



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

Drafted and Presented by Maimuna BORNO
Edited by: Hubert KABENGELA, Pierre KAMSU

Content of the Technical Note

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- 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

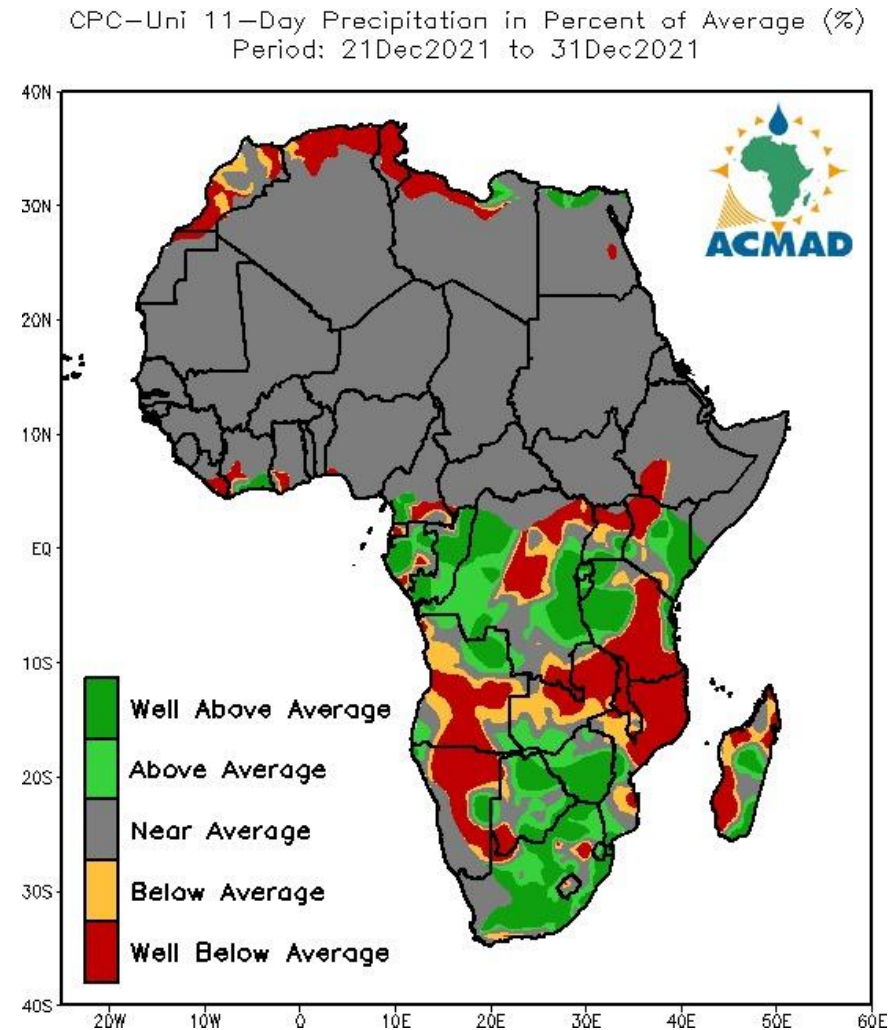
- Weekly and monthly SST anomaly assessment
- Current Velocity Potential at 200hPa
- Current MJO Status and Forecast
- Weekly PWAT observed and outlook
- Dekadal velocity potential with MJO, Kelvin and Rossby Wave
- Dekadal Stream Function with MJO, Kelvin and Rossby Wave

3. Model Guidance for Weekly Climate outlook

- Weekly wind anomaly and divergent forecast
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- 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 First Dekad of December 2021



The third dekad of December 2021 witnessed enhanced rainfall activities when compared to the three previous dekad, over the central and southern regions of the continent. Above-average to well above-average precipitation was observed over Congo, Rwanda, Burundi, most of Gabon, Botswana, Zimbabwe, South Africa, northern edges of Libya and Egypt, southern Cote D'Ivoire, Cameroon, Somalia and Zambia, north-eastern Angola, as well as parts of DRC, Uganda, Kenya, Tanzania, Namibia, Mozambique and Madagascar. Below-average rainfall was observed over the northern part of northern Africa, most of Angola, Namibia, Mozambique, Malawi, Tanzania, and parts of Liberia, Cote D'Ivoire, Ghana, Cameroon, Gabon, DRC, Uganda, Kenya, Ethiopia, Zambia, South Africa and Madagascar.

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

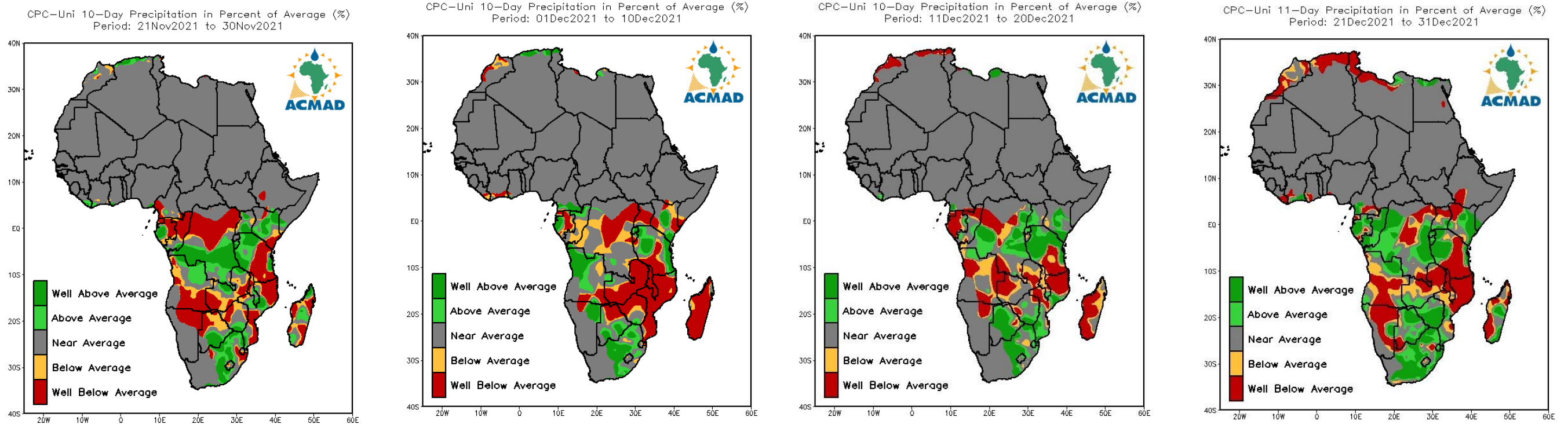


Figure 2: This maps display decadal average precipitation in percent of average

Below to well below average precipitation was observed in the last dekads of November and the first dekad of December 2021, with rainfall activities centered below the equatorial belt mostly in the central and southern African region. The deficit persisted into the last three dekads with more spatial coverage dominated by below to well below average precipitation in these two regions of the continent. Enhanced spatial coverage of above average to well above average precipitation was observed mostly in the second dekad of December when compared to the preceding dekads. The last dekad of December observed enhanced rainfall activities compared to the three previous dekads.

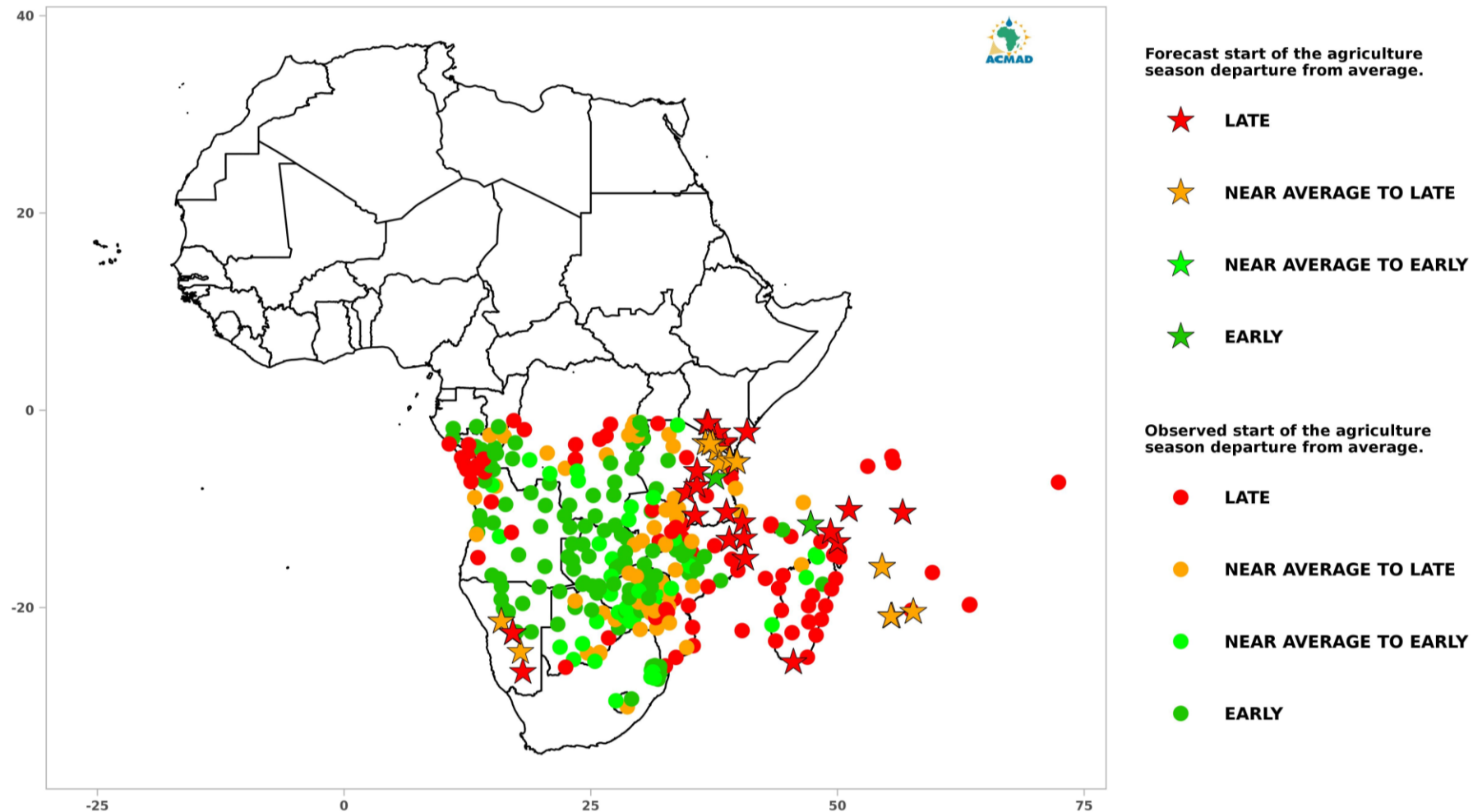
MONITORING OF OBSERVED ANOMALIES ON THE START OF THE AGRICULTURE SEASON AND OUTLOOK.

MONITORING PERIOD: JULY 2021-JANUARY 2022.

CURRENT MONITORING WEEK: LAST WEEK OF DECEMBER.

OUTLOOK VALIDITY PERIOD: JANUARY 01 TO JANUARY 14 2022.

DATE OF ISSUE: DECEMBER 31-2021.



PAST 3 DEKADS OLR ANOMALIES

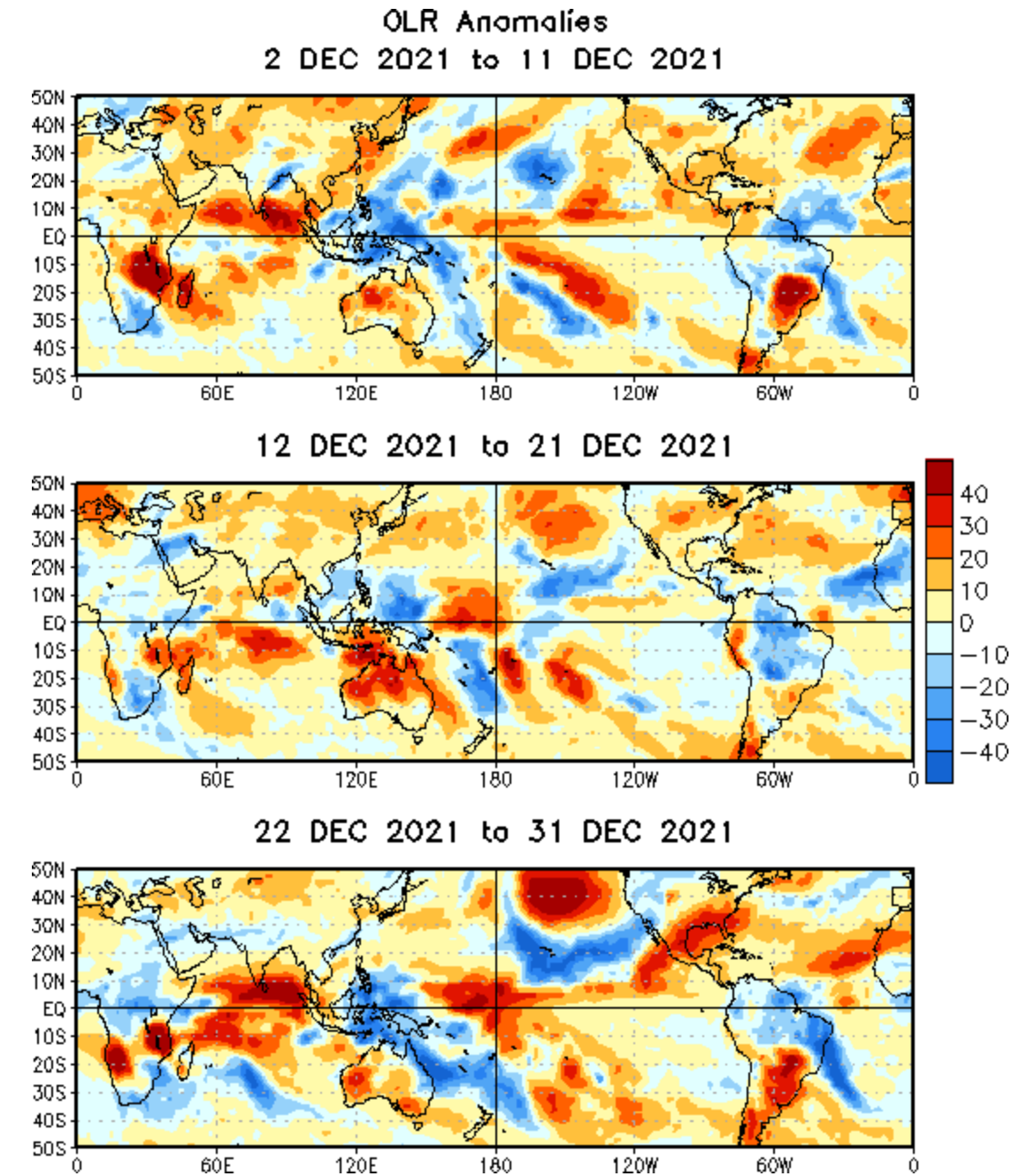


Figure 4: Past 3 weeks OLR anomalies

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

Mean Sea Level Pressure (MSLP) Anomalies for the 3rd Dekad of Dec. 2021

Mean Sea Level Pressure (MSLP) Anomalies for the 3rd Dekad of December 2021

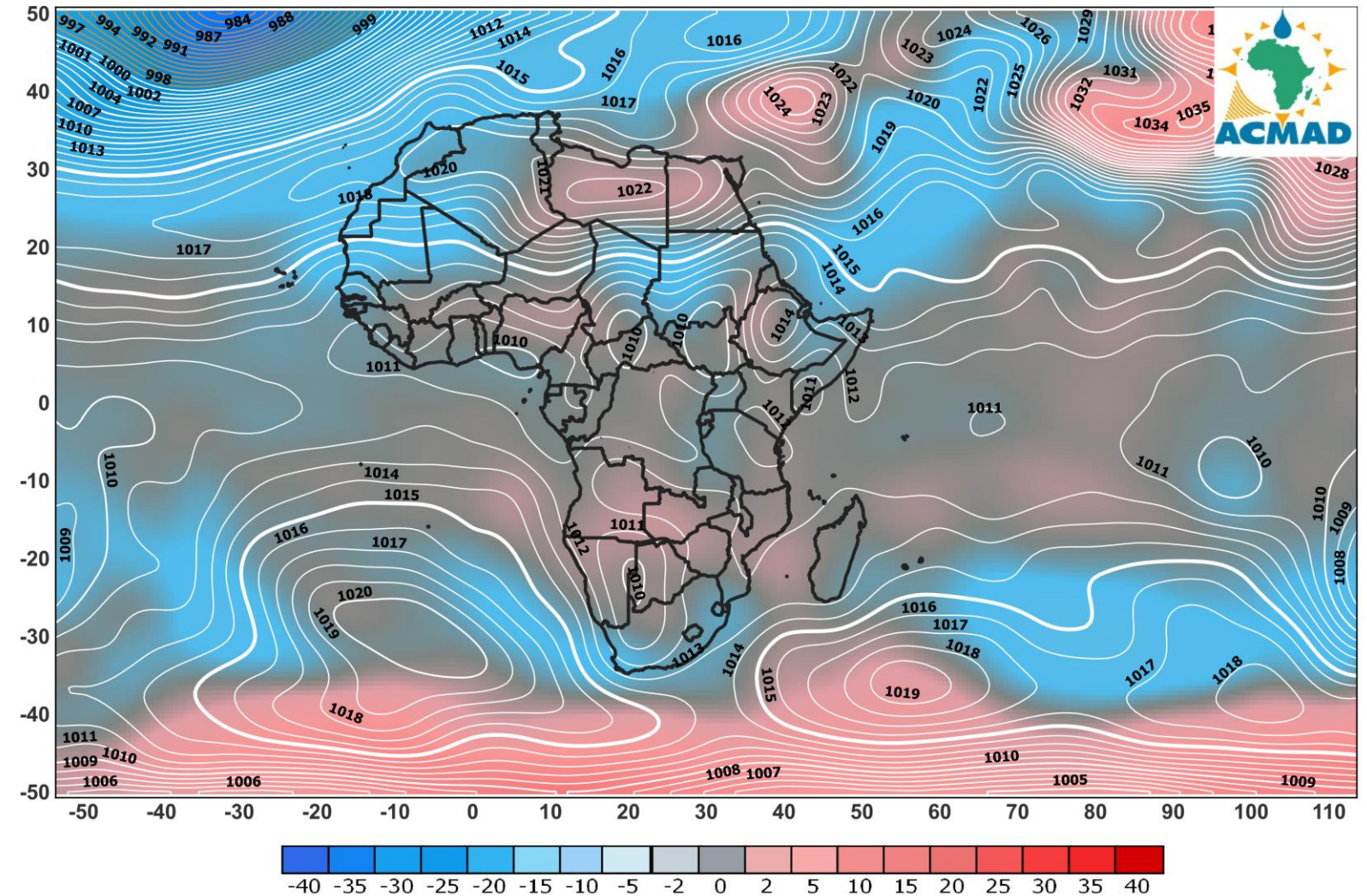
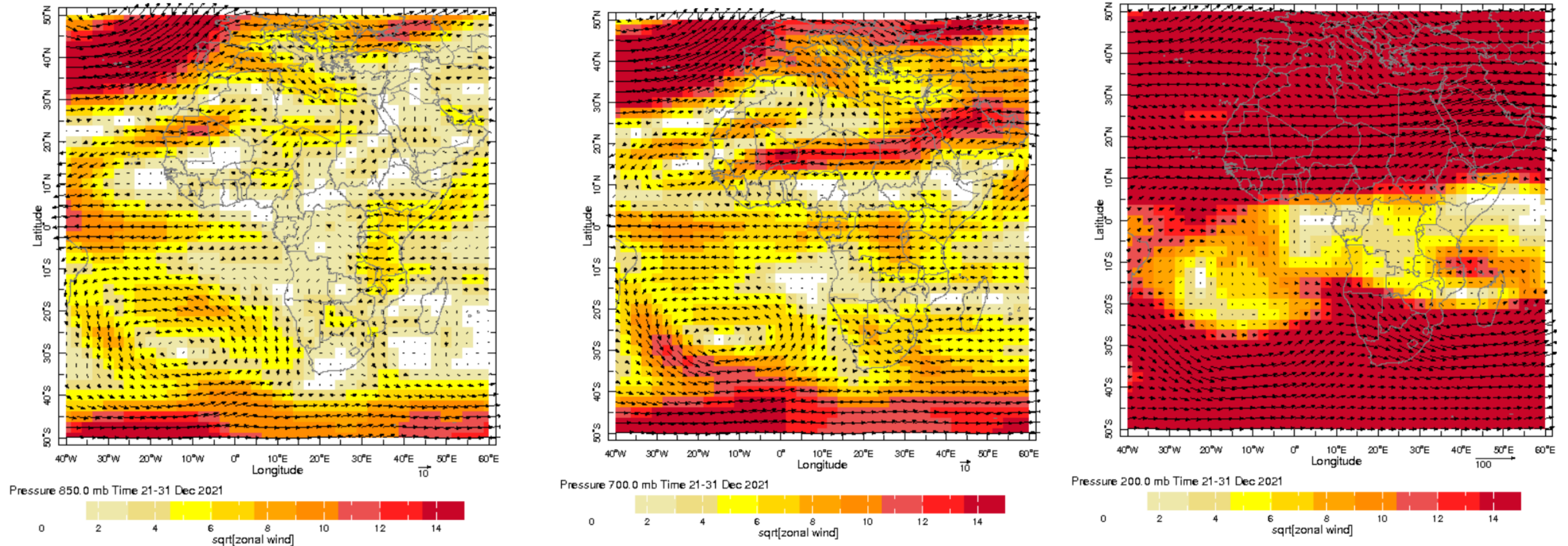


Figure 5: MSLP observation versus anomaly

Data source:

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

Wind Anomalies for the 3rd Dekad of Dec. 2021 @ 850hpa, 700hpa and 200hPa



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/

Figure 6: Wind anomalies for 850hpa and 700hPa

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

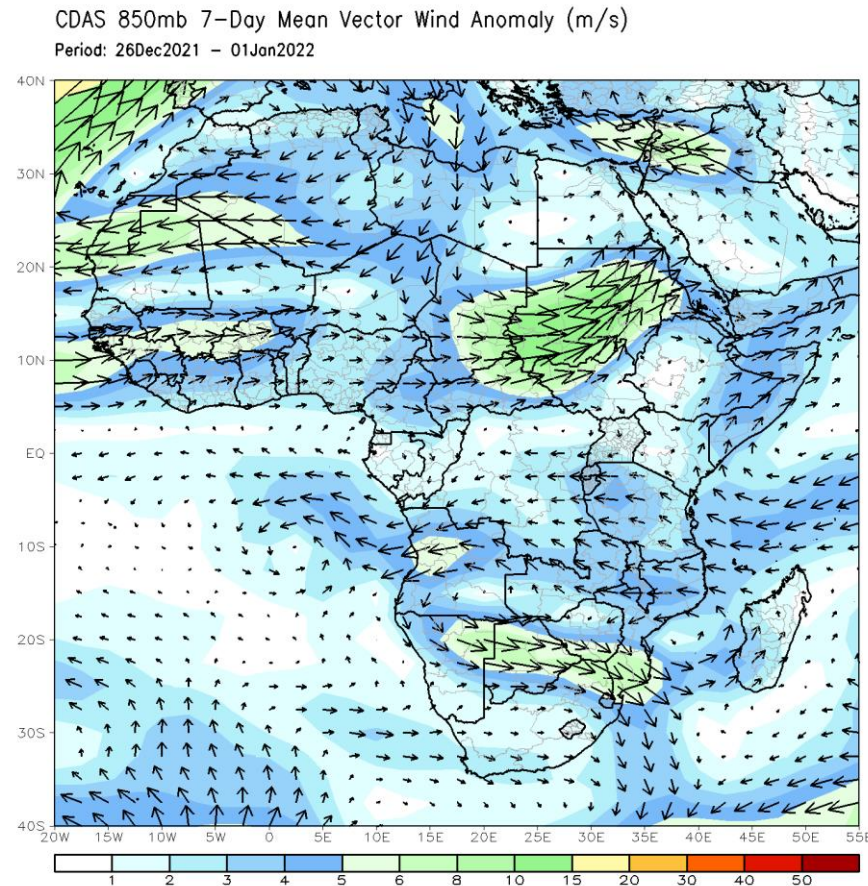
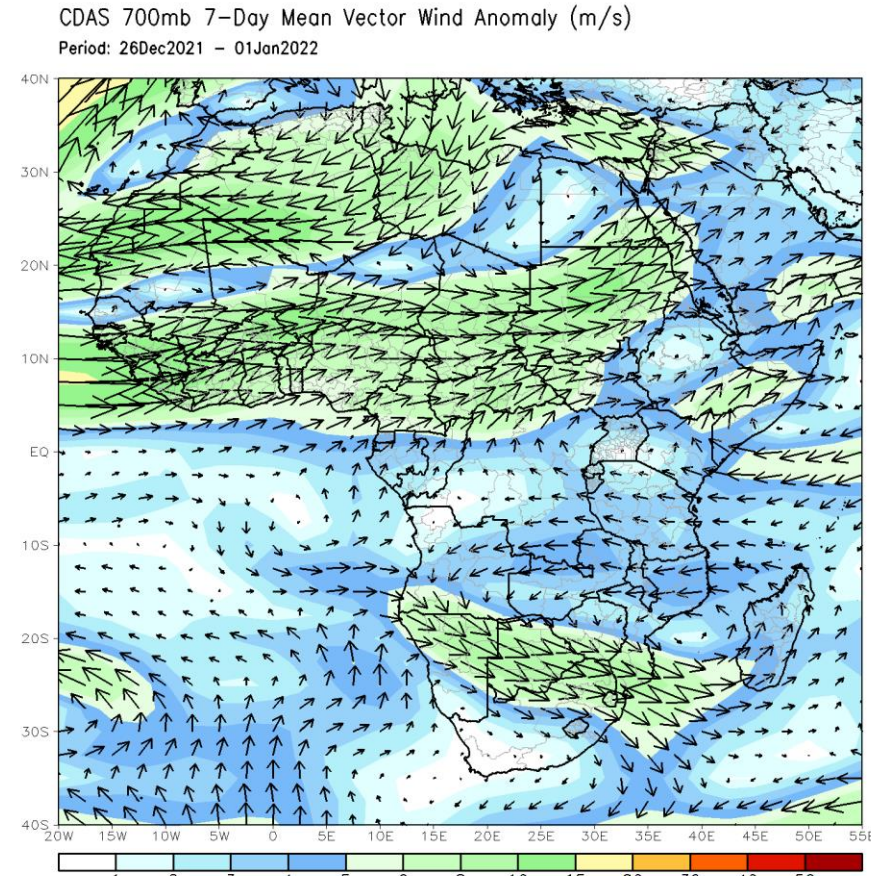
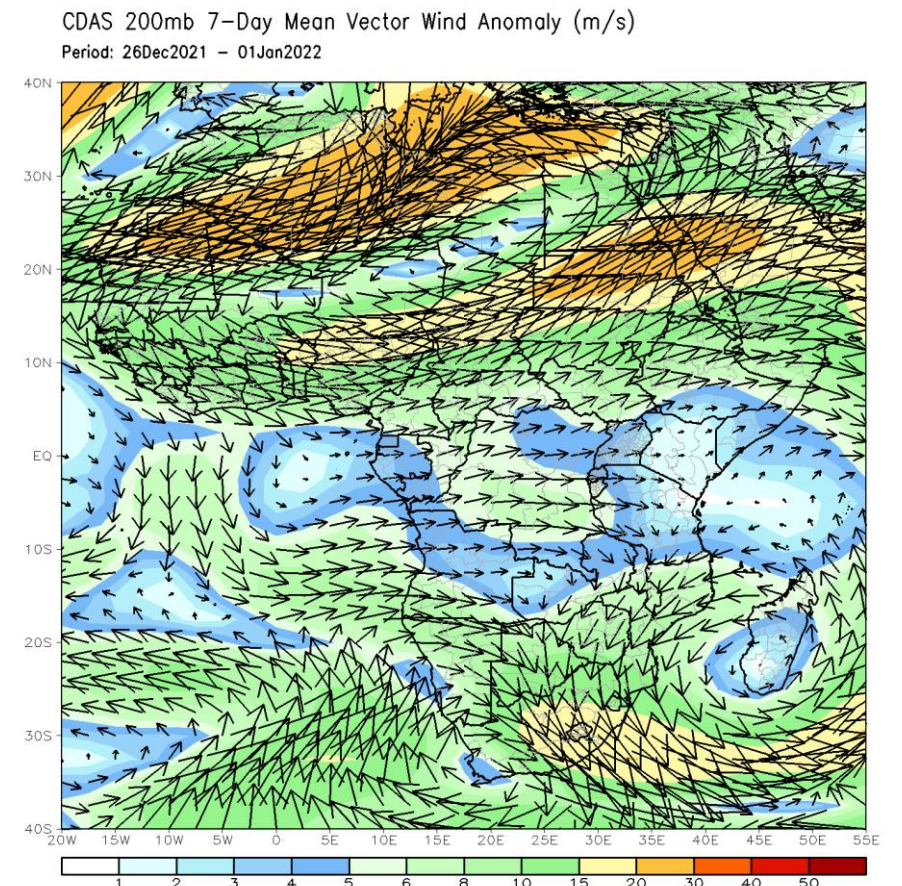


Figure 7: Wind anomalies for 850hpa, 700hPa and 200hpa

<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 3rd Dekad of Dec. 2021

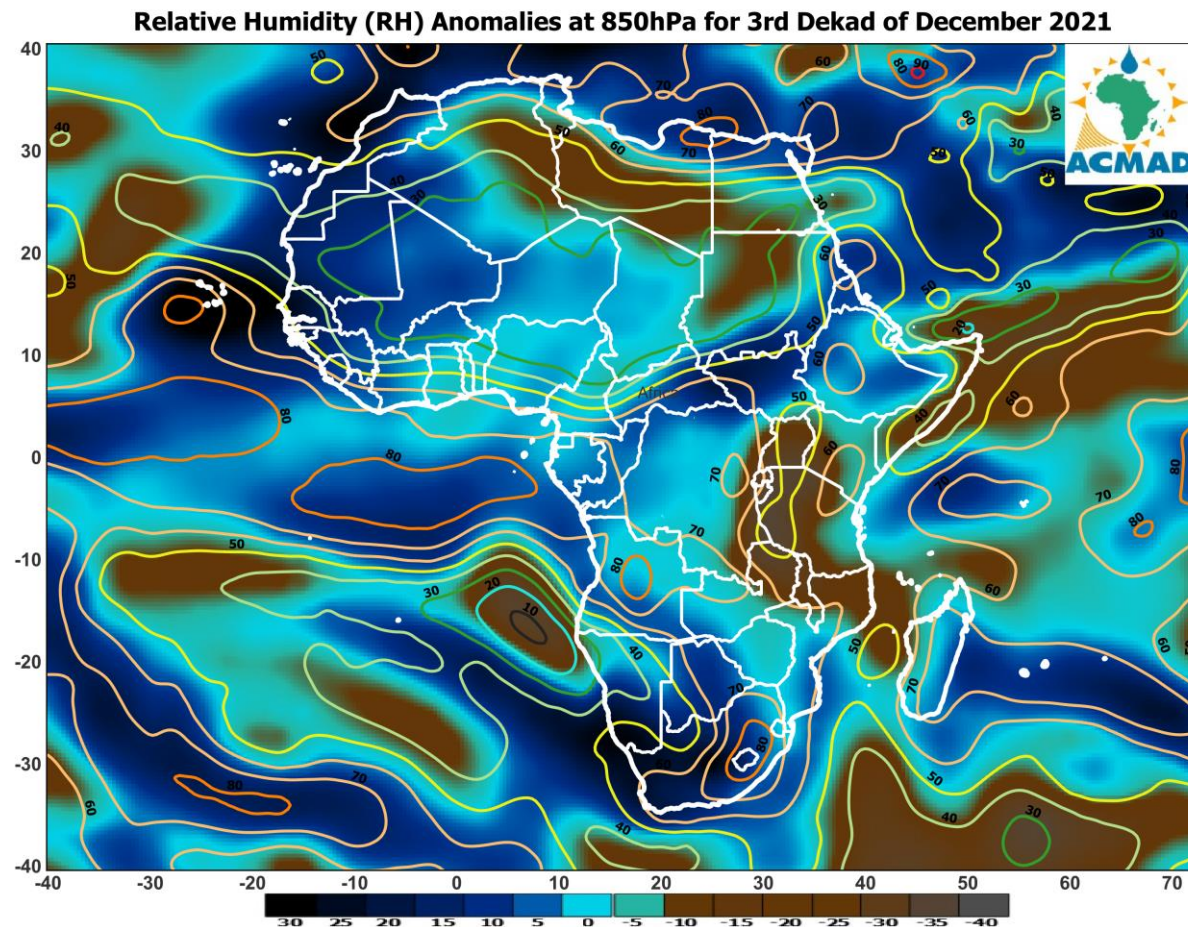
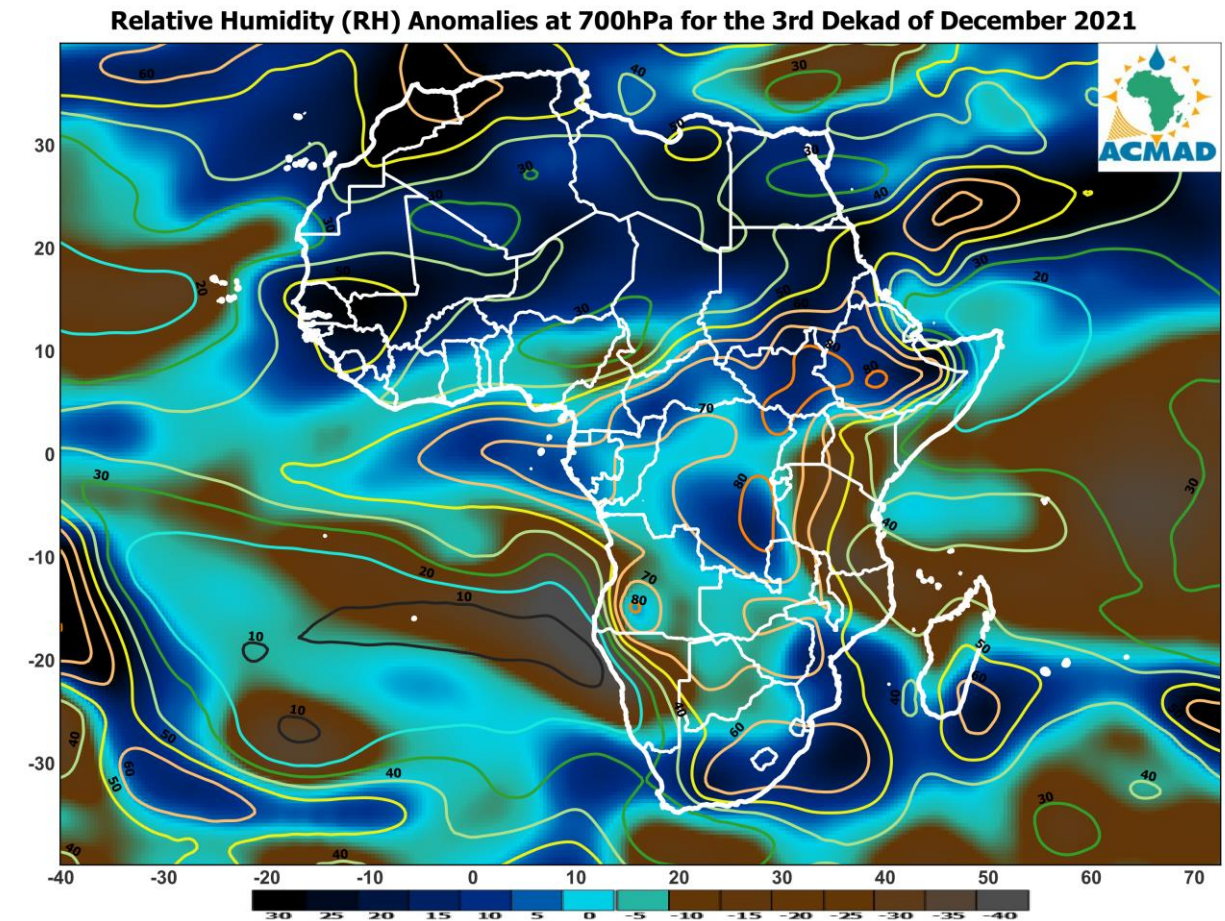
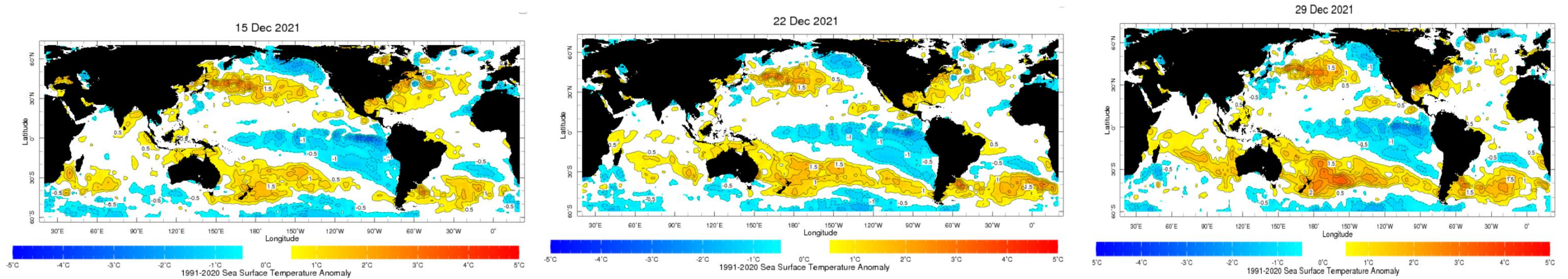


Figure 8: Relative Humidity Anomaly at 850hPa (left) and 700hPa (right)

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

Weekly Sea Surface Temperature Anomaly



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.

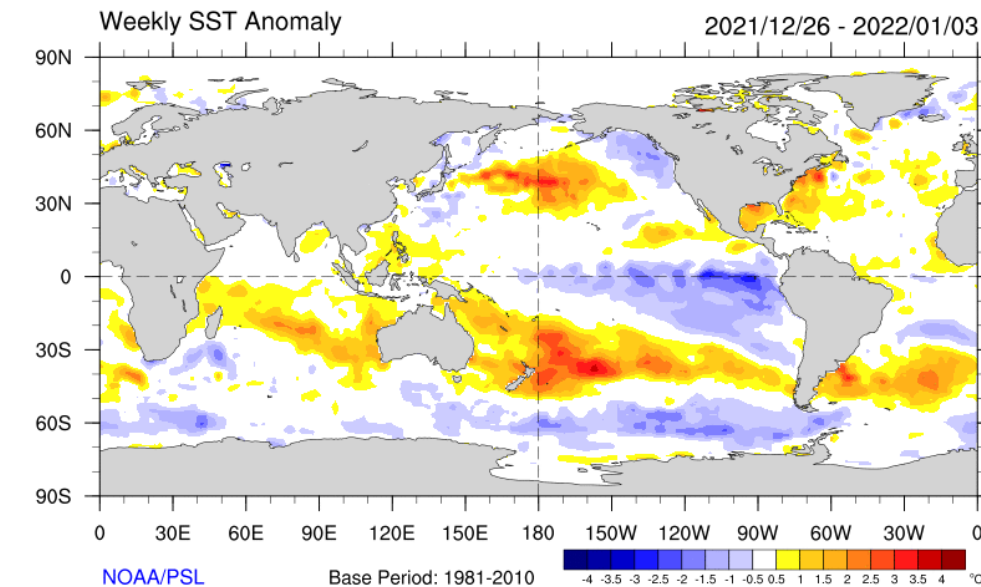
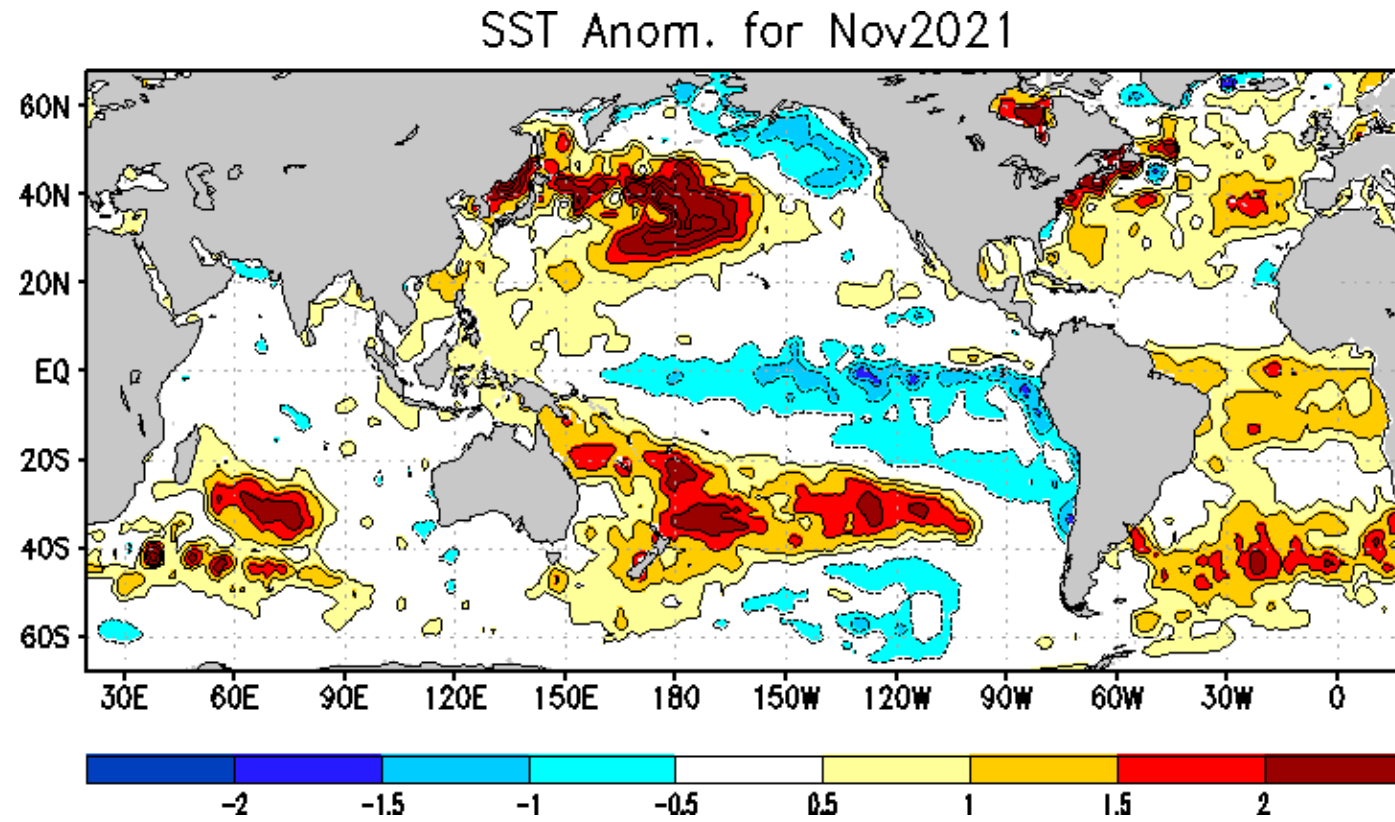
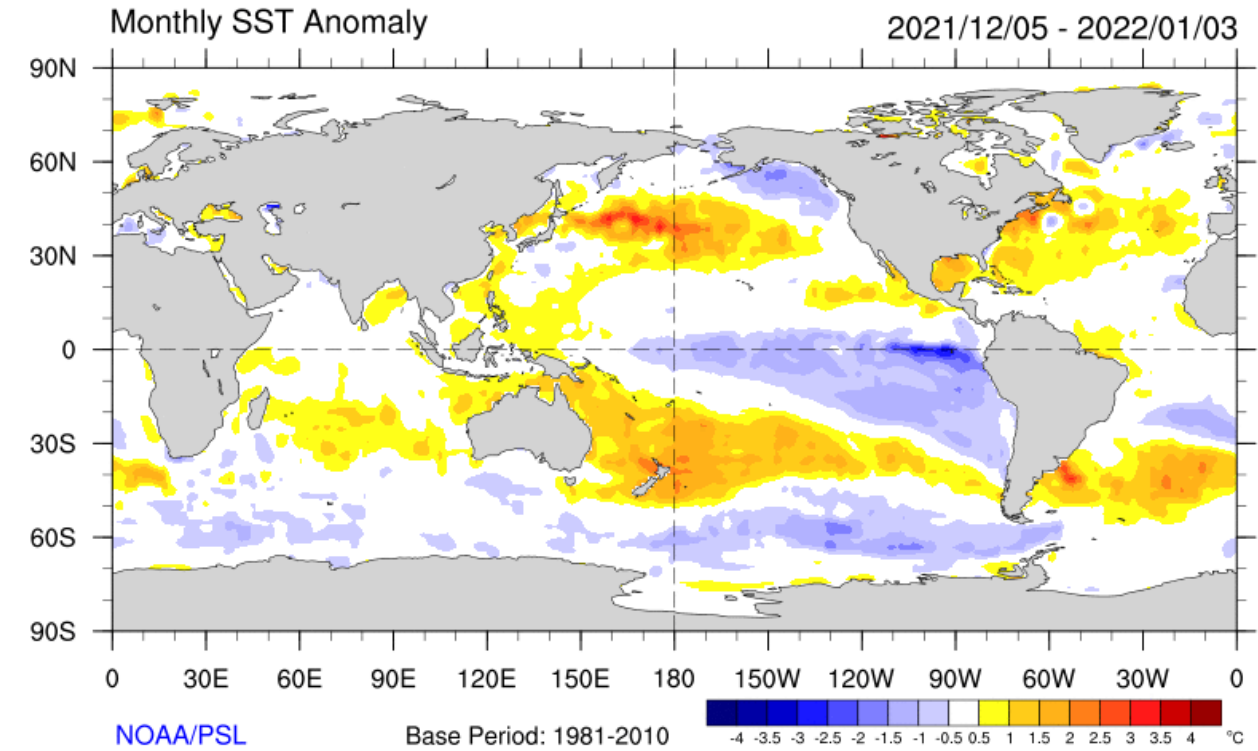


Figure 9: Maps display weekly sea surface temperature anomalies over the globe for last four weeks

<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



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

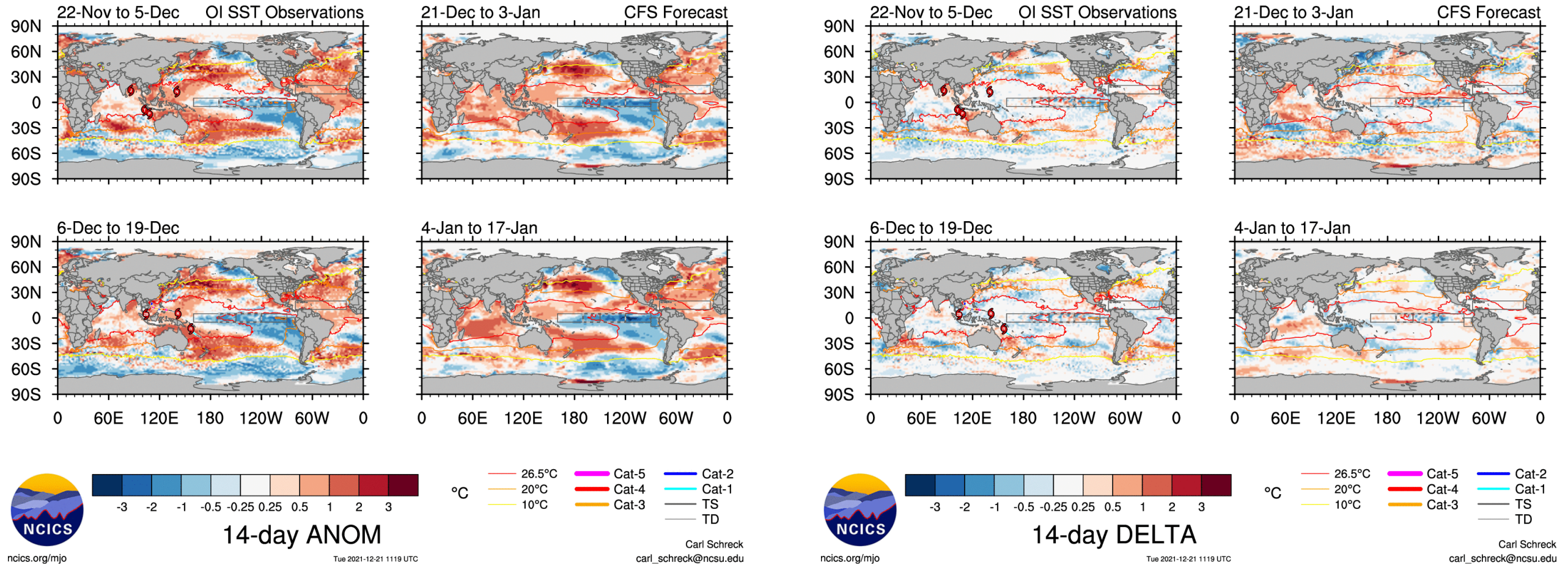


Figure 11: Sea Surface Temperature and FCST for two week

<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

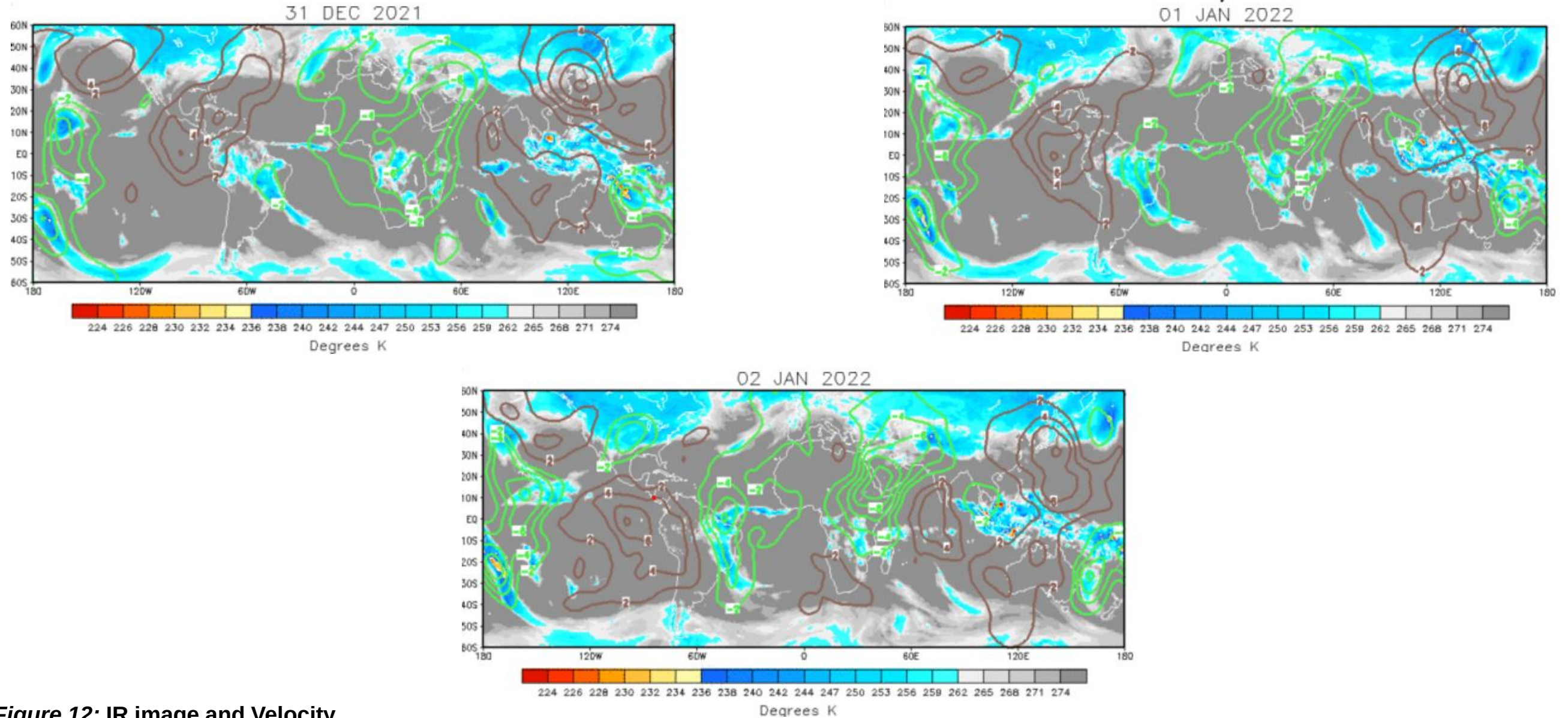


Figure 12: IR image and Velocity Potential anomalies

ECMWF Madden-Julian-Oscillation (MJO) Forecast

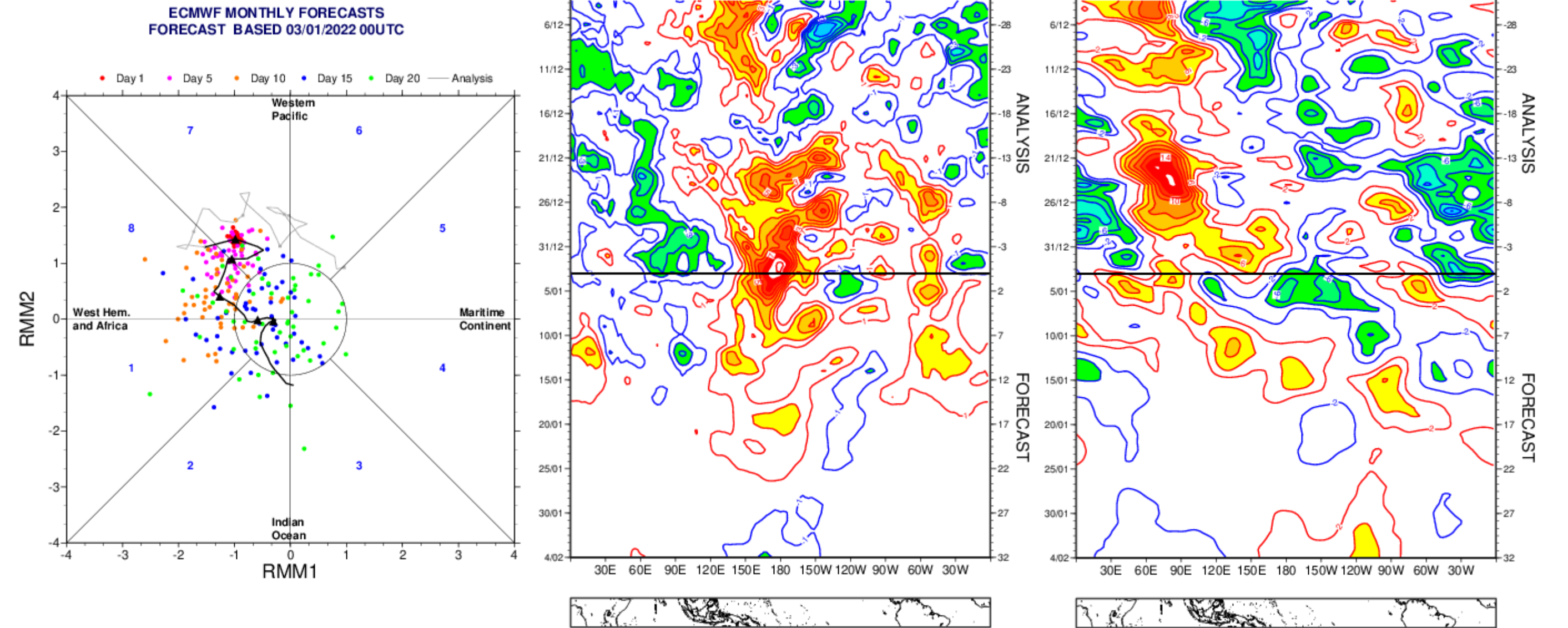


Figure 13: ECMWF MJO Forecast

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

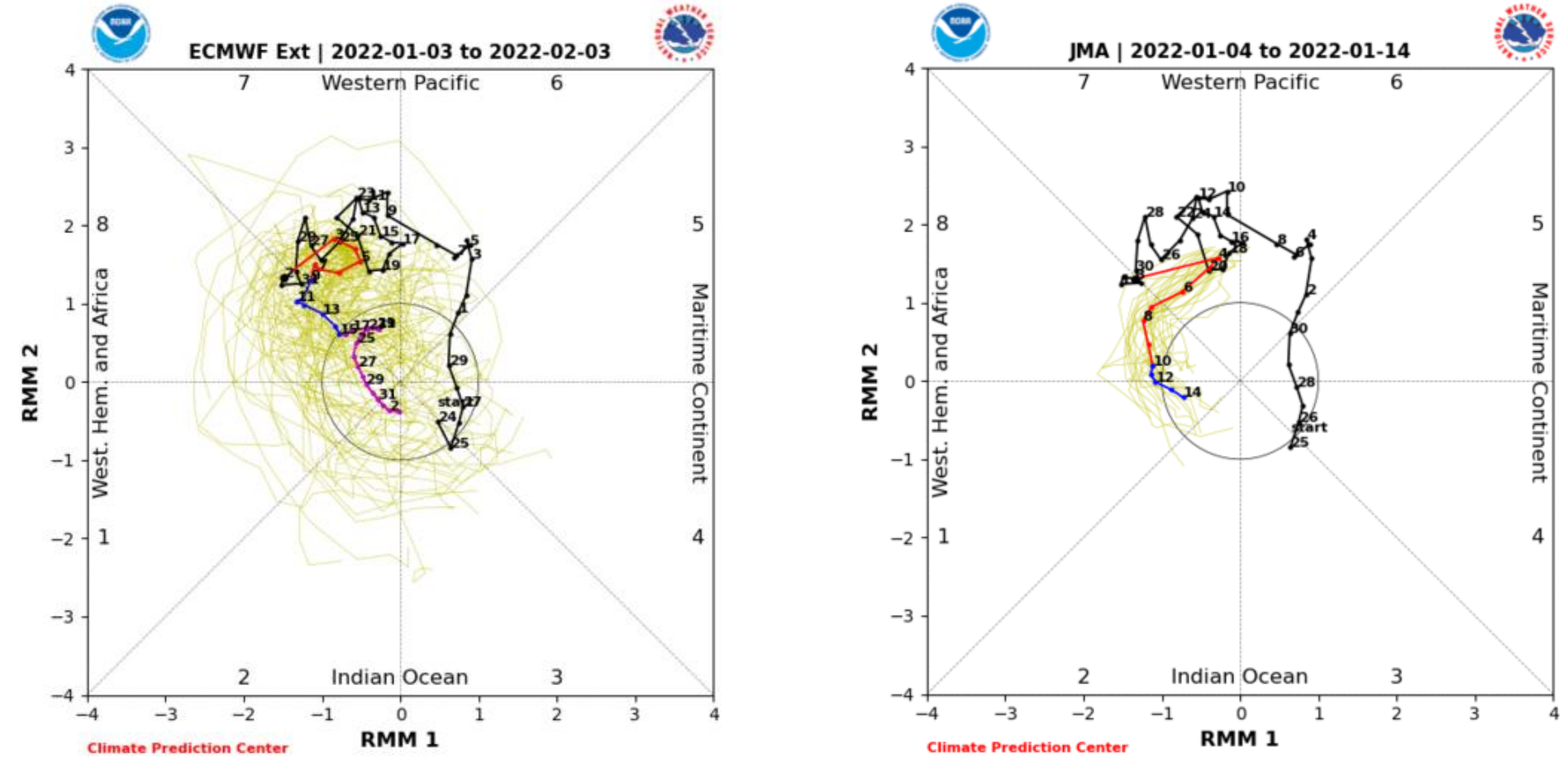


Figure 14: Forecasts for ECMWF, NCEP and UK Met Office

<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

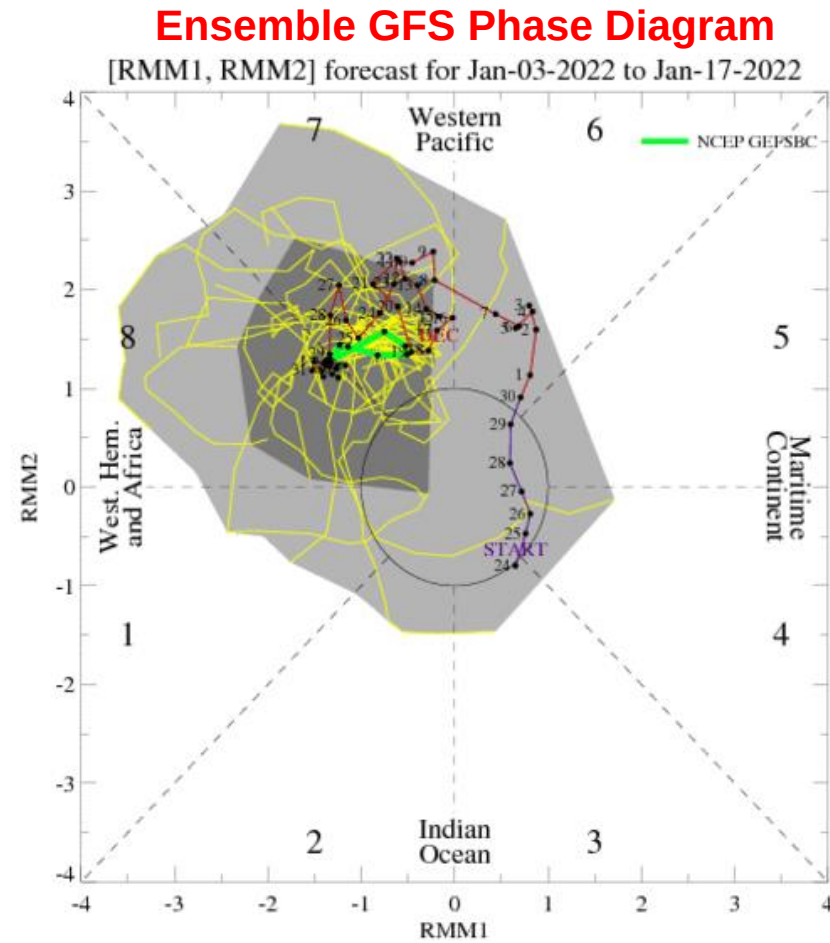
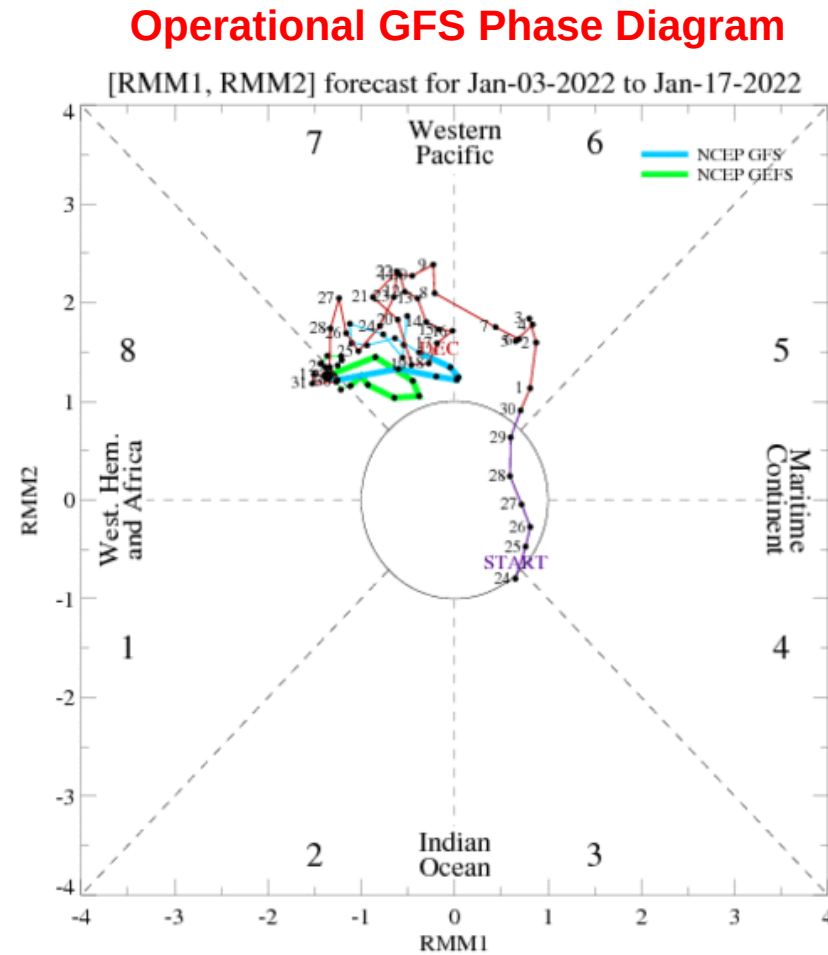
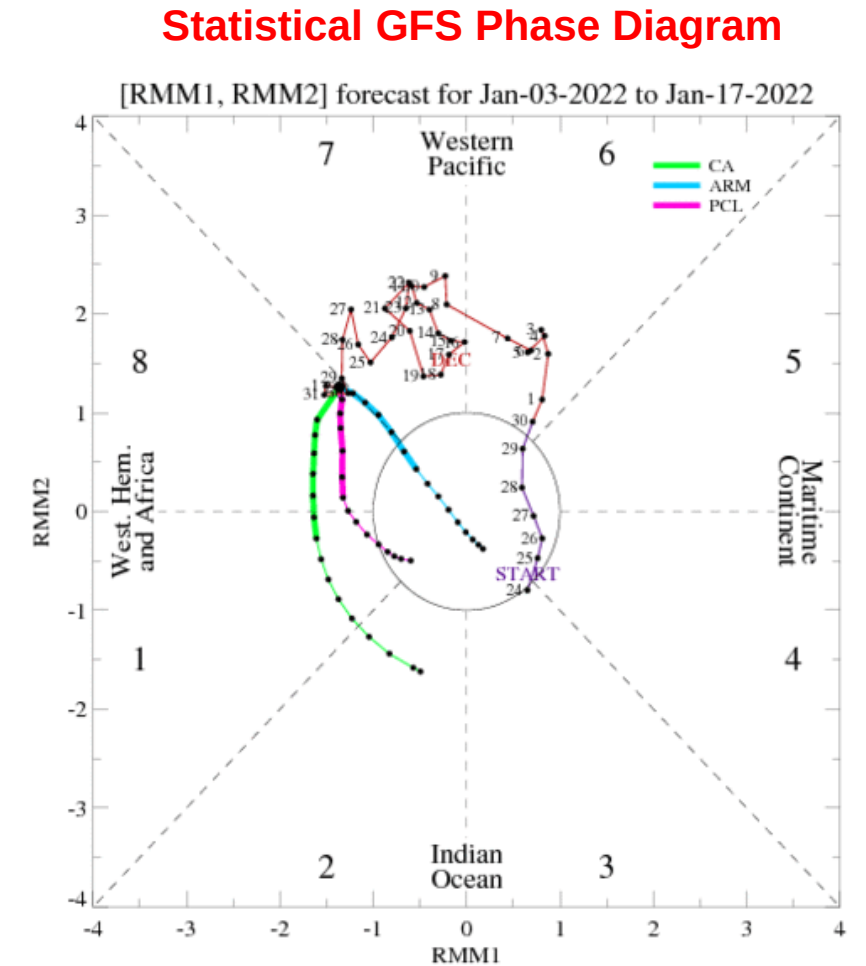


Figure 15: MJO forecast

<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

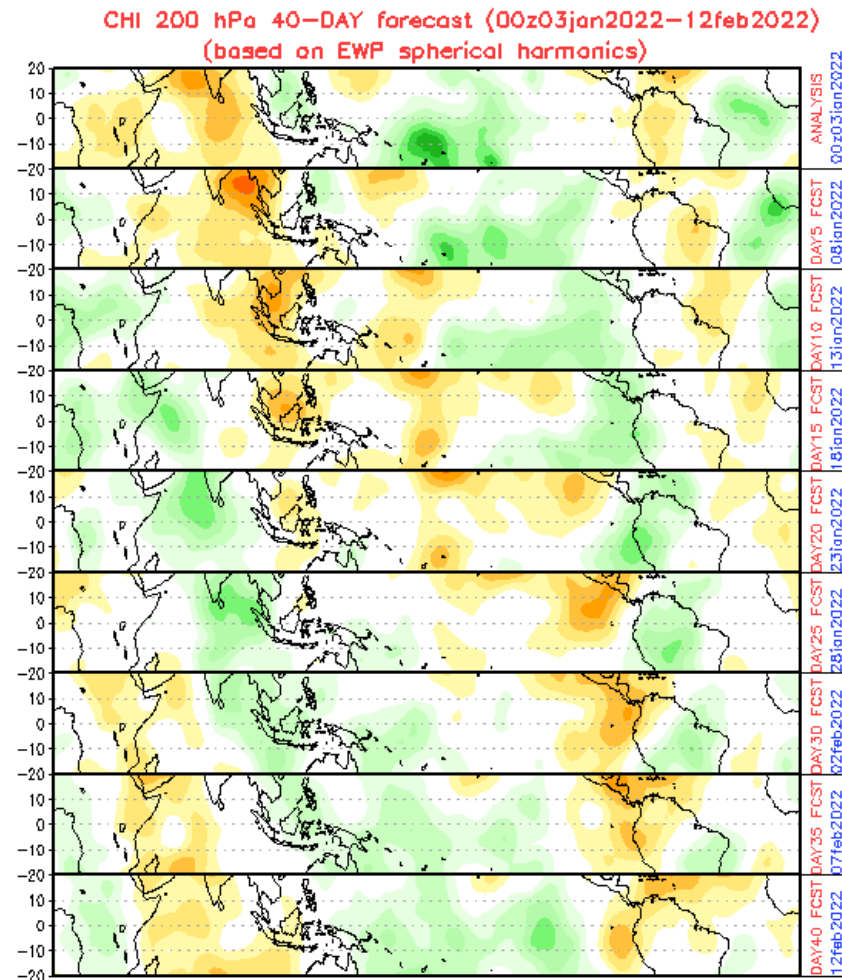
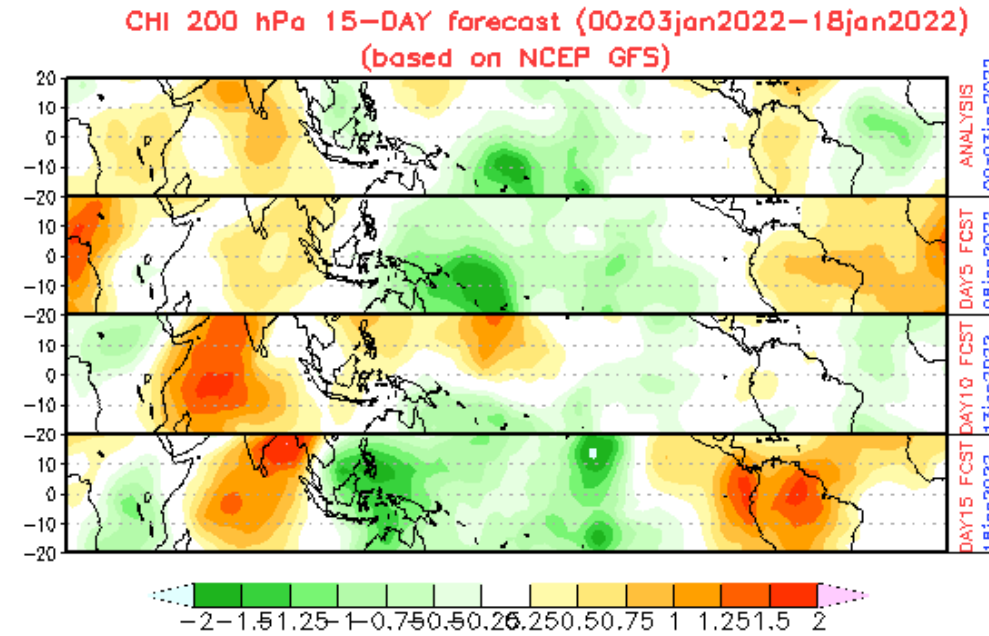
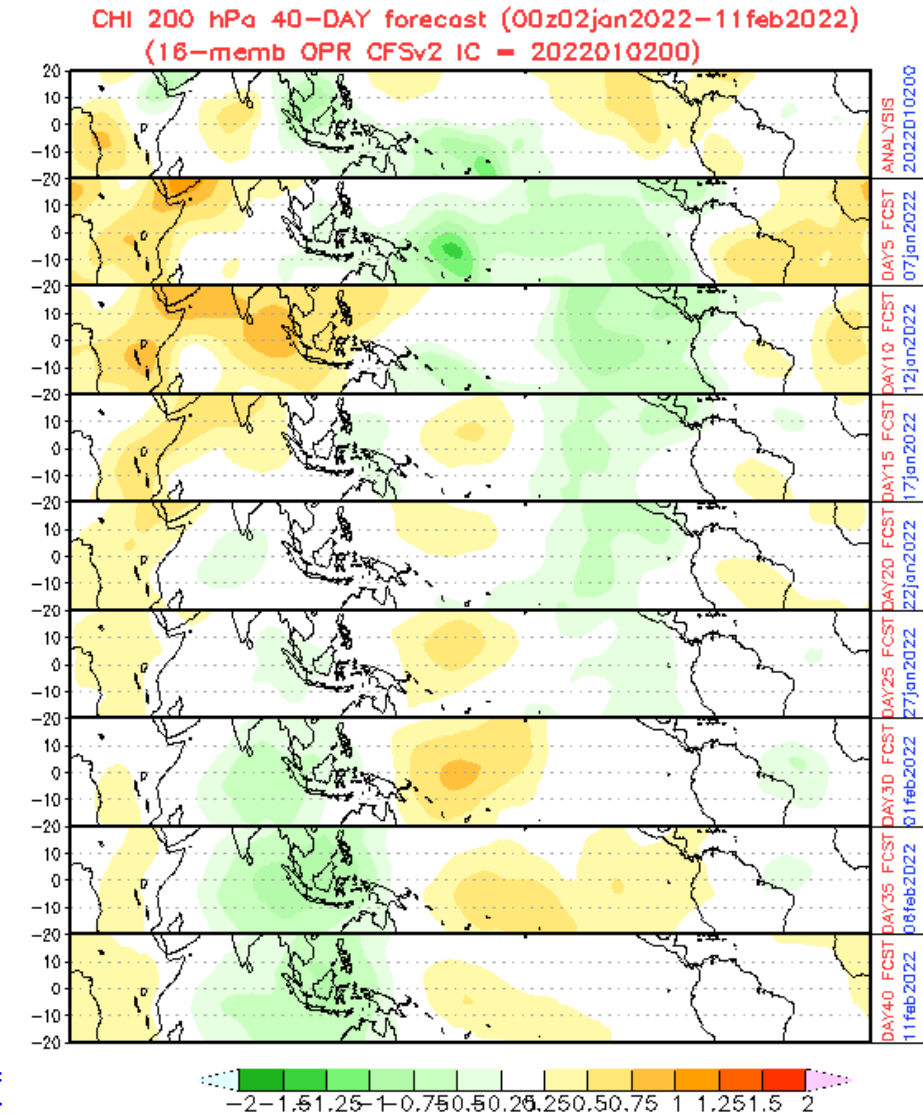


Figure 16: MJO forecast

<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

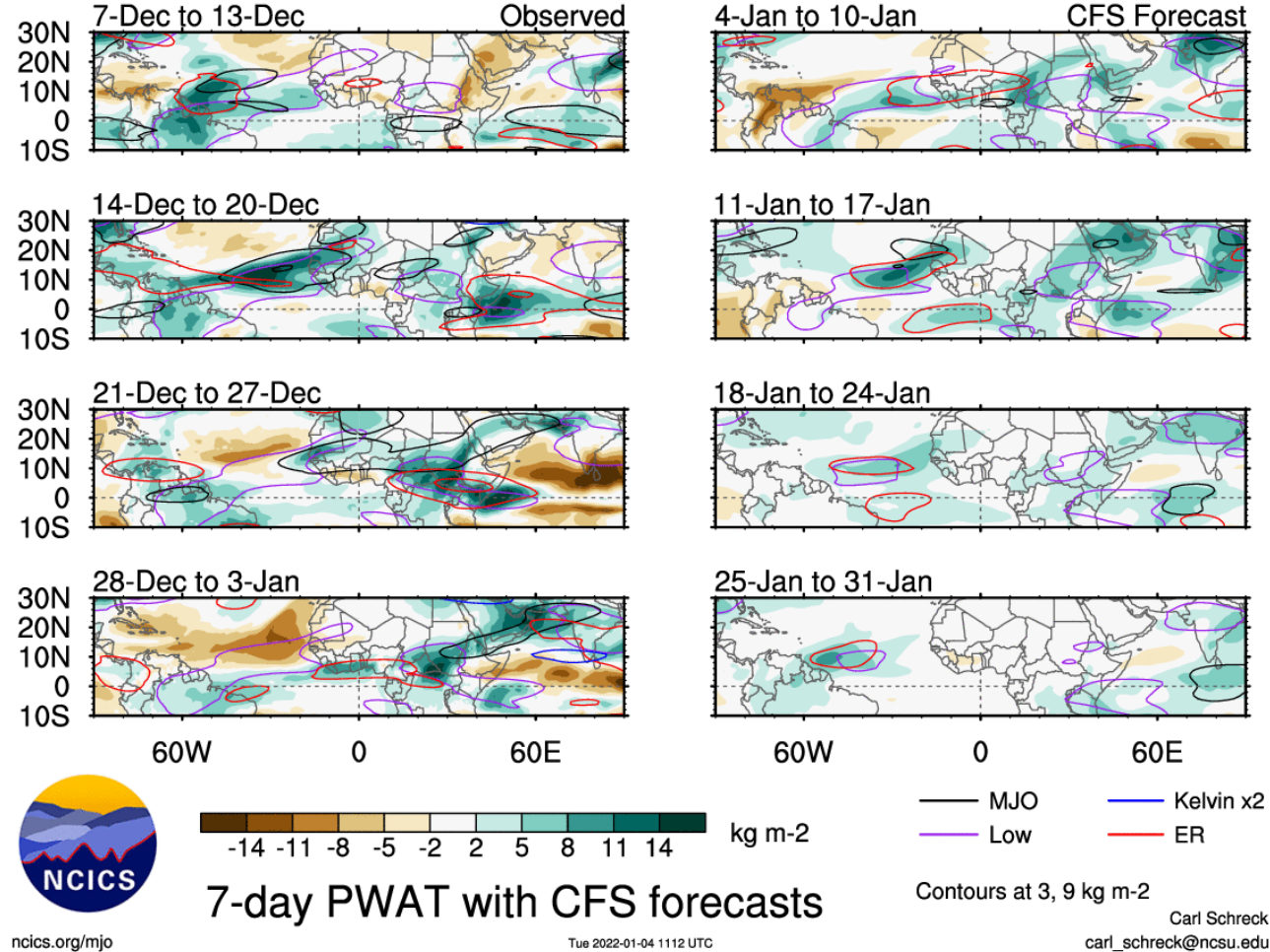


Figure 7a: Africa

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

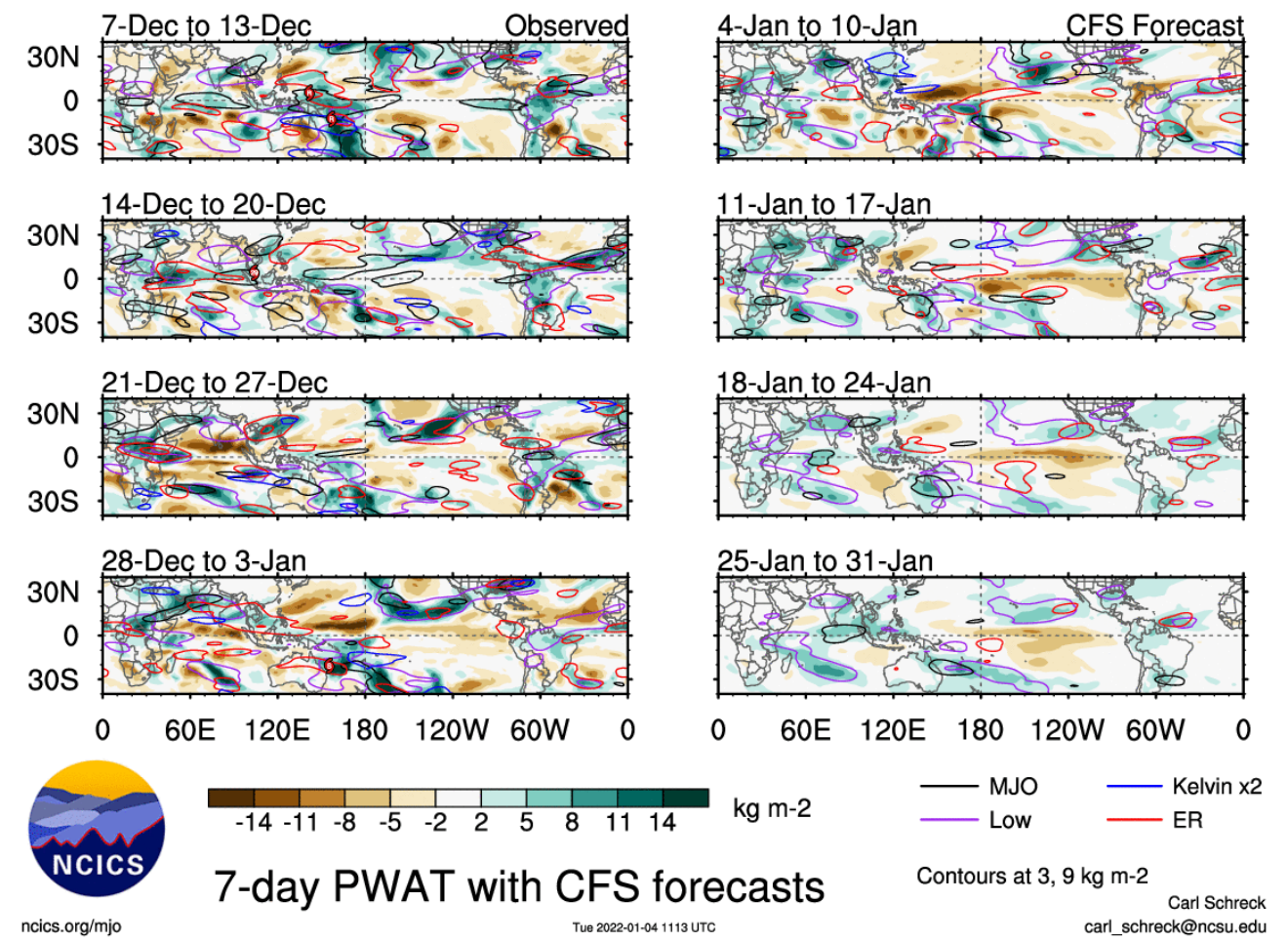


Figure 7b: Global

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

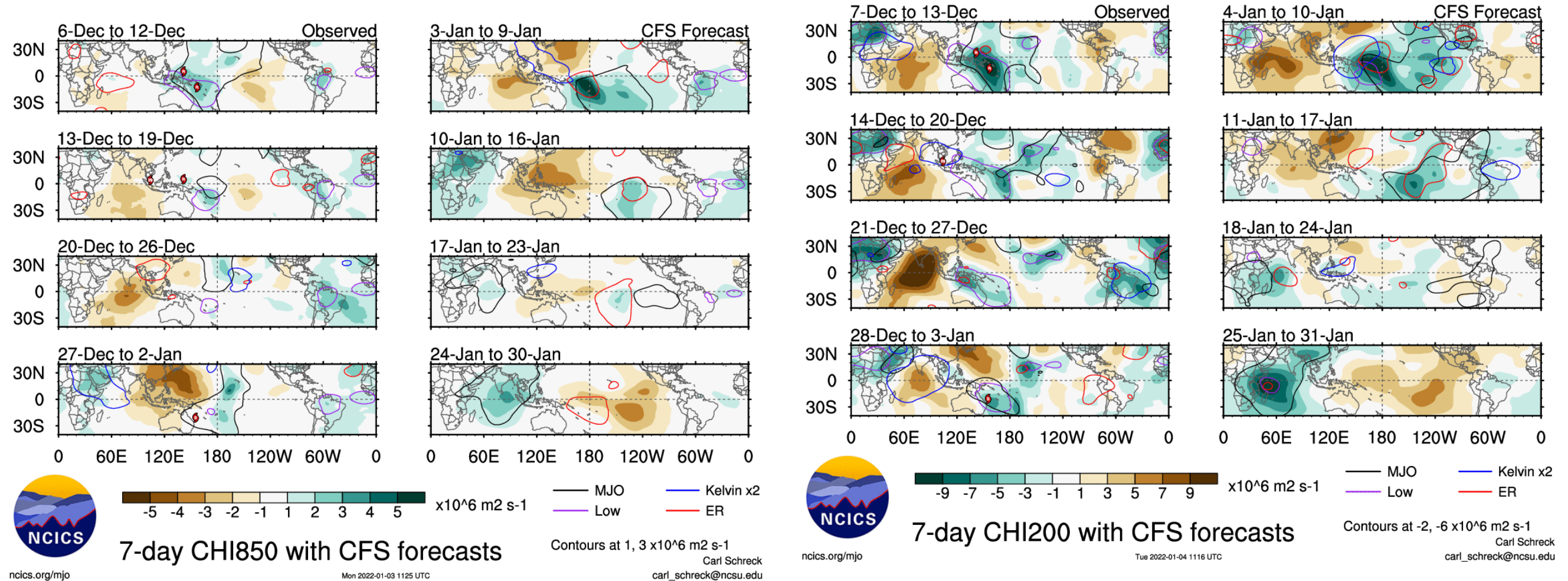


Figure 18a and b: Past four week and month velocity potential

<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

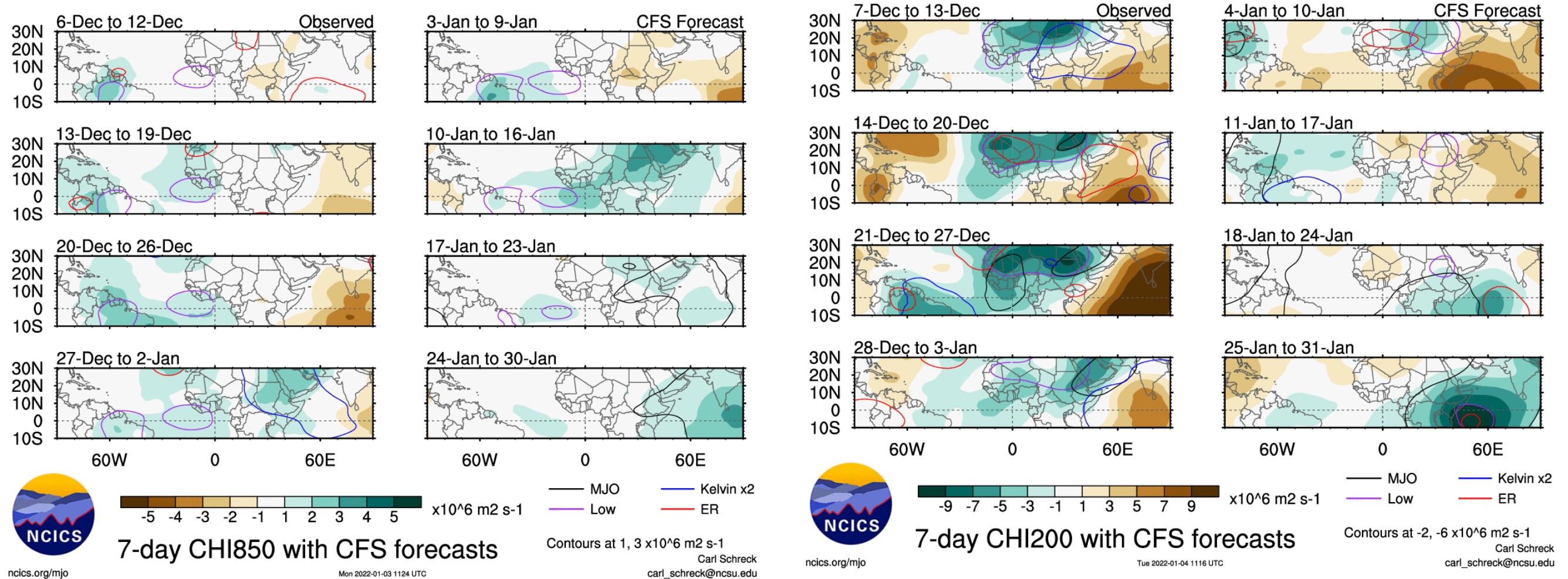


Figure 19a and b: Past four week and month velocity potential

<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

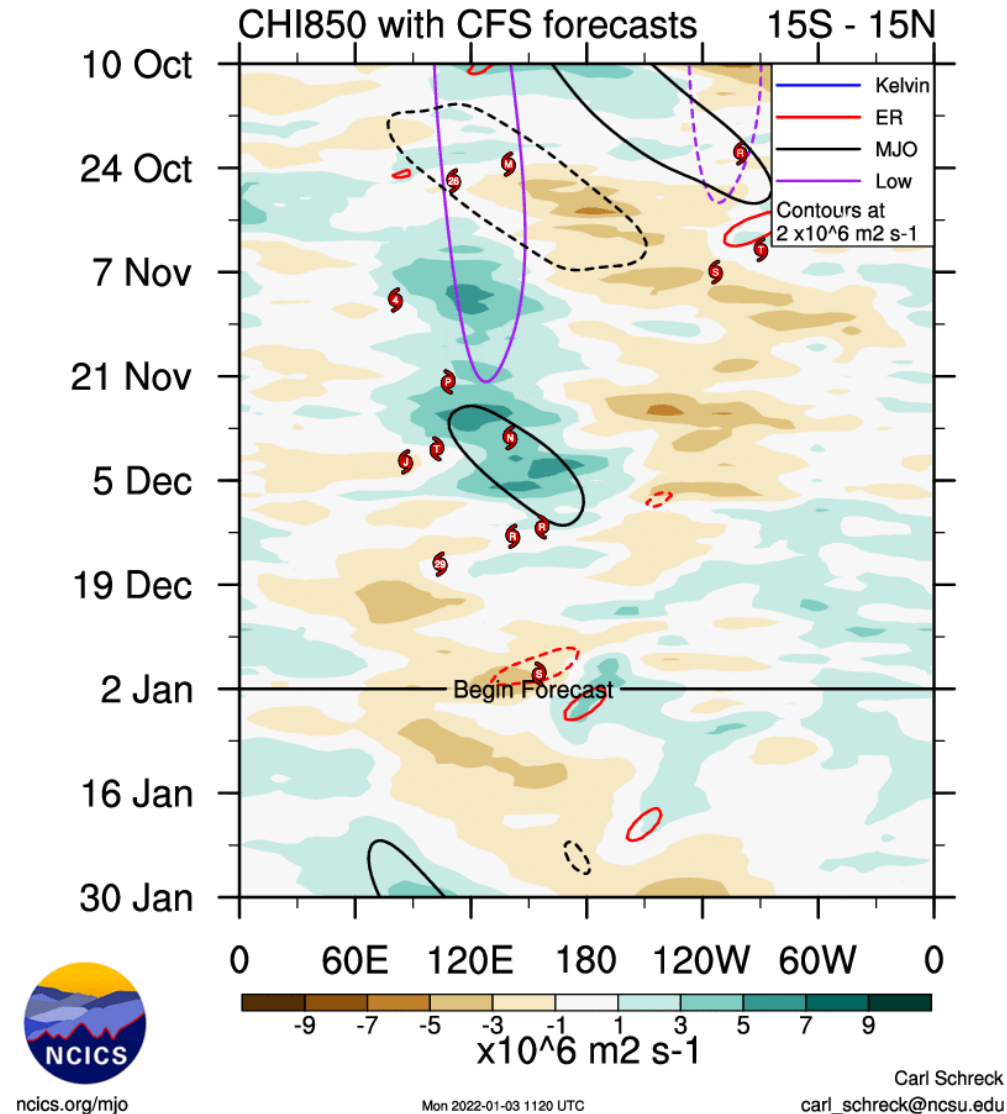
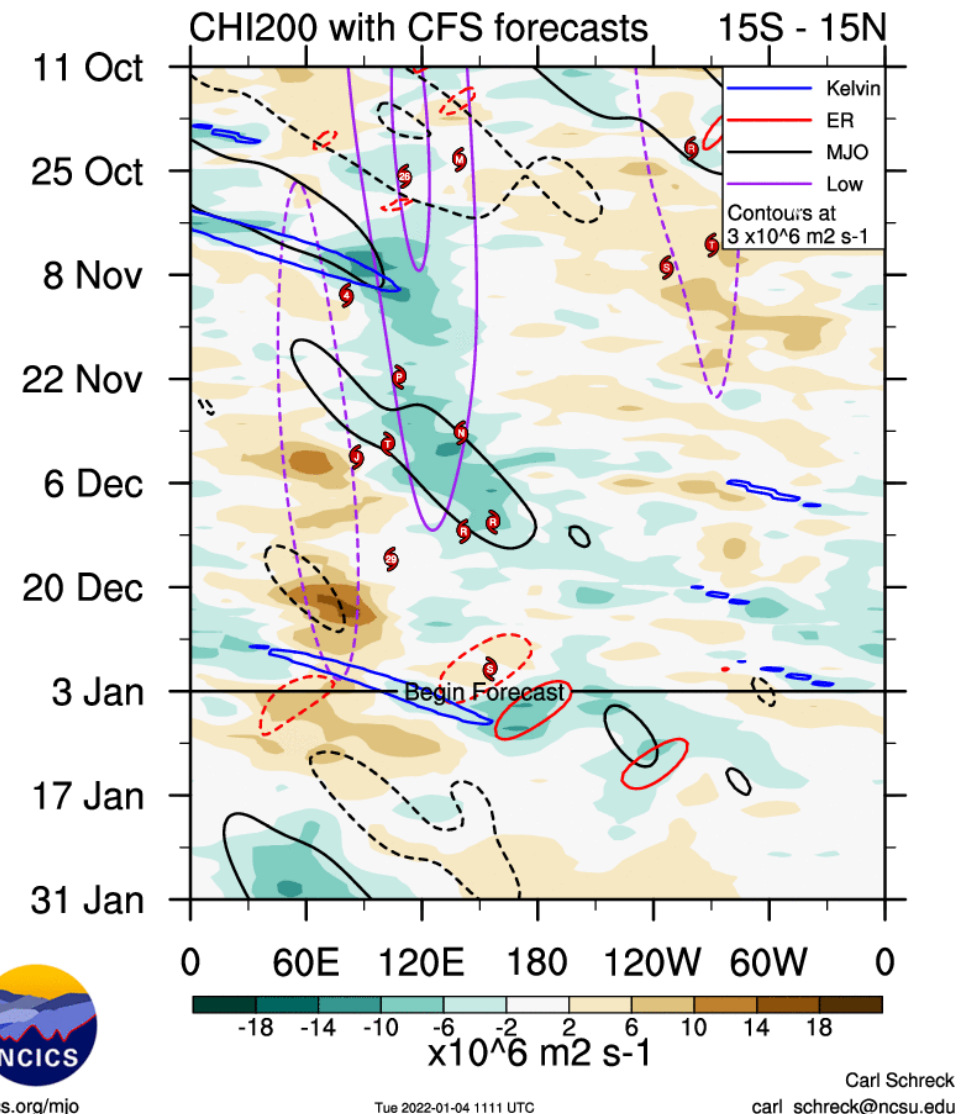


Figure 20: Anomalies for 15n-15s with waves overlay including outlooks

<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

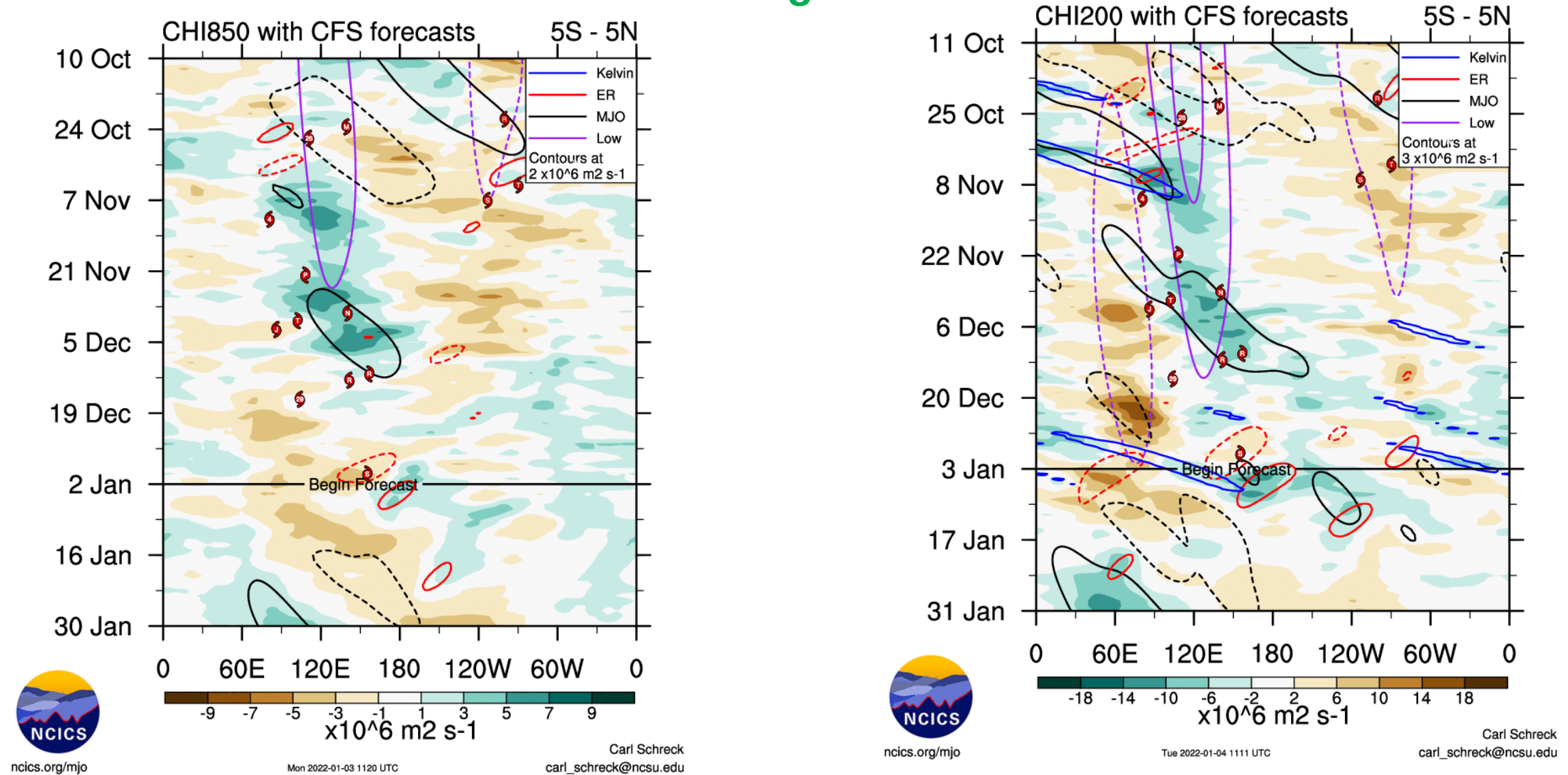
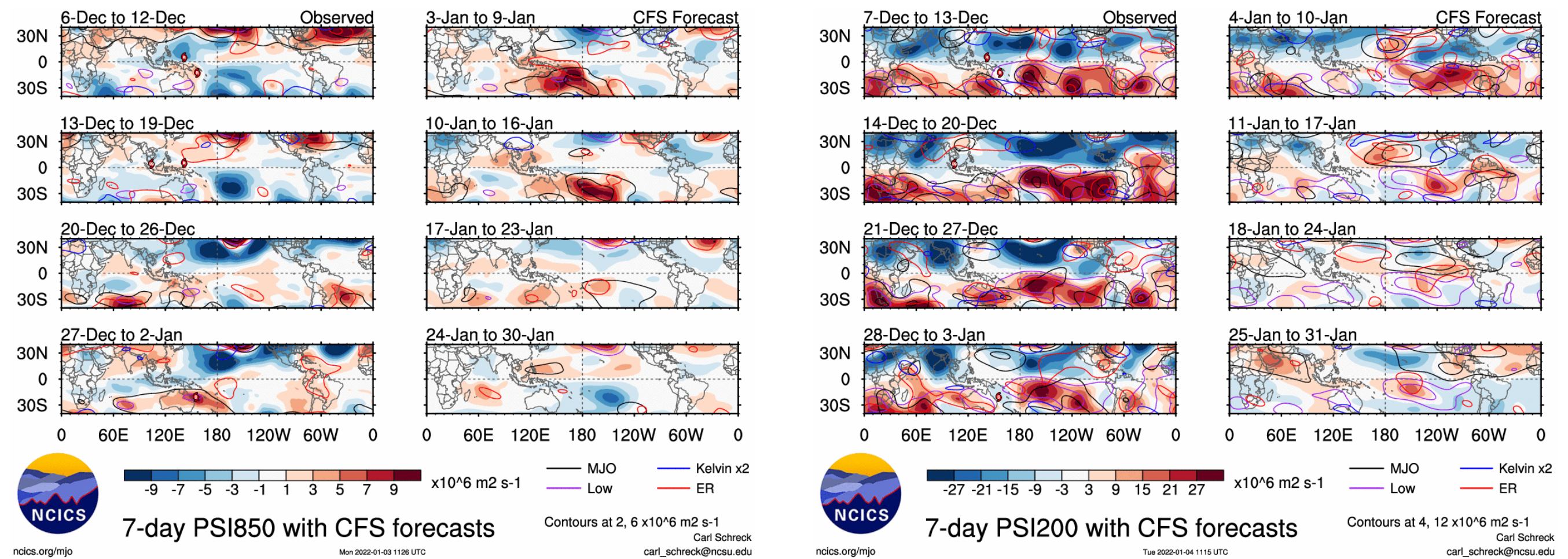


Figure 21: Anomalies for 5N-5S with waves overlay including outlooks

<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

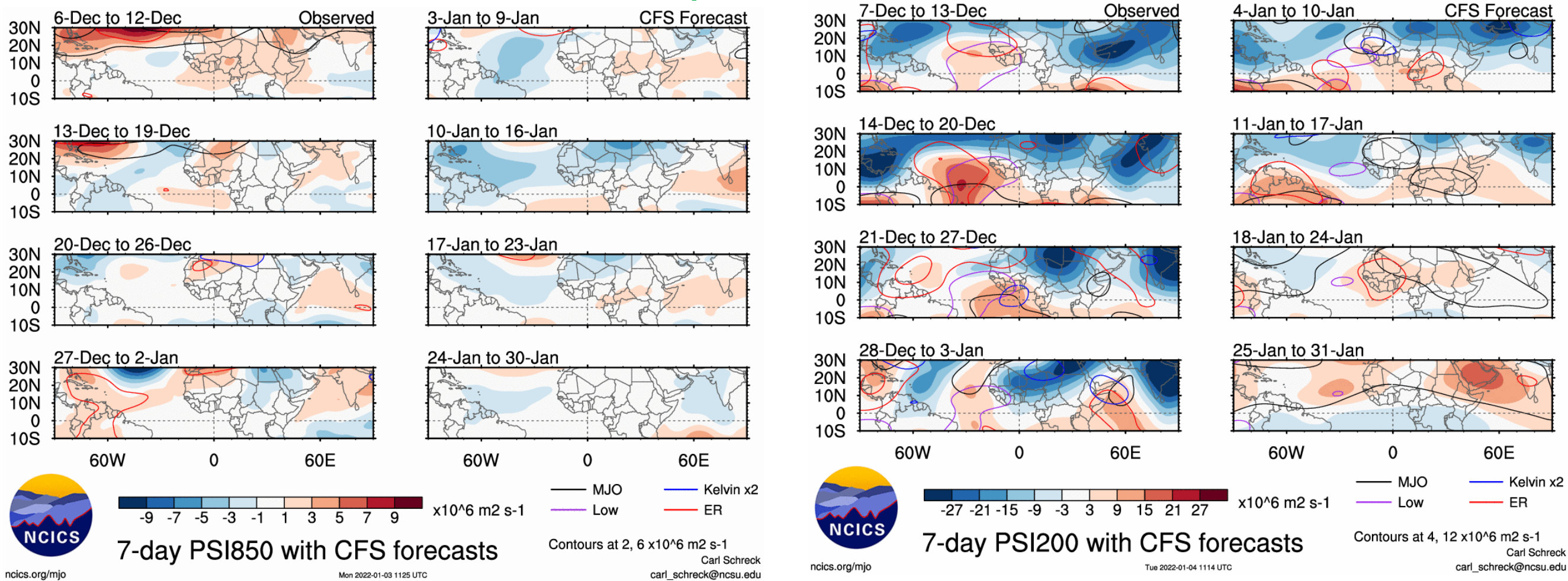


Figure 23: Past 4 weeks stream function anomalies with MJO, Kelvin & Rossby wave on Africa maps

<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
2. Global Driver Review and Assessment
3. Model Guidance for Weekly Climate outlook

Wind Anomaly and Divergence Forecast from GFS week1

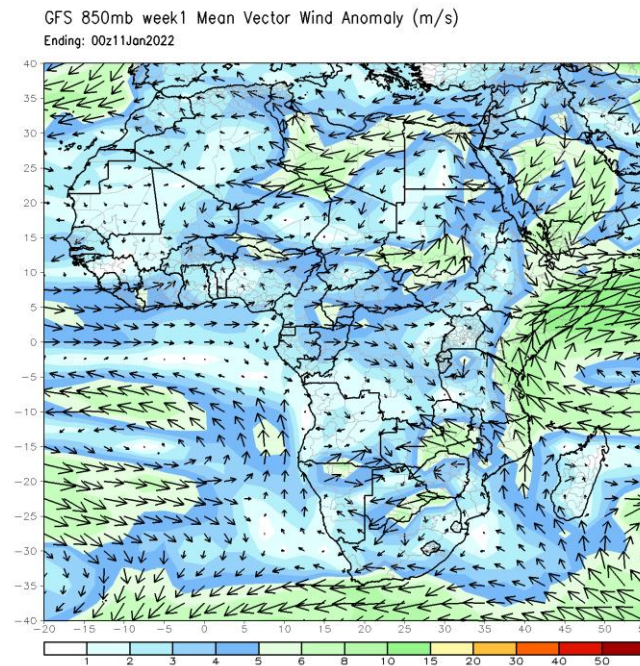
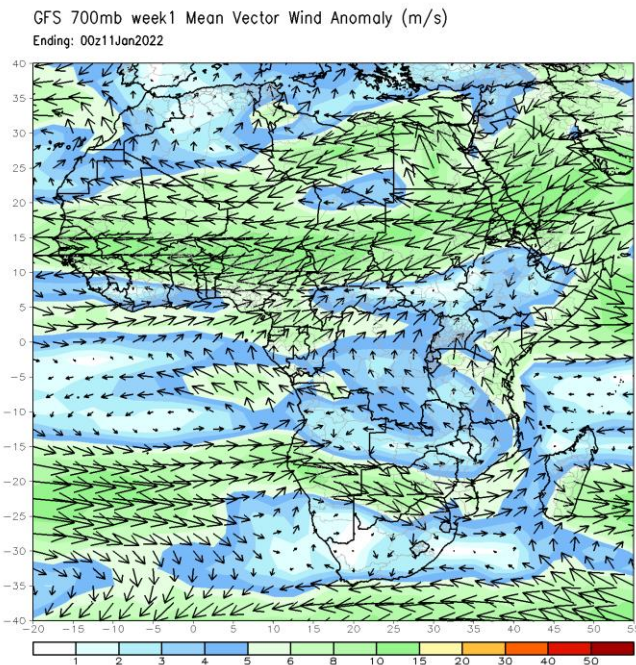
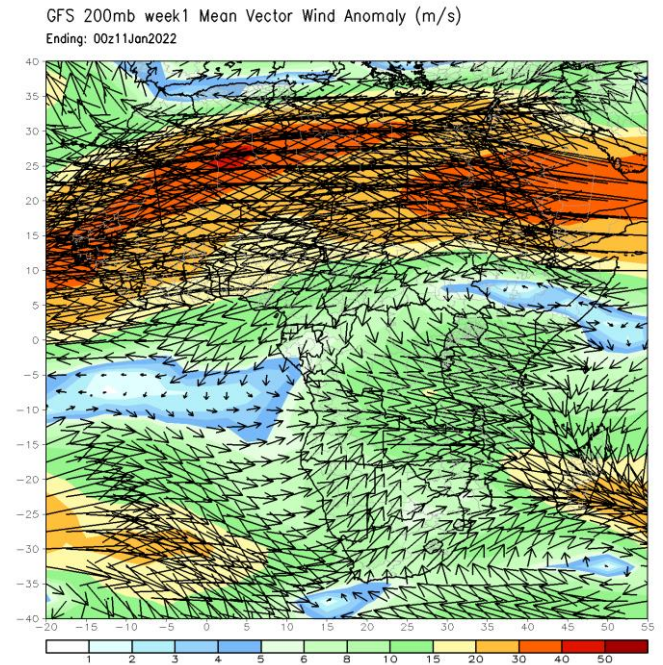
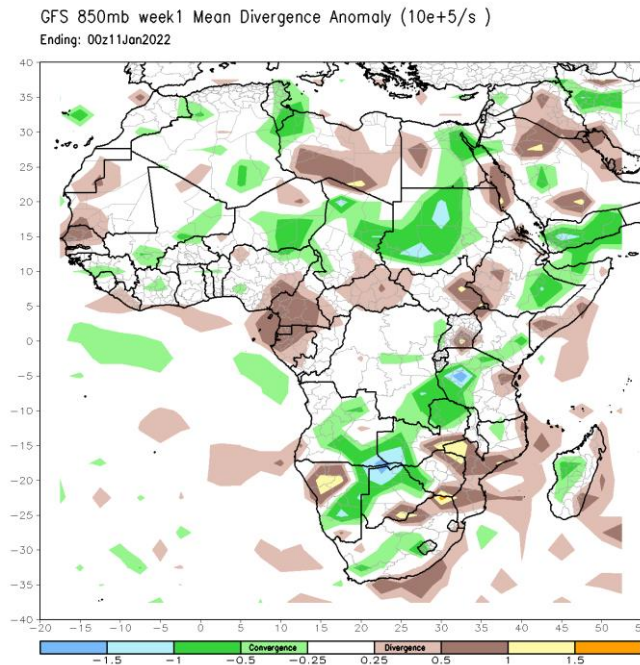
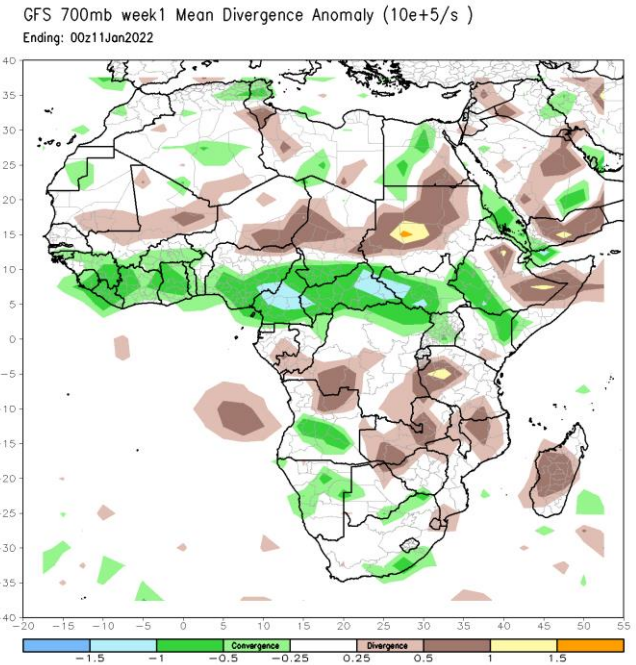
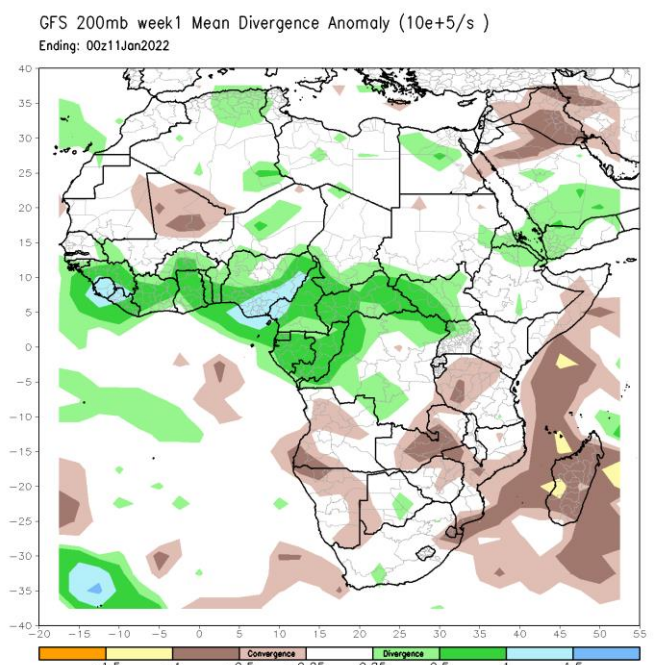


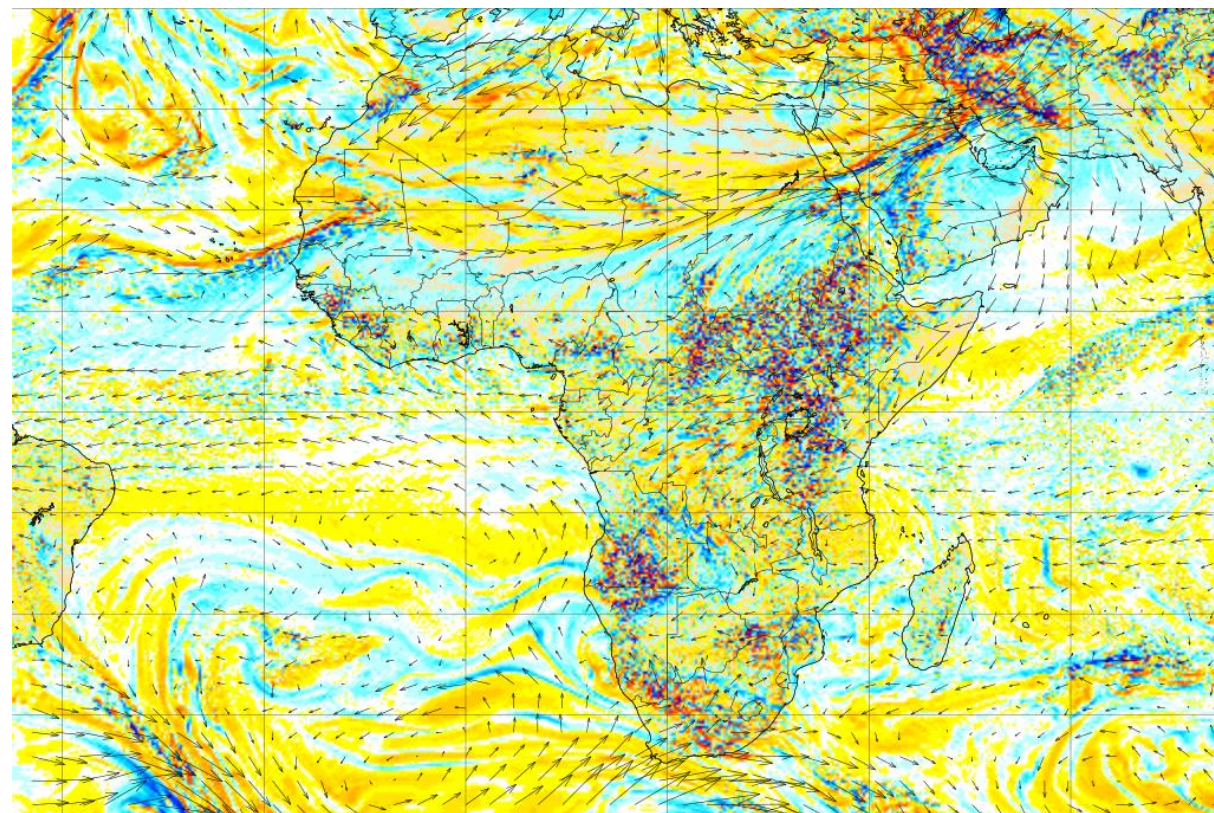
Figure 24 : Forecast from GFS

<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 4 Jan, 00 UTC T+234 Valid: Thursday 13 Jan, 18 UTC



Divergence at 700 hPa / Wind at 700 hPa

Tuesday 4 Jan, 00 UTC T+234 Valid: Thursday 13 Jan, 18 UTC

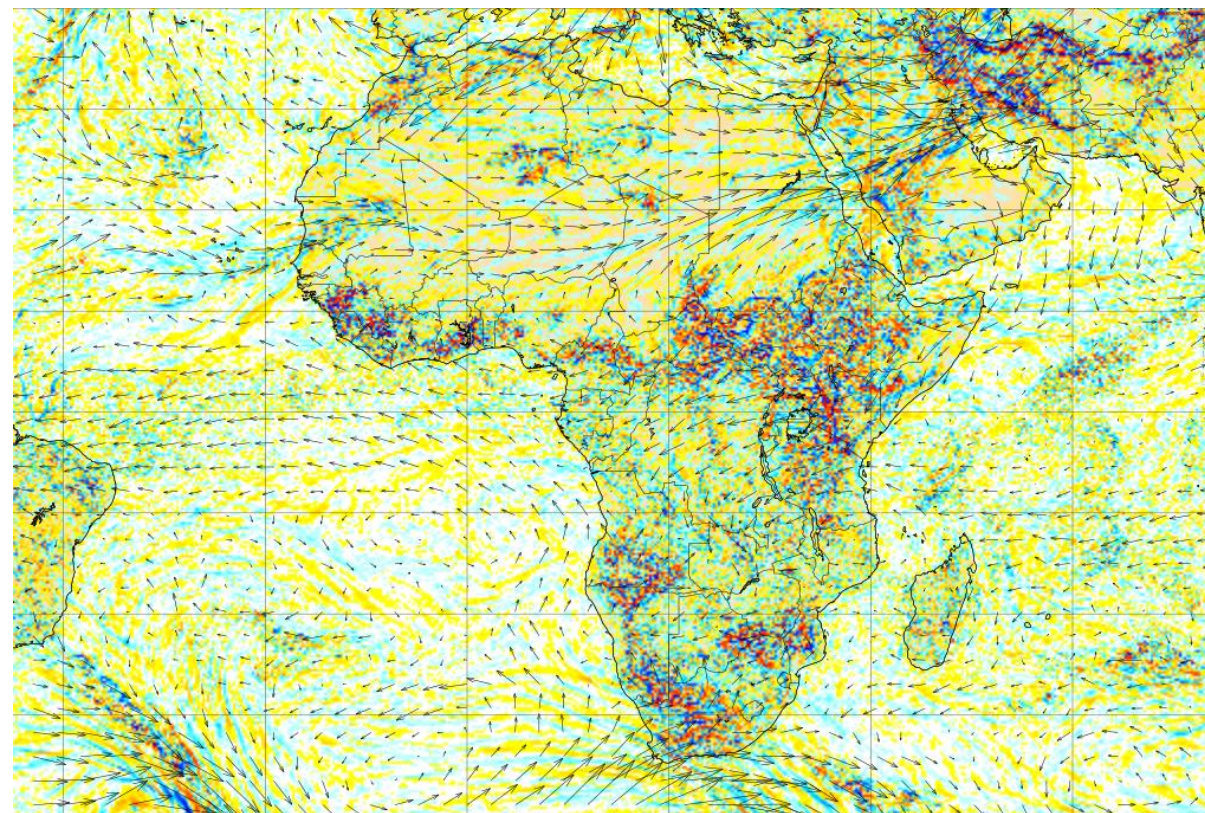
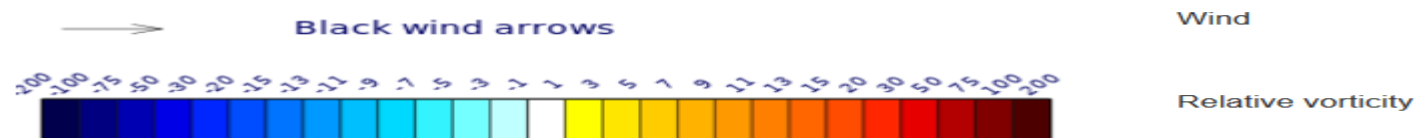


Figure 25: Relative Vorticity and Divergence forecast from CFS and ECMWF

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

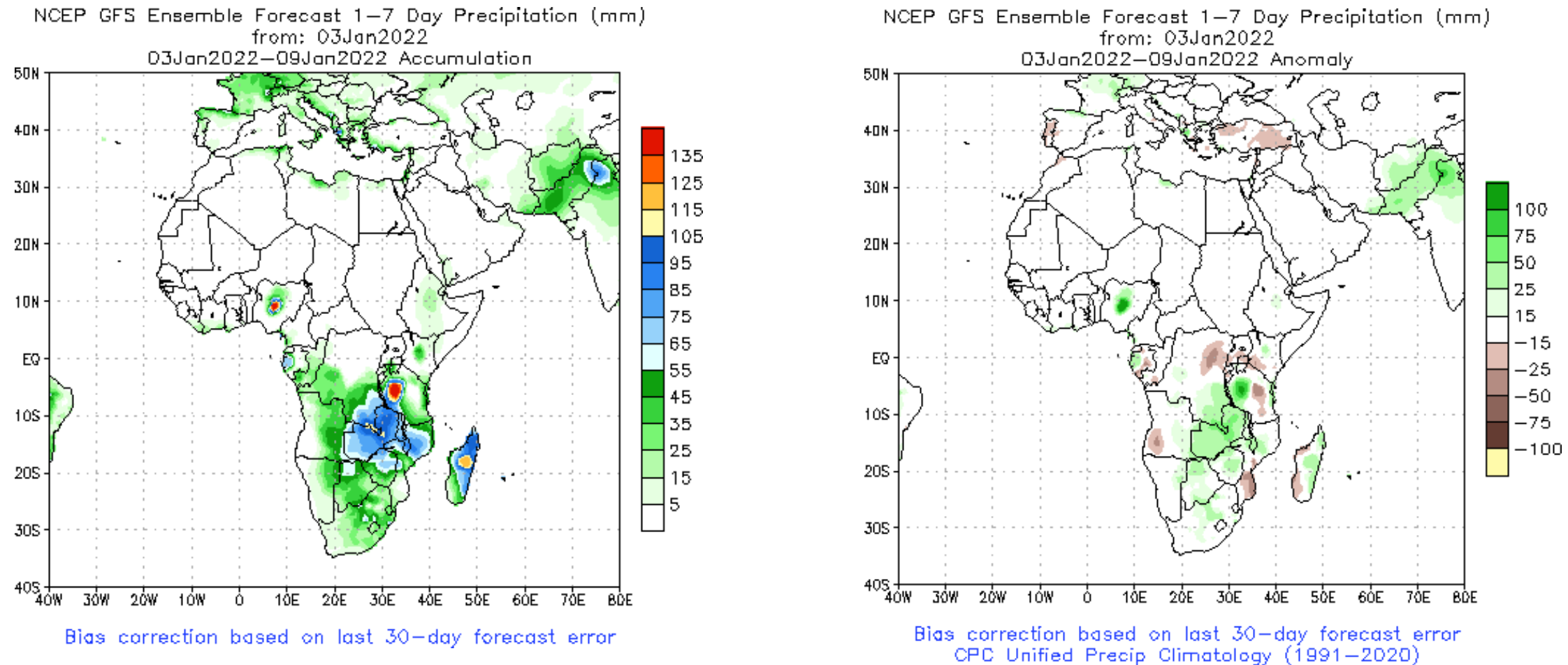


Figure 26: NCEP/GFS Précipitation and Anomaly forecast.

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

Week-1 Precipitation
 Probability of Exceedance:
 Forecast and Climatology
 4-10 January 2022

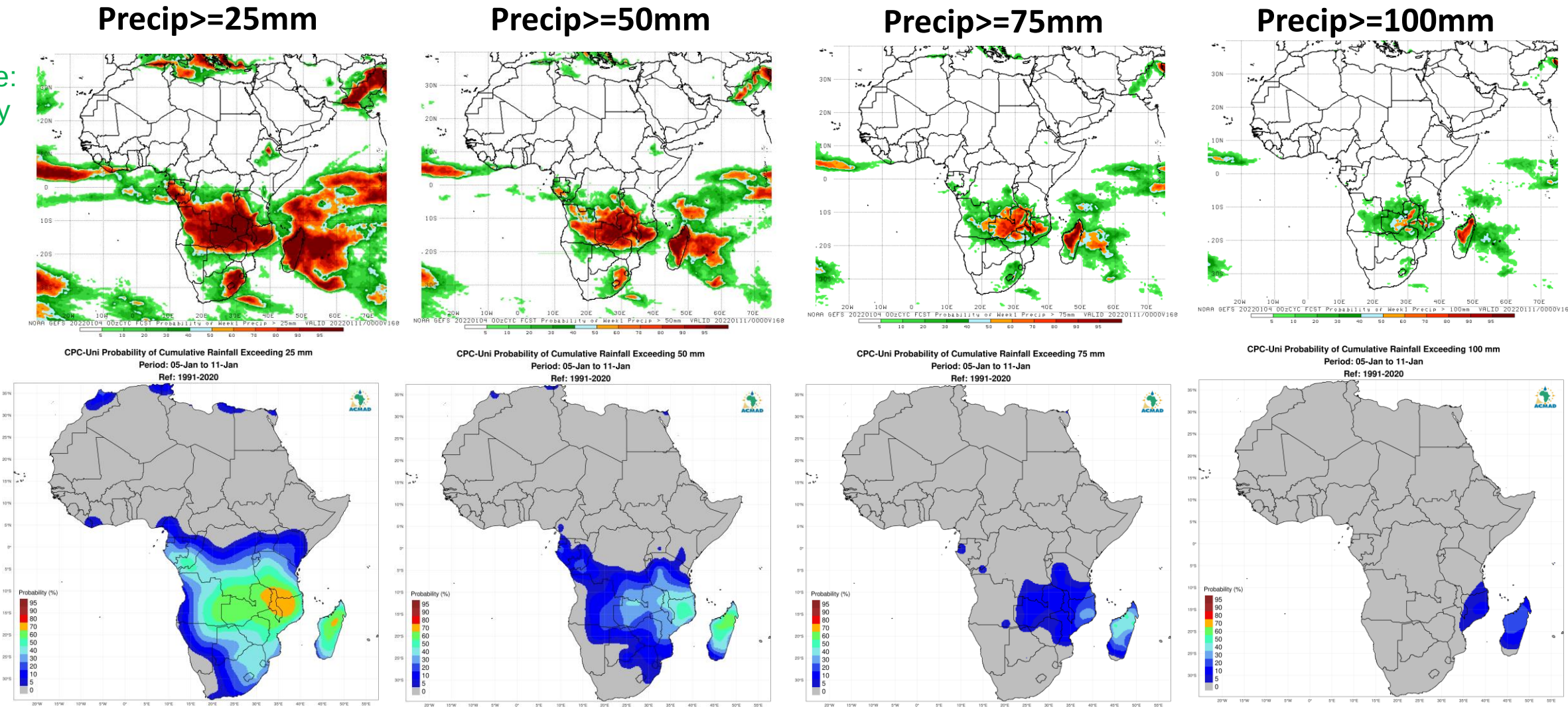


Figure 27: Week1 Precipitation Total Exceedance Probabilities

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 1

ECMWF EPS-Monthly Forecasting System

Precipitation anomaly

Forecast start reference is 03-01-2022

ensemble size = 51 , climate size = 660

Day 1-7

03-01-2022/TO/09-01-2022

Shaded areas significant at 10% level

Contours at 1% level

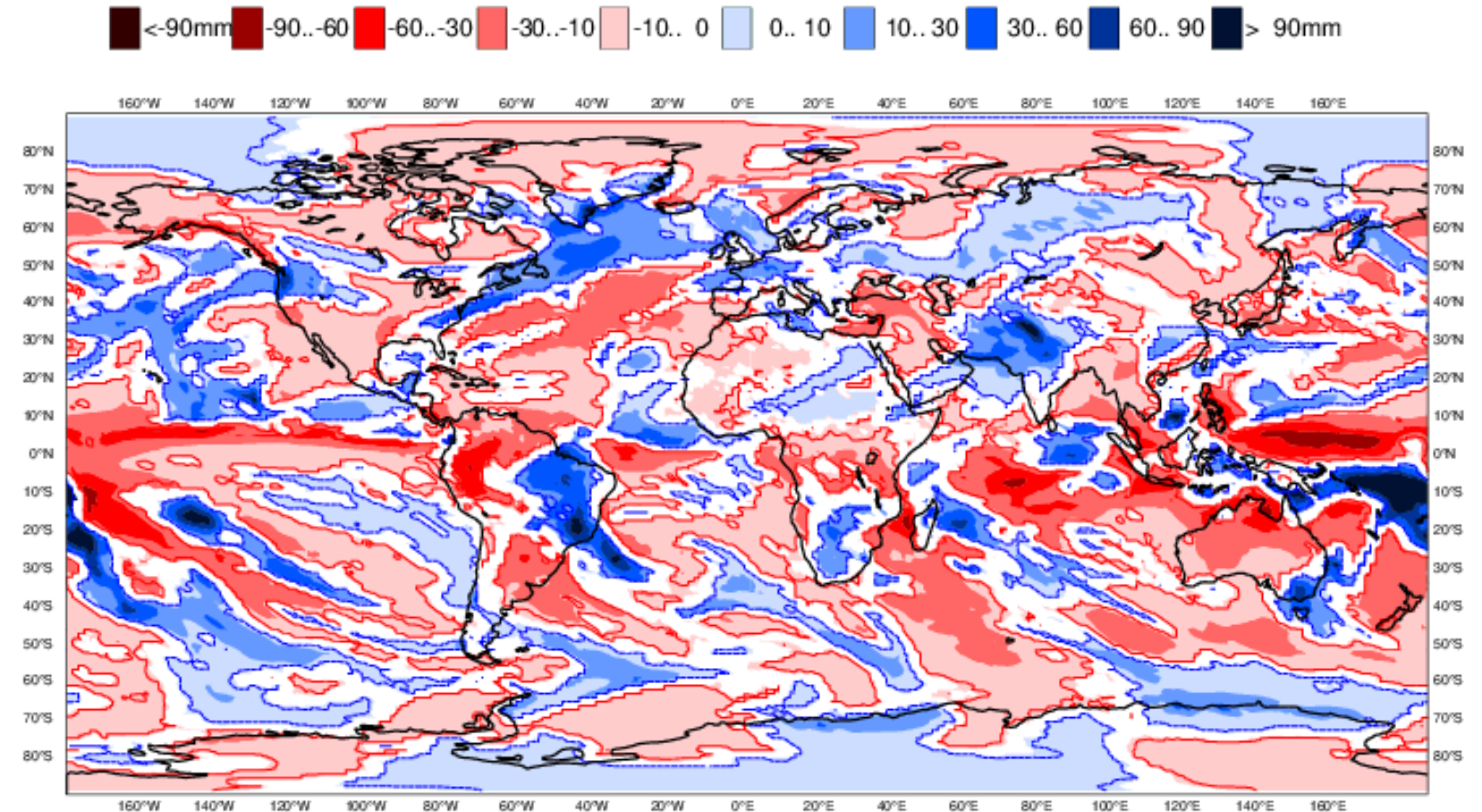


Figure 28: Monthly Precipitation Anomaly
forecast from ECMWF

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%

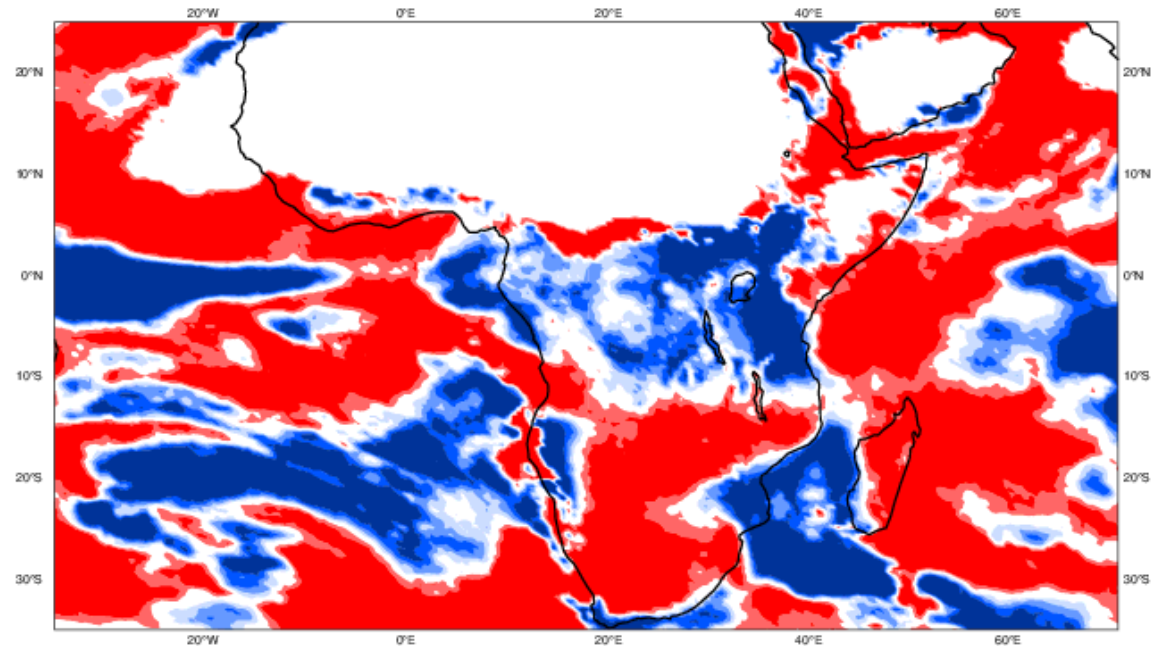
ECMWF EPS-Monthly Forecasting System
(Prob Precip. anom below 33%)
Forecast start reference is 03-01-2022
ensemble size = 51 , climate size = 660

Day 1-7
03-01-2022/TO/09-01-2022

ECMWF EPS-Monthly Forecasting System
(Prob Precip. anom above 66%)
Forecast start reference is 03-01-2022
ensemble size = 51 , climate size = 660

Day 1-7
03-01-2022/TO/09-01-2022

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



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

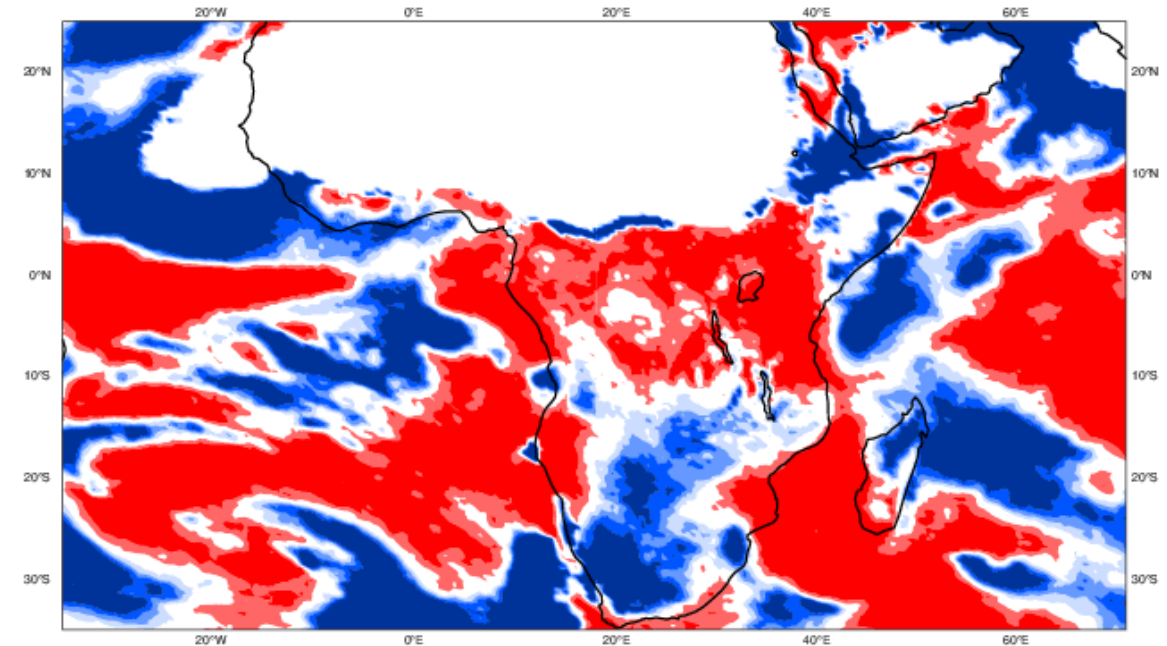


Figure 29: Weekly tercile probability forecast below 33%

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

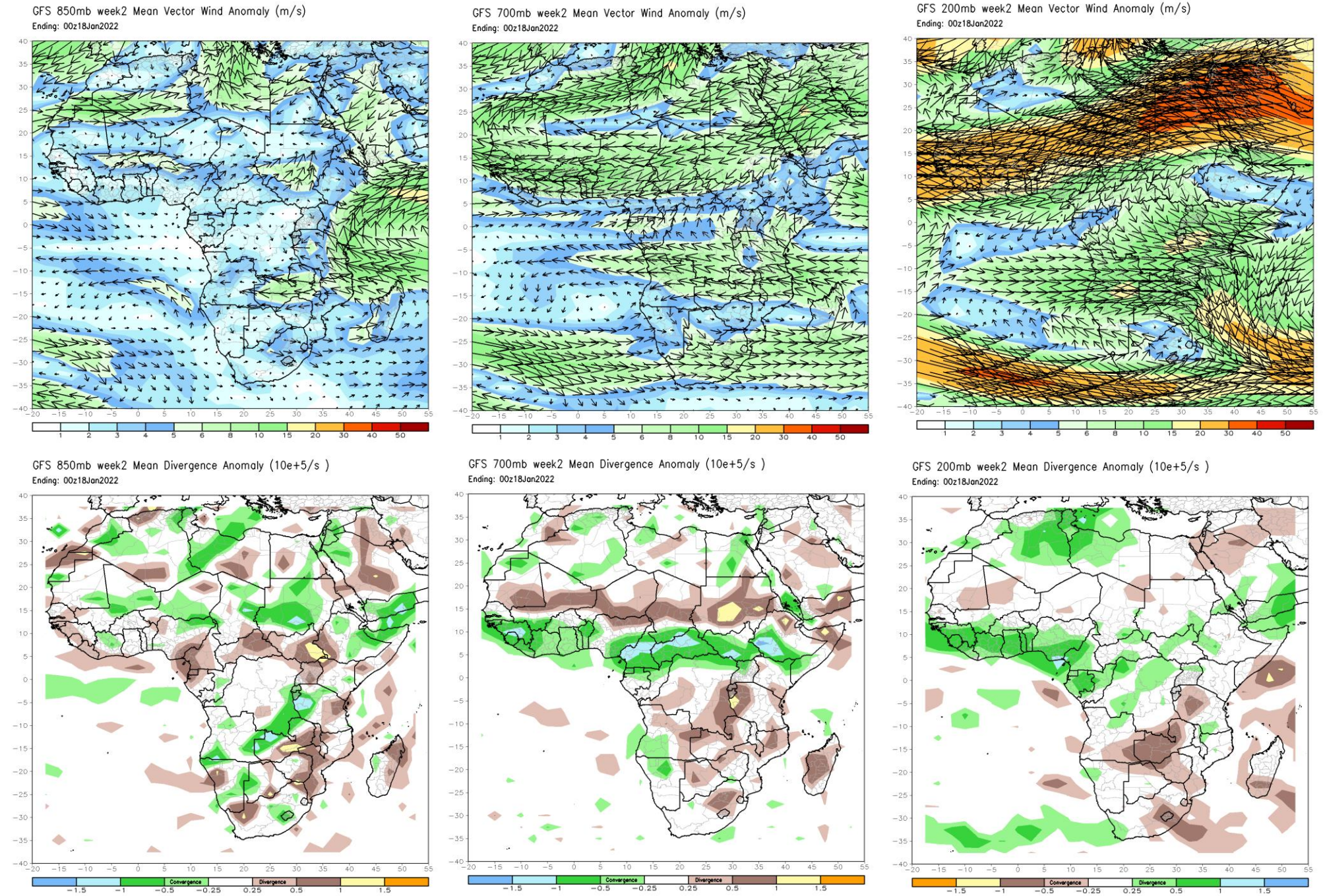


Figure 30: GFS divergence forecast
<https://www.cpc.ncep.noaa.gov/products/inter-national/africa/africa.shtml>

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

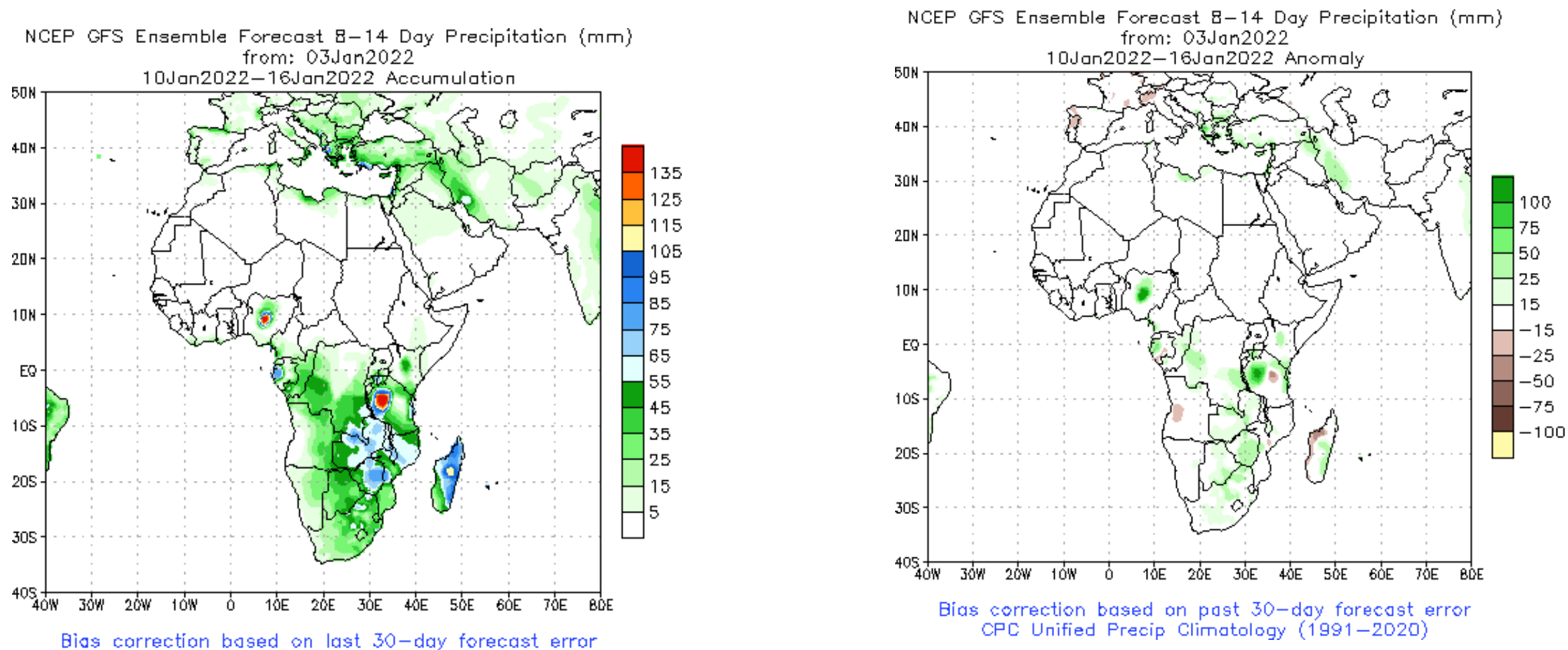


Figure 31: Précipitation and Anomaly forecast

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

Week-2 Precipitation
Probability of Exceedance:
Forecast and Climo
11 – 17 Jan 2022

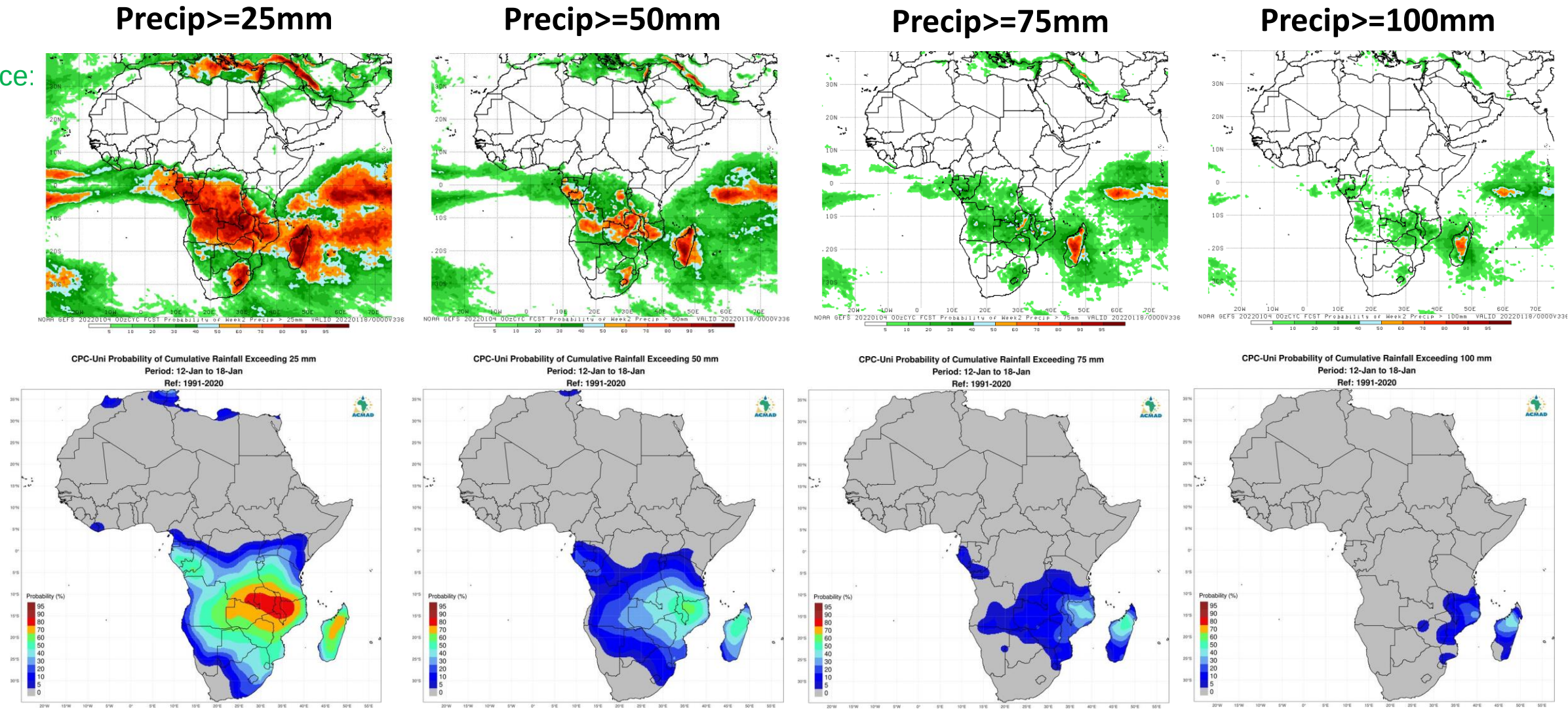


Figure 32: Week2 Precipitation Total Exceedance Probabilities

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 03-01-2022

ensemble size = 51 , climate size = 660

Day 8-14

10-01-2022/TO/16-01-2022

Shaded areas significant at 10% level

Contours at 1% level

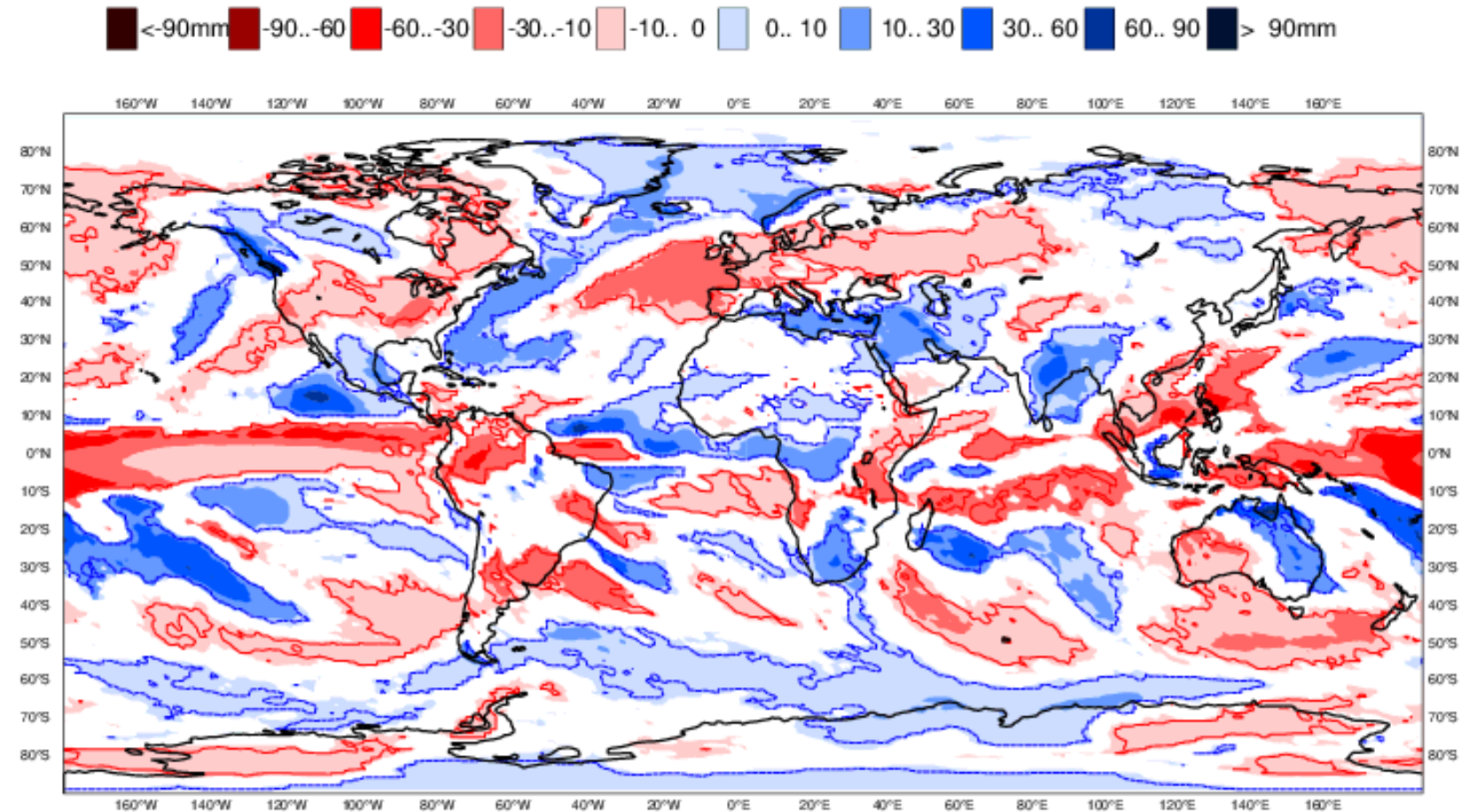


Figure 33: Monthly Precipitation Anomaly
forecast from ECMWF

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%

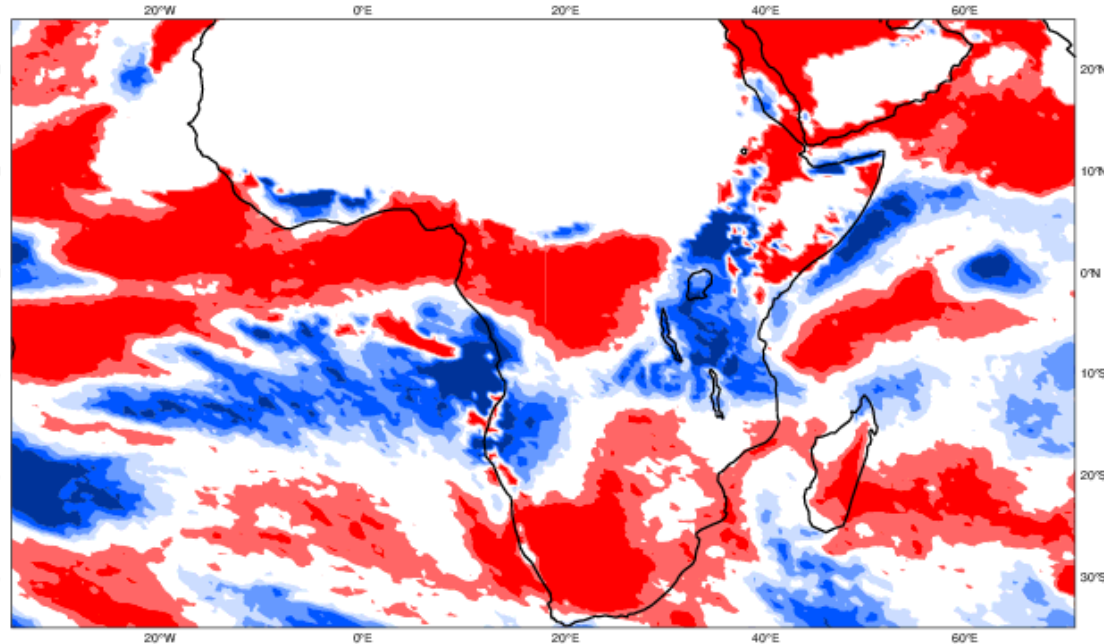
ECMWF EPS-Monthly Forecasting System
(Prob Precip. anom below 33%)
Forecast start reference is 03-01-2022
ensemble size = 51 , climate size = 660

Day 8-14
10-01-2022/TO/16-01-2022

ECMWF EPS-Monthly Forecasting System
(Prob Precip. anom above 66%)
Forecast start reference is 03-01-2022
ensemble size = 51 , climate size = 660

Day 8-14
10-01-2022/TO/16-01-2022

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



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

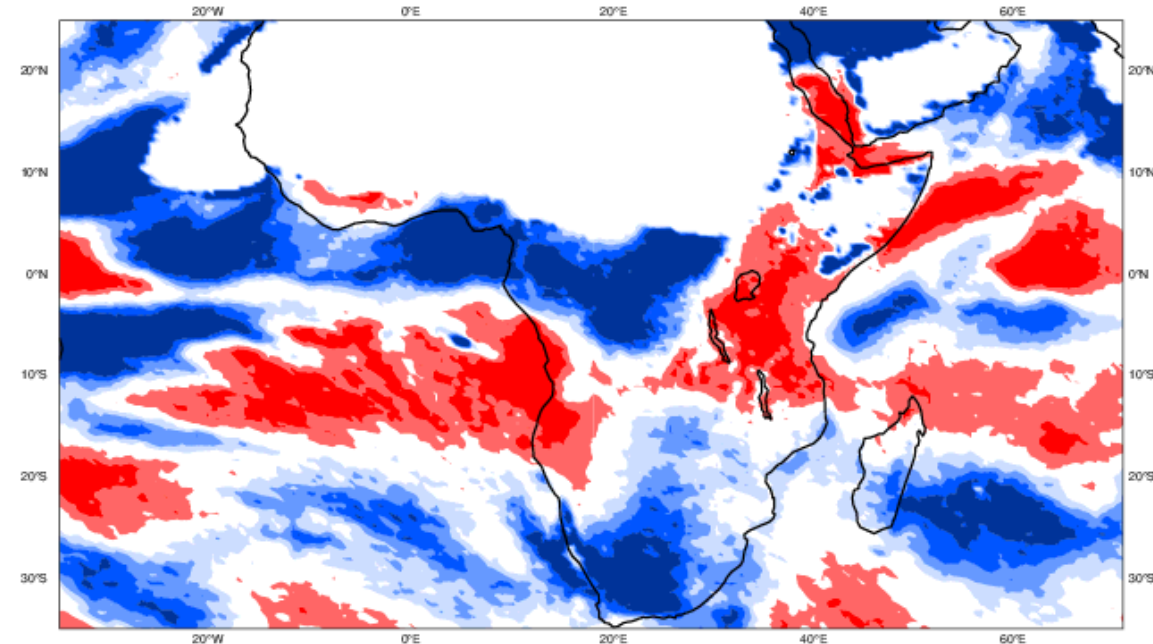
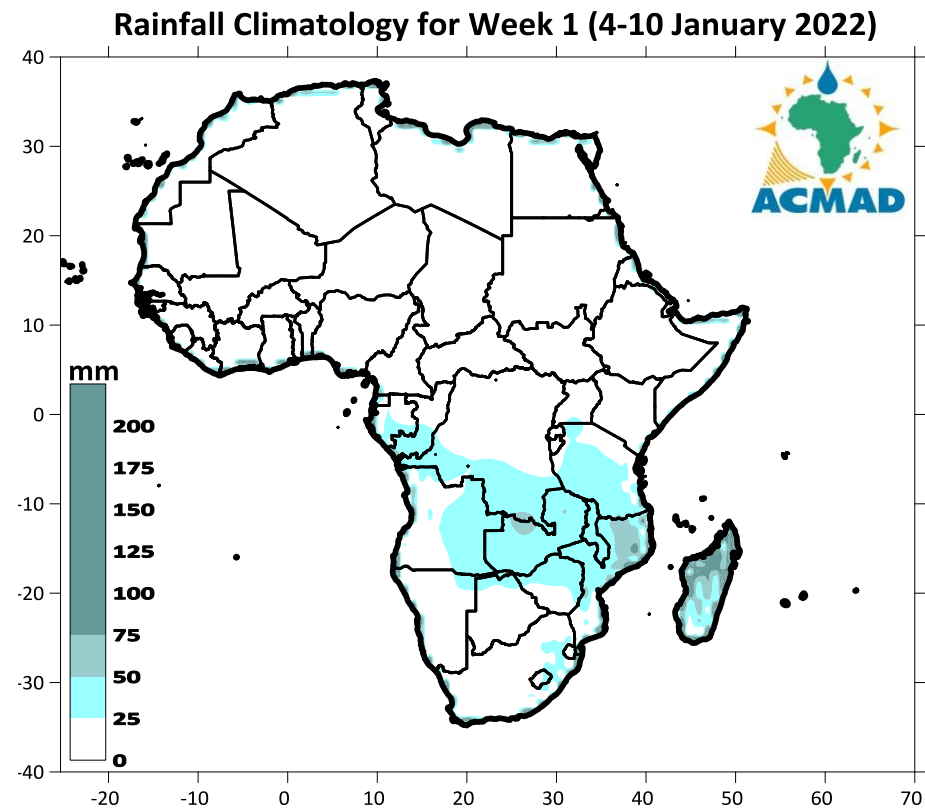
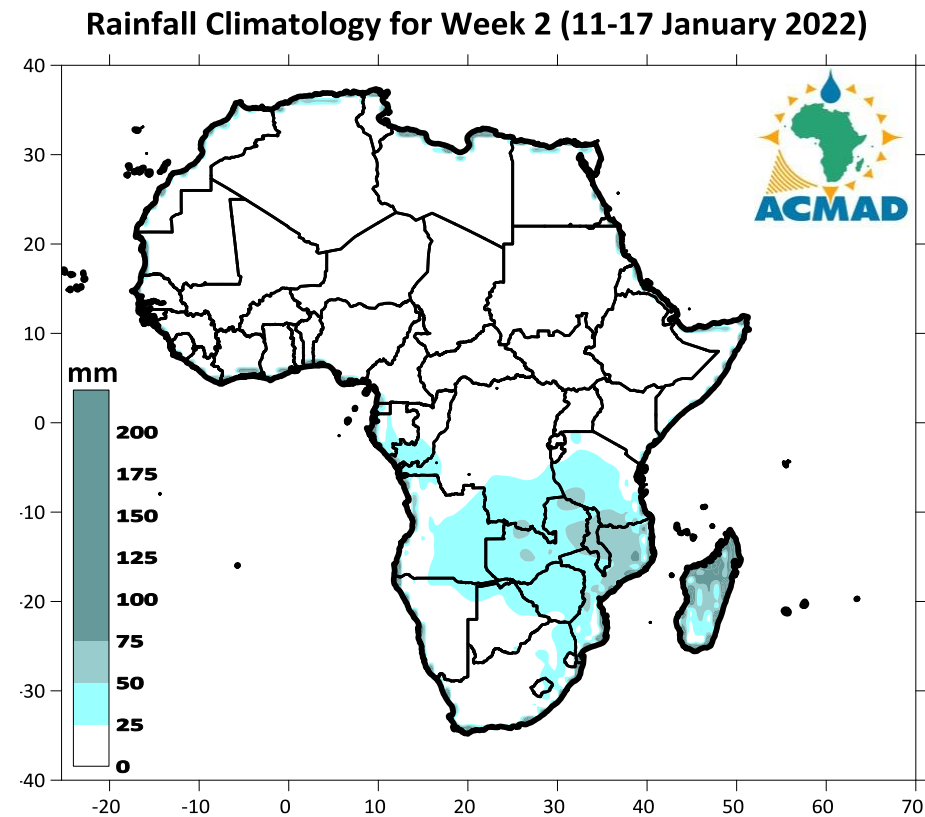


Figure 34: Weekly tercile probability forecast below 33%

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

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



PRECIPITATIONS FORECAST FOR THE UPCOMING TWO WEEKS

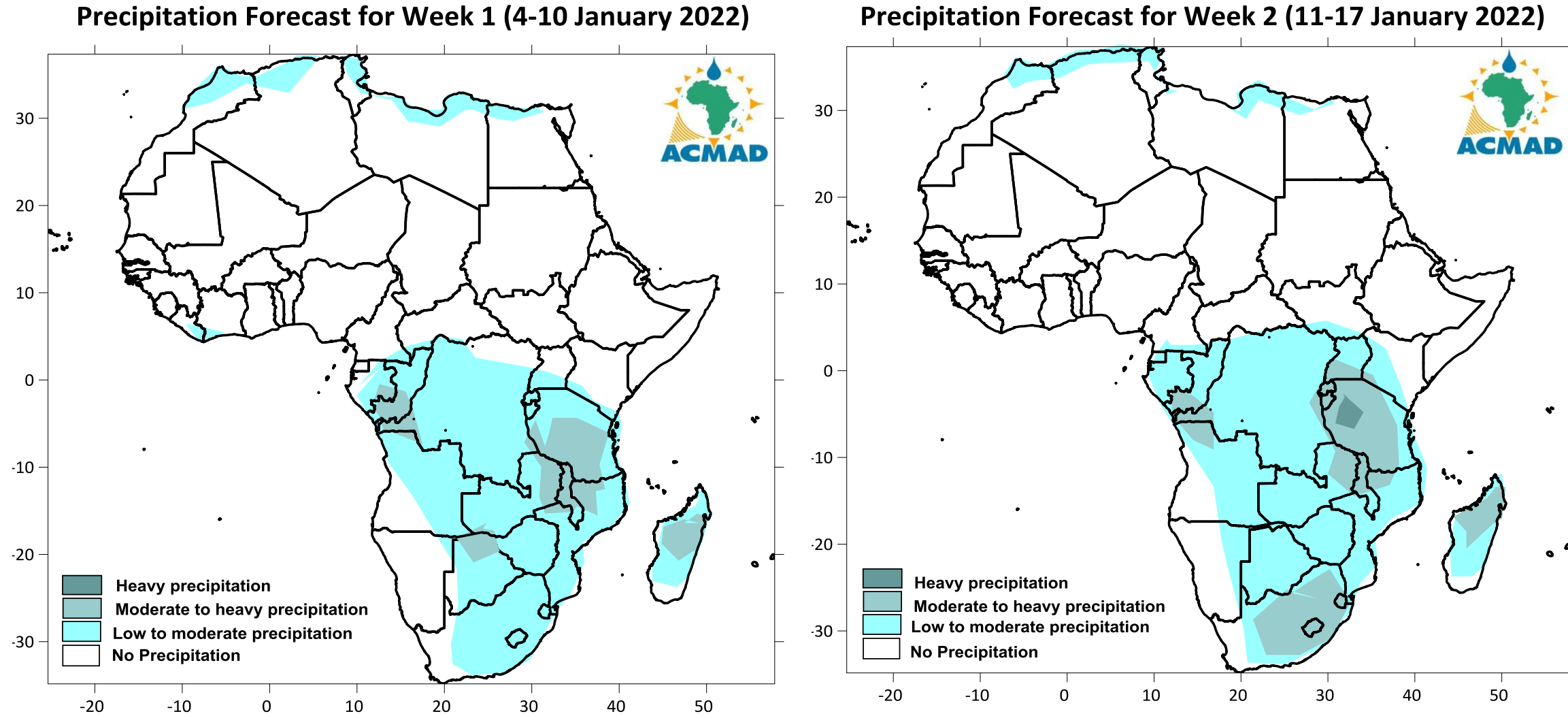


Figure 39: Precipitation Outlook for week-1(left panel) and week-2 (right panel)