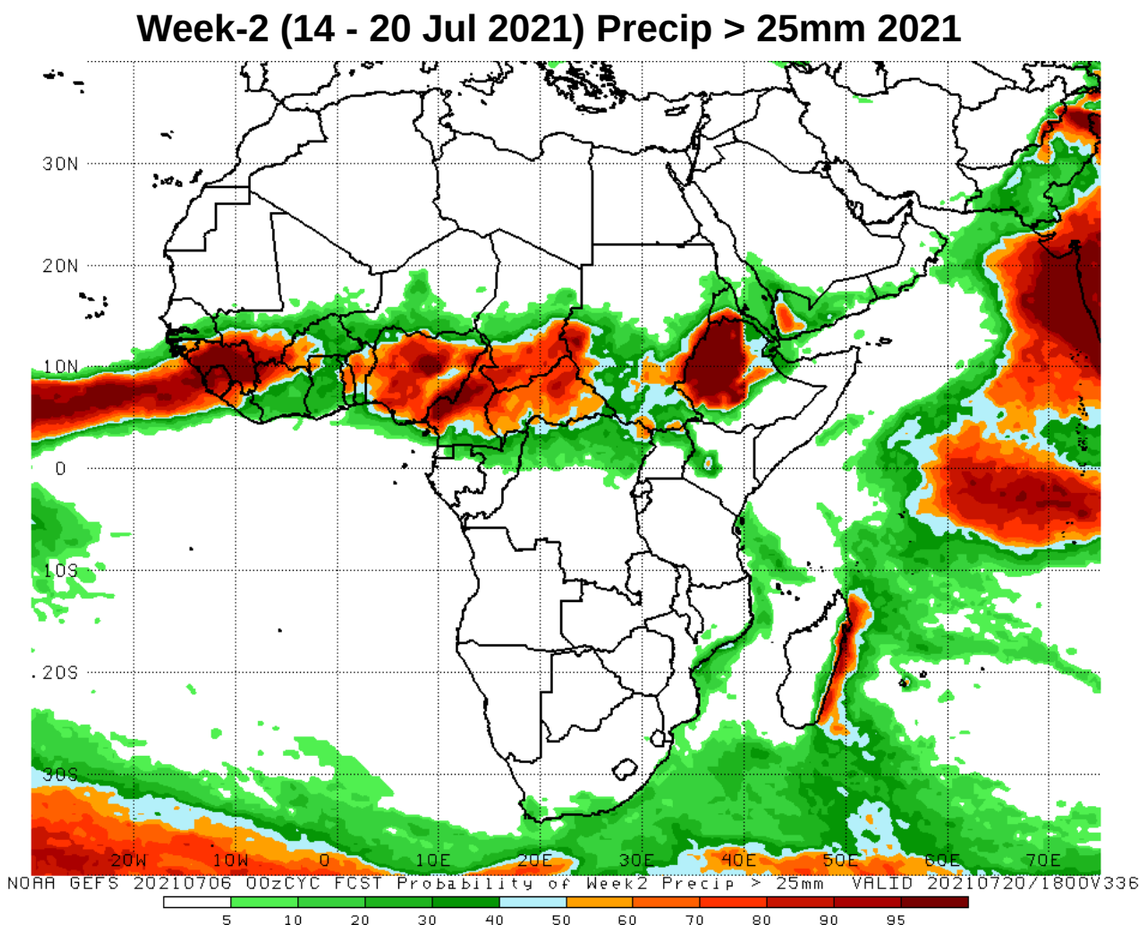


Figure 27: Week1 Precipitation Total Exceedance Probabilities

https://www.cpc.ncep.noaa.gov/products/international/cpci/data/18/gefs_wk1_precip25mm_prob_africa.html

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



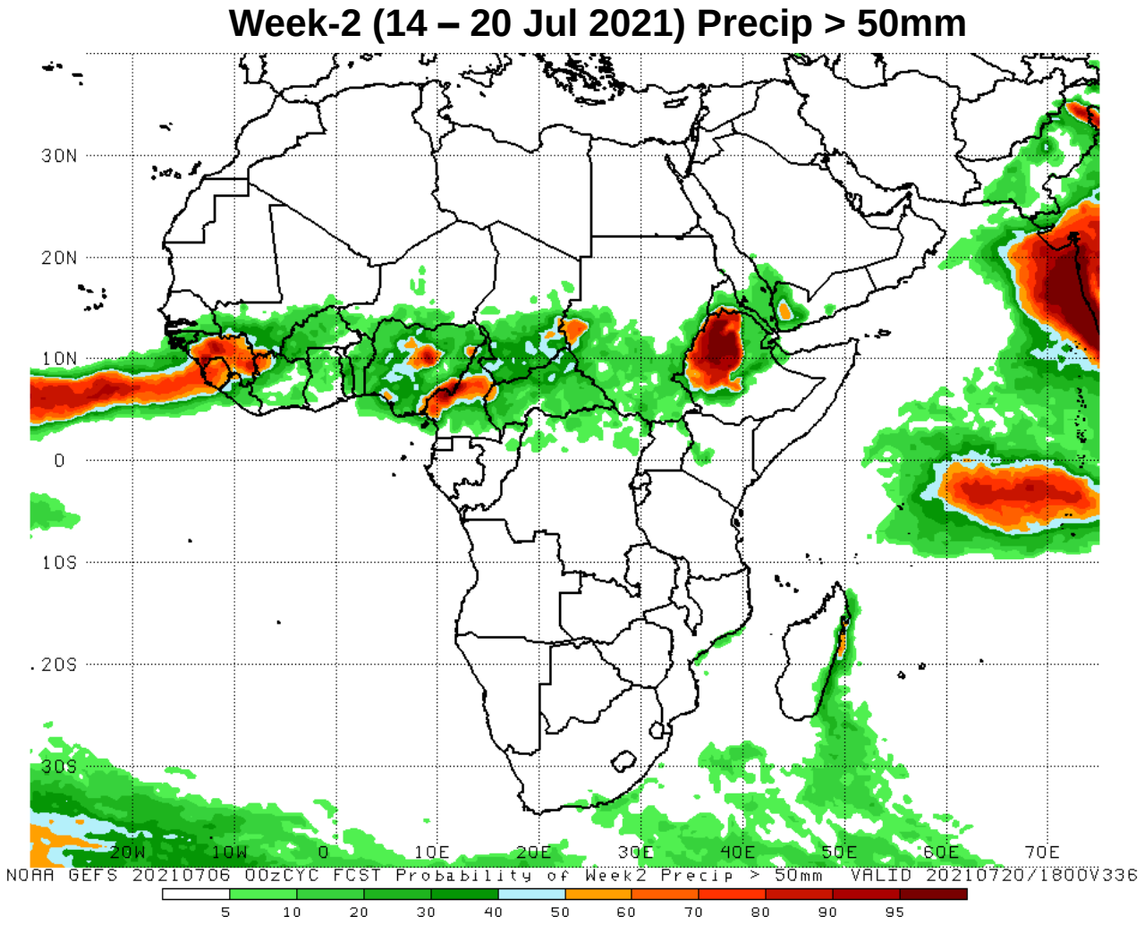
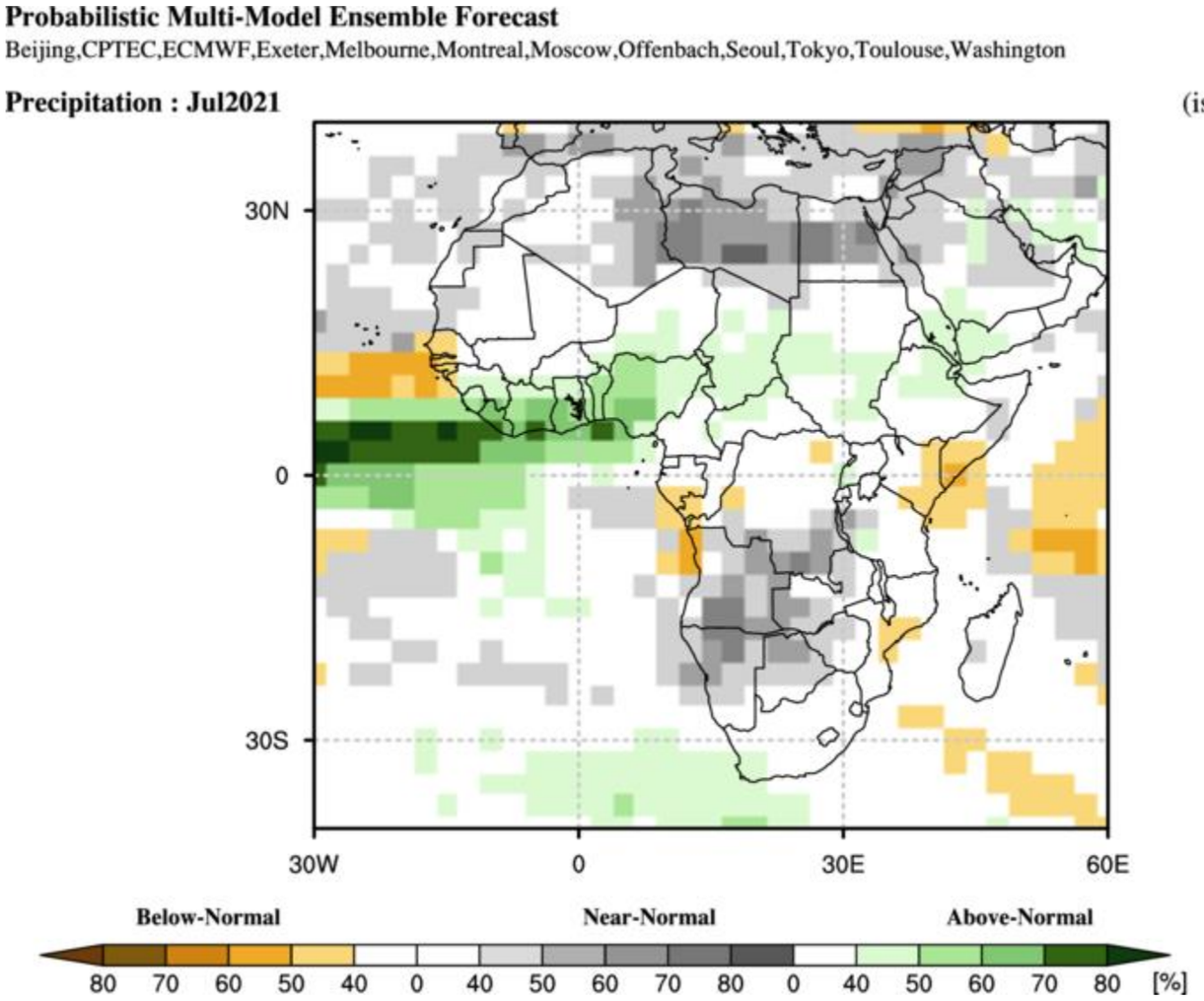


Figure 28: Week2 Precipitation Total Exceedance Probabilities

https://www.cpc.ncep.noaa.gov/products/international/cpci/data/18/gefs_wk2_precip25mm_prob_africa.html

https://www.cpc.ncep.noaa.gov/products/international/cpci/data/18/gefs_wk2_precip50mm_prob_africa.html

Monthly Forecast from WMO Lead Centre Multi-Model Ensemble

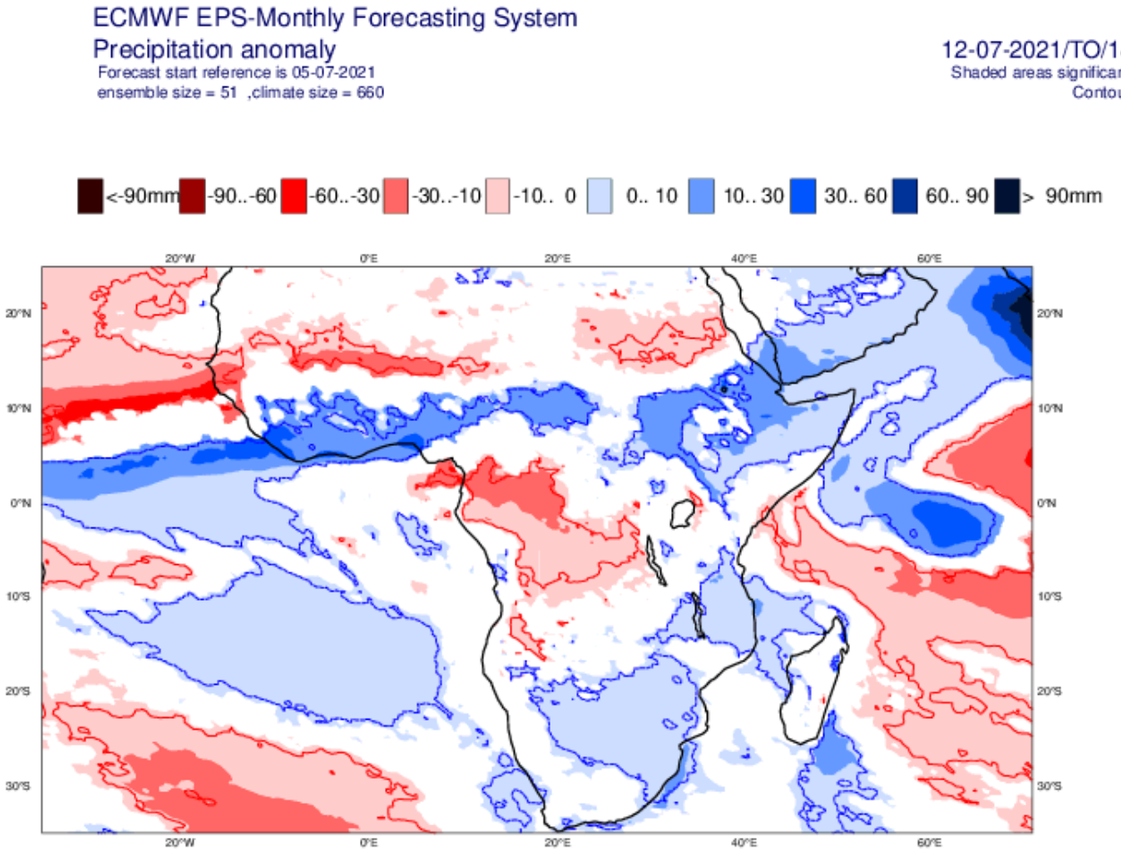


The LCMM-level model set tells us that part of the Africa region will have average to higher than average rainfall.

Figure 29: Monthly Precipitation forecast

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

Precipitation Anomaly Forecasts from ECMWF for week 1 and 2



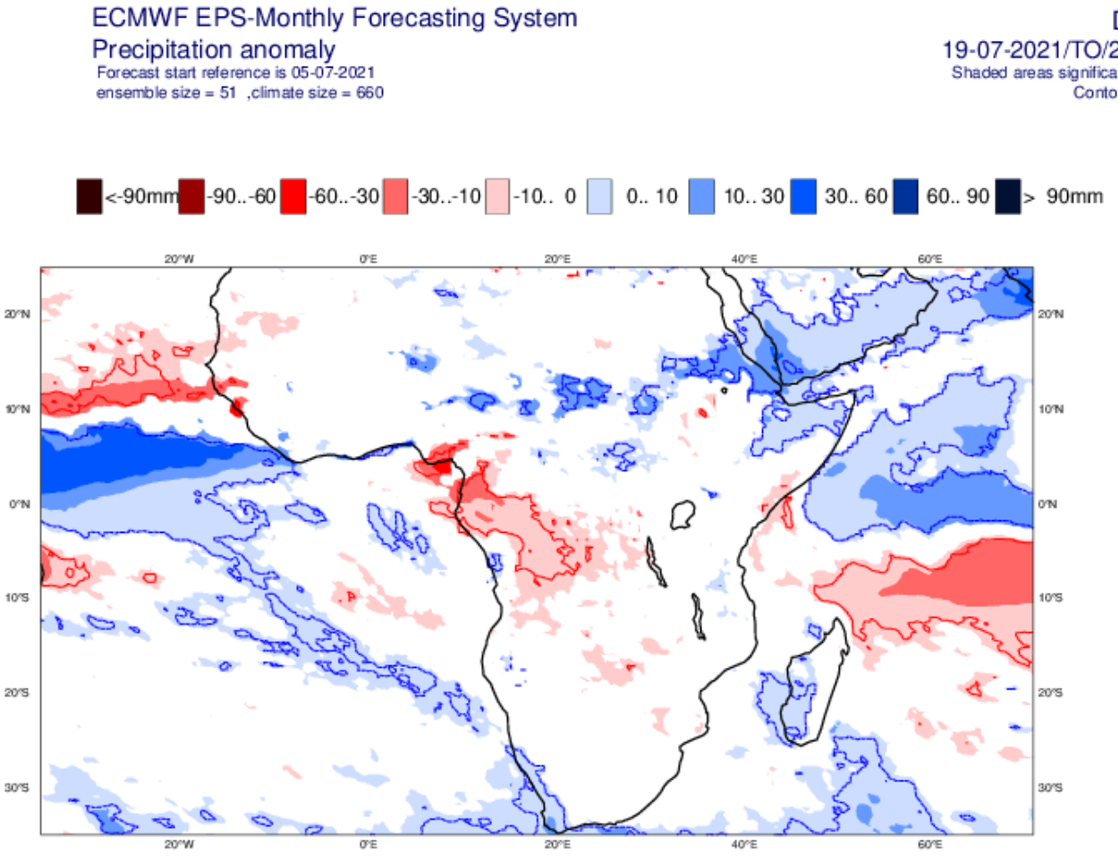
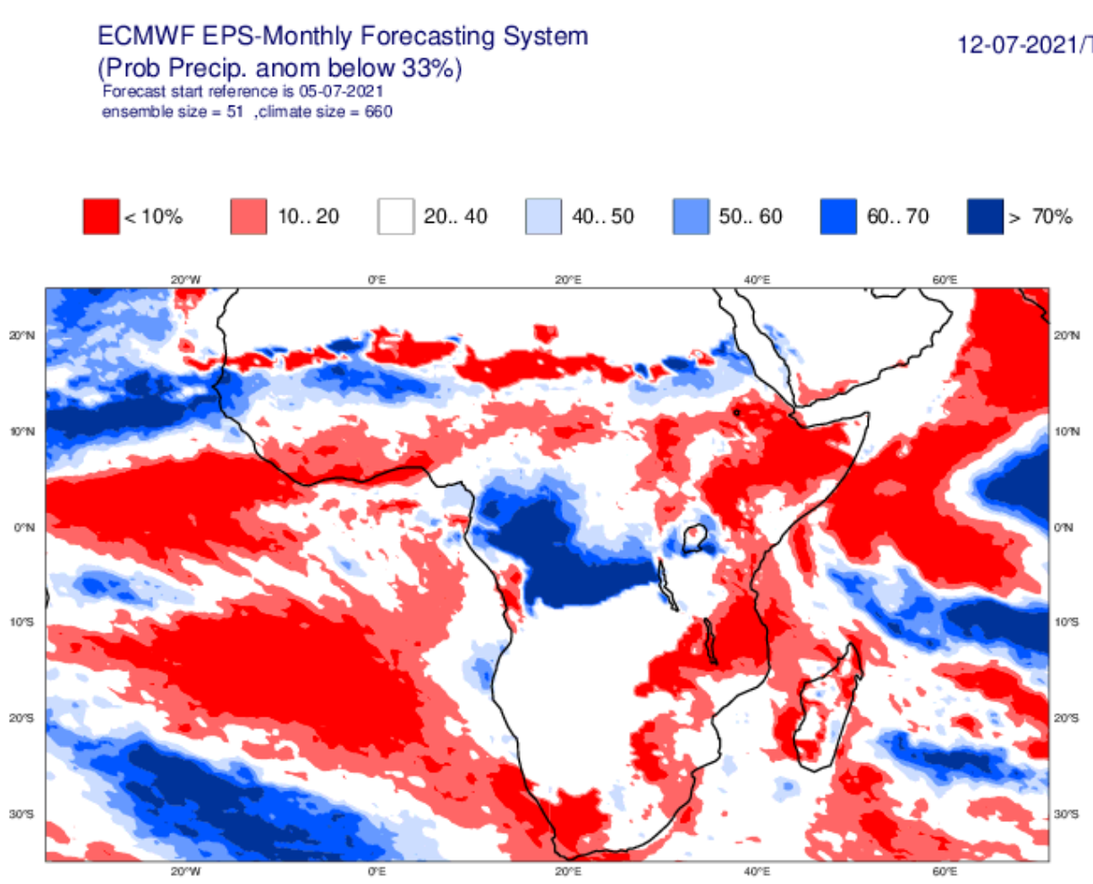


Figure 30: Monthly Precipitation Anomaly forecast from ECMWF

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 & 2: weekly tercile at above 33%



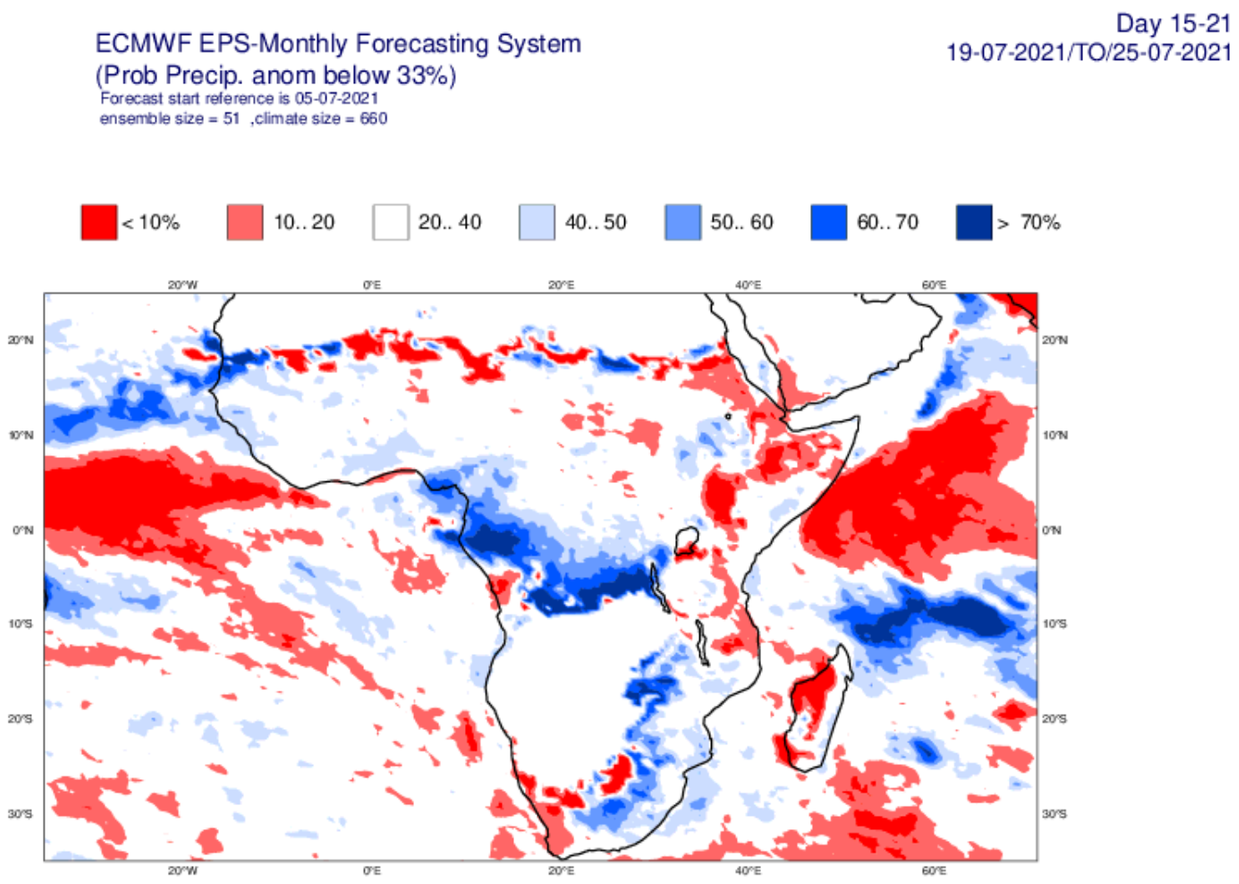
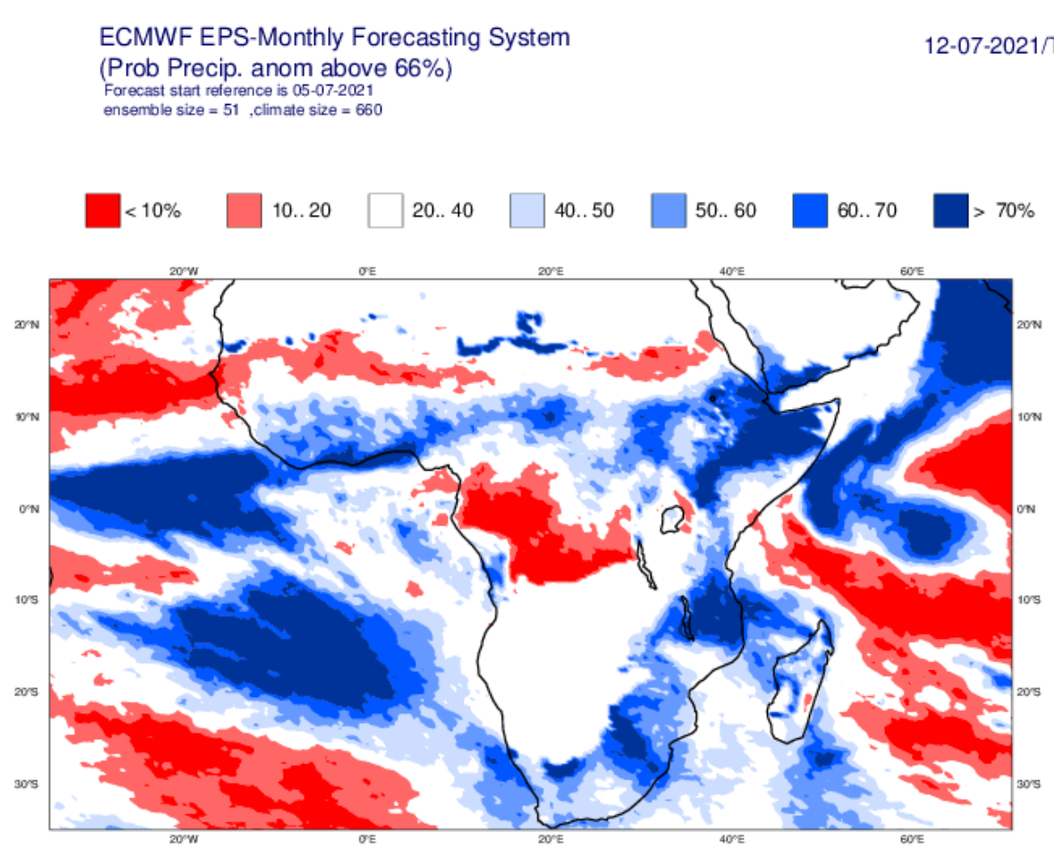


Figure 31: Weekly tercile probability forecast below 33%

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 1 & 2: weekly tercile at above 66%



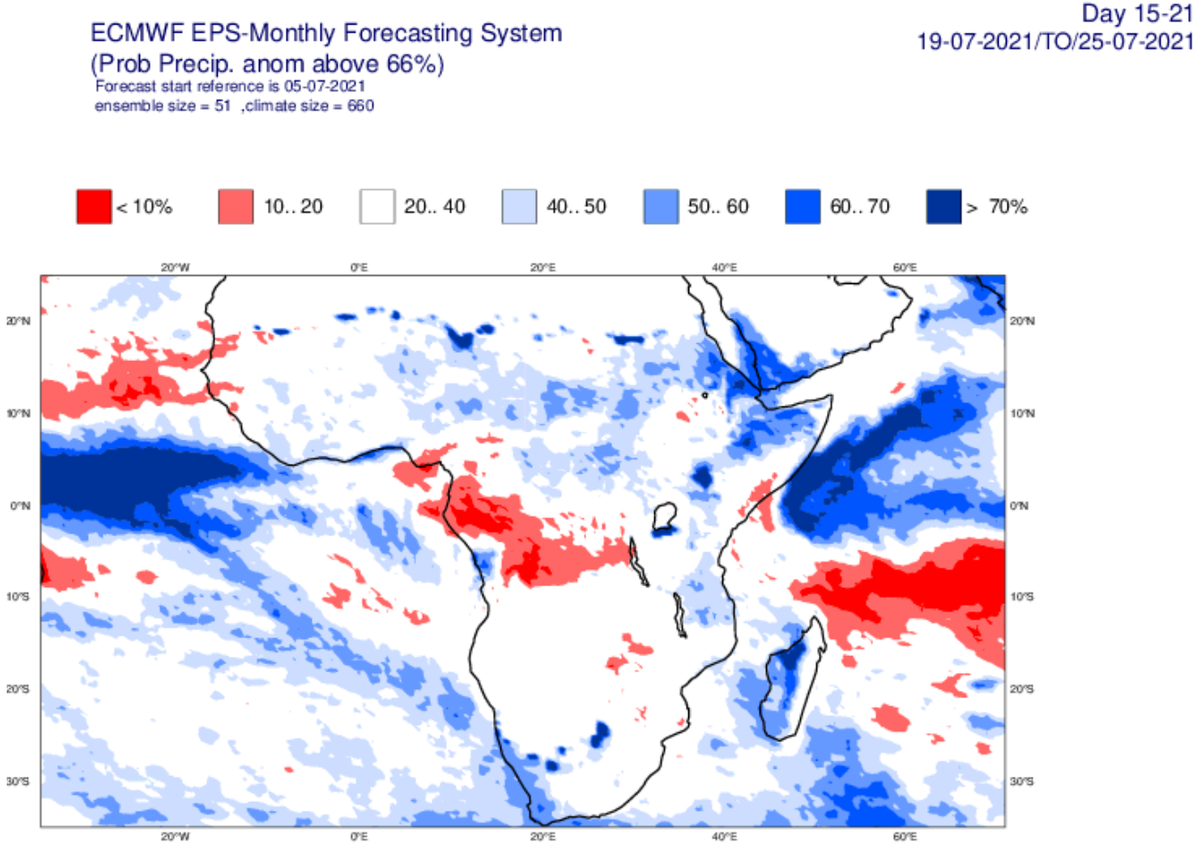
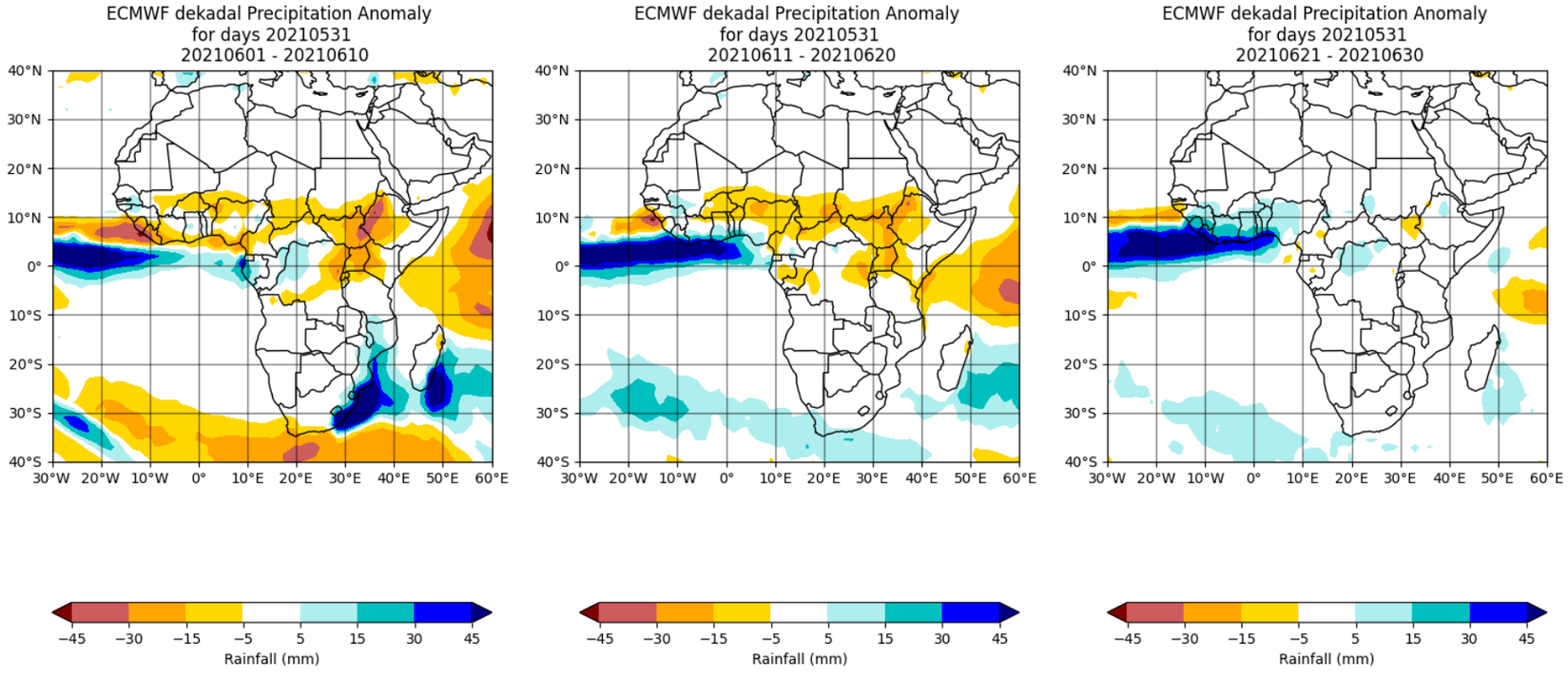
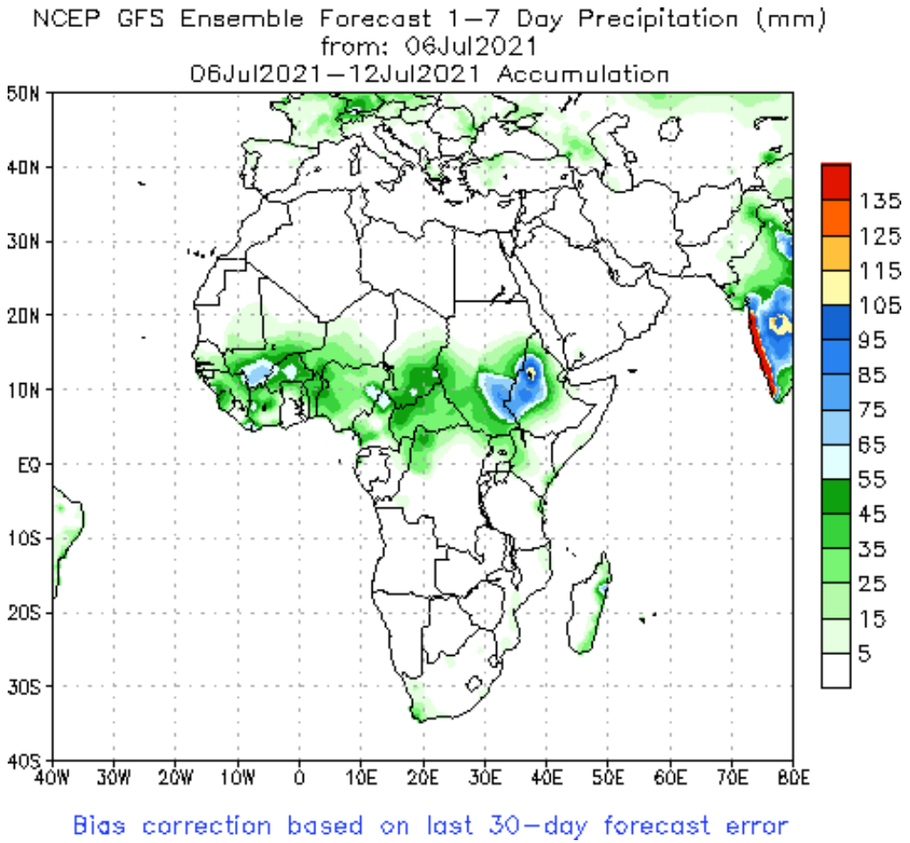


Figure 32: weekly tercile probability forecast below above 66%

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


ECMWF dekadal Precipitation Anomaly
for days 20210531
20210601 - 20210610
ECMWF dekadal Precipitation Anomaly
for days 20210531
20210611 - 20210620
ECMWF dekadal Precipitation Anomaly
for days 20210531
20210621 - 20210630
40°N
30°N
20°N
10°N
0°
10°S
20°S
30°S
40°S
30°W 20°W 10°W 0° 10°E 20°E 30°E 40°E 50°E 60°E
−45 −30 −15 −5 5 15 30 45
Rainfall (mm)

African Precipitation NCEP/GFS Bias-Corrected Precipitation and Anomaly Forecasts for week one



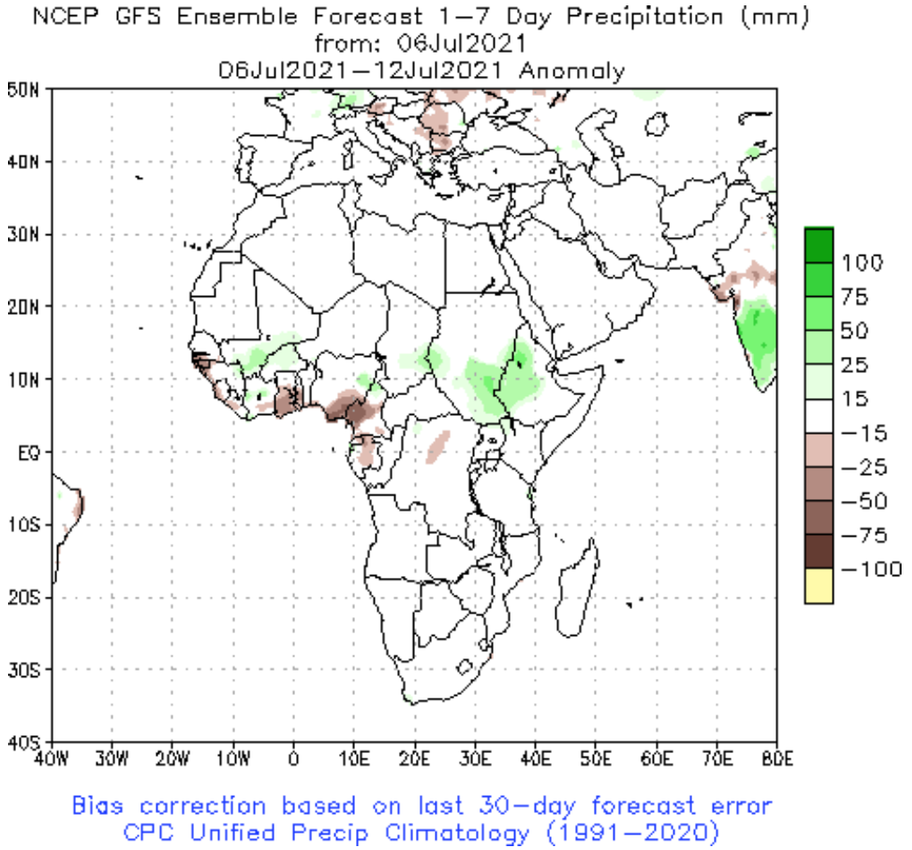
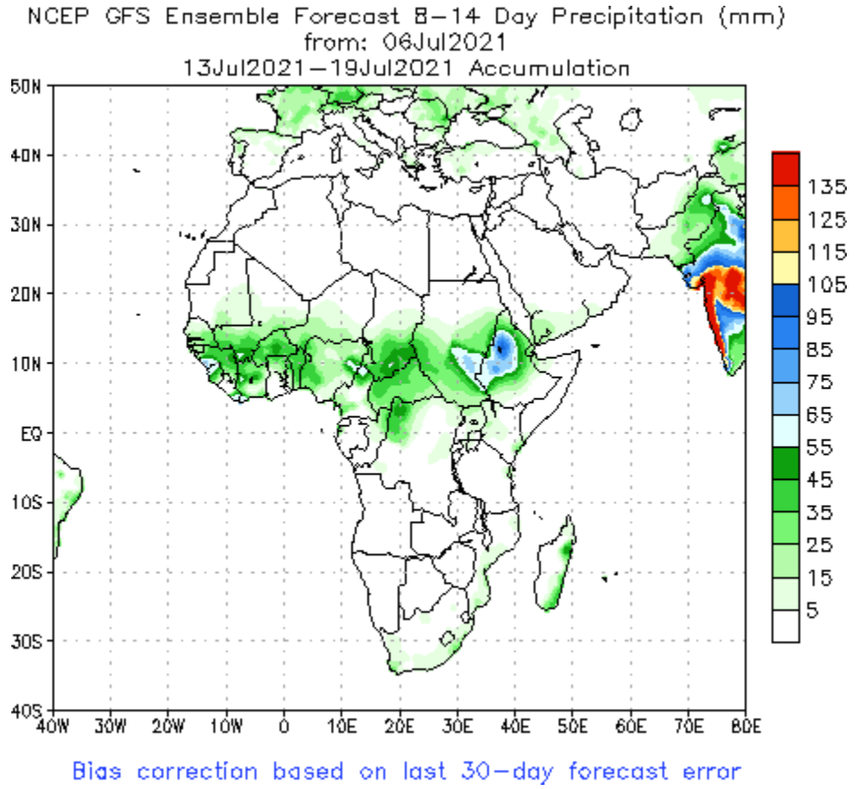


Figure 33: NCEP/GFS Précipitation and Anomaly forecast.

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



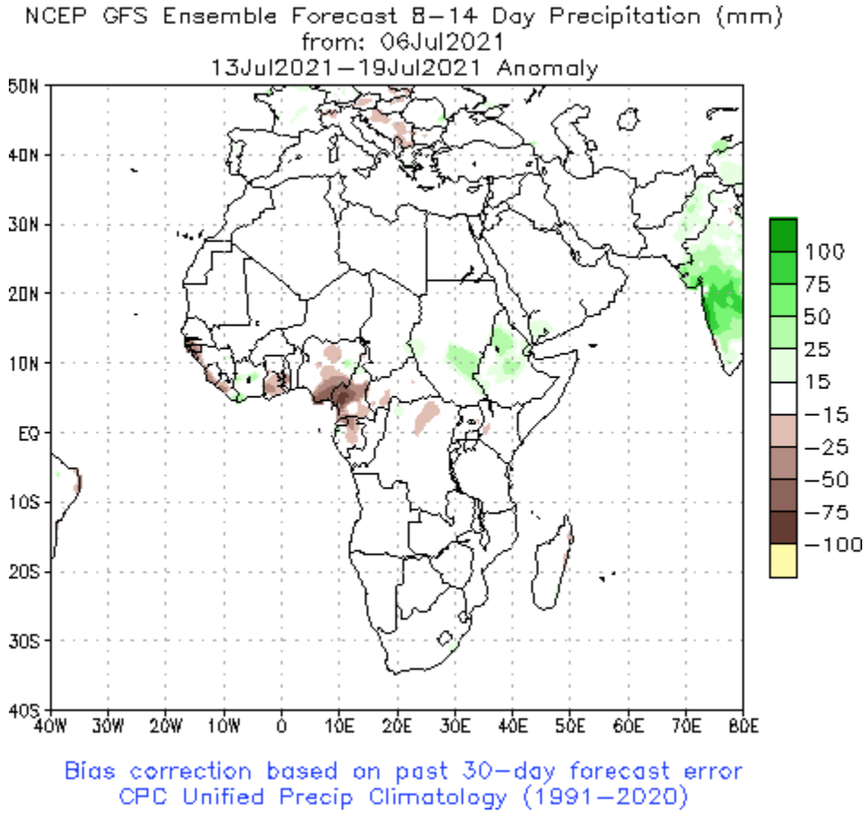


Figure 34: Précipitation and Anomaly forecast

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

PRECIPITATION PROBABILITY FORECAST 10 June – 30 Jul 2021

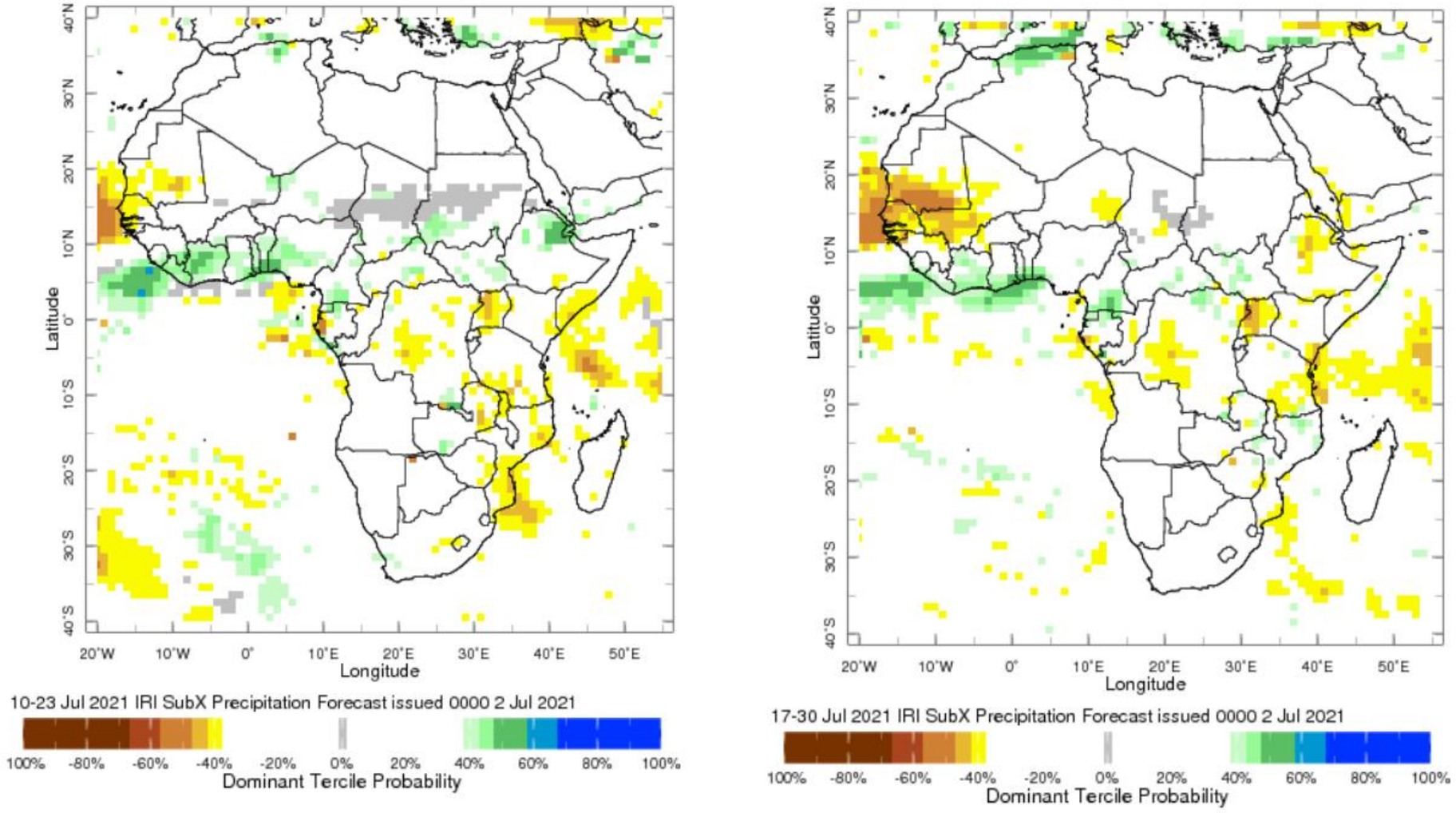
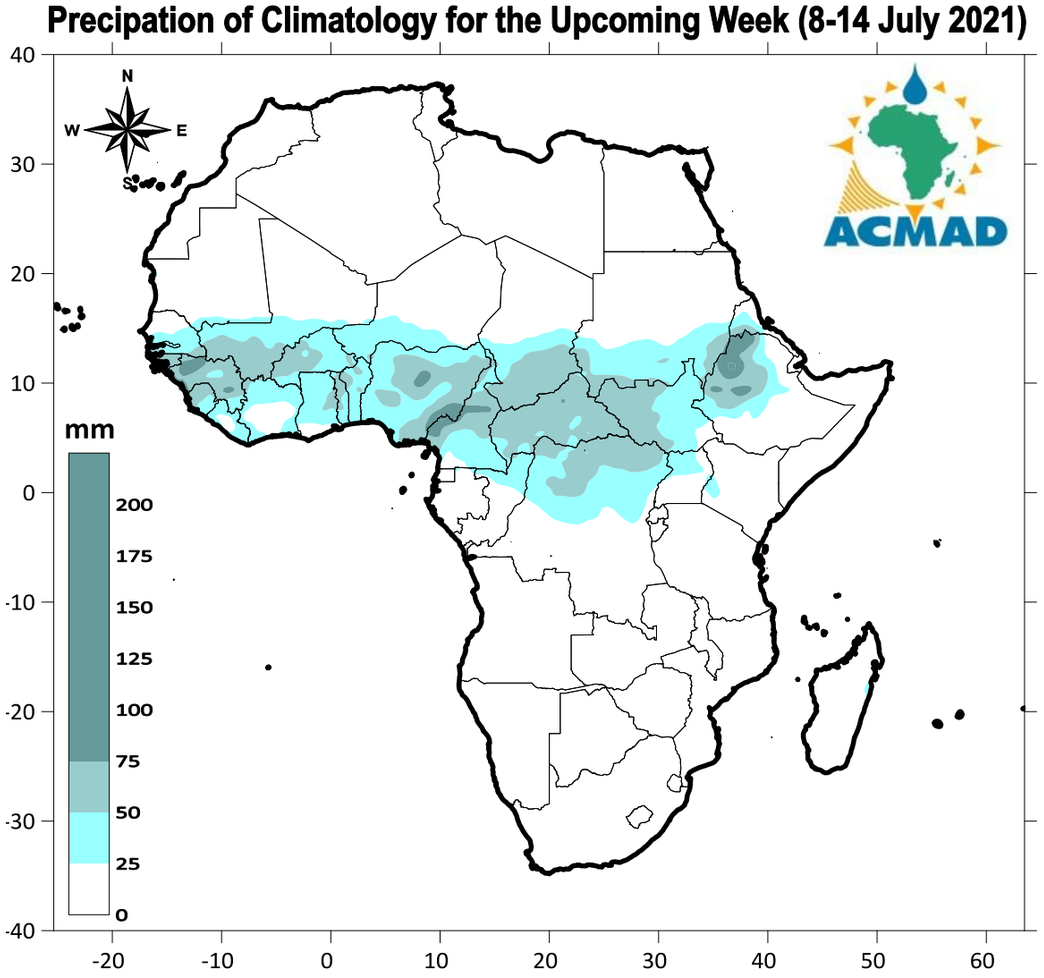


Figure 35: Précipitation and Anomaly forecast

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 3 & 4



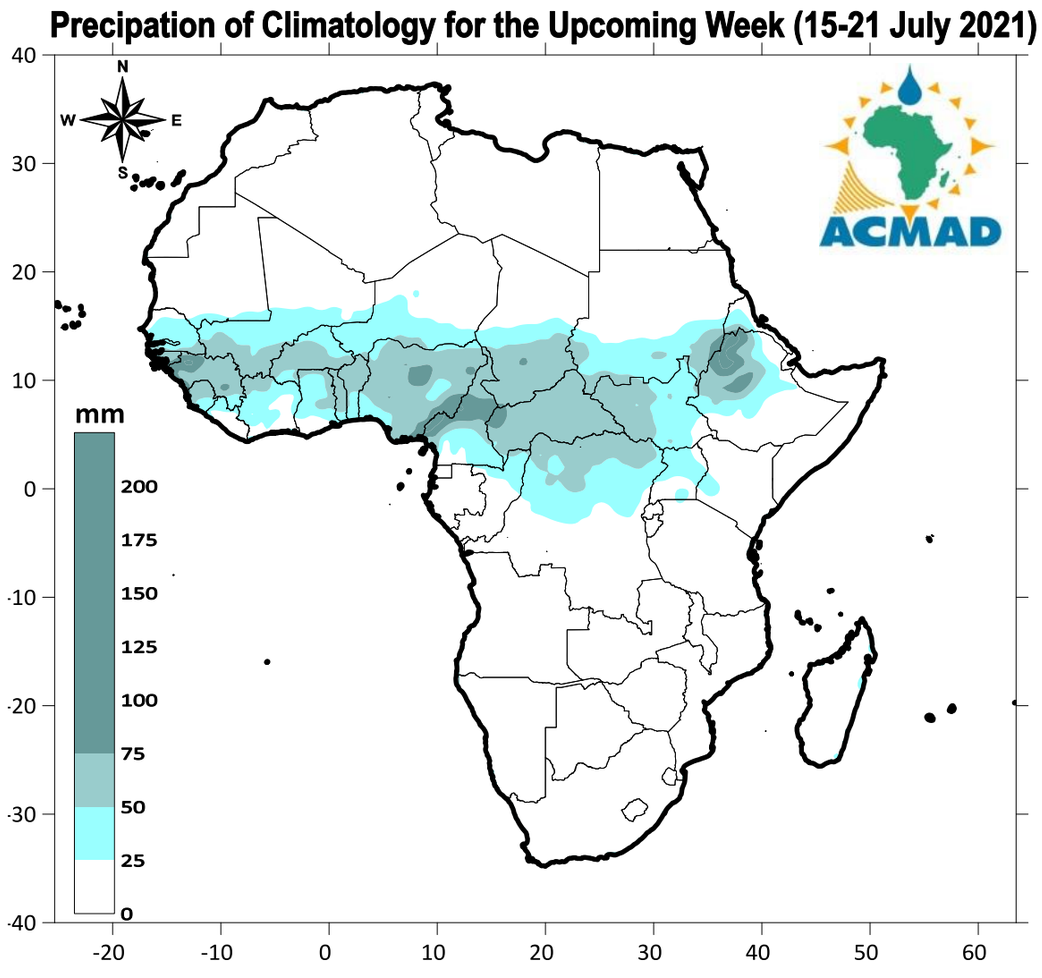


Figure 36: Climatology of Precipation for week-1(left panel) and week-2 (right panel)

PRECIPITATION FORECAST FOR THE COMING TWO WEEKS

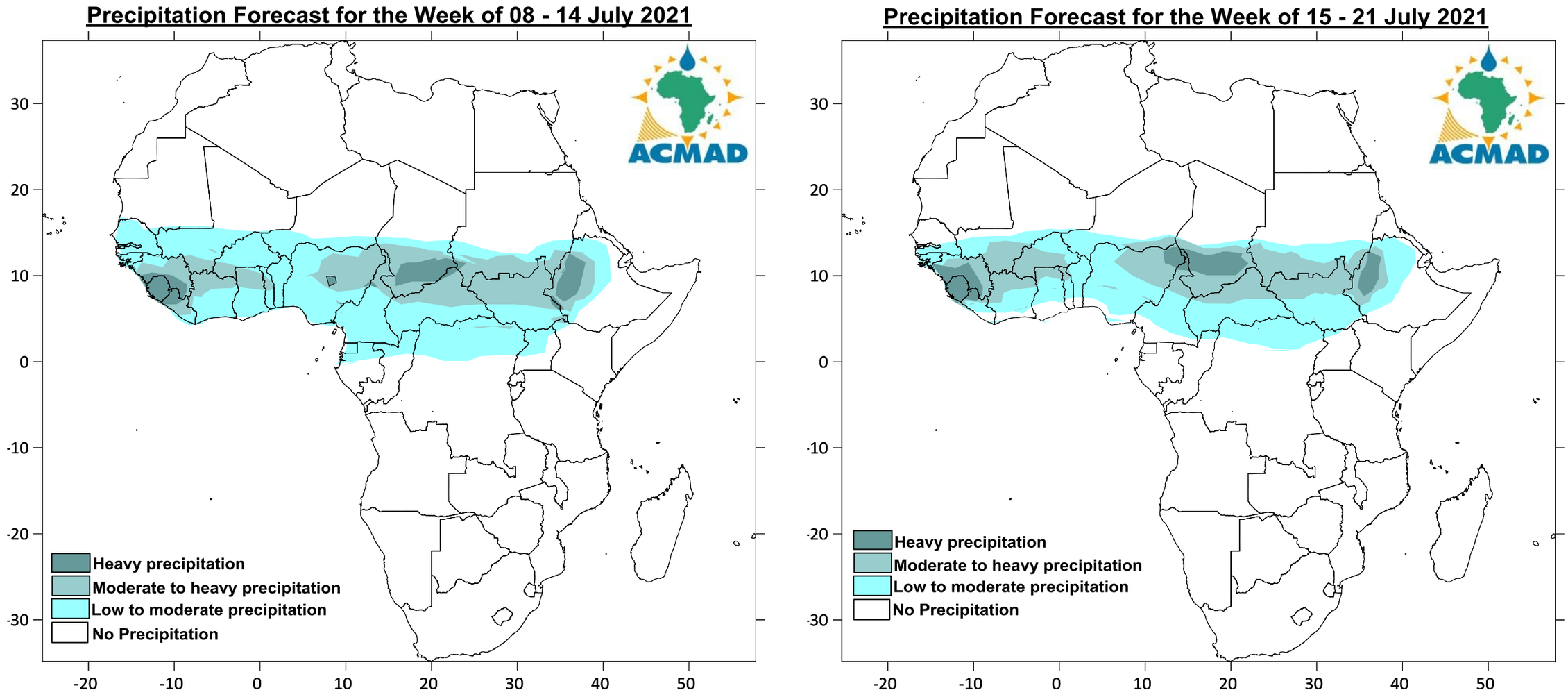


Figure 37: Climatology of Precipation for week-2 (left panel) and week-3 (right panel)