



DEKADAL TECHNICAL NOTE FOR SECOND DEKAD OF DECEMBER, 2021 AND PRECIPITATION FORECAST FOR WEEK 1 AND 2

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Content of the Technical Note

1. Monitoring Climate Element

- Percent of precipitation
- Temporal variation of precipitation
- Precipitation Onset (Observed and Projected)
- Dekadal OLR anomaly
- MSLP anomaly
- Wind anomaly at 850 and 700 hPa
- Relative Humidity anomaly

2. Global Driver Review and Assessment

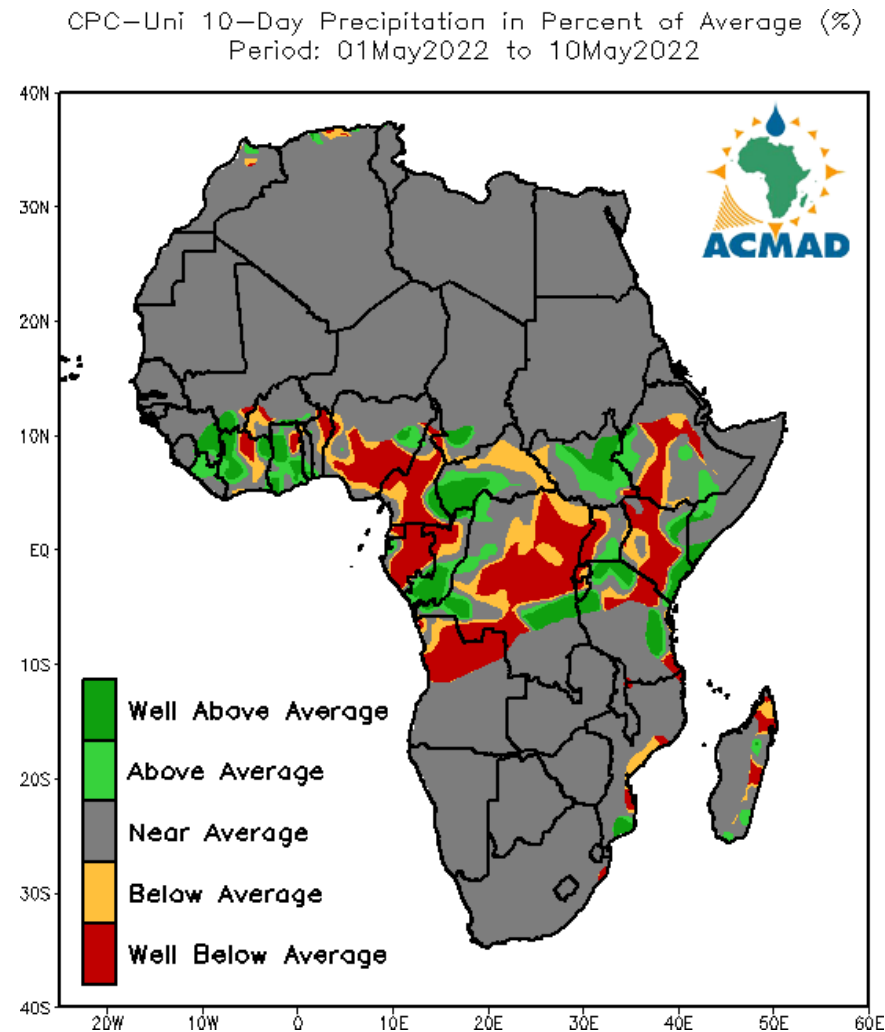
- Weekly and monthly SST anomaly assessment
- Current Velocity Potential at 200hPa
- Current MJO Status and Forecast
- Weekly PWAT observed and outlook
- Dekadal velocity potential with MJO, Kelvin and Rossby Wave
- Dekadal Stream Function with MJO, Kelvin and Rossby Wave

3. Model Guidance for Weekly Climate outlook

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- Weekly NCEP/GFS bias corrected ensemble forecast
- GEFS weekly precip exceedance forecast
- Weekly Precip Forecast from ECMWF (Anom and Prob.)
- Monthly tercile prob precip anomaly forecast
- IRI SubX precip forecast
- Two week climatology
- Two weeks precip forecast

1. Monitoring Climate Element

Estimated Cumulative Precipitation in % of average for the Second Dekad of December 2021



The figure shows a gradual extension of the rains to most of the southern hemisphere with above average to well above average precipitation observed over most of Gulf of Guinea areas. Below to well below average precipitation dominated over most of the east African countries from Ethiopia, Somalia, Kenya, east of Tanzania, Mozambique and north of Zambia. Areas of above to well above average precipitation are observed further south in most of Angola, south of Zambia, north east of Namibia, south Botswana and central part of S. Africa.

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

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

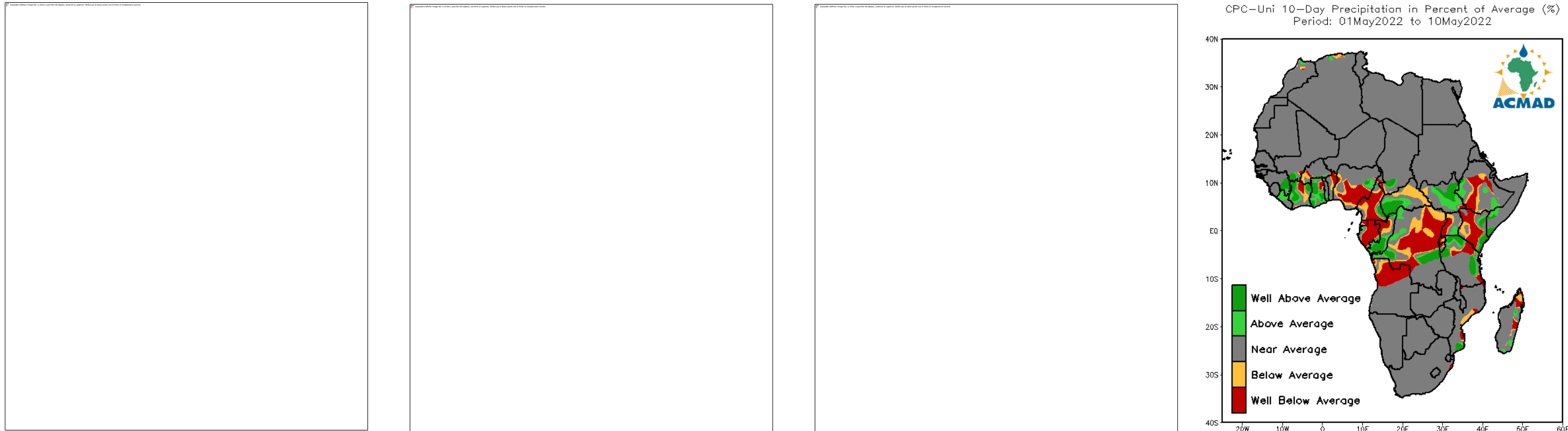
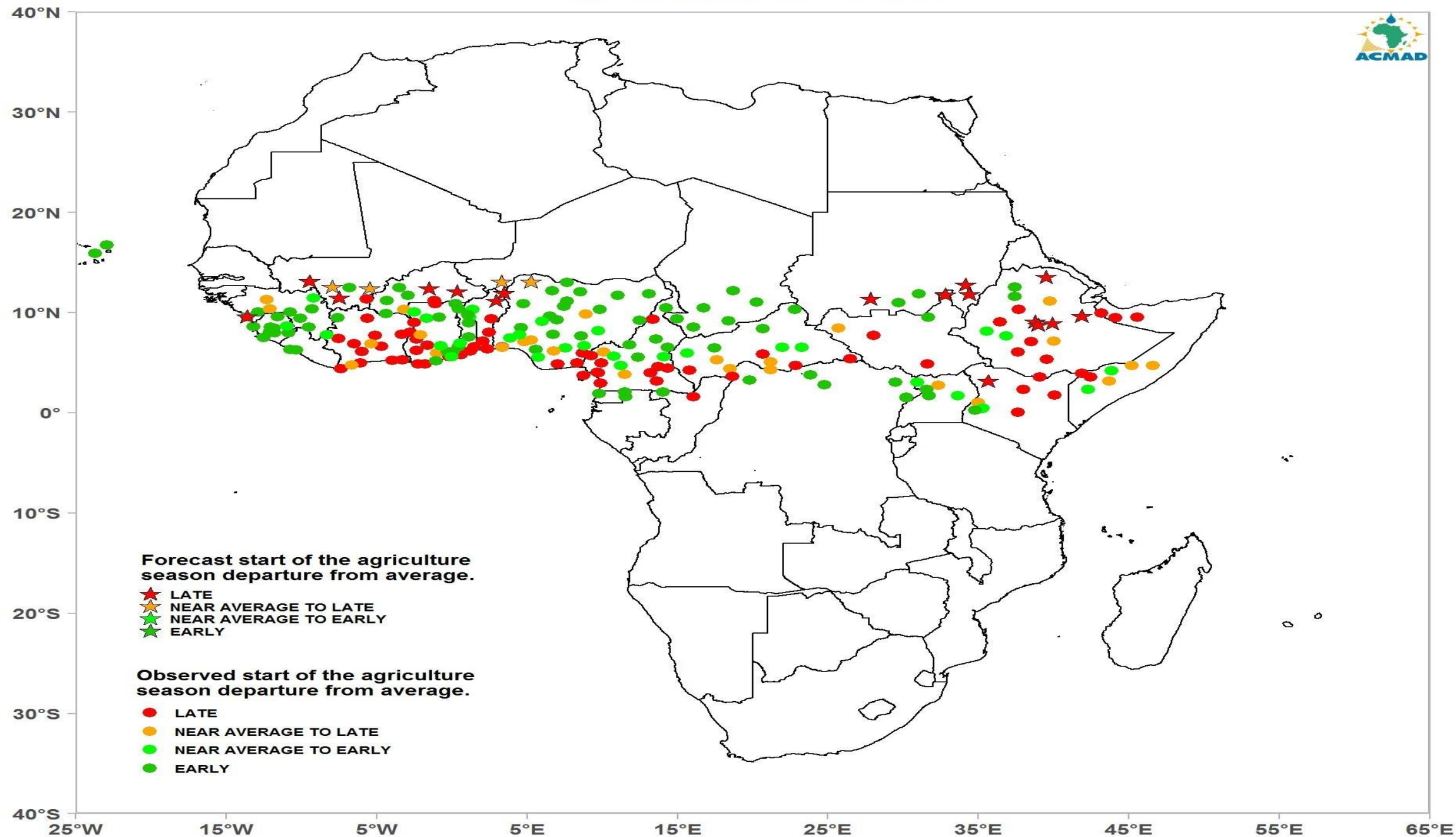


Figure 2: This maps display decadal average precipitation in percent of average

The below to well below average precipitation observed in the third dekad of September and the first two dekads of October with rainfall activities centered around the Gulf of Guinea and central African states. The persisted deficit into the last dekad of October with more spatial coverage though dominated by below to well below average precipitation in the eastern part of the continent with countries like Ethiopia, Somalia, Mozambique and Madagascar most affected. The above to well above average precipitation was observed in most of the Gulf of Guinea from south Senegal, Guinea, Liberia, Côte d'Ivoire, Ghana and southern Nigeria. Further south into most of Angola, north east of Namibia, west of Zambia and central S. Africa.

MONITORING OF OBSERVED ANOMALIES ON THE START OF THE AGRICULTURE SEASON AND OUTLOOK.
MONITORING PERIOD: JANUARY-MAY 2022.
OUTLOOK VALIDITY PERIOD: MAY 12 TO MAY 26 2022 .
DATE OF ISSUE: MAY-12-2022.



PAST 3 DEKADS OLR ANOMALIES

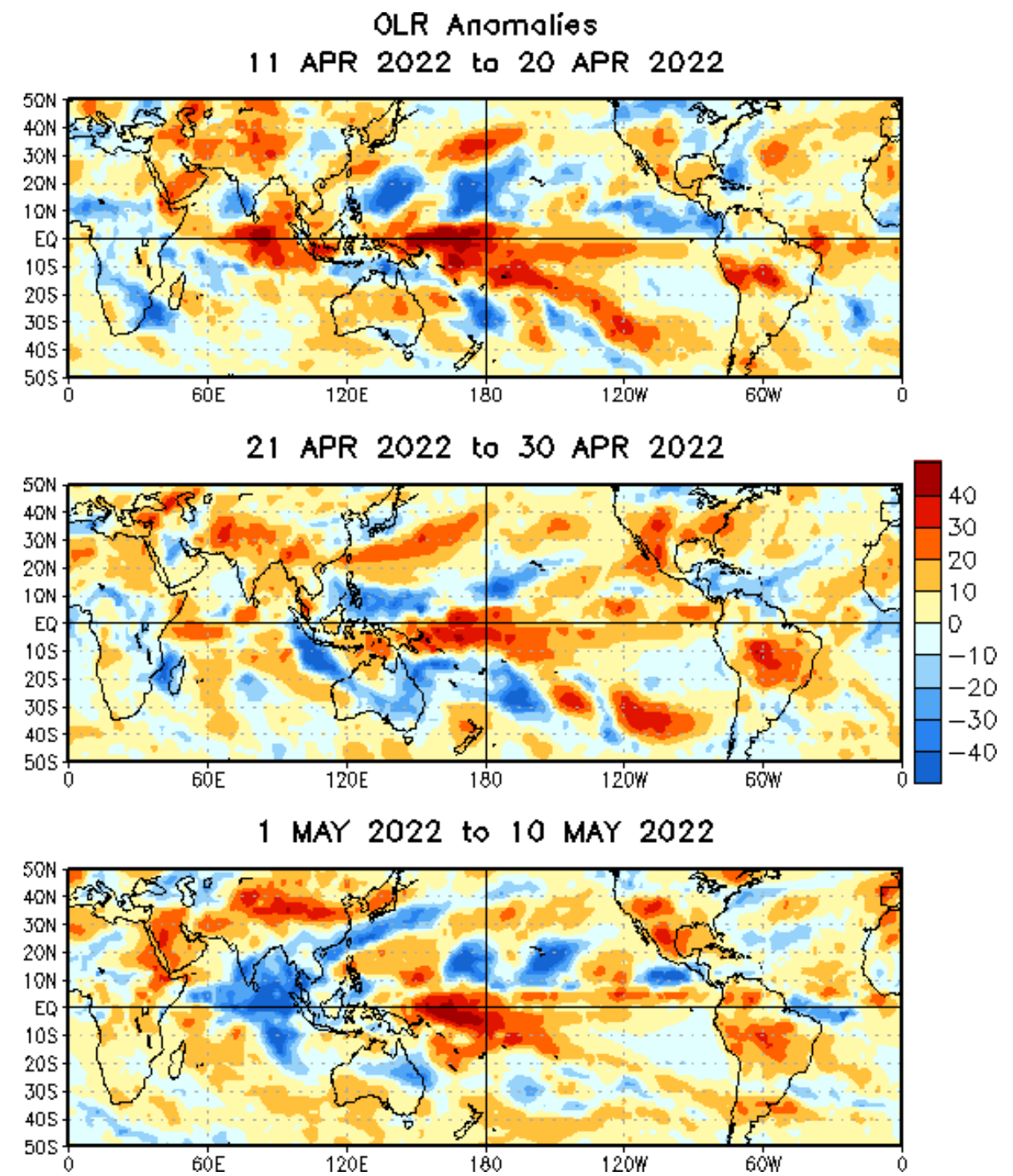


Figure 4: Past 3 weeks OLR anomalies

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

Mean Sea Level Pressure (MSLP) Anomalies for the 1st Dekad of Dec. 2021

MSLP Obs. vs Anom. for the Dekad: 01–10 May 2022

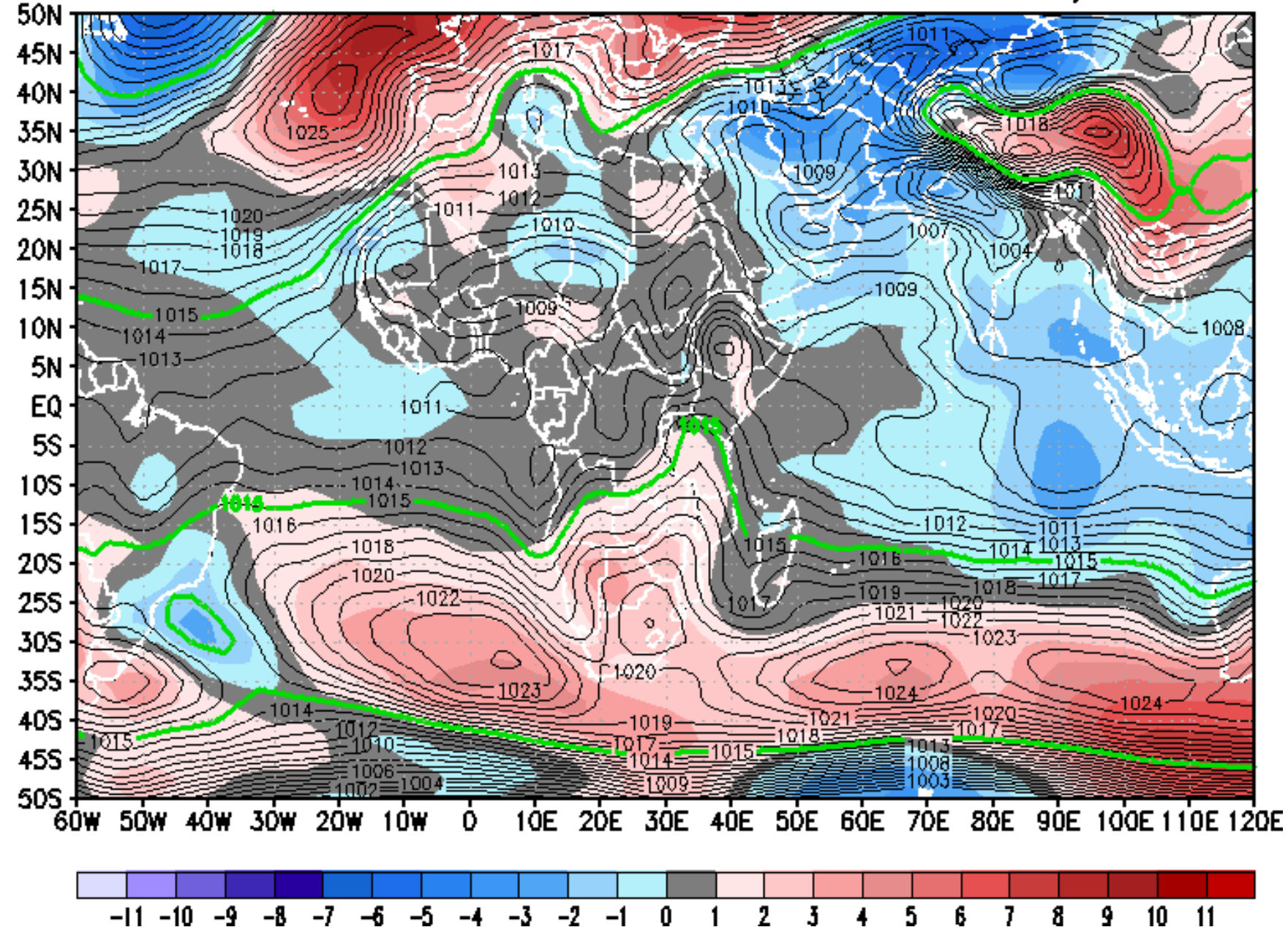


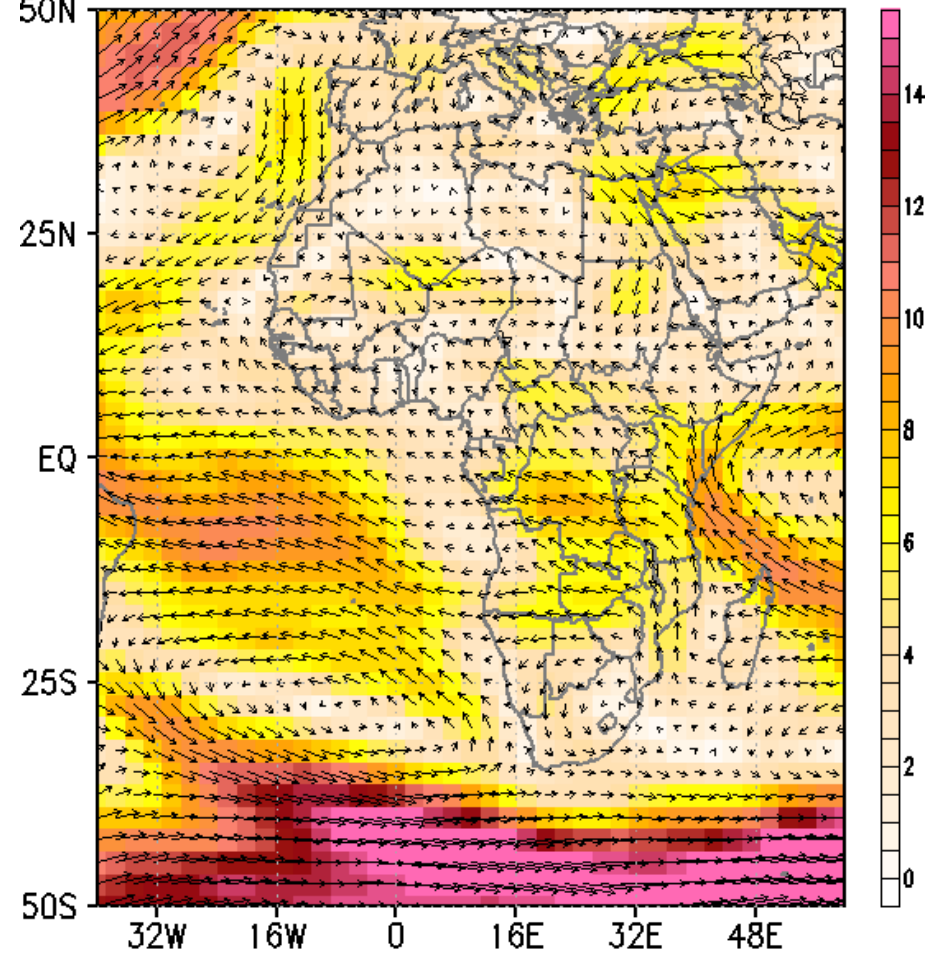
Figure 5: MSLP observation versus anomaly

Data source:

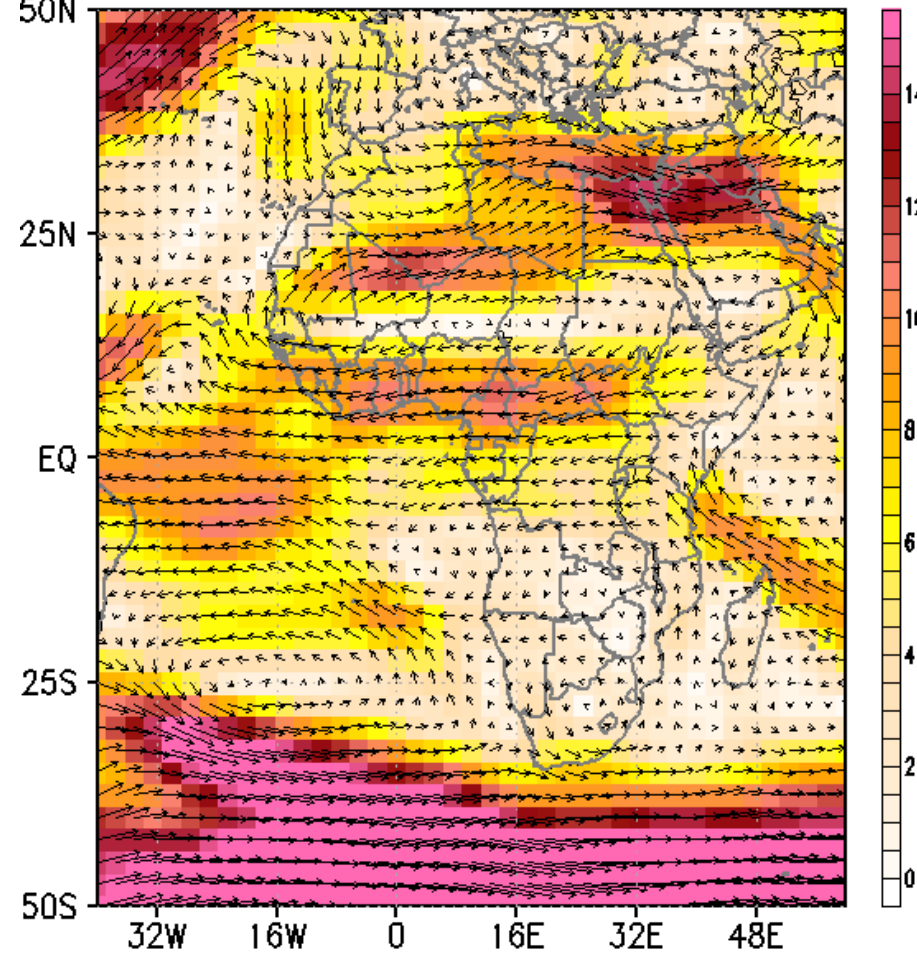
<http://iridl.ldeo.columbia.edu/expert/SOURCES/NOAA/NCEP-NCAR/CDAS-1/DAILY/Intrinsic/MSL/pressure>

Wind Anomalies for the 1st Dekad of Dec. 2021 @ 850hpa, 700hpa and 200hPa

850hPa Wind for the Dekad: 01–10 May 2022



700hPa Wind for the Dekad: 01–10 May 2022



200hPa Wind for the Dekad: 01–10 May 2022

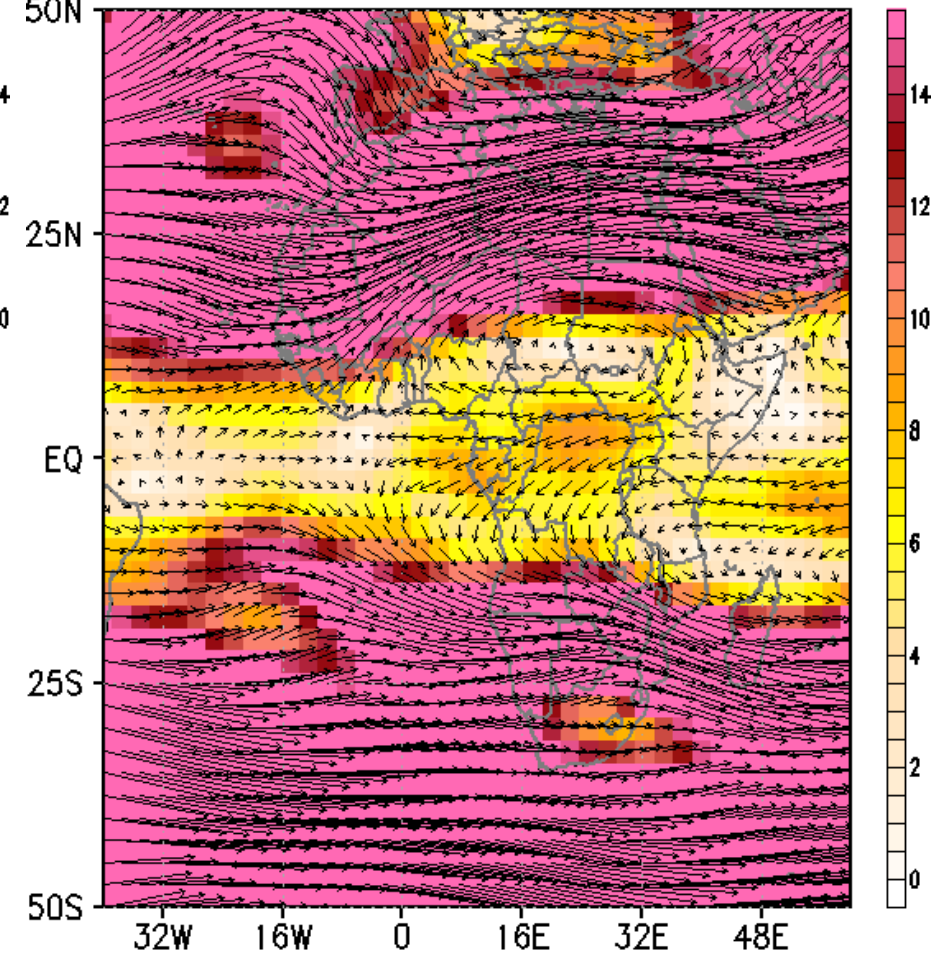


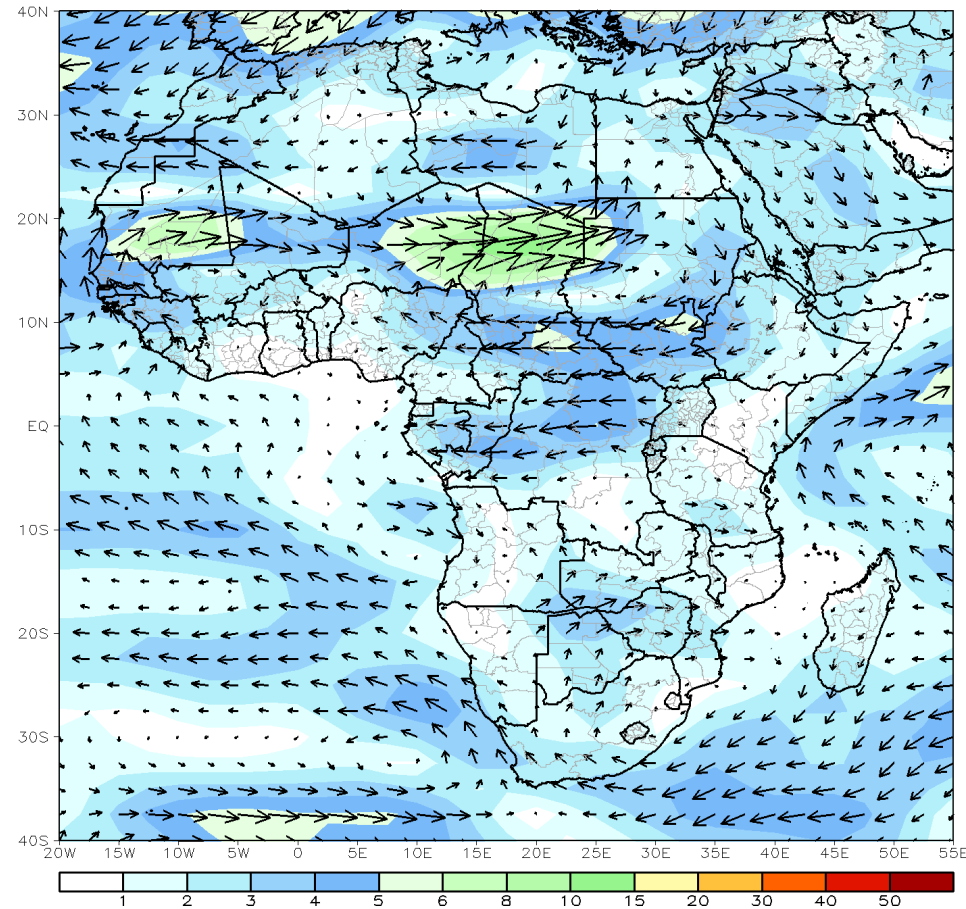
Figure 6: Wind anomalies for 850hpa and 700hPa

9def/long_name/%28Vitesse%29def/windspeed_colors/DATA/0/15/RANGE/u/v/X/Y/fig:/colors/vectors/grey/countries_gaz/:fig//plotaxislength/432/psdef//plotborder/72/psdef//XOVY/null/psdef/

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

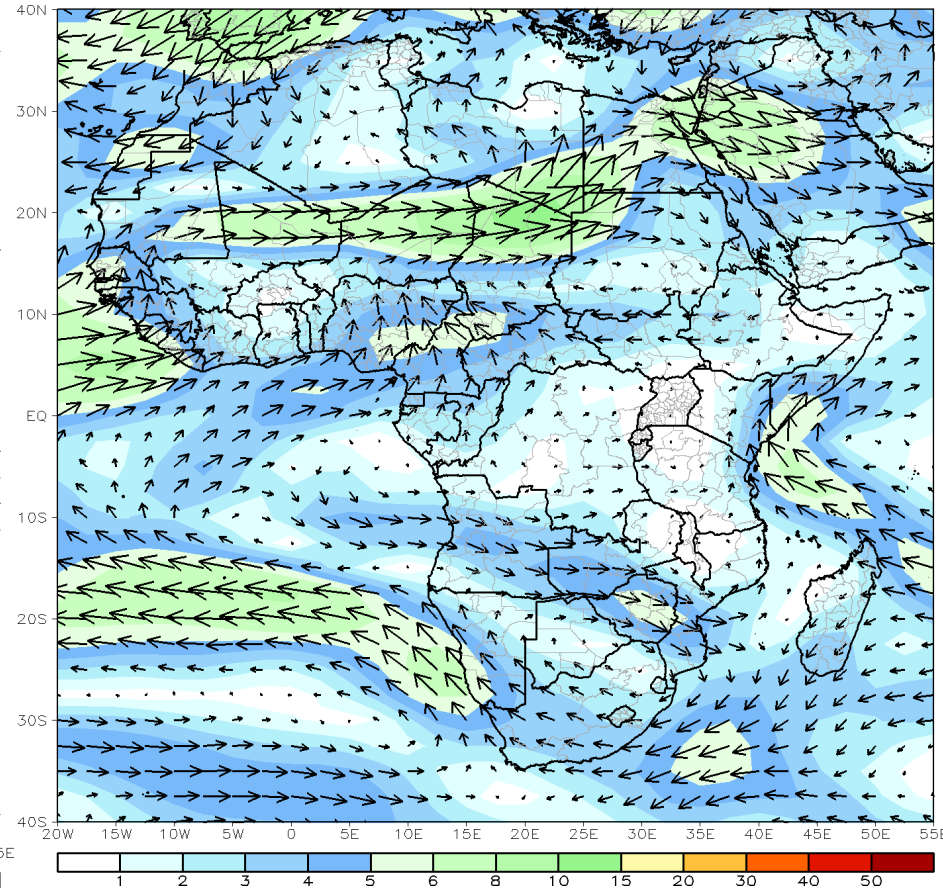
CDAS 850mb 7-Day Mean Vector Wind Anomaly (m/s)

Period: 03May2022 - 09May2022



CDAS 700mb 7-Day Mean Vector Wind Anomaly (m/s)

Period: 03May2022 - 09May2022



CDAS 200mb 7-Day Mean Vector Wind Anomaly (m/s)

Period: 03May2022 - 09May2022

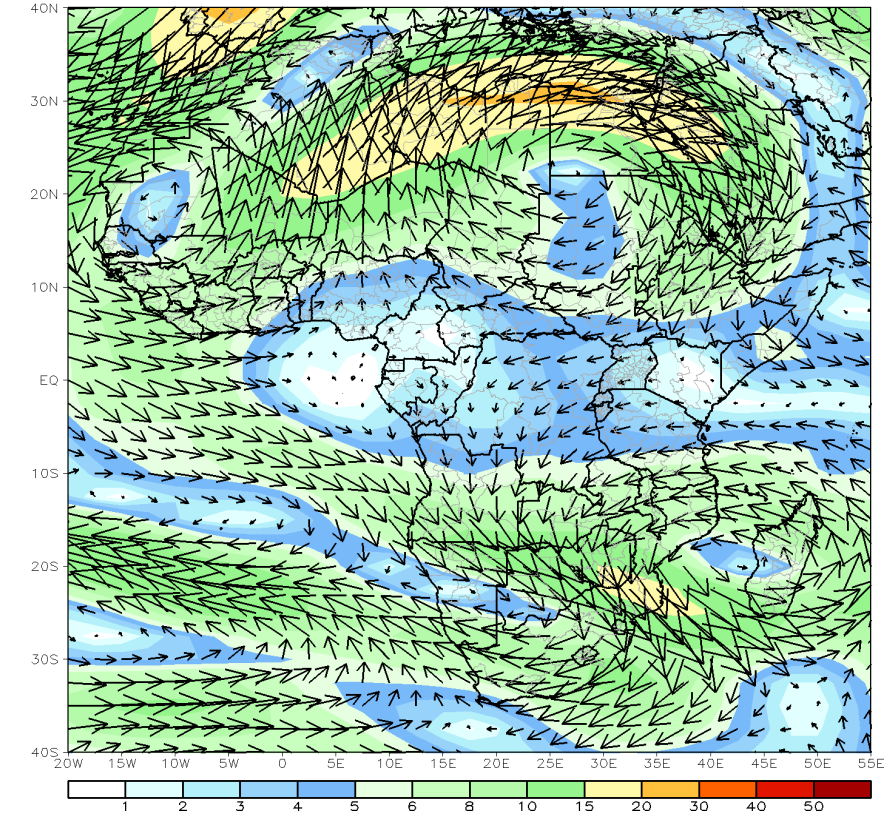


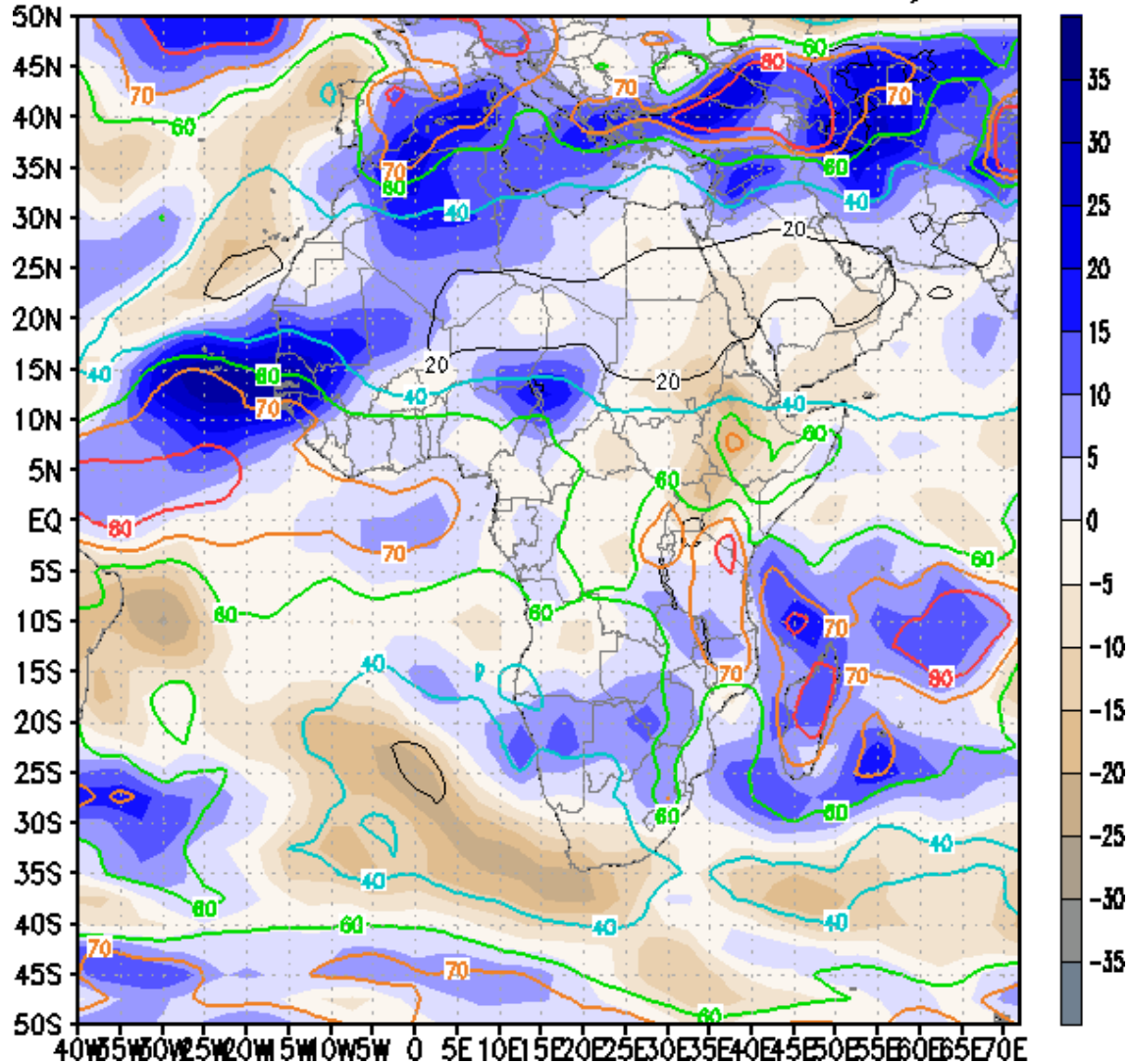
Figure 7: Wind anomalies for 850hpa, 700hPa and 200hpa

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

[Climate Prediction Center - African Desk: SWFDP GFS FORECASTS \(noaa.gov\)](https://www.cpc.ncep.noaa.gov/products/international/africa/africa.shtml)

Relative Humidity (RH) Anomalies at 850hpa and 700hpa for the 1st Dekad of Dec 2021

RHum 850hPa Anom. Dekad: 01–10 May 2022



RHum 700hPa Anom. Dekad: 01–10 May 2022

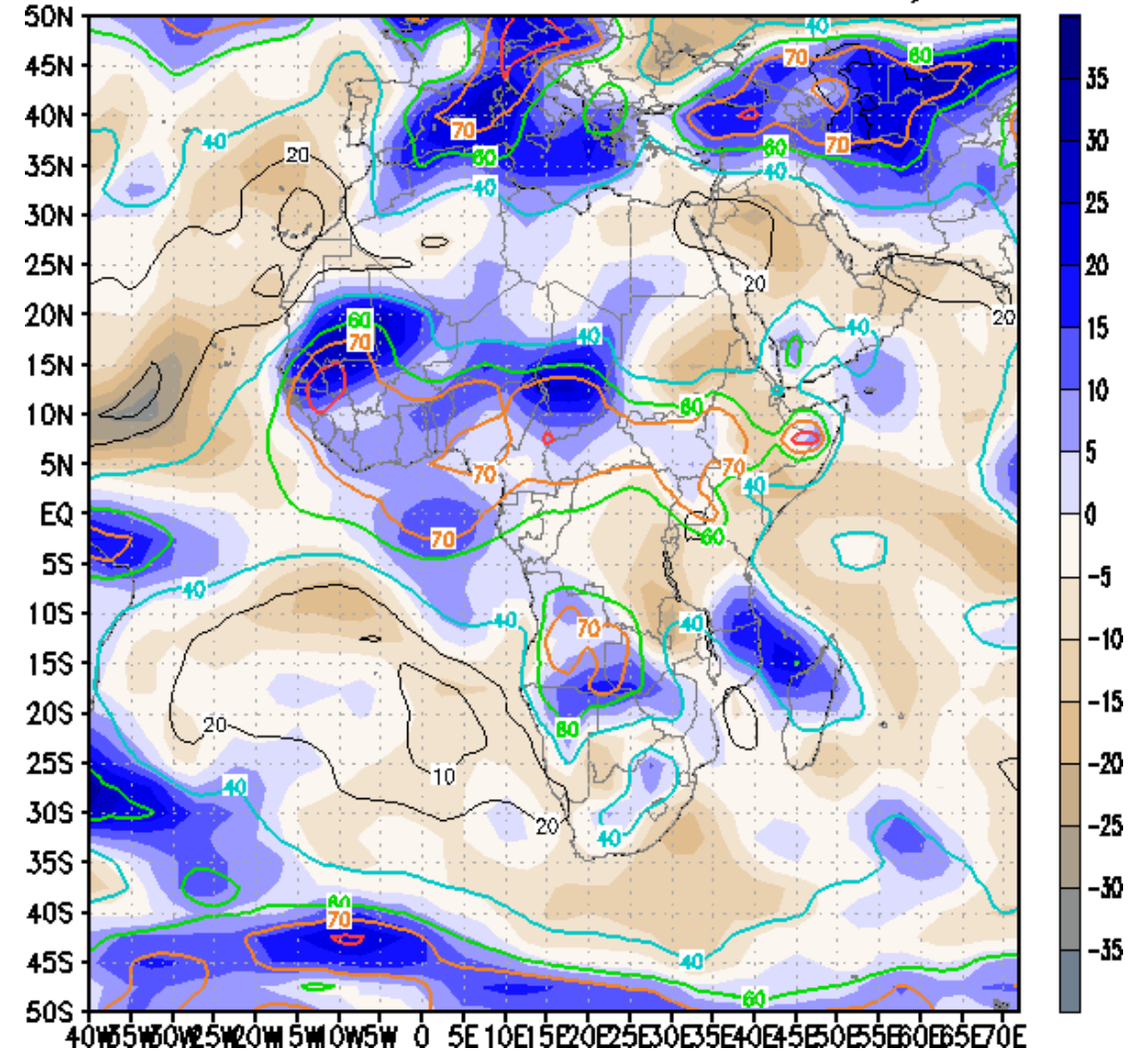
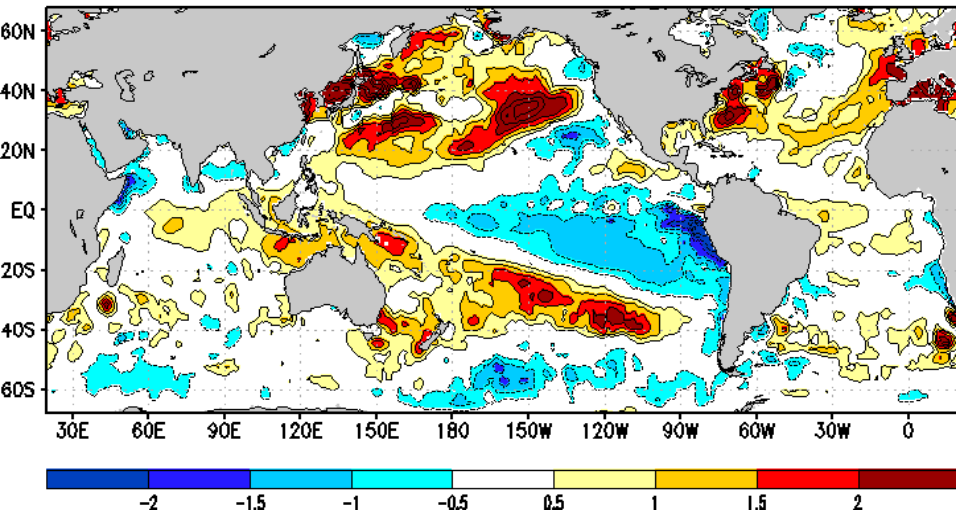


Figure 8: Relative Humidity Anomaly at 850hPa (left) and 700hPa (right)

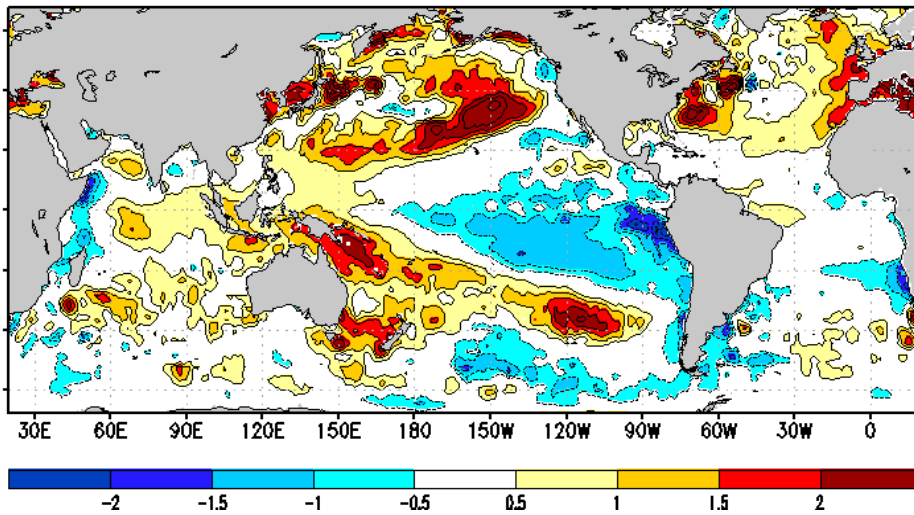
1. Monitoring Climate Element
2. Global Driver Review and Assessment
 - a. SST
 - b. MJO and other Equatorial Waves

Weekly Sea Surface Temperature Anomaly

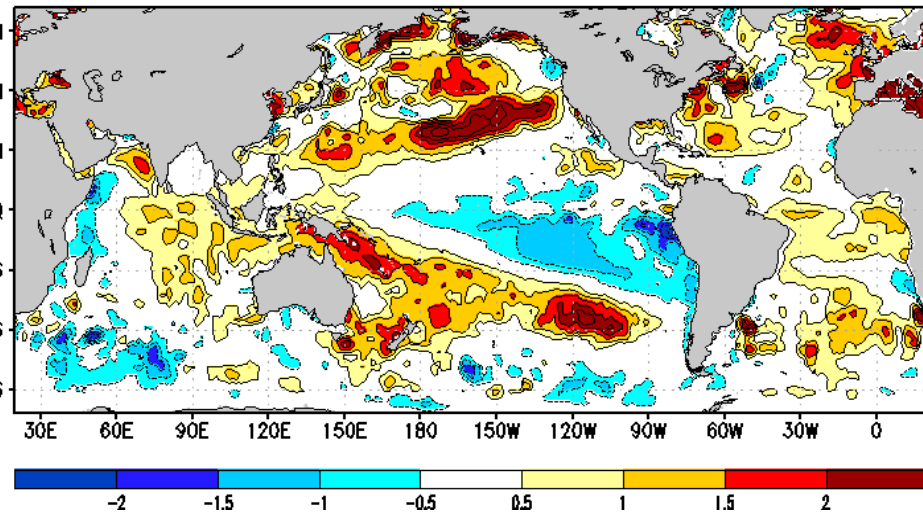
SST Anom. for the Week From 22May2022 to 28May2022



SST Anom. for the Week From 29May2022 to 04Jun2022



SST Anom. for the Week From 05Jun2022 to 11Jun2022



These maps display weekly sea surface temperature anomalies over the globe, and they depict mostly normal to cooling conditions over the equatorial Pacific with warming observed over northern Atlantic, Gulf of Guinea while neutral to cooling ssts are observed over the south-western Indian ocean.

SST Anom. for the Week From 12Jun2022 to 18Jun2022

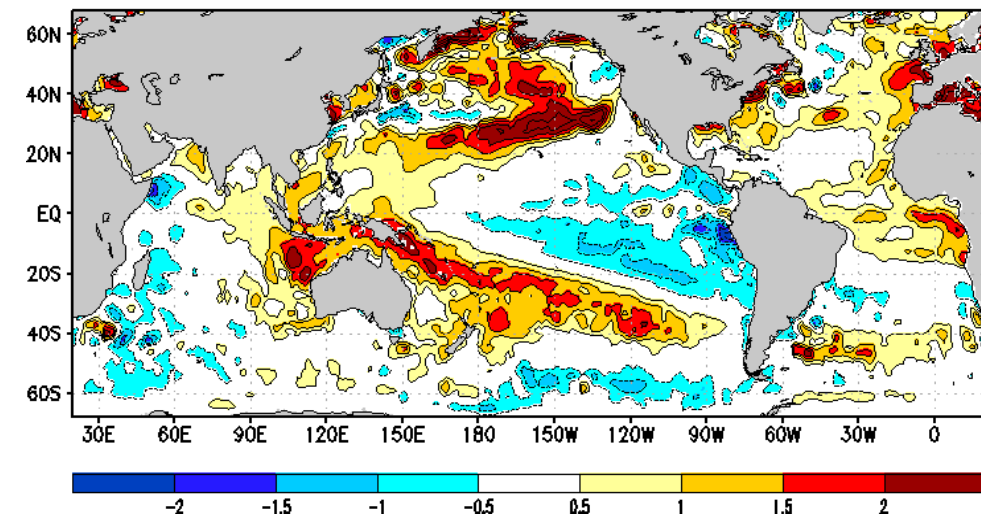


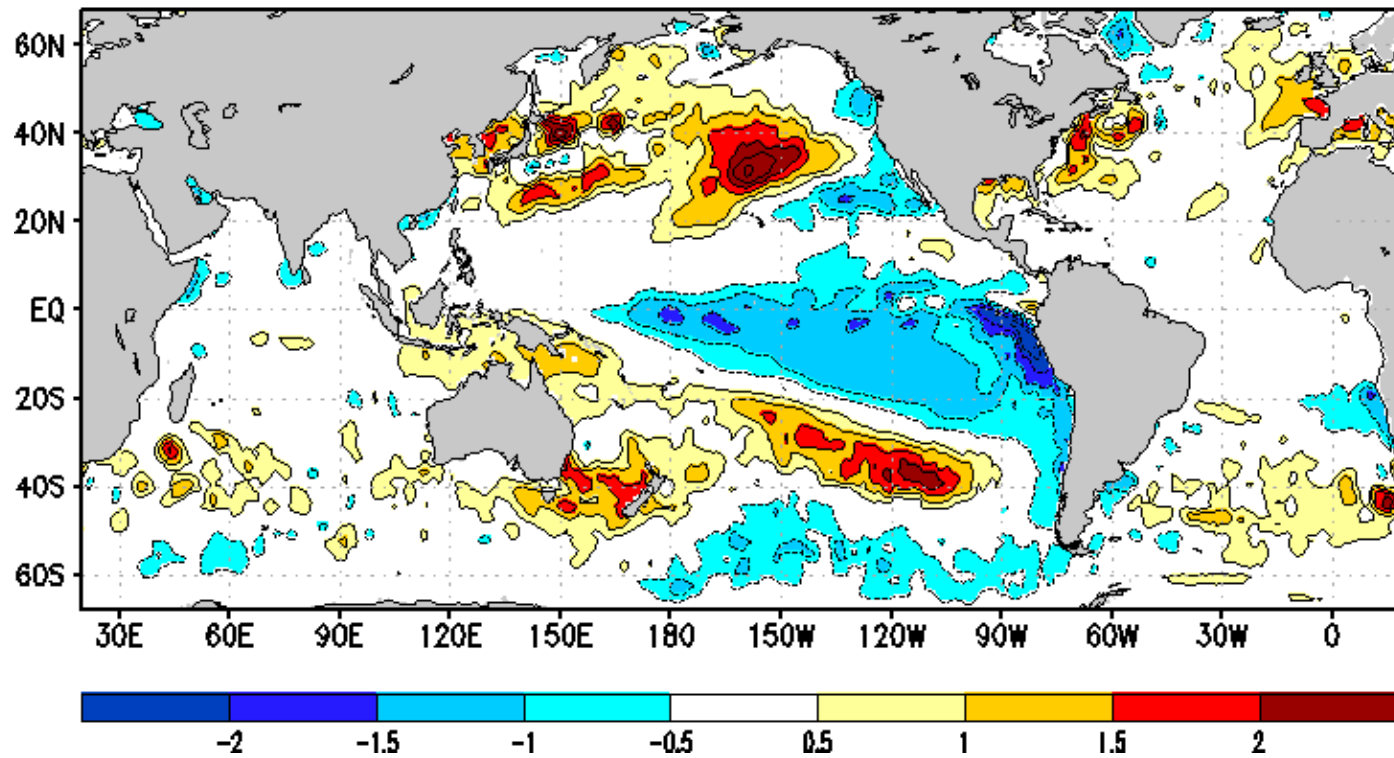
Figure 9: Maps display weekly sea surface temperature anomalies over the globe for last four weeks

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

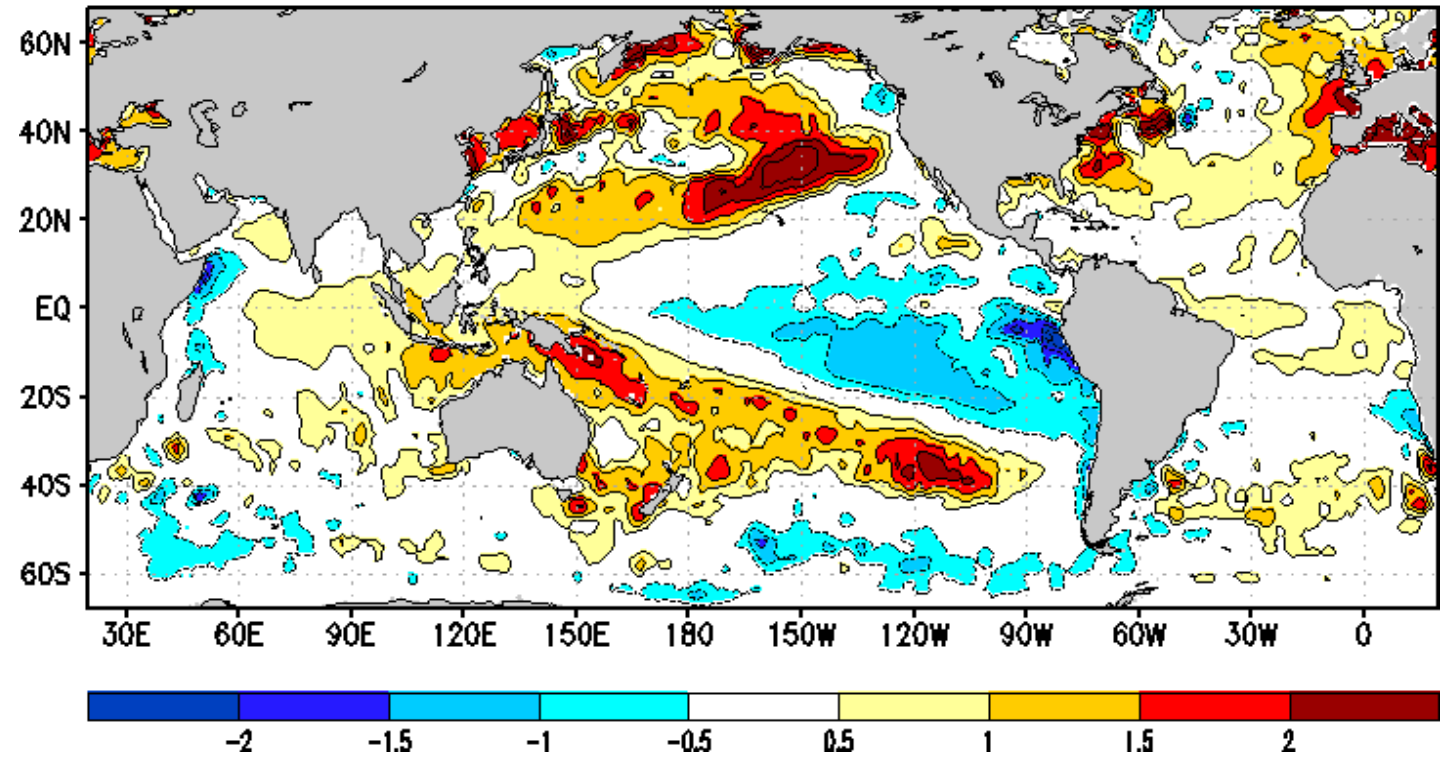
http://iridl.ldeo.columbia.edu/maproom/Global/Ocean_Temp/Weekly_Anomaly.html?

Last Month's Sea Surface Temperatures (SST) Observed

SST Anom. for May2022



SST Anom. for the Week From 22May2022 to 18Jun2022



During 20th of Sep to 23rd Oct 2021, the cooling persisted over eastern Equatorial Pacific, and the Western Indian Ocean, whereas the Gulf of Guinea in the South Atlantic, and western pacific continue in warming situation.

Figure 10 : 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

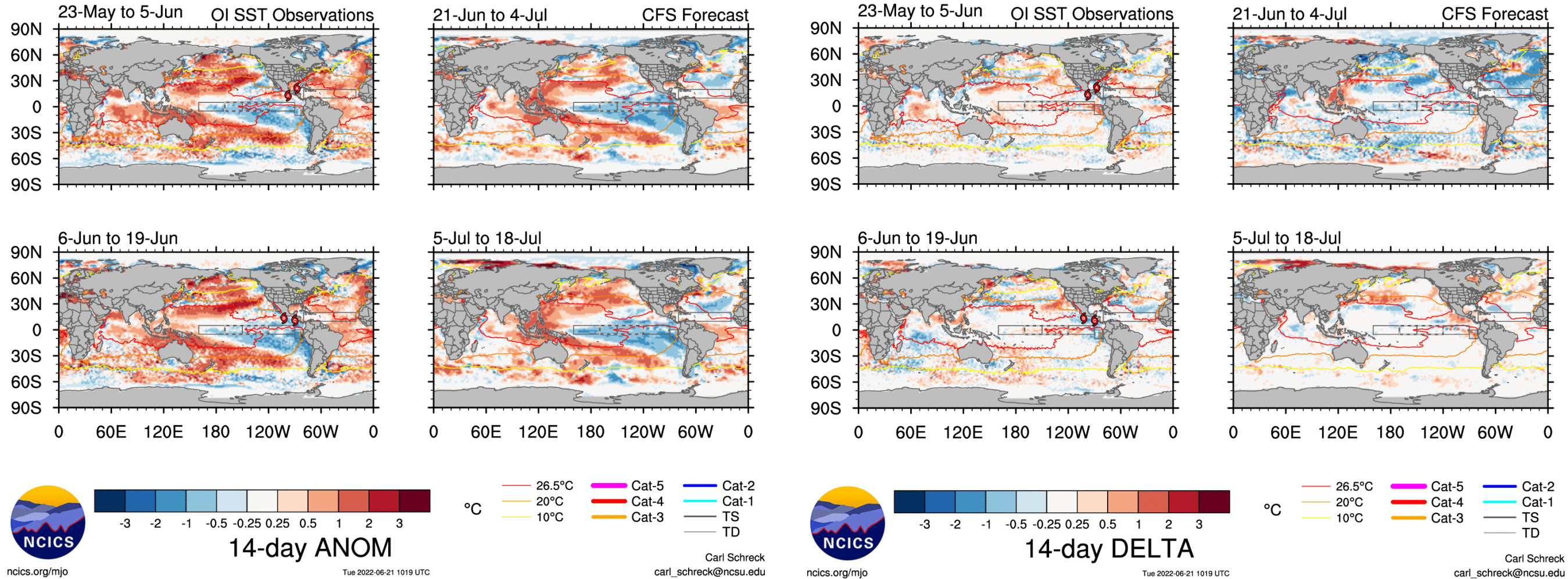


Figure 11: Sea Surface Temperature and FCST for two week

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

3-Days Infra-Red (IR) 200hpa and Velocity Potential Anomaly

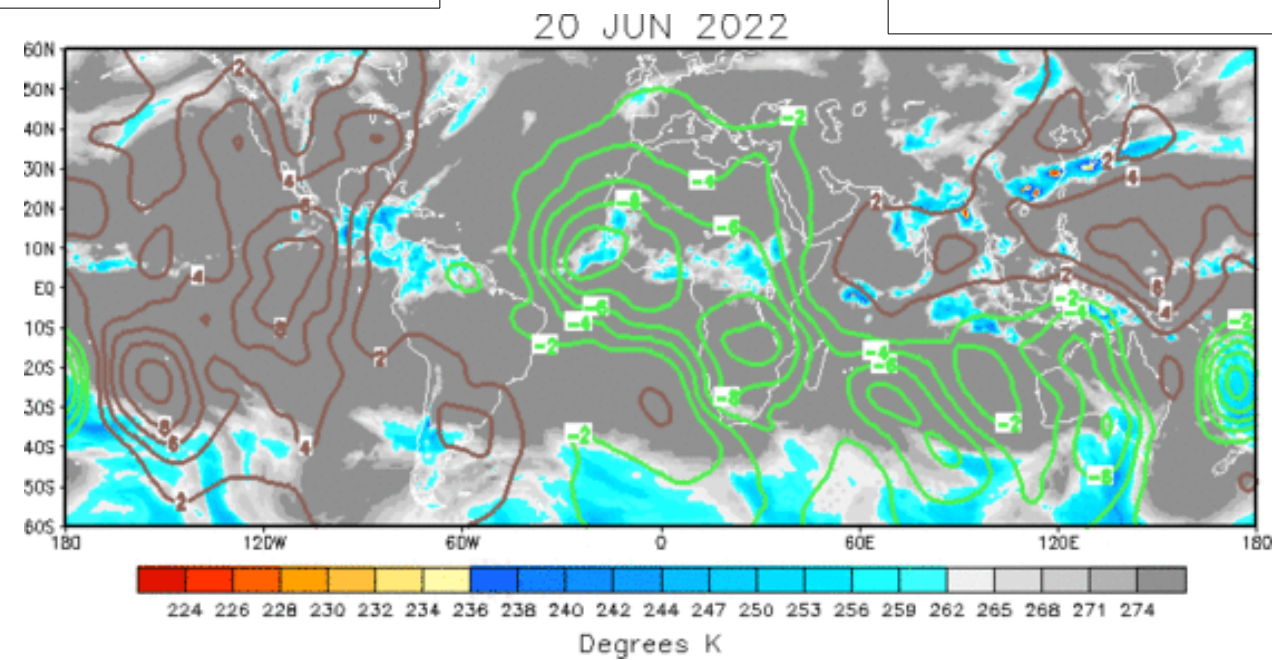


Figure 12: IR image and Velocity Potential anomalies

ECMWF Madden-Julian-Oscillation (MJO) Forecast

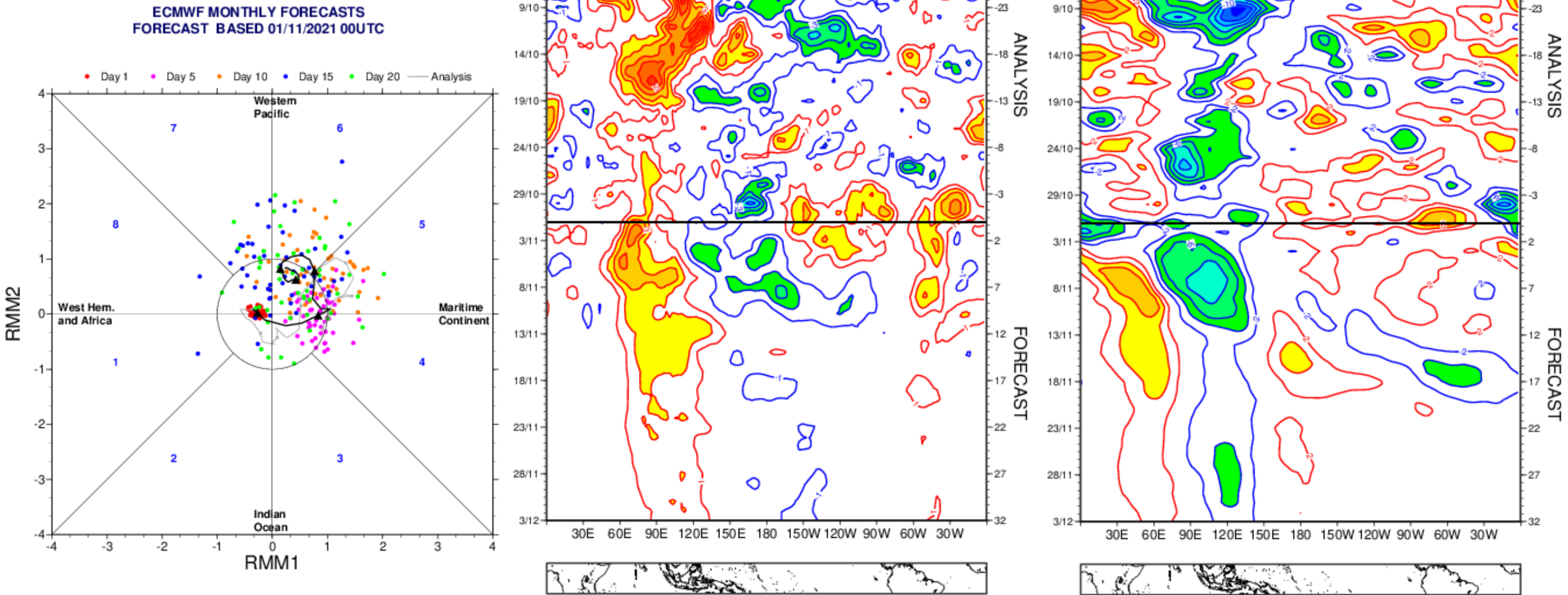


Figure 13: ECMWF MJO Forecast

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

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

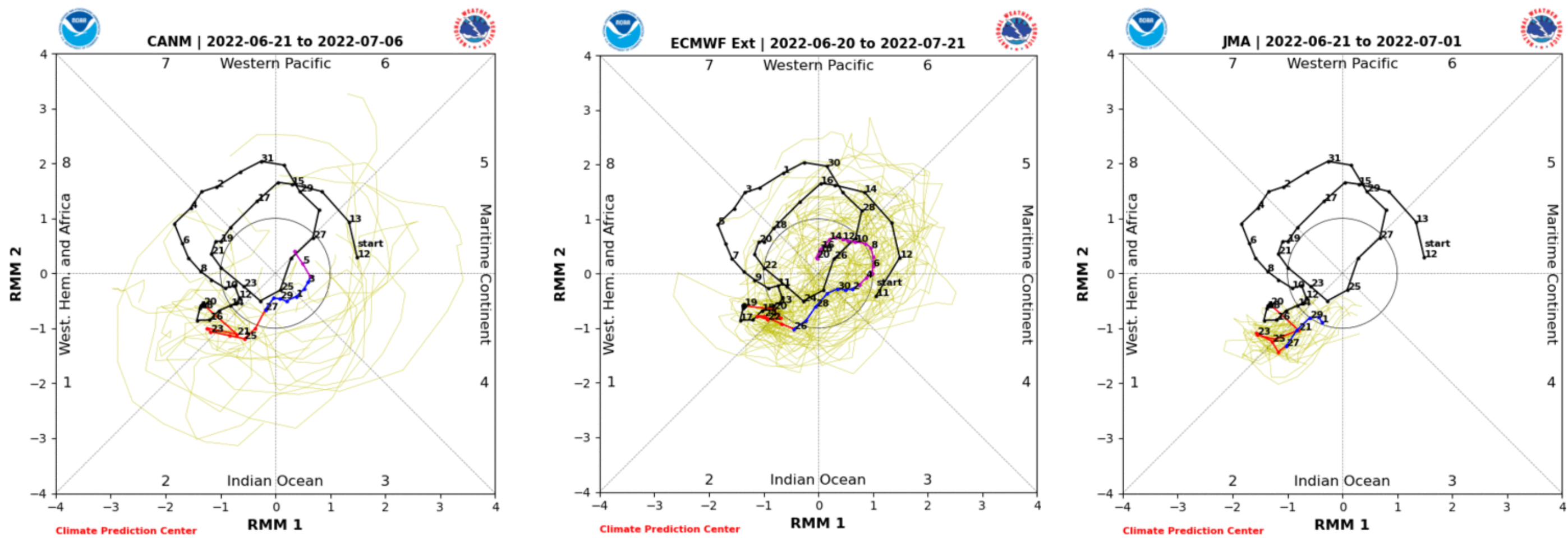


Figure 14: Forecasts for ECMWF, NCEP and UK Met Office

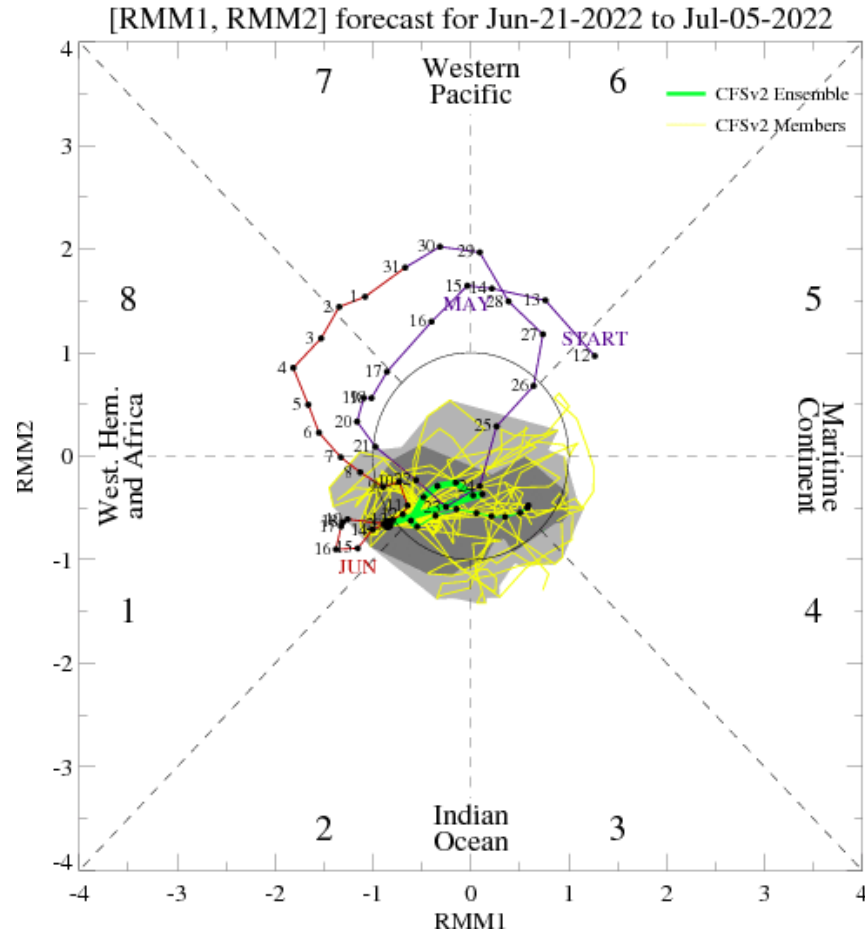
<https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/emon.shtml>

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

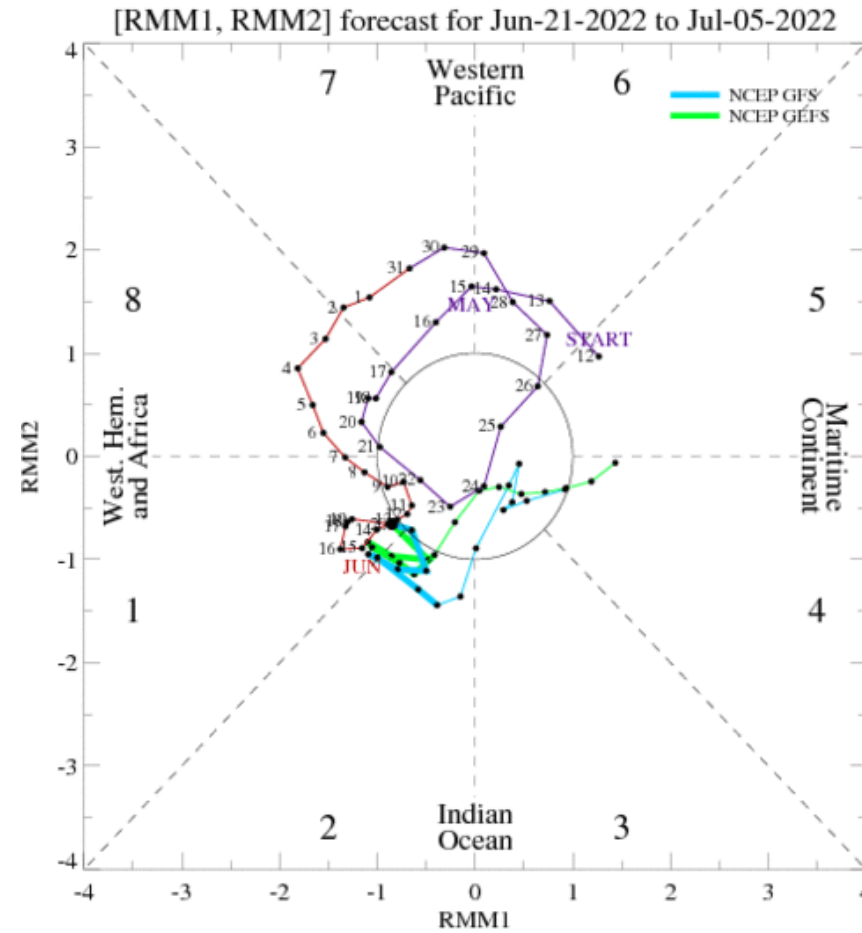
https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_mjo_family_index?facets=undefined&time=2019081500,0,2019081500

MJO FORECAST

Ensemble GFS Phase Diagram



Operational GFS Phase Diagram



Statistical GFS Phase Diagram

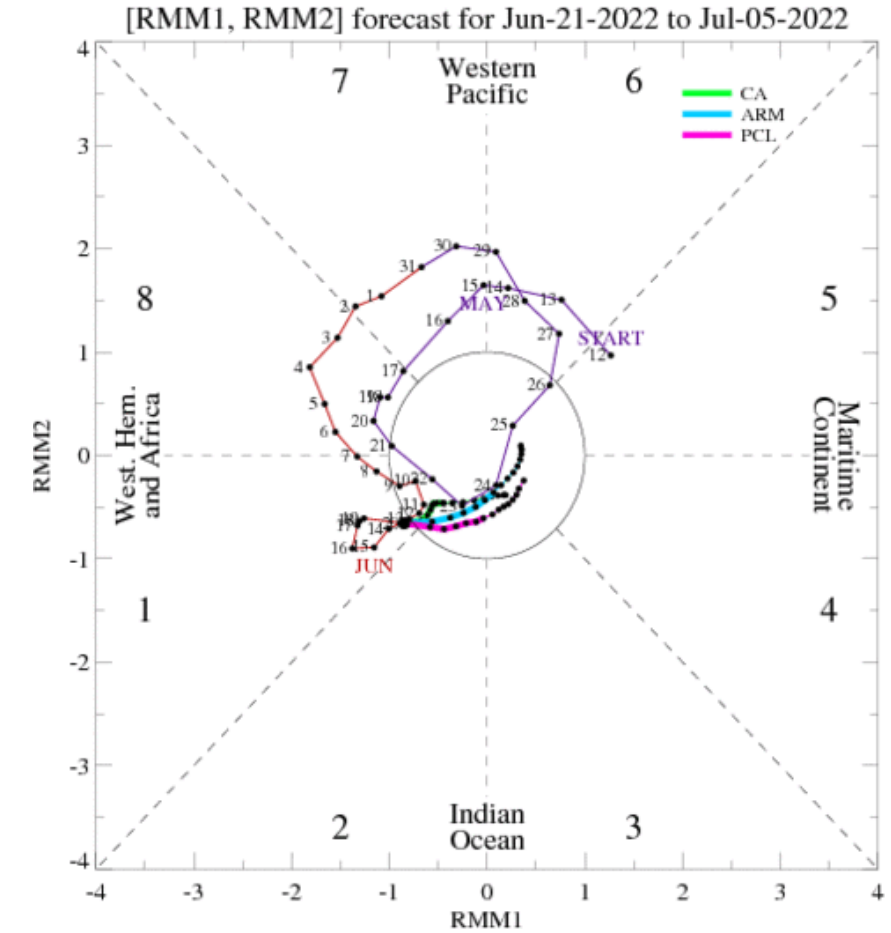


Figure 15: MJO forecast

<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

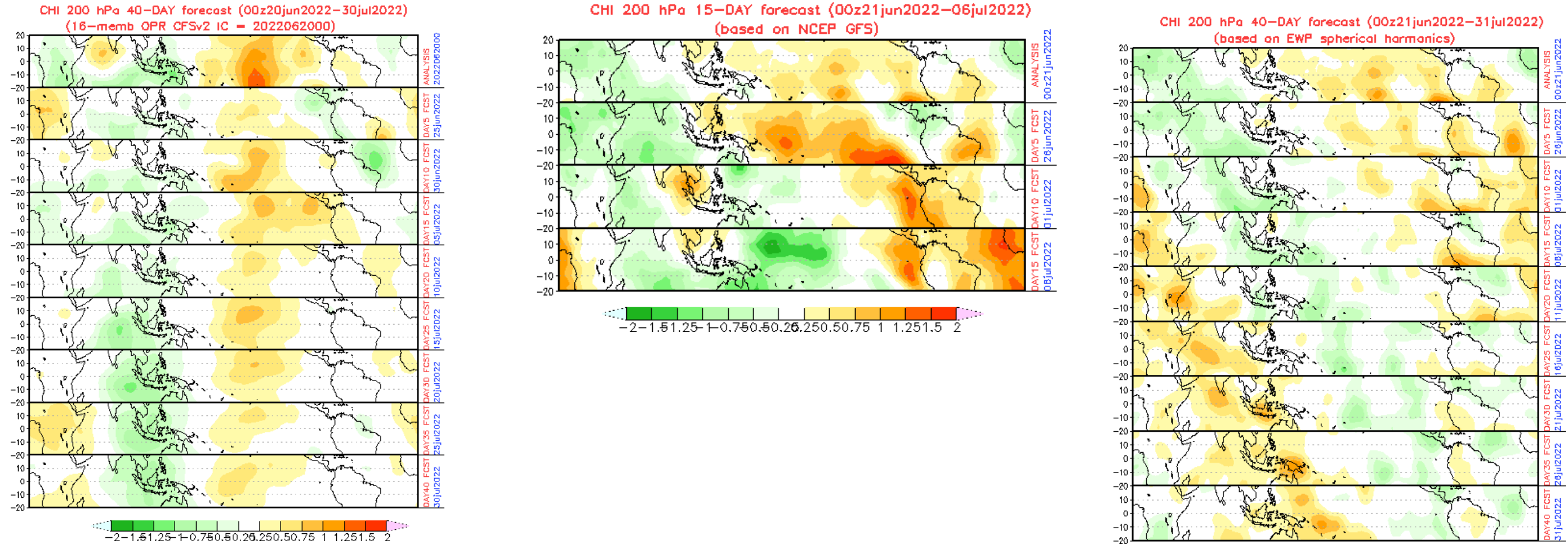


Figure 16: MJO forecast

<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>

Past 4 Weeks Precipitable Water and Outlooks for Africa and Globally

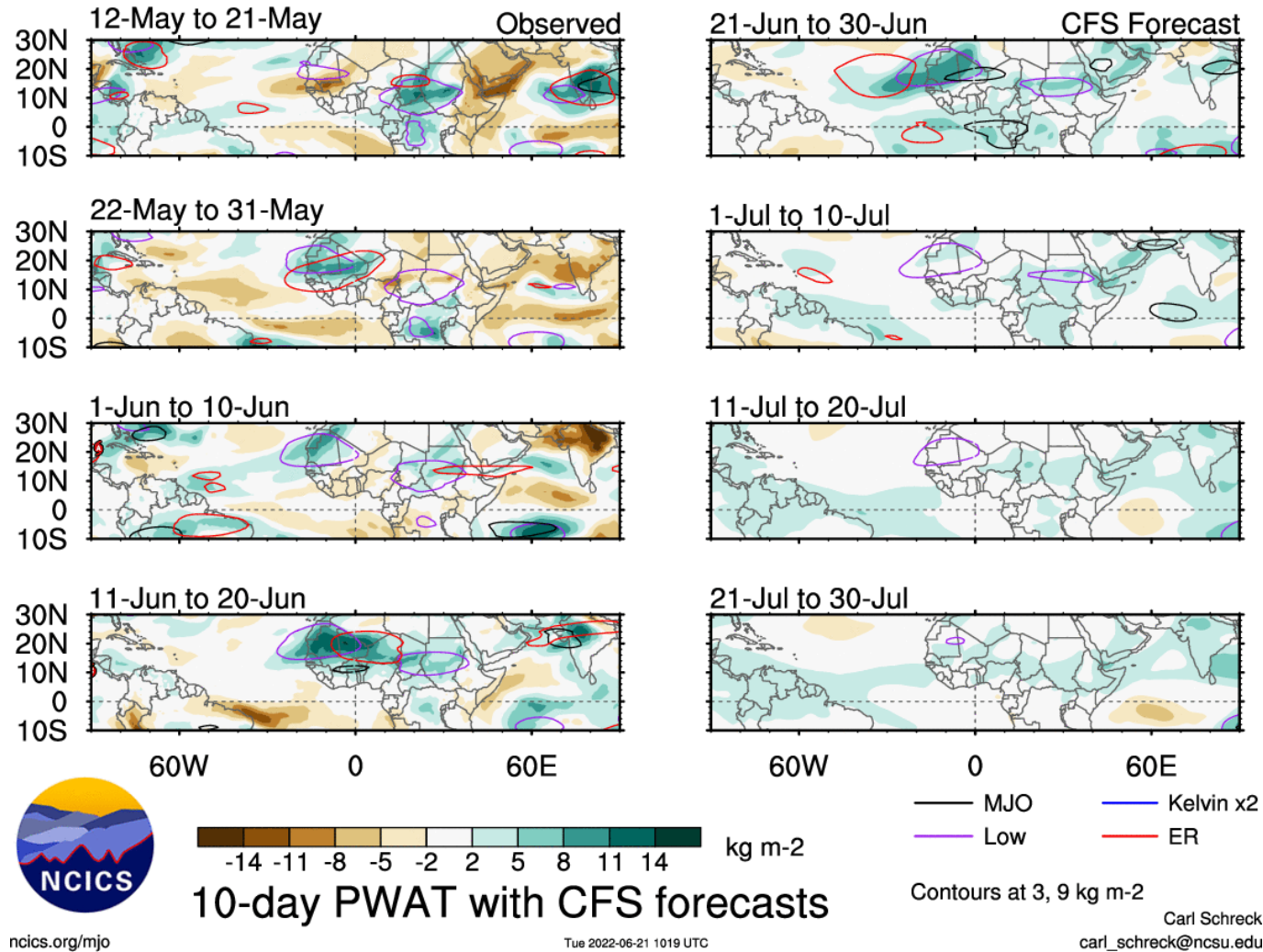


Figure 7a: Africa

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

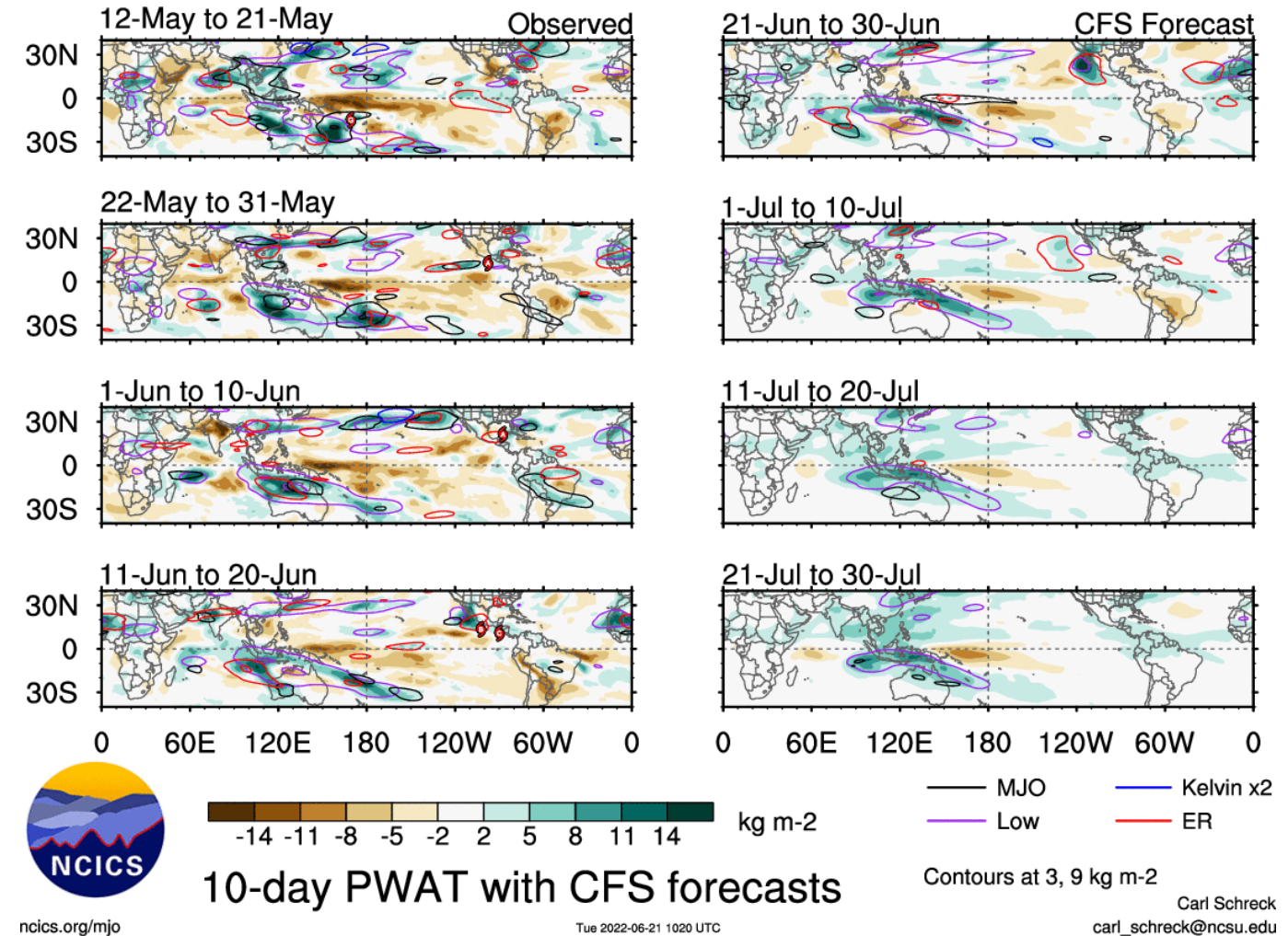


Figure 7b: Global

Figure 17: 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

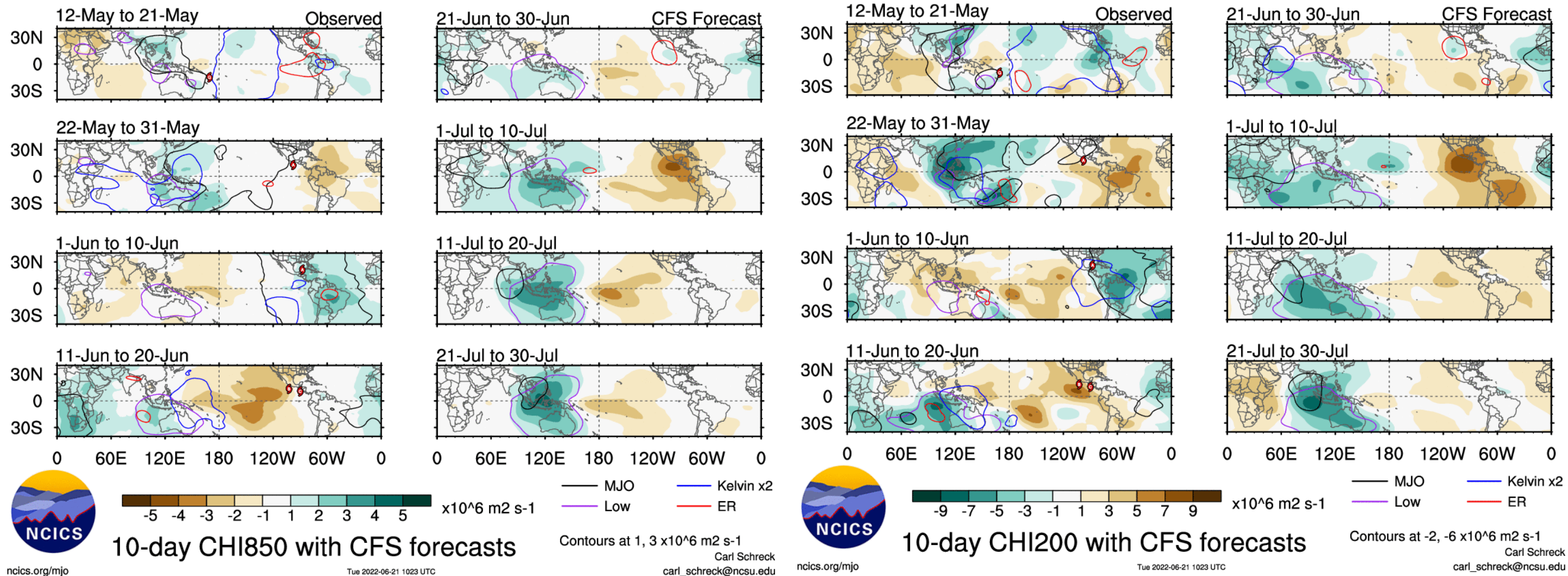


Figure 18a and b: Past four week and month velocity potential

<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

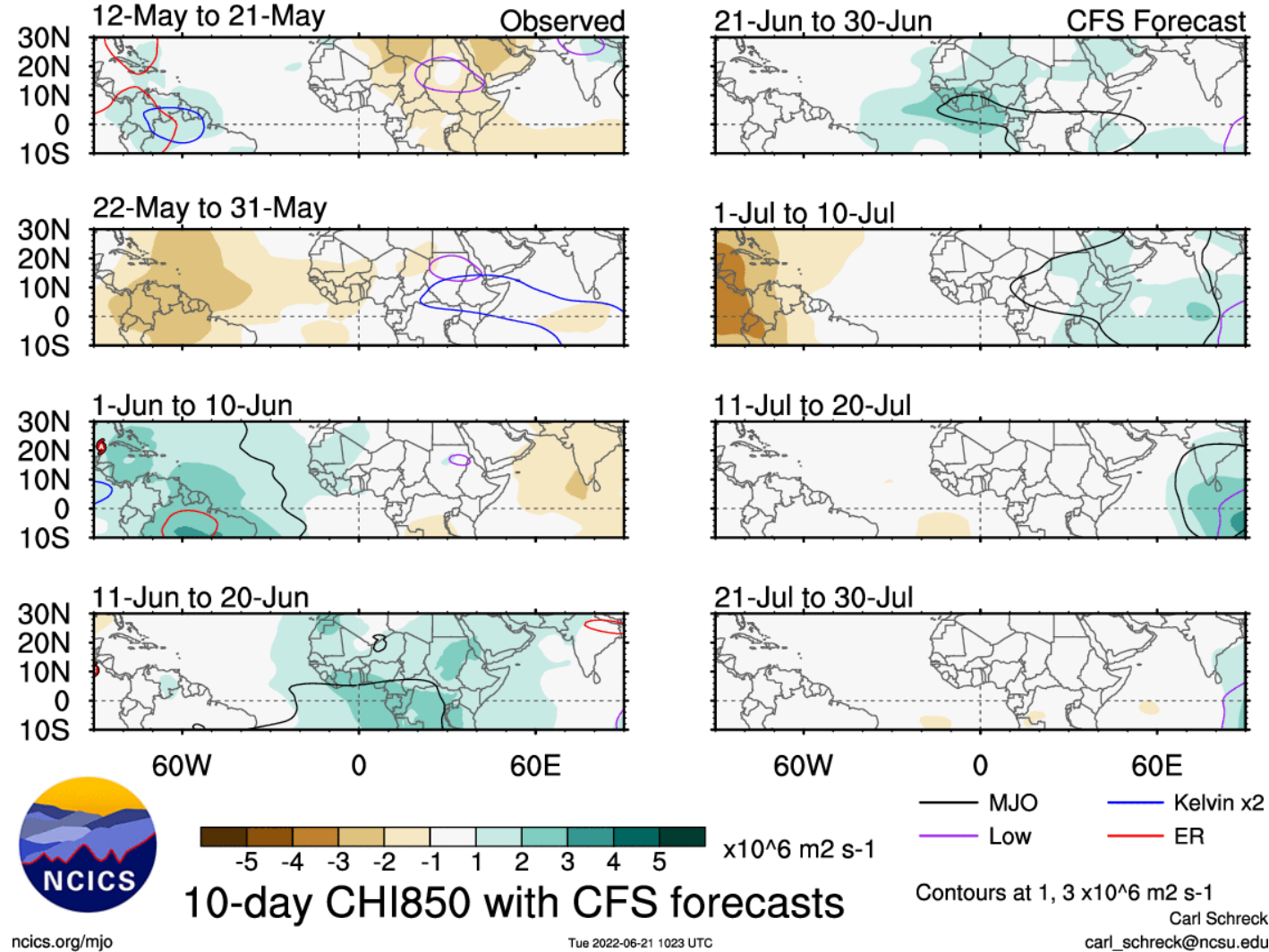
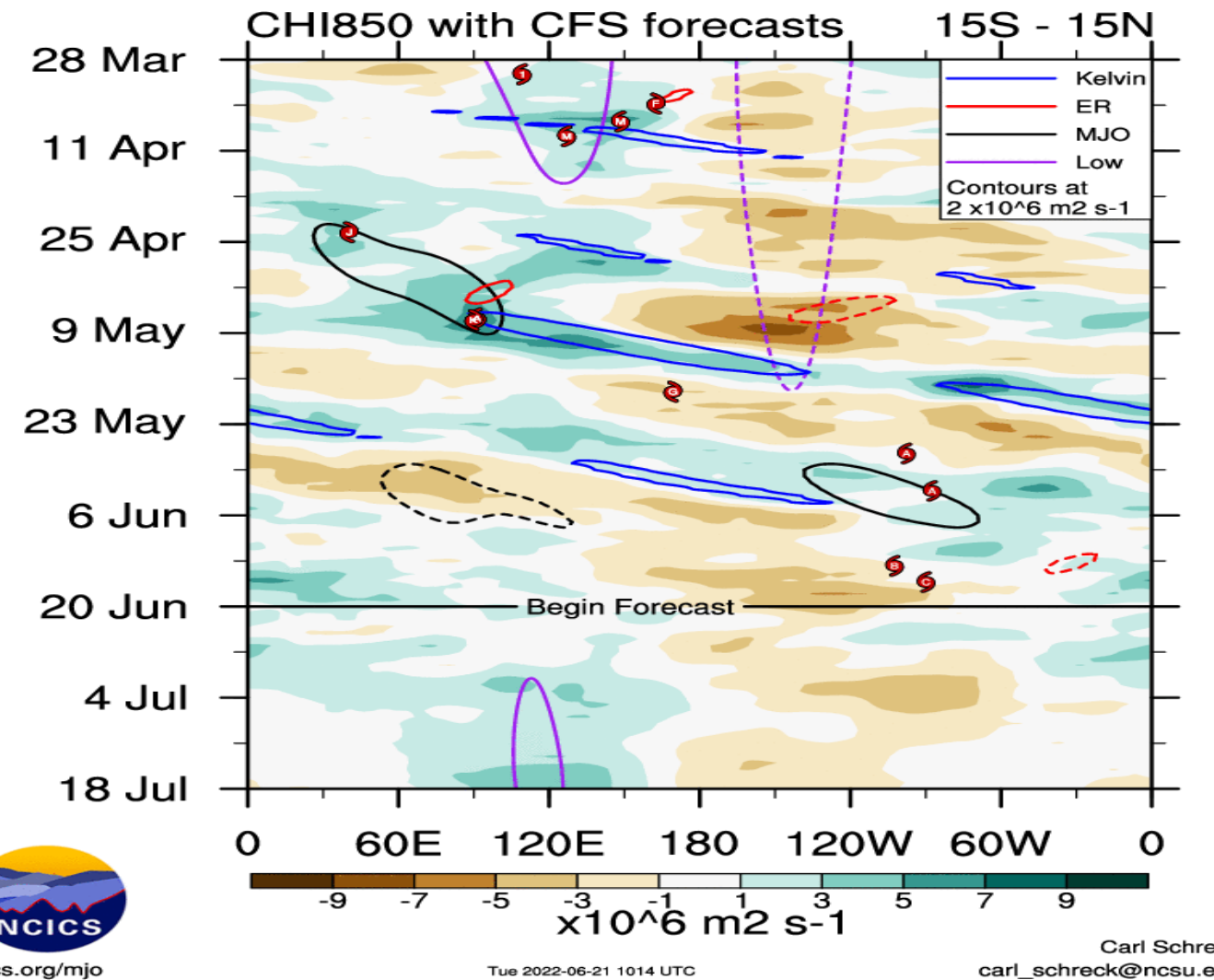
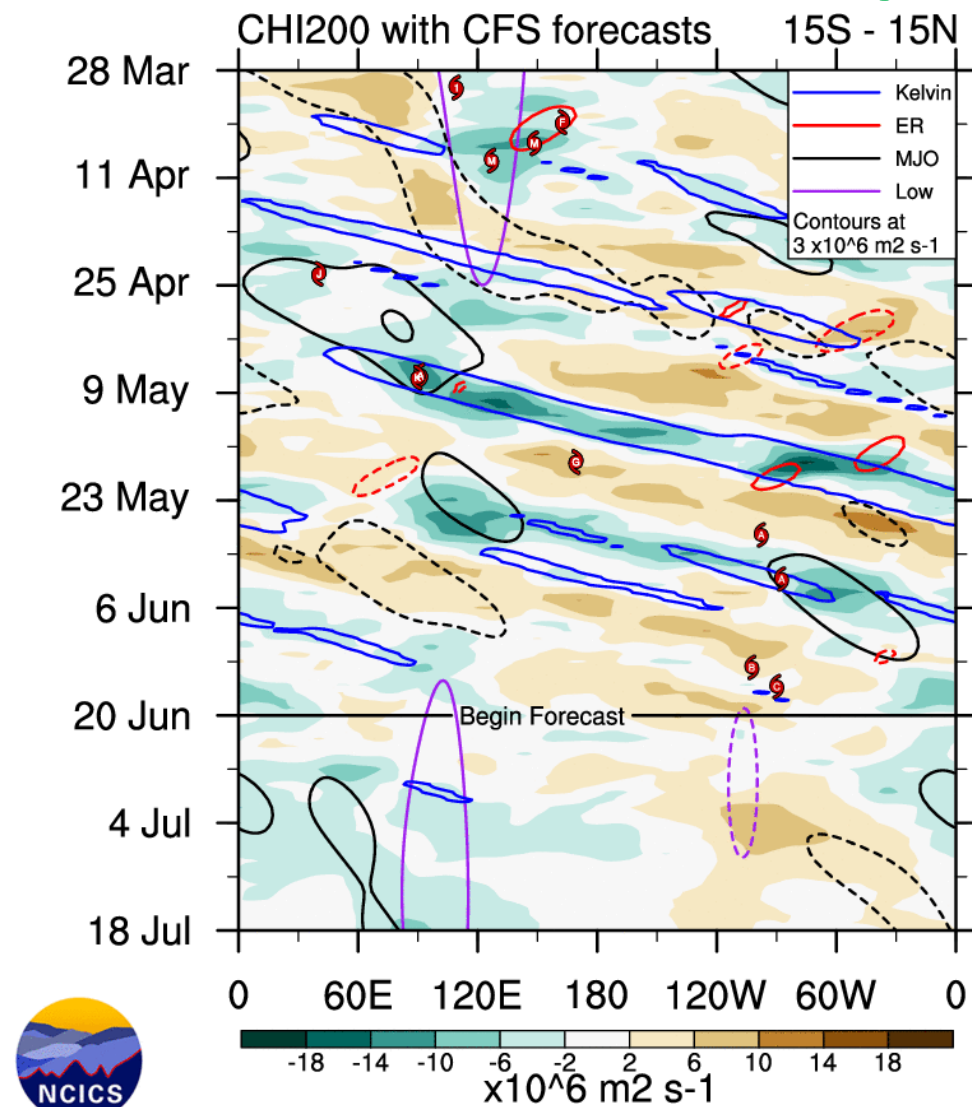


Figure 19a and b: Past four week and month velocity potential

<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>

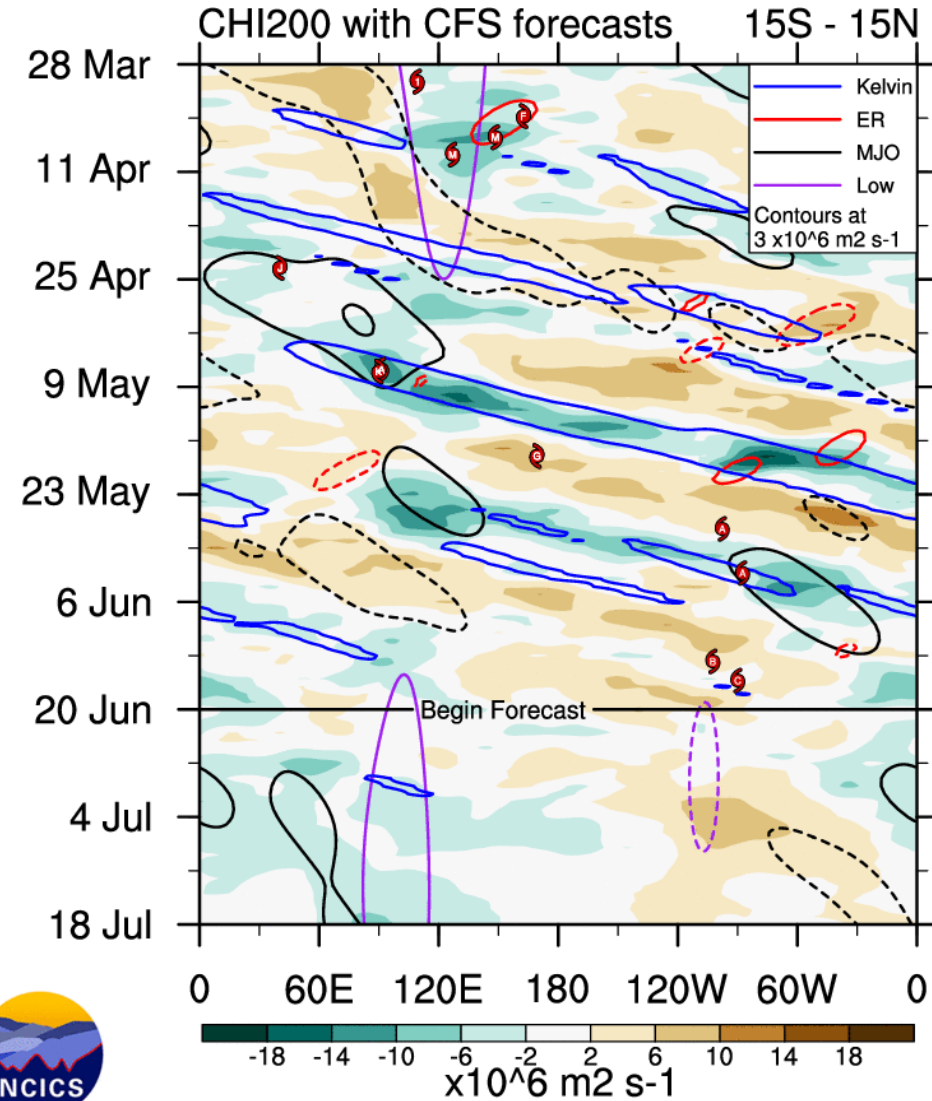
Hovmoller diagram of Velocity Potential, Anomalies for 15N-15S with Waves overlay including Outlook



ncics.org/mjo

Tue 2022-06-21 1015 UTC

Carl Schreck
carl_schreck@ncsu.edu



ncics.org/mjo

Tue 2022-06-21 1015 UTC

Carl Schreck
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Figure 20: 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

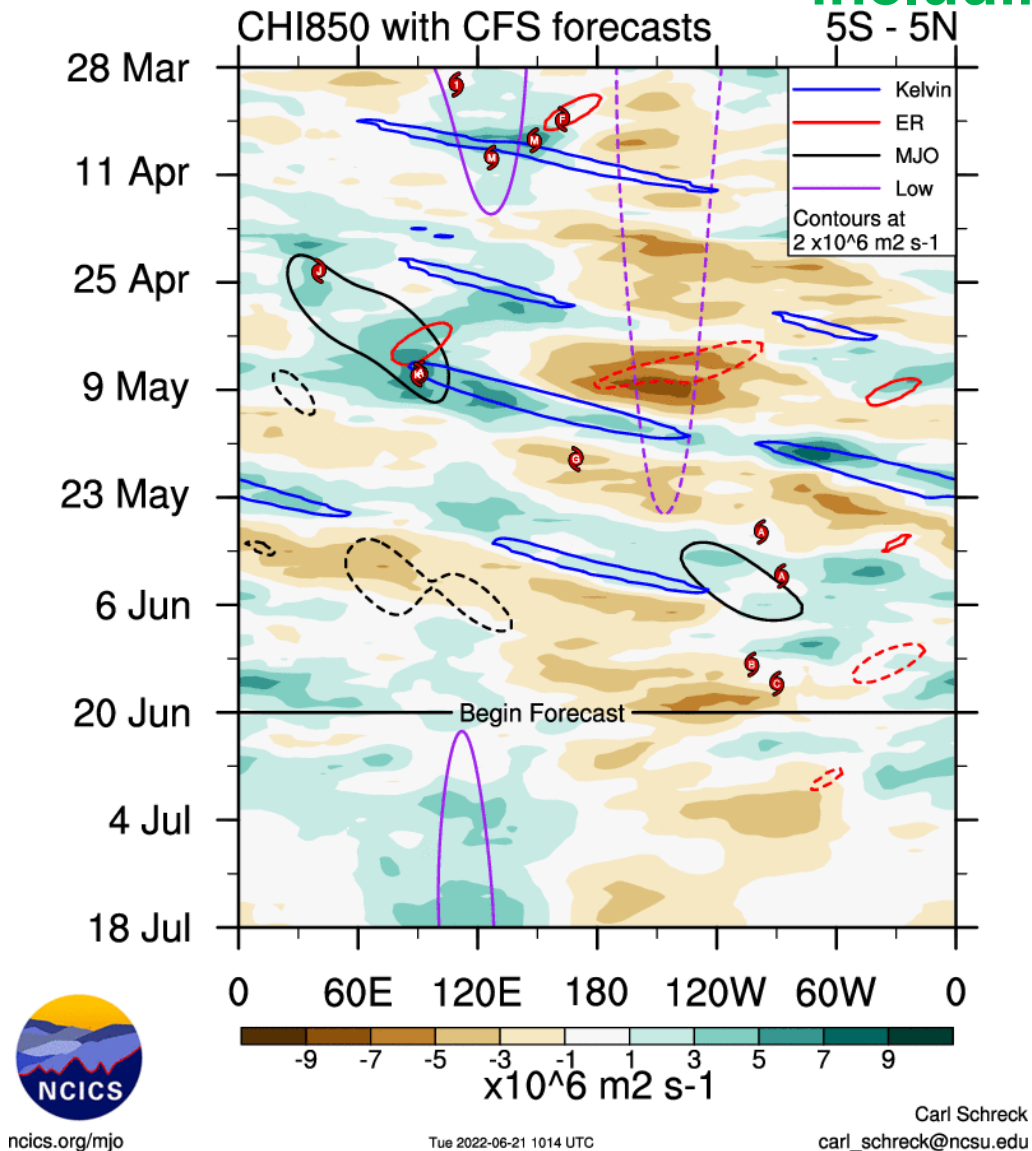
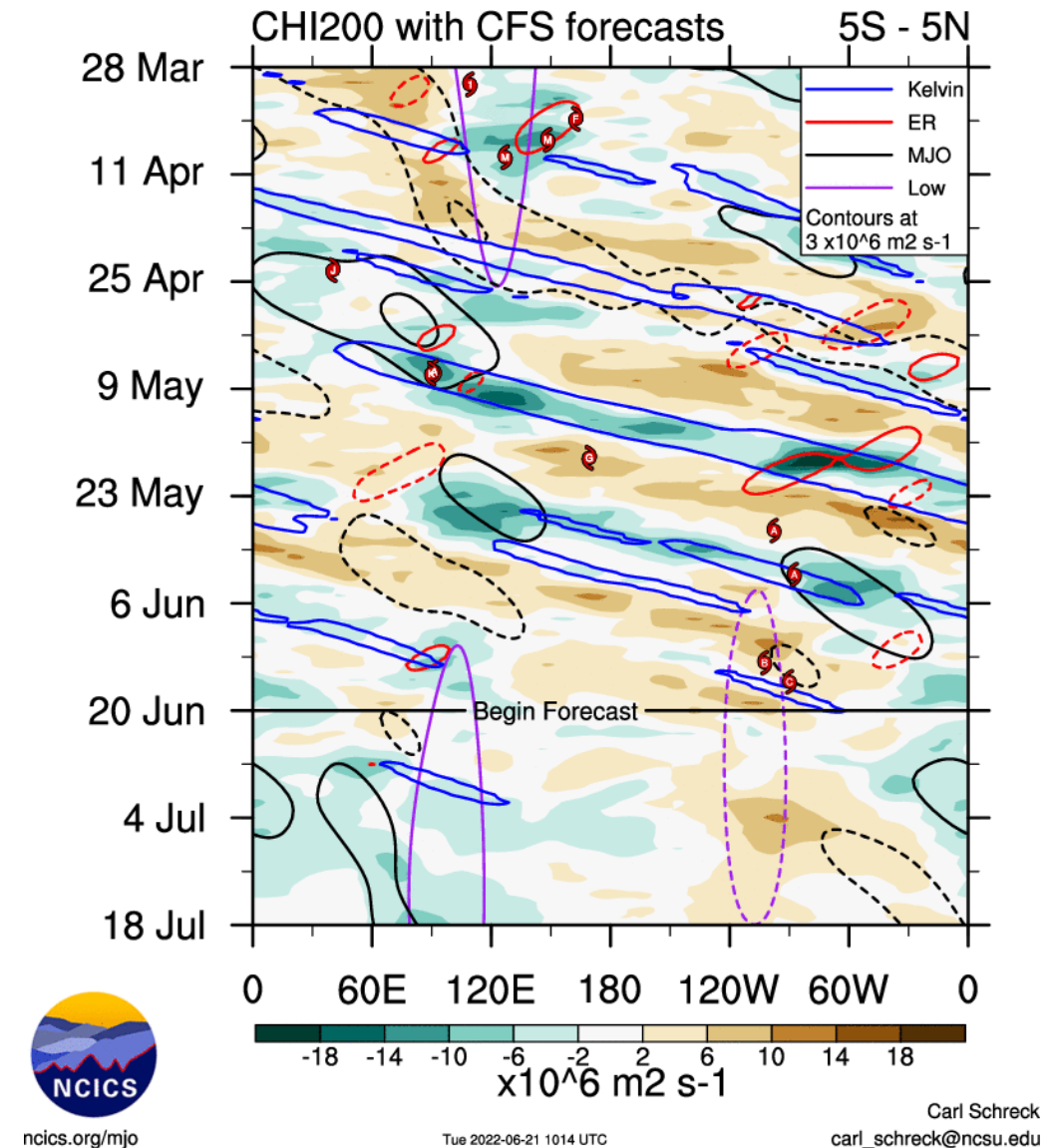
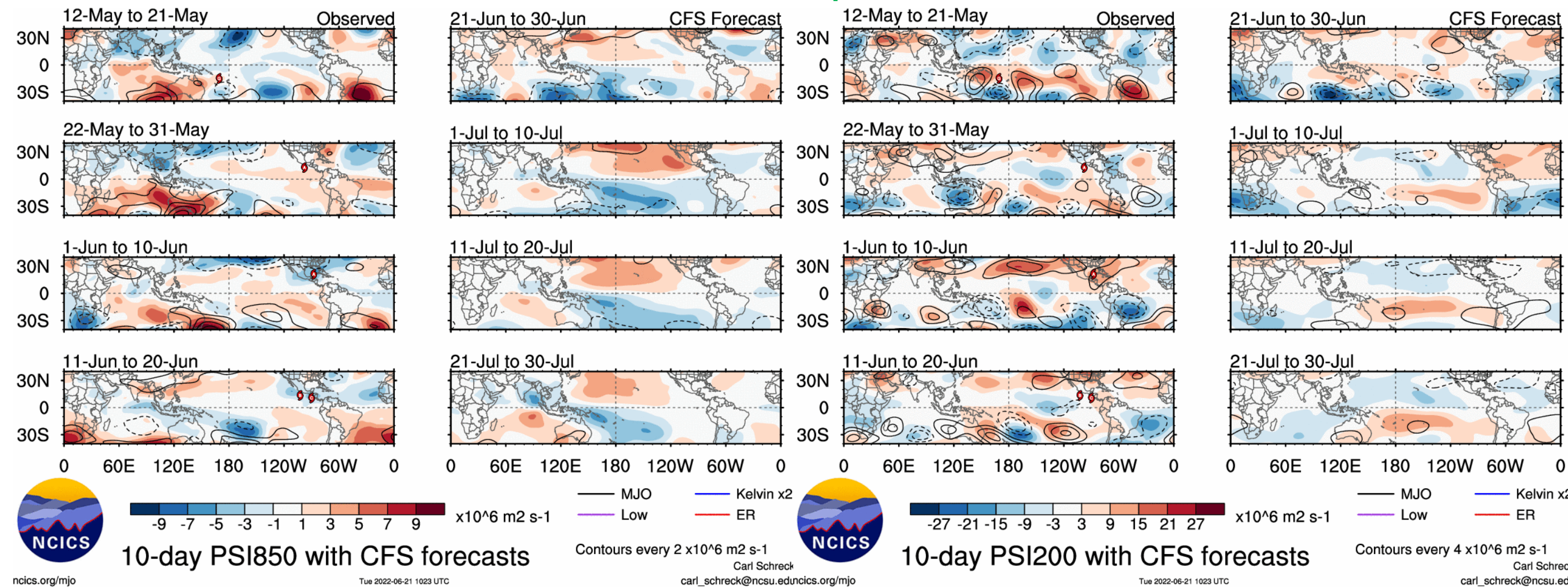


Figure 21: Anomalies for 5N-5S with waves overlay including outlooks

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

<https://ncics.org/pub/mjo/v2/hov/chi200.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/psi850.cfs.mjo.global.10.png>

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

Figure 22: 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

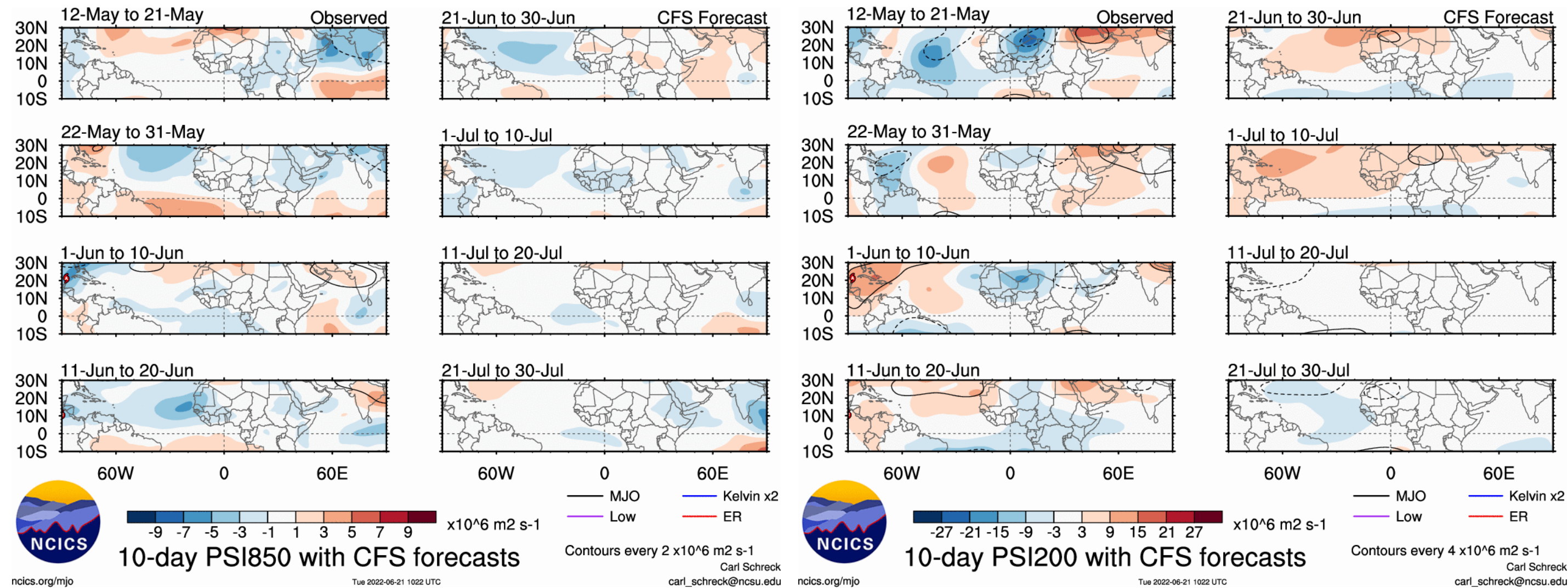


Figure 23: Past 4 weeks stream function anomalies with MJO, Kelvin & Rossby wave on Africa maps

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

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

1. Monitoring Climate Element
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3. Model Guidance for Weekly Climate outlook

Wind Anomaly and Divergence Forecast from GFS week1

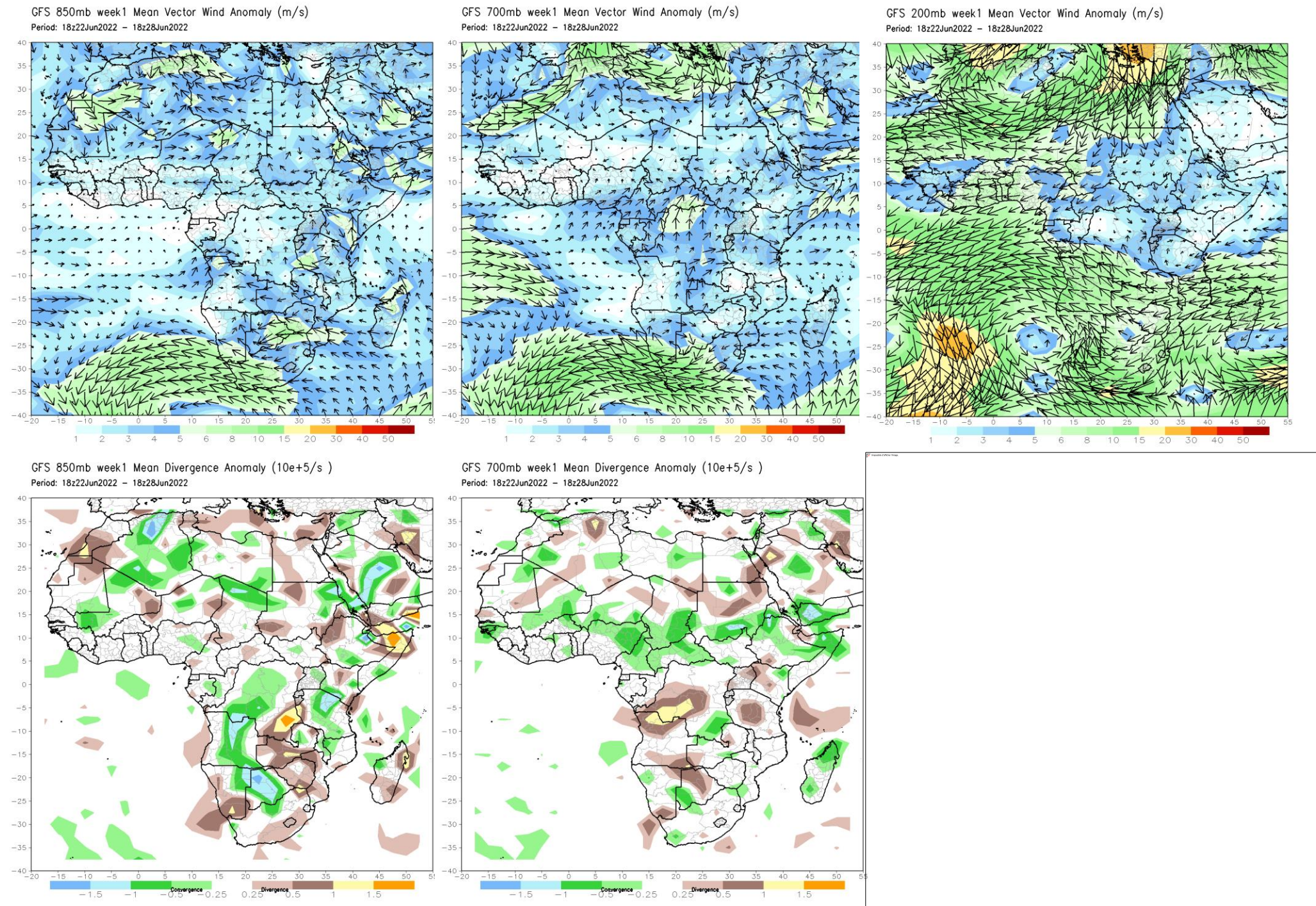
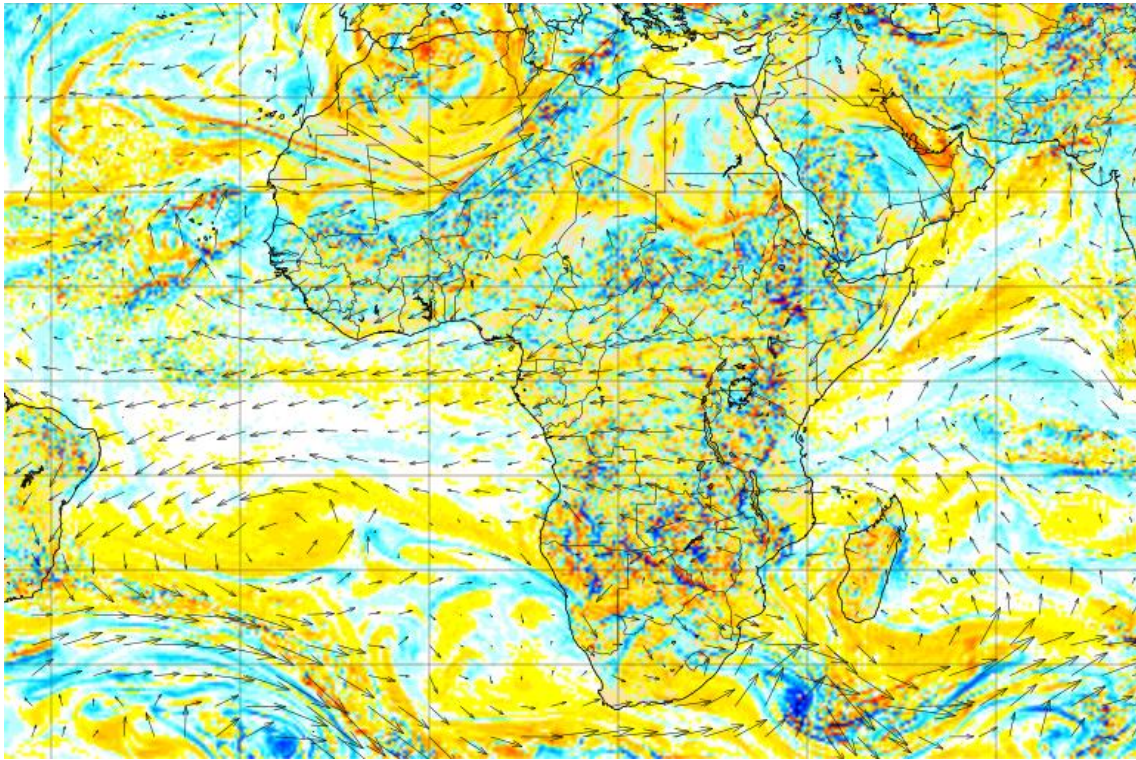
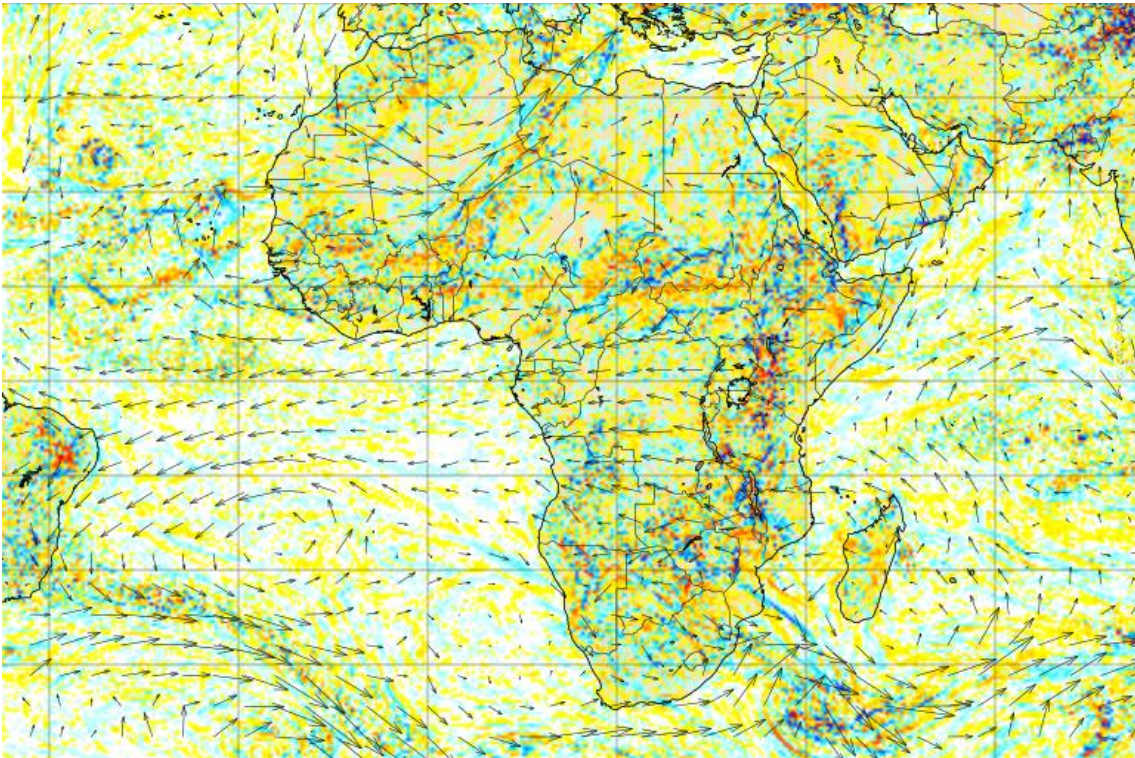
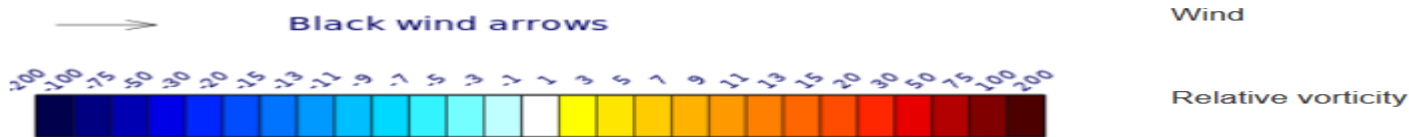


Figure 24 : Forecast from GFS

<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 700 hPa / Wind at 700 hPa
Tuesday 13 Jul, 00 UTC T+180 Valid: Tuesday 20 Jul, 12 UTC



Relative vorticity at 700 hPa / Wind at 700 hPa
Tuesday 22 Jul, 00 UTC T+168 Valid: Saturday 31 Jul, 12 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

African Precipitation NCEP/GFS Bias-Corrected Precipitation and Anomaly Forecasts for week 1

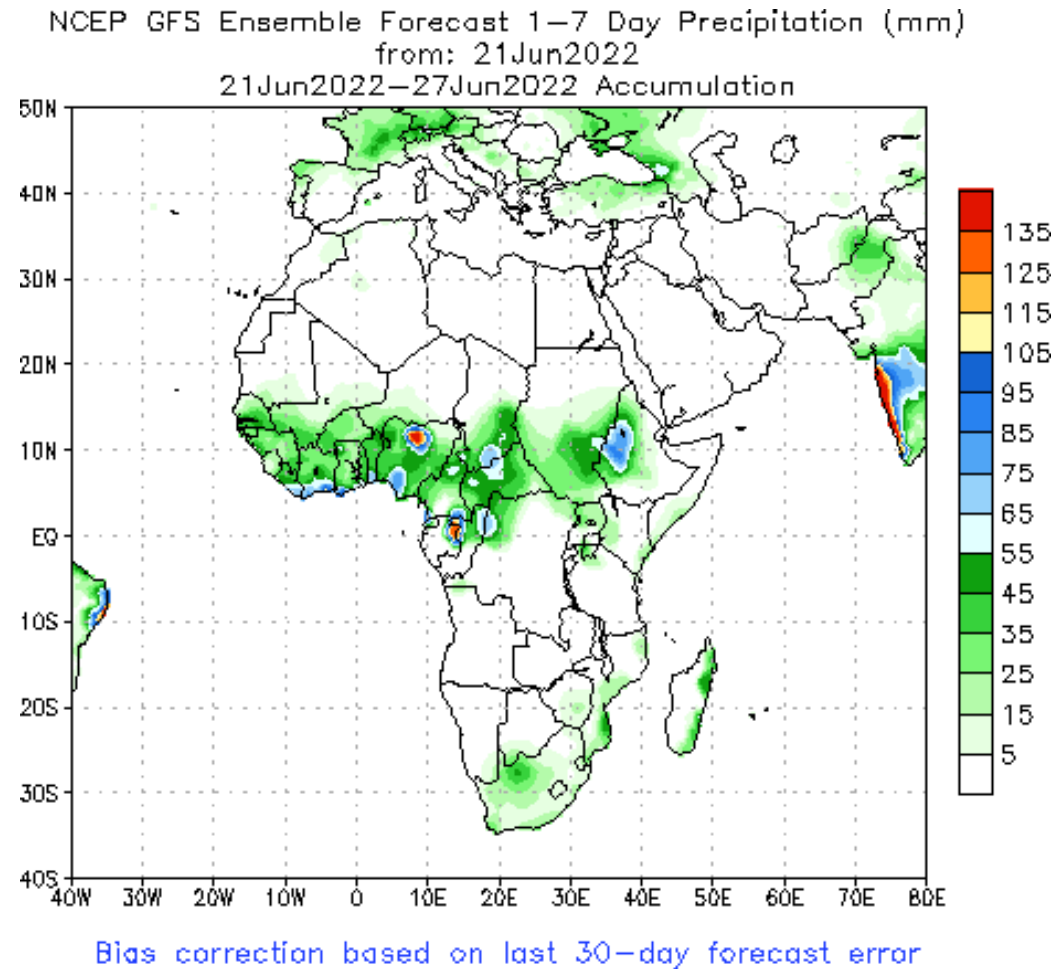
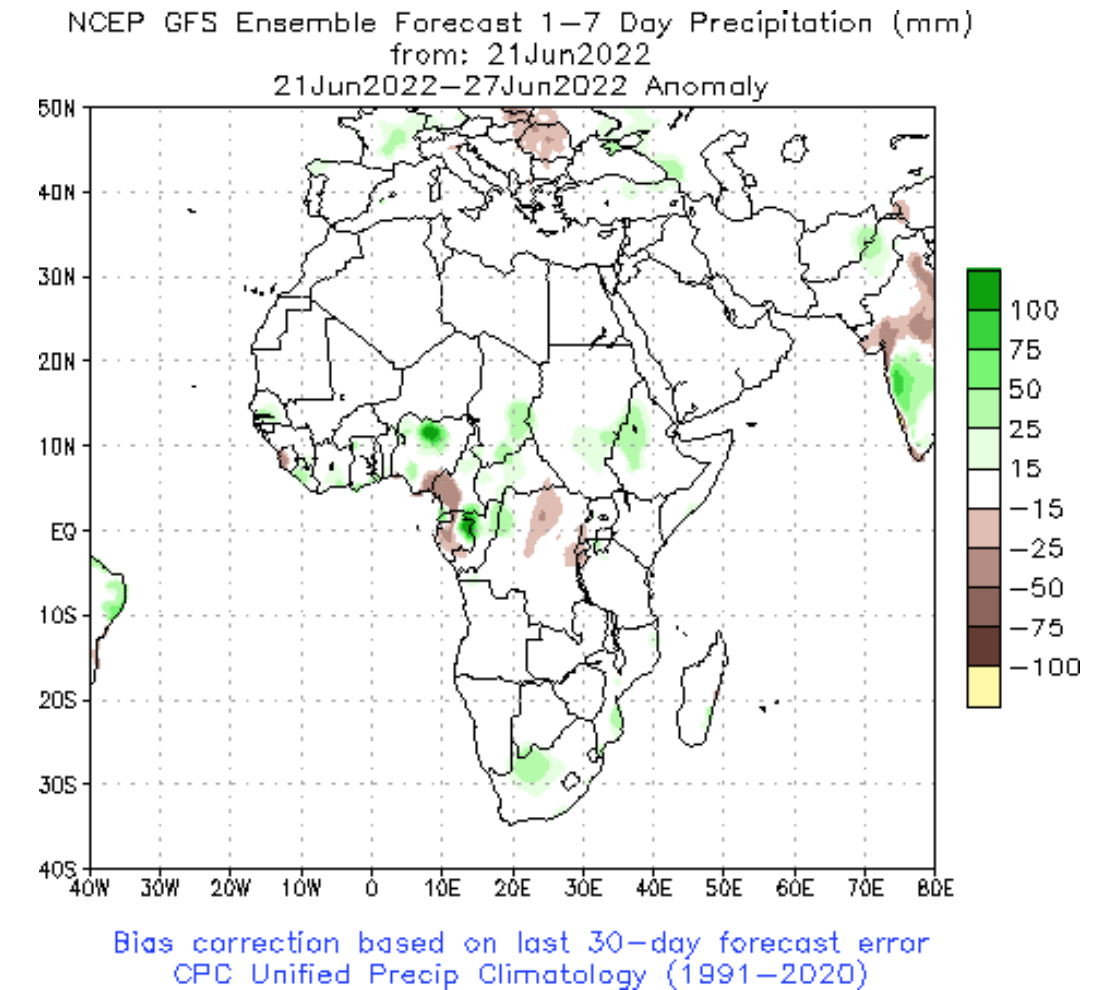


Figure 26: NCEP/GFS Précipitation and Anomaly forecast.

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

Precip>=25mm

Precip>=50mm

Precip>=75mm

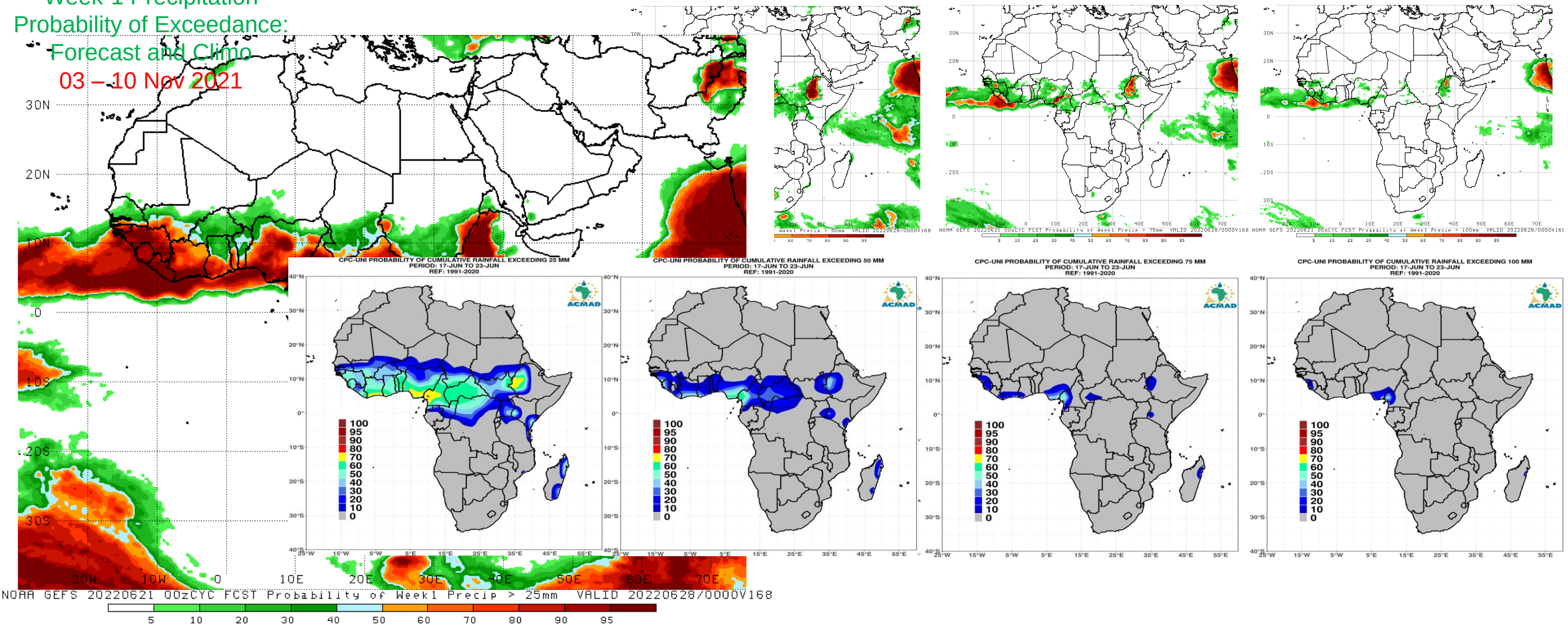
Precip>=100mm

Week-1 Precipitation

Probability of Exceedance:

Forecast and Climo

03 –10 Nov 2021



https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip25mm_prob_africa.html

https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip50mm_prob_africa.html

https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip75mm_prob_africa.html

https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip100mm_prob_africa.html

http://154.66.220.45:8080/thredds/catalog/ACMAD/CDD/climatemonitoringservice/Probability_of_Exceedance/Weekly/Current/catalog.html

Precipitation Anomaly Forecasts from ECMWF for week 1

ECMWF EPS-Monthly Forecasting System
Precipitation anomaly
Forecast start reference is 01-11-2021
ensemble size = 51 ,climate size = 660

Day 1-7
01-11-2021/TO/07-11-2021
Shaded areas significant at 10% level
Contours at 1% level

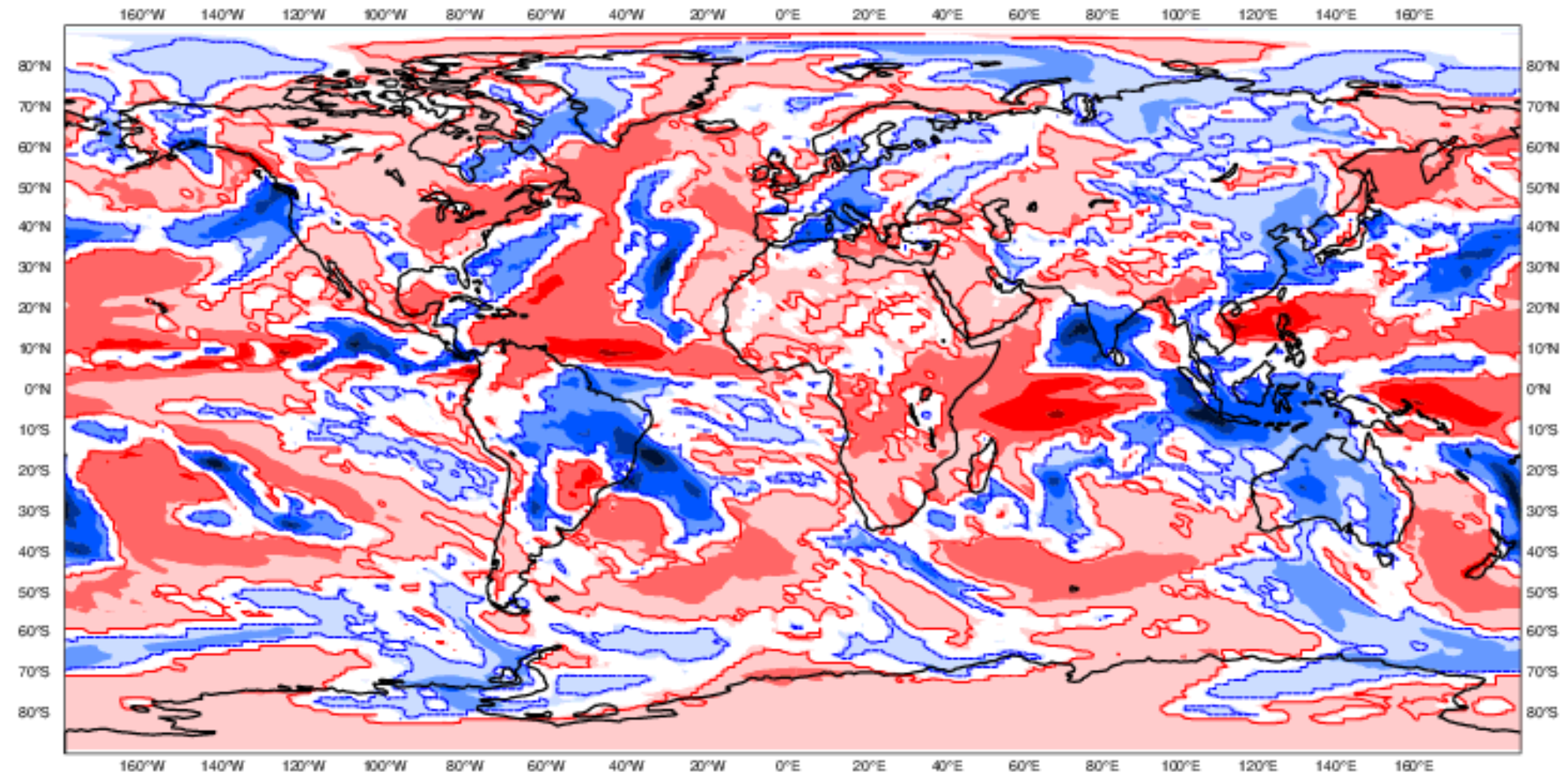


Figure 28: Monthly Precipitation Anomaly
forecast from ECMWF

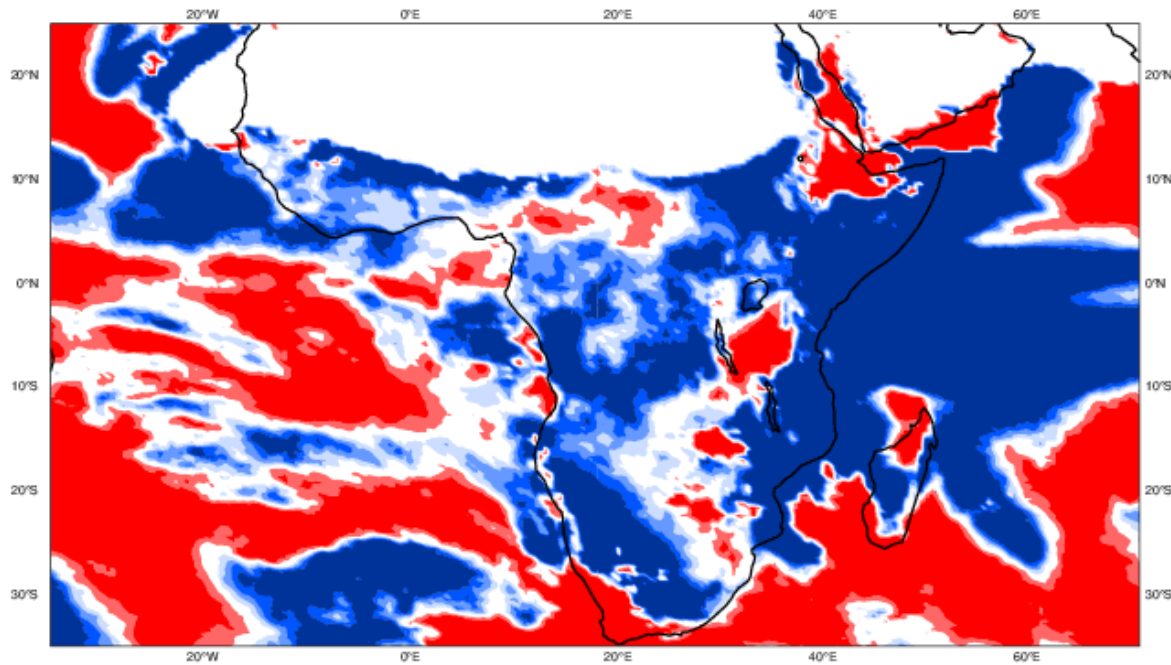
https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_anomaly?facets=undefined&time=2019081500,408,2019090100&parameter=precipitation&area=Global

Probability Precipitation Forecasts from ECMWF for week 1 : weekly tercile at below 33% and above 66%

ECMWF EPS-Monthly Forecasting System
(Prob Precip. anom below 33%)
Forecast start reference is 01-11-2021
ensemble size = 51 ,climate size = 660

Day 1-7
01-11-2021/TO/07-11-2021

< 10% 10..20 20..40 40..50 50..60 60..70 > 70%



ECMWF EPS-Monthly Forecasting System
(Prob Precip. anom above 66%)
Forecast start reference is 01-11-2021
ensemble size = 51 ,climate size = 660

Day 1-7
01-11-2021/TO/07-11-2021

< 10% 10..20 20..40 40..50 50..60 60..70 > 70%

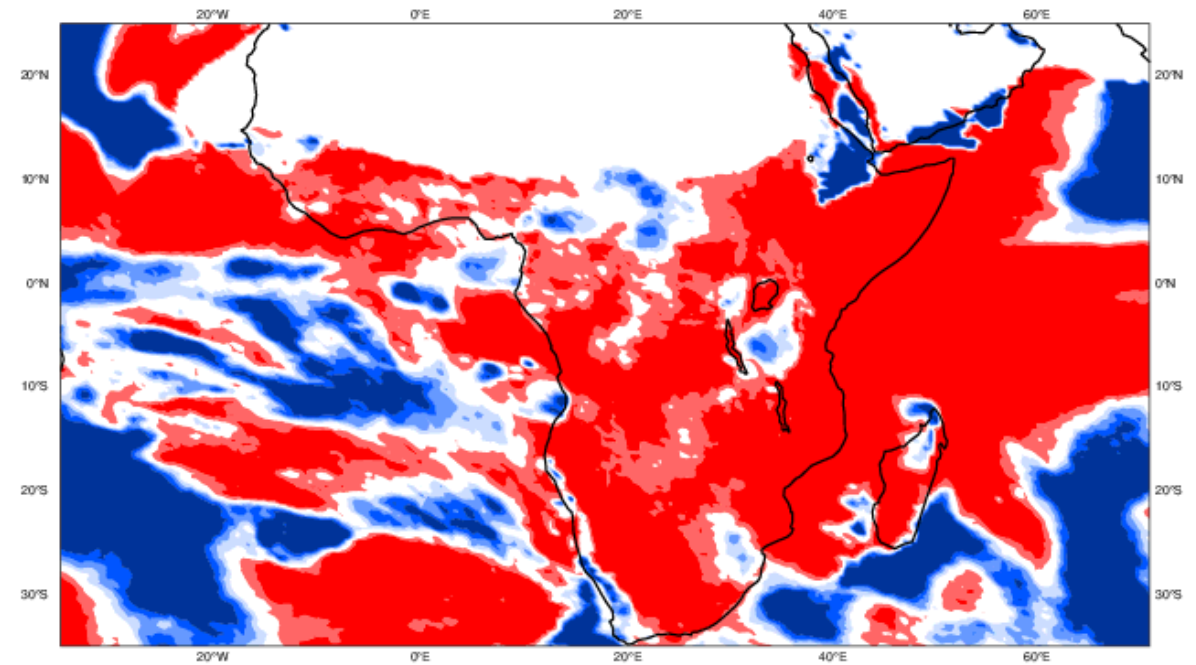


Figure 29: Weekly tercile probability forecast below 33%

https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_tercile?facets=undefined&time=2021110100,312,2021111400&parameter=precipitation&tercile=1&area=Africa

Wind Anomaly and Divergence Forecast from GFS week2

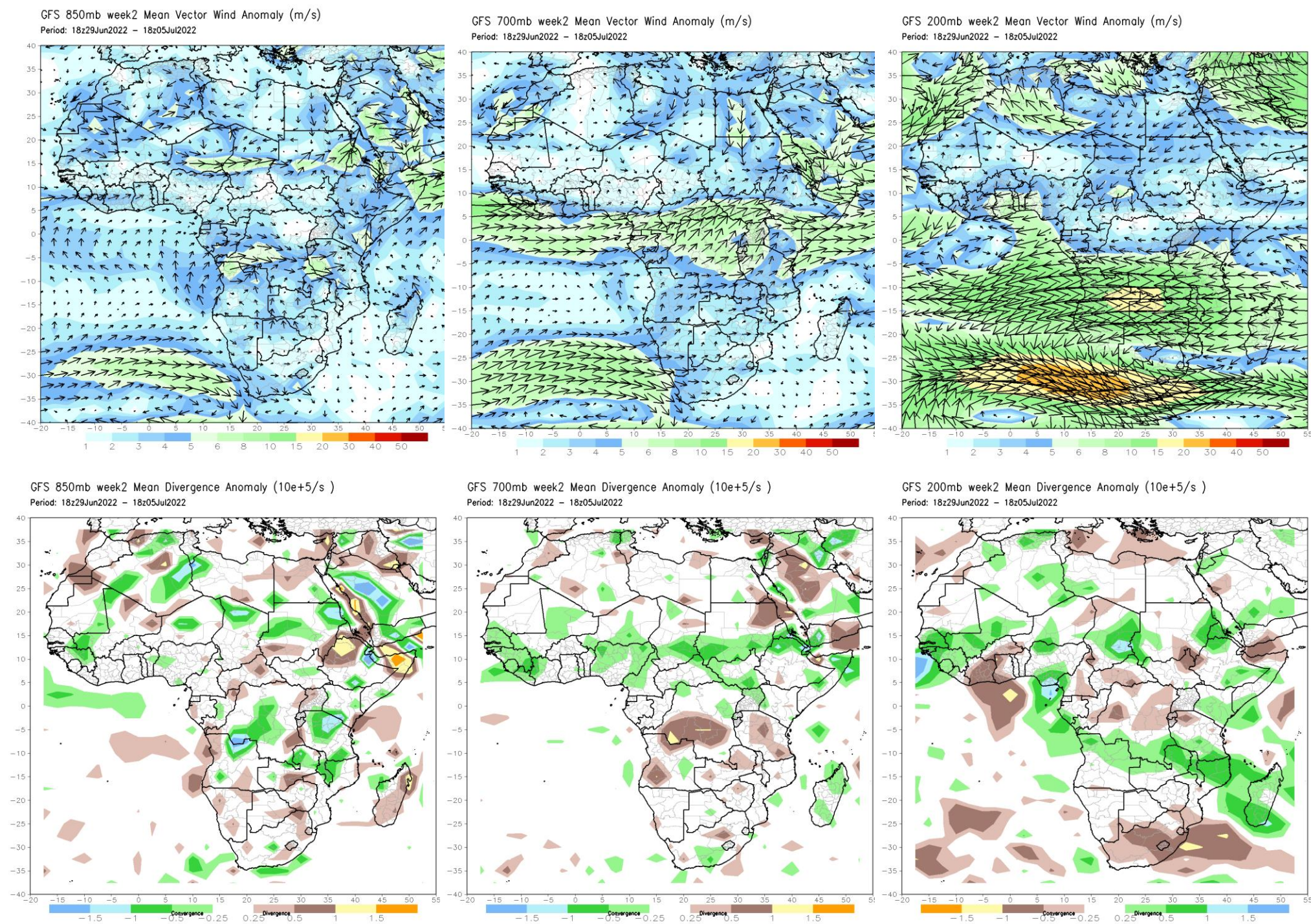


Figure 30: GFS divergence forecast

<https://www.cpc.ncep.noaa.gov/products/inter-national/africa/africa.shtml>

African Precipitation NCEP/GFS Bias-Corrected precipitation and anomaly forecasts for week 2

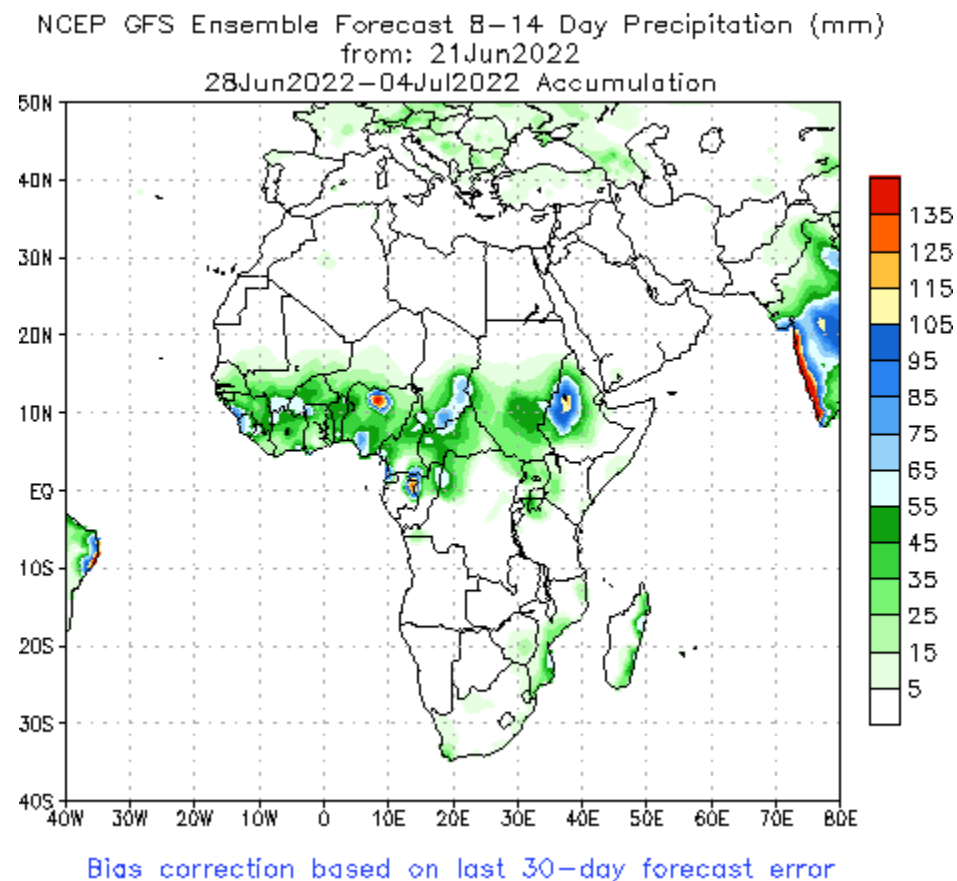
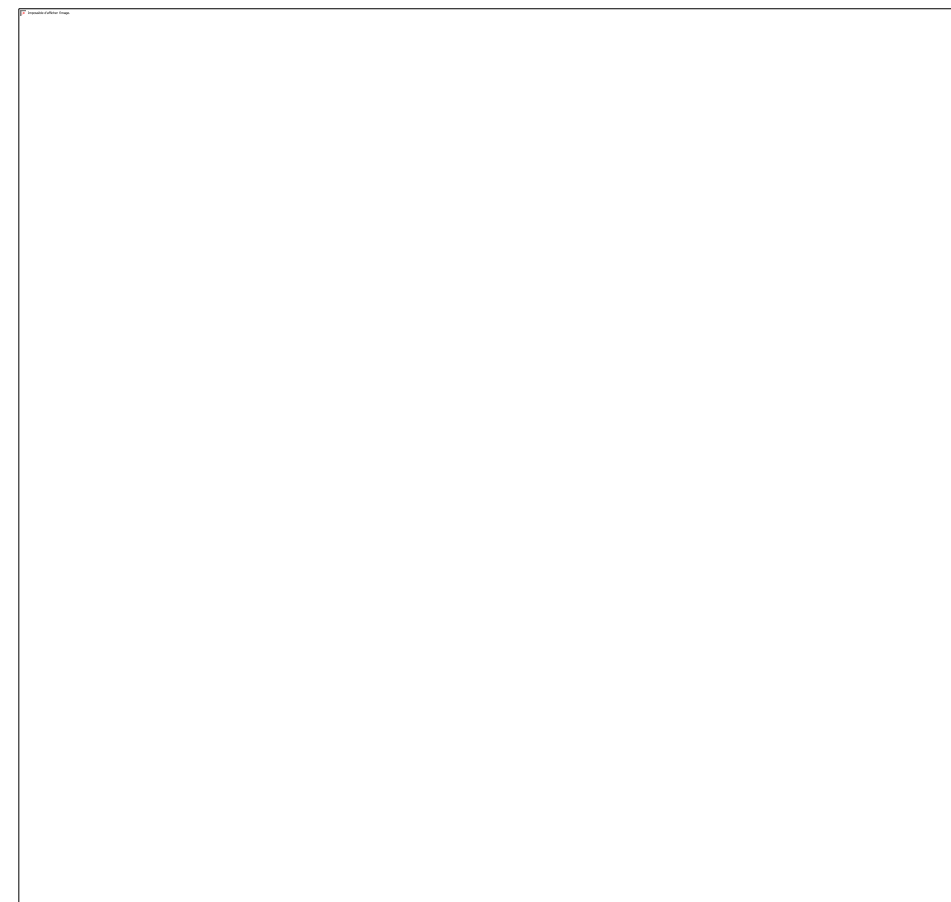


Figure 31: Précipitation and Anomaly forecast

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

Week-2 Precipitation
Probability of Exceedance:
Forecast and Climo
03 – 10 Nov 2021

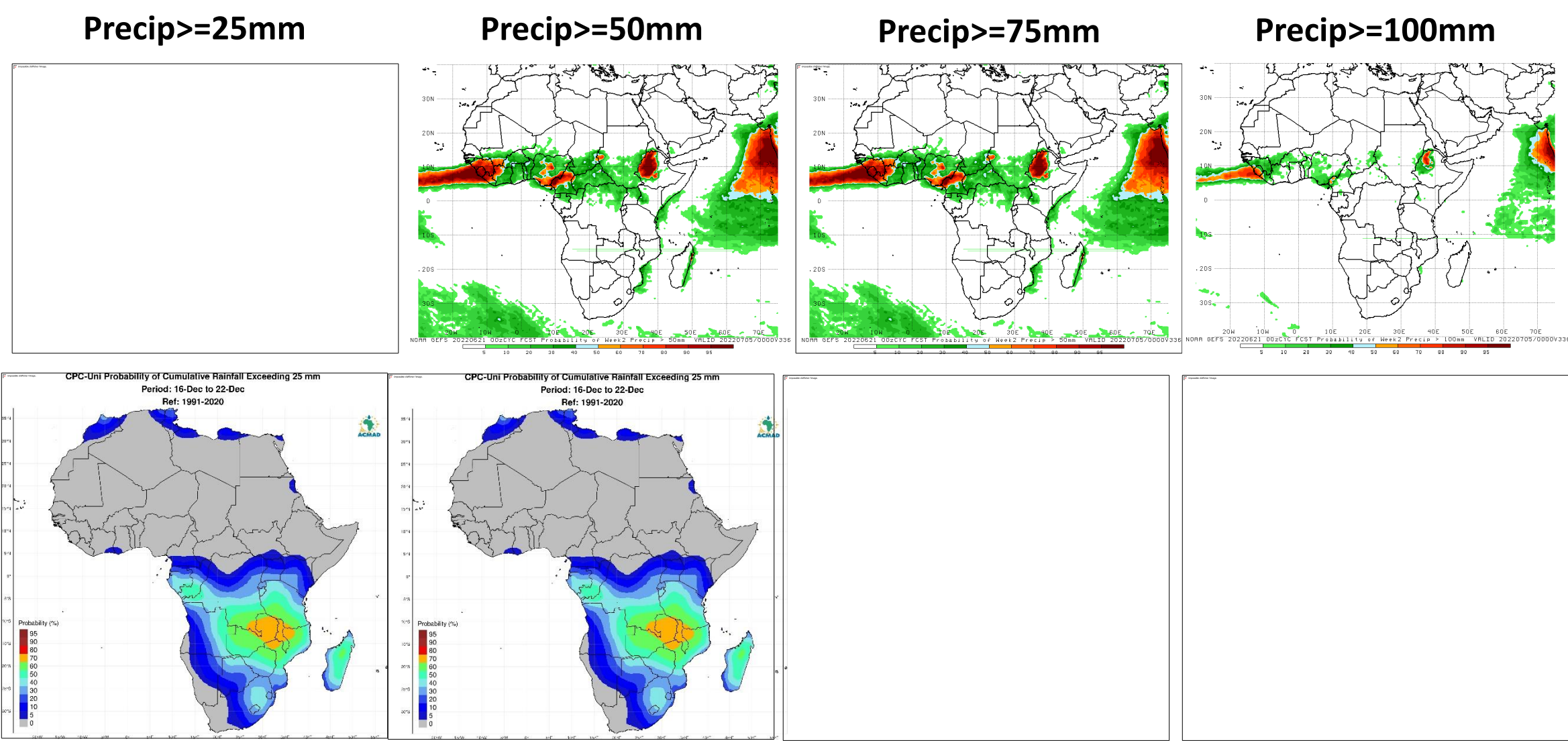


Figure 32: Week2 Precipitation Total Exceedance Probabilities

https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip25mm_prob_africa.html
https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip50mm_prob_africa.html
https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip75mm_prob_africa.html
https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip100mm_prob_africa.html
http://154.66.220.45:8080/thredds/catalog/ACMAD/CDD/climatemonitoringservice/Probability_of_Exceedance/Weekly/Current/catalog.html

Precipitation Anomaly Forecasts from ECMWF for week 2

ECMWF EPS-Monthly Forecasting System
Precipitation anomaly
Forecast start reference is 01-11-2021
ensemble size = 51 ,climate size = 660

Day 8-14
08-11-2021/TO/14-11-2021
Shaded areas significant at 10% level
Contours at 1% level

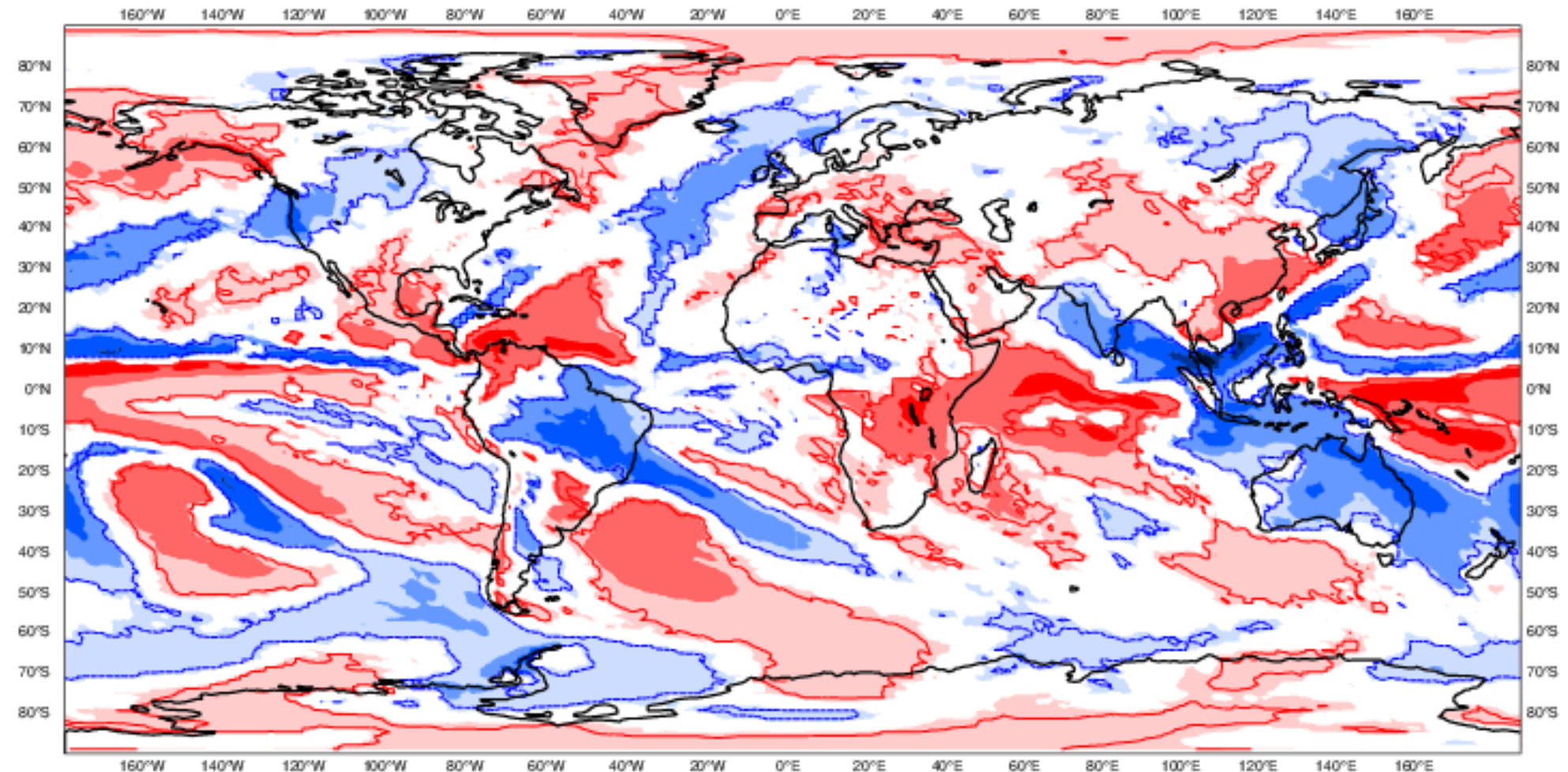


Figure 33: Monthly Precipitation Anomaly
forecast from ECMWF

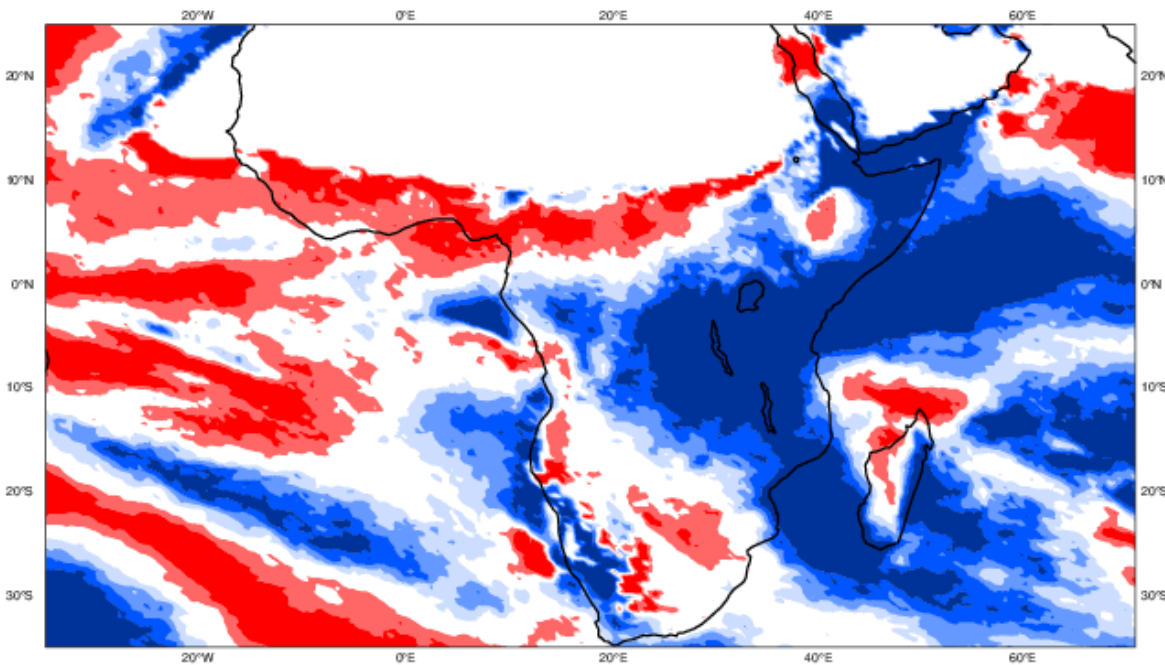
https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_anomaly?facets=undefined&time=2019081500,408,2019090100&parameter=precipitation&area=Global

Probability Precipitation Forecasts from ECMWF for week 2 : weekly tercile at below 33% and above 66%

ECMWF EPS-Monthly Forecasting System
(Prob Precip. anom below 33%)
Forecast start reference is 01-11-2021
ensemble size = 51 , climate size = 660

Day 8-14
08-11-2021/TO/14-11-2021

< 10% 10..20 20..40 40..50 50..60 60..70 > 70%



ECMWF EPS-Monthly Forecasting System
(Prob Precip. anom above 66%)
Forecast start reference is 01-11-2021
ensemble size = 51 , climate size = 660

Day 8-14
08-11-2021/TO/14-11-2021

< 10% 10..20 20..40 40..50 50..60 60..70 > 70%

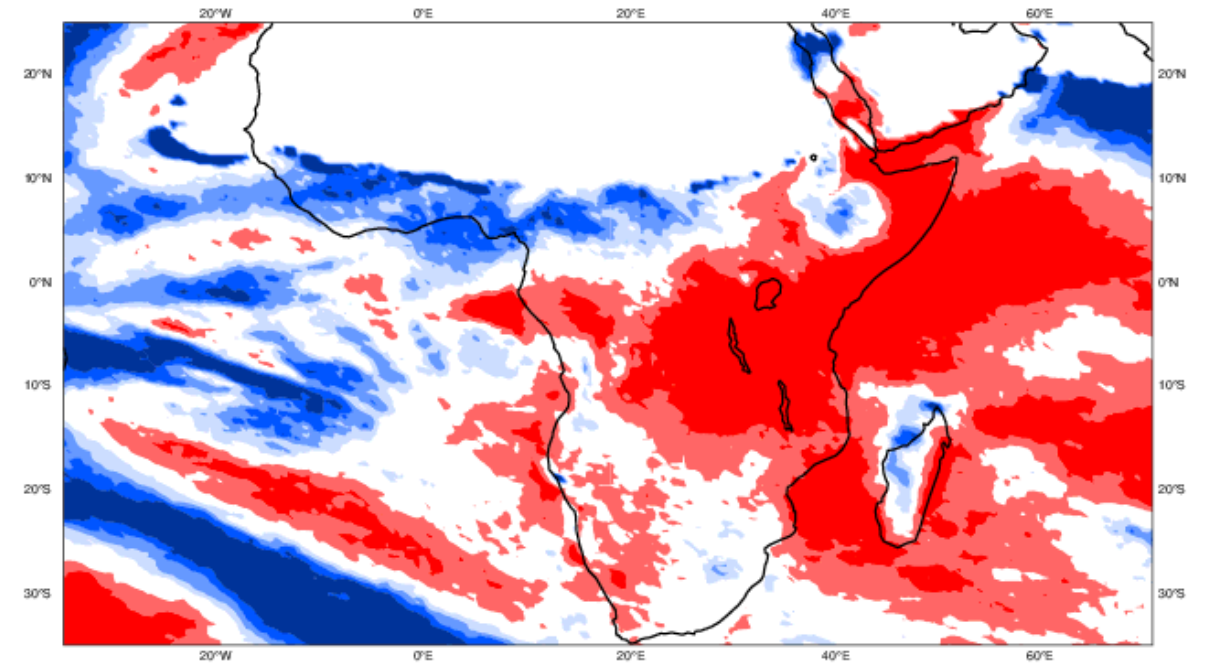
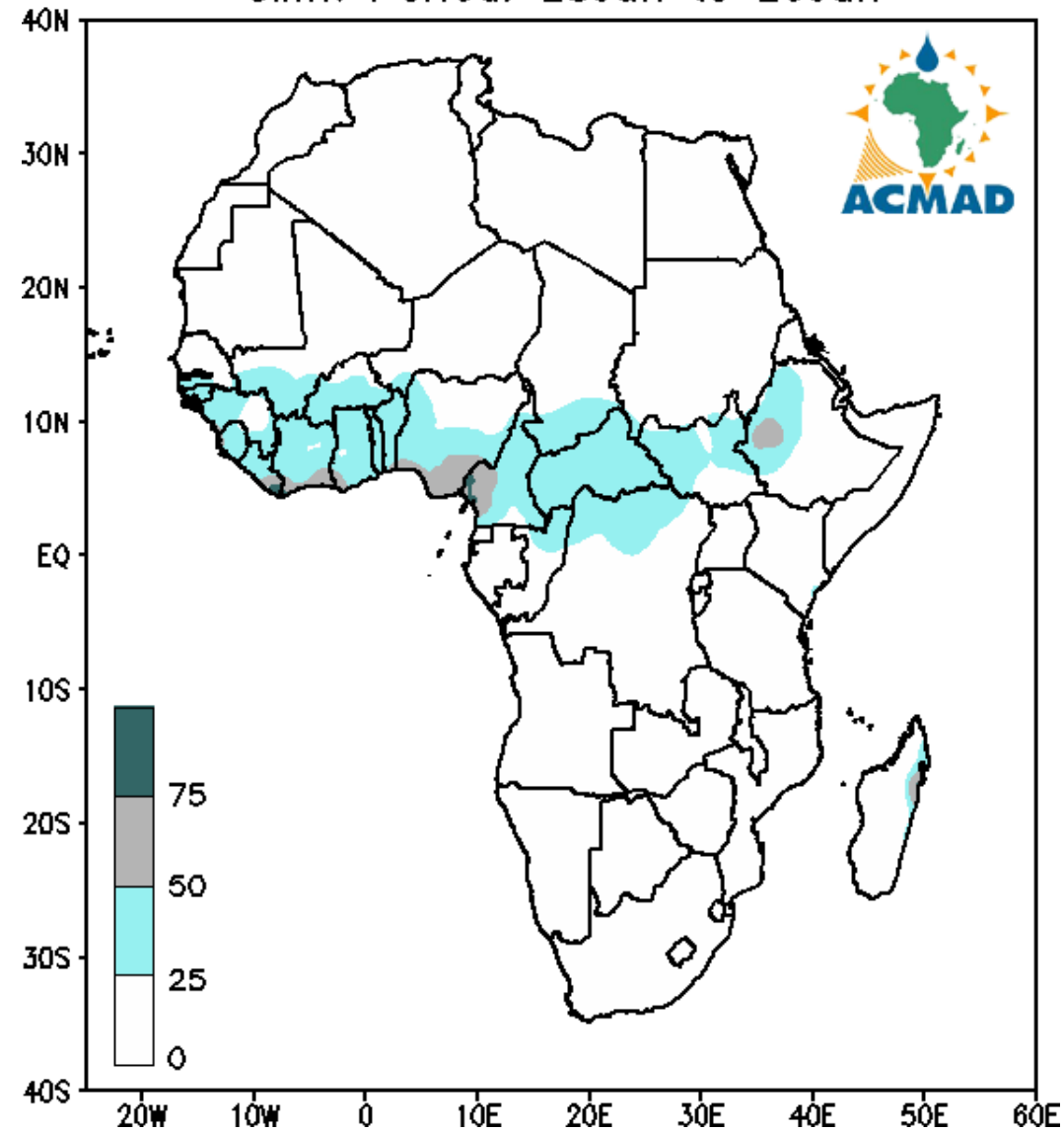


Figure 34: Weekly tercile probability forecast below 33%

https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_tercile?facets=undefined&time=2021110100,312,2021111400&parameter=precipitation&tercile=1&area=Africa

CLIMATOLOGY OF PRECIPITATIONS FOR UPCOMING 2 WEEKS

CPC-Uni 7-Day Total Precip (mm)
Clim. Period: 23Jun to 29Jun



CPC-Uni 7-Day Total Precip (mm)
Clim. Period: 29Jun to 05Jul

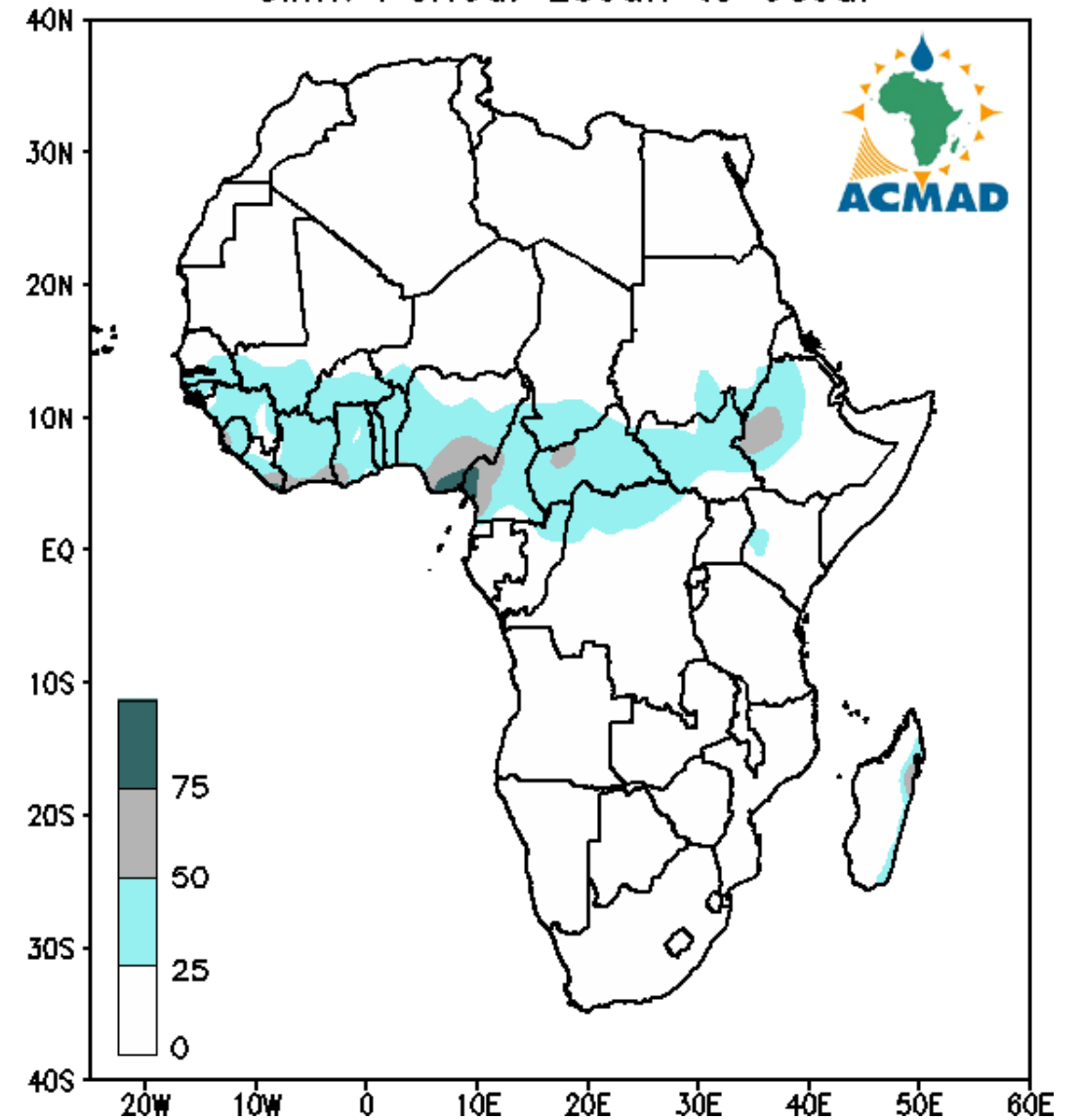
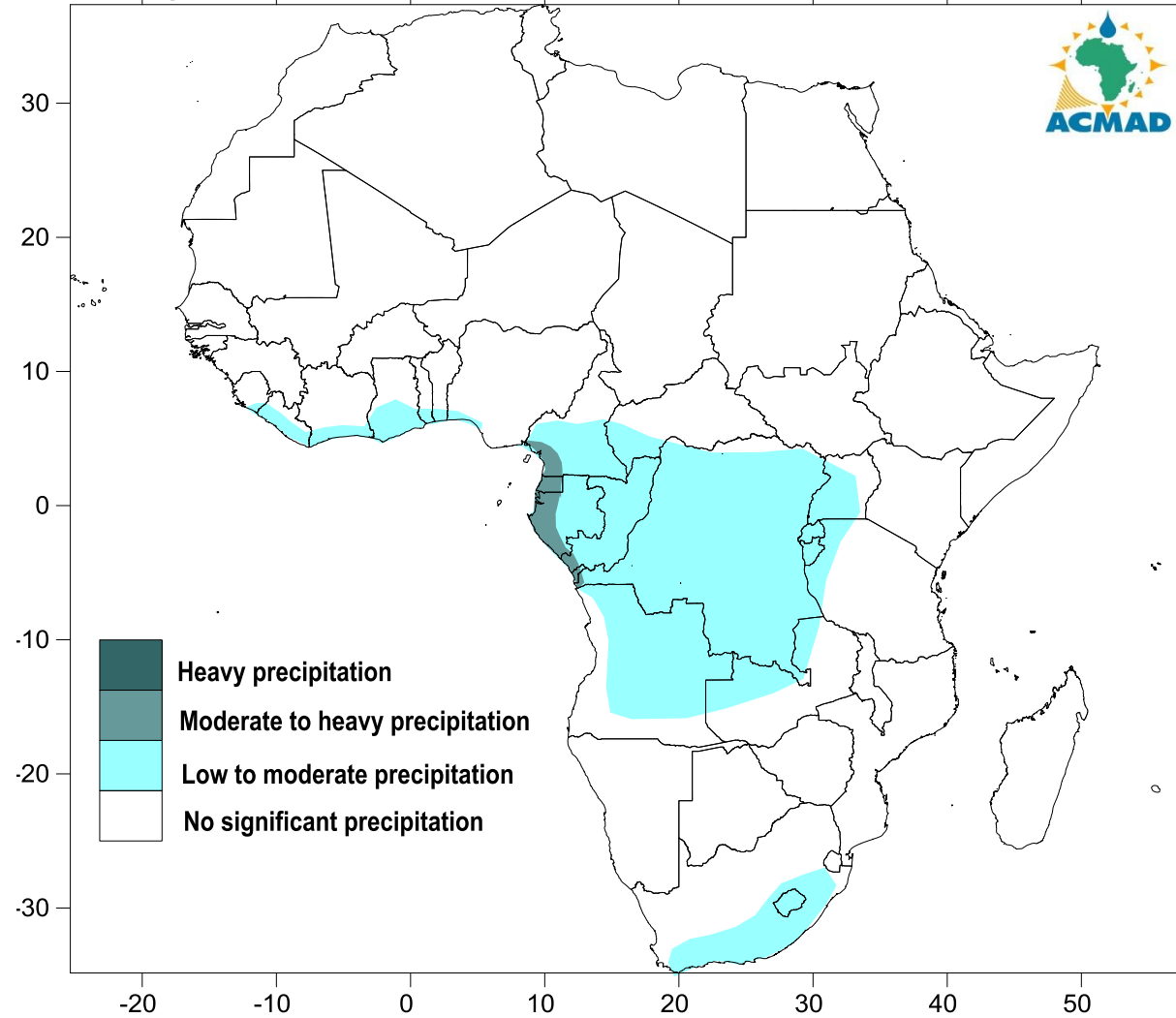


Figure 38: Climatology of Precipitation for week-1(left panel) and week-2 (right panel)

PRECIPITATIONS FORECAST FOR THE UPCOMING TWO WEEKS

Precipitation forecast for the week of 5 - 11 November 2021



Precipitation forecast for the week of 12 - 18 November 2021

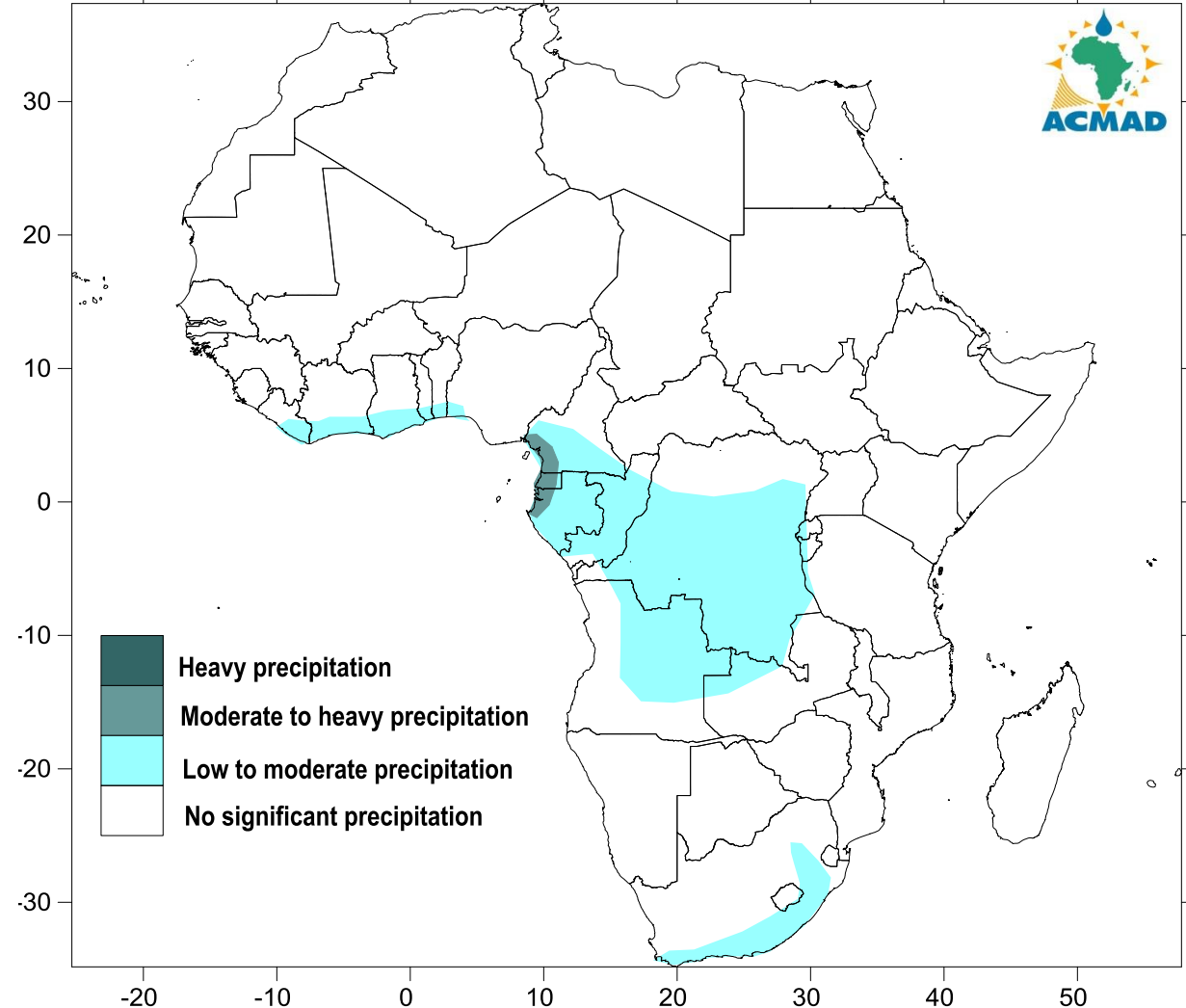


Figure 39: Precipitation Outlook for week-1(left panel) and week-2 (right panel)