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

Drafted by: **Tarekegn Abera**

Edited by: **Hubert KABENGELA**

Presented by:

OUTLINE

- Dekadal average precipitation in percent of average
- Past four weeks SST anomalies
- Last month SST anomalies
- Past four weeks and month velocity potential, TPW anomalies with MJO, Kelvin and Rossby wave overlaid on global maps (850 et 200)
- Past 4 weeks precipitable water and outlooks
- Hovmoller diagram of velocity potential, anomalies for 5N-5S , 15N-15S with waves overlay including outlooks

- Ecmwf mjo forecast
- Hovmoller diagram for TPW and OLR with waves overlaid including outlook
- Past 3 weeks olr anomalies
- Past 4 weeks velocity potential and month stream function anomalies with MJO, kelvin and rossby wave overlaid on global maps 850 hpa Mean Sea Level Presssure (dekadal climatology, dekadal mean and anomaly overlayed)

OUTLINE

- Observed mlsp for the recent 10 day period with anomalies super imposed on the left and climatology of mslp for the past 10 day period

- Wind anomalies for the recent 10 day period 850 and 700 hpa

- Relative humidity recent 10 days anomalies, climatology 850 for dekad 1 of February 2021

- Relative humidity recent 10 days anomalies, climatology 700 for dekad 1 of February 2021

- Ir image and Velocity Potential anomaly
- Extremes events table recorded during the dekad in Africa and socio economic impacts

- Precipitation forecasts from ECMWF for week 1 & 2

OUTLINE

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

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

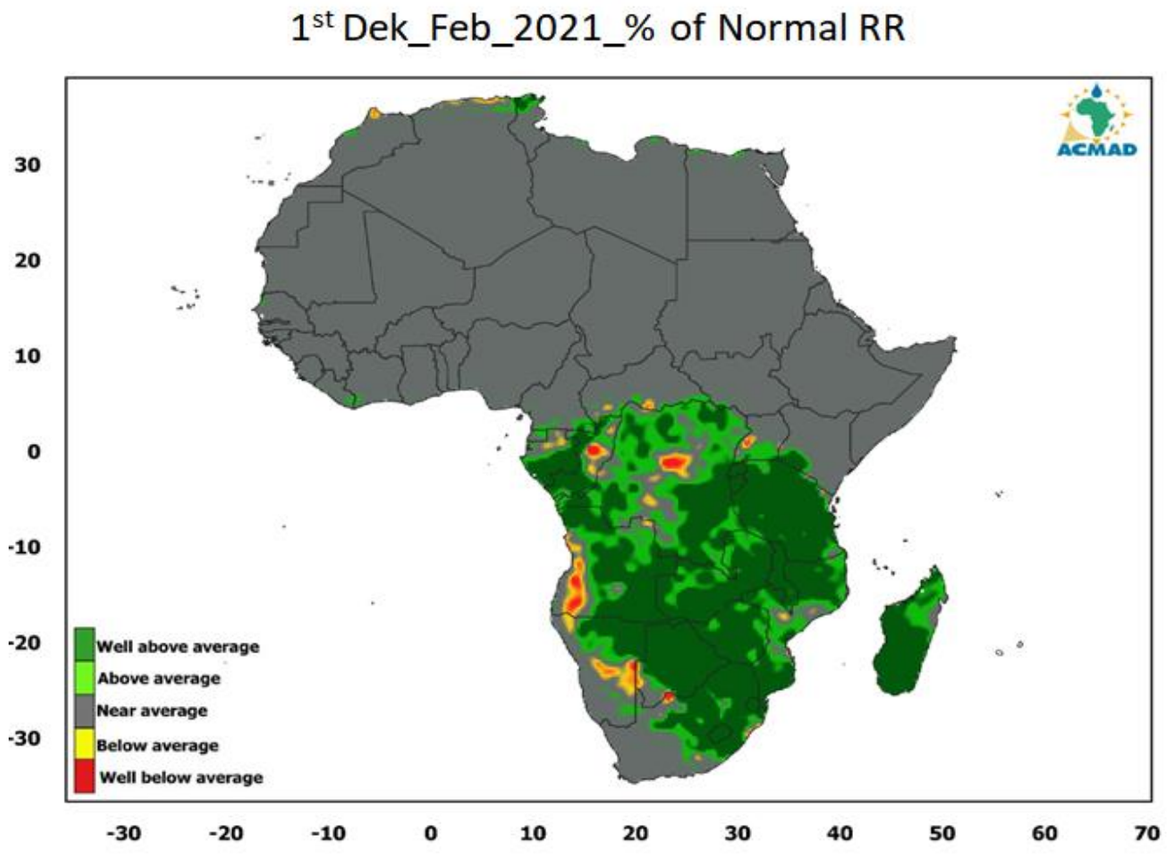
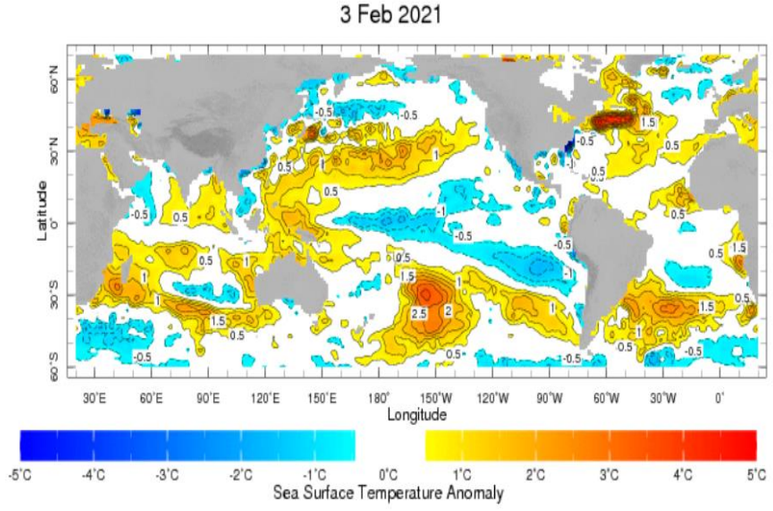


Figure 1: **This map displays decadal average precipitation in percent of average**
The figure show well above to above average précipitation prevailed over most parts of the central and southern-esatern of the West African Countries, Eastern Africa and northern-eastern Algeria during the first dek of February 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/

Weekly Sea Surface Temperature Anomaly

31 Jan 2021-6 Feb 2021



24-30 Jan 2021

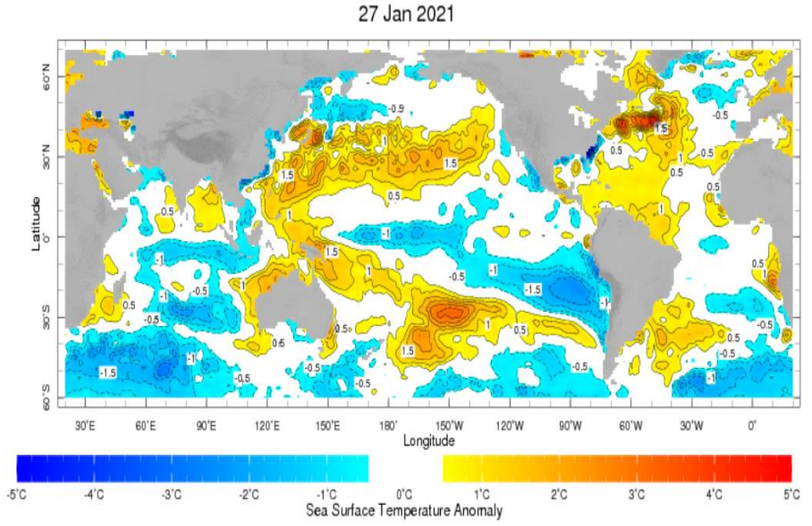
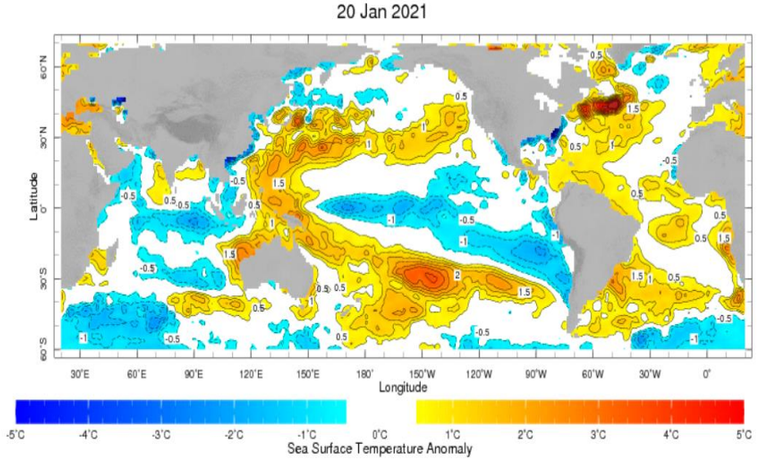
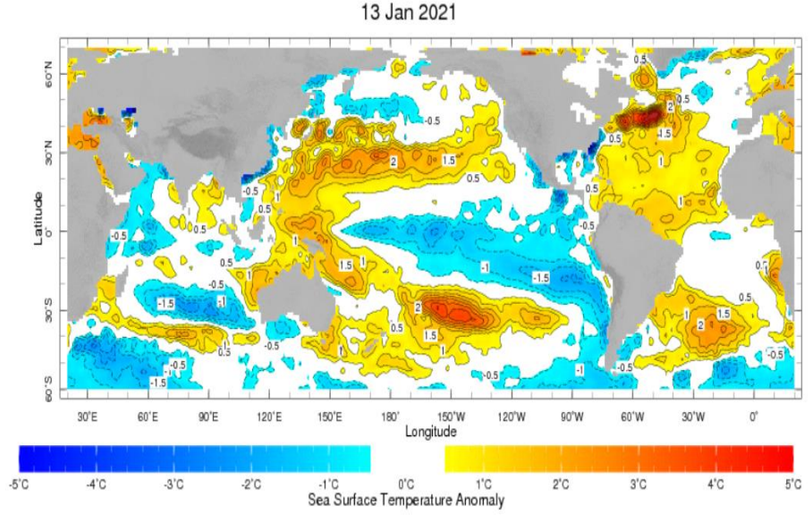


Figure3, the above two maps display weekly sea surface temperature anomalies for the globe, the warming conditions dominate over the equatorial Pacific , Atlantic, and the western Indian during the three last weeks and the recent week warming conditions decreased over all this regions.

17-23 Jan 2021



10-16 Jan 2021



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

LAST MONTH SST OBSERVED

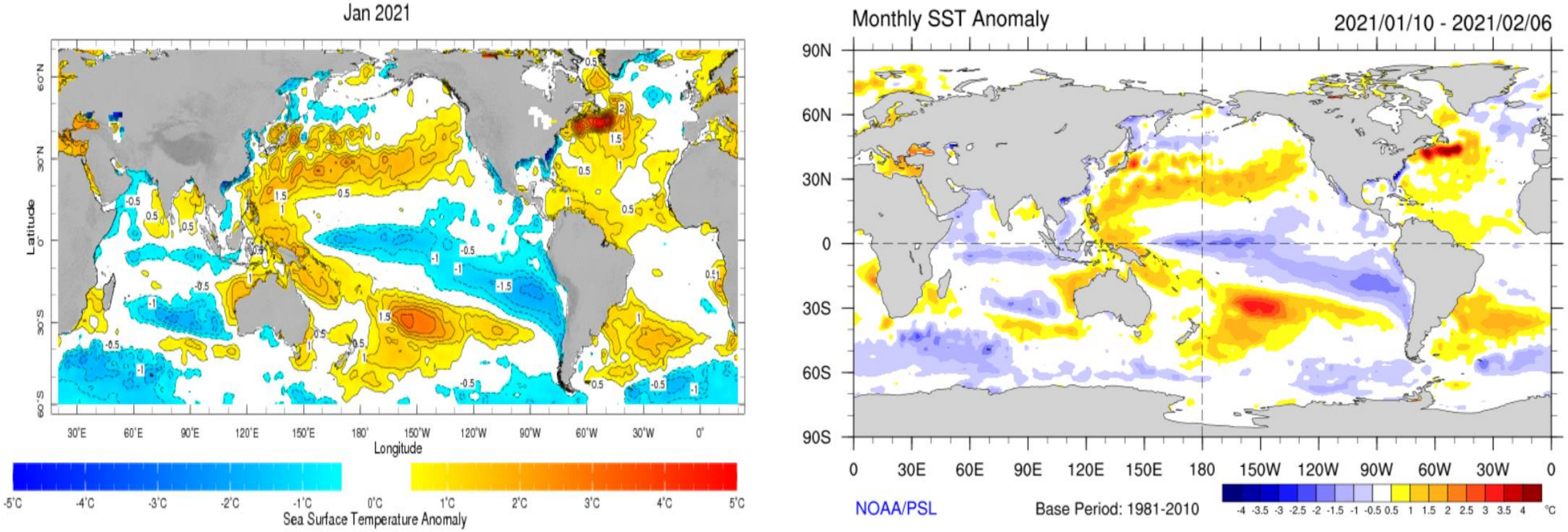


Figure 4 : This map displays monthly sea surface temperature anomalies for the globe.

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. Accessed 15/02/2021.

SST OBS AND FCST FOR TWO WEEK

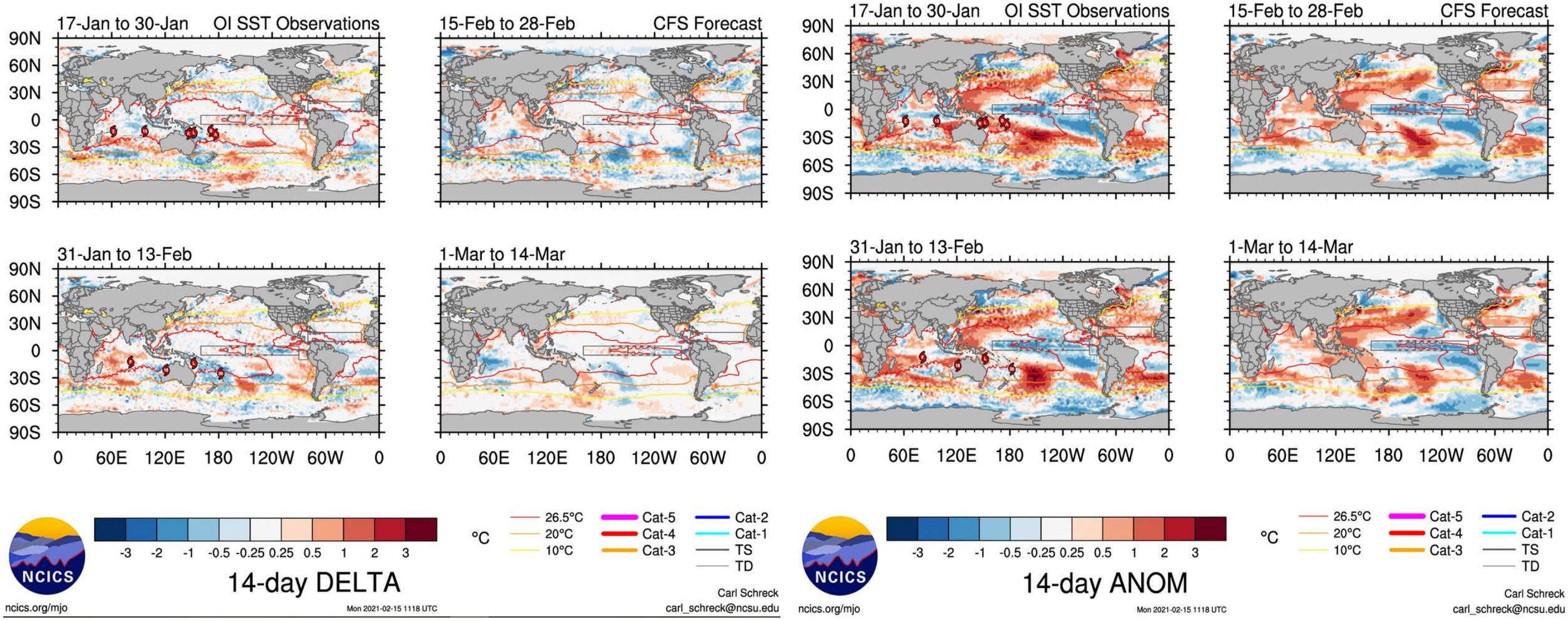
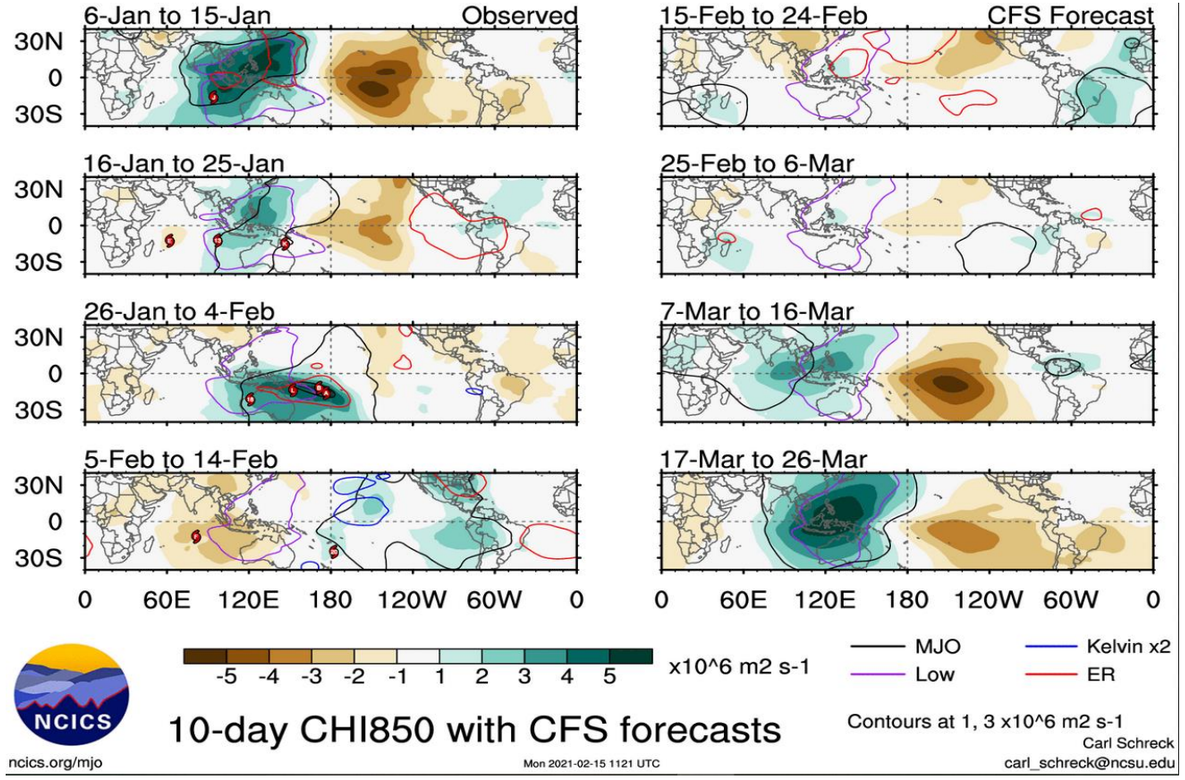


Figure 5: Sea Surface Temperature and FCST for two week

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

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



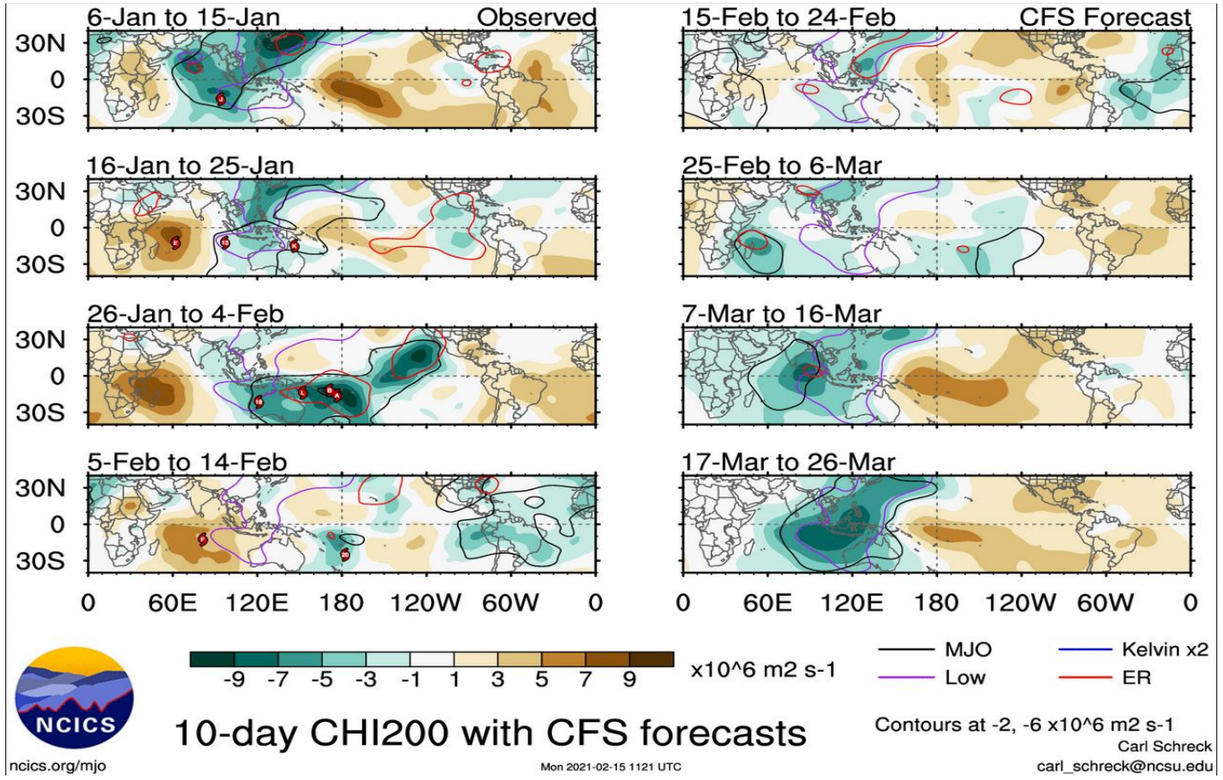


Figure 6a and b: past four week and month velocity potential

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

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

PAST 4 WEEKS PRECIPITABLE WATER AND OUTLOOKS

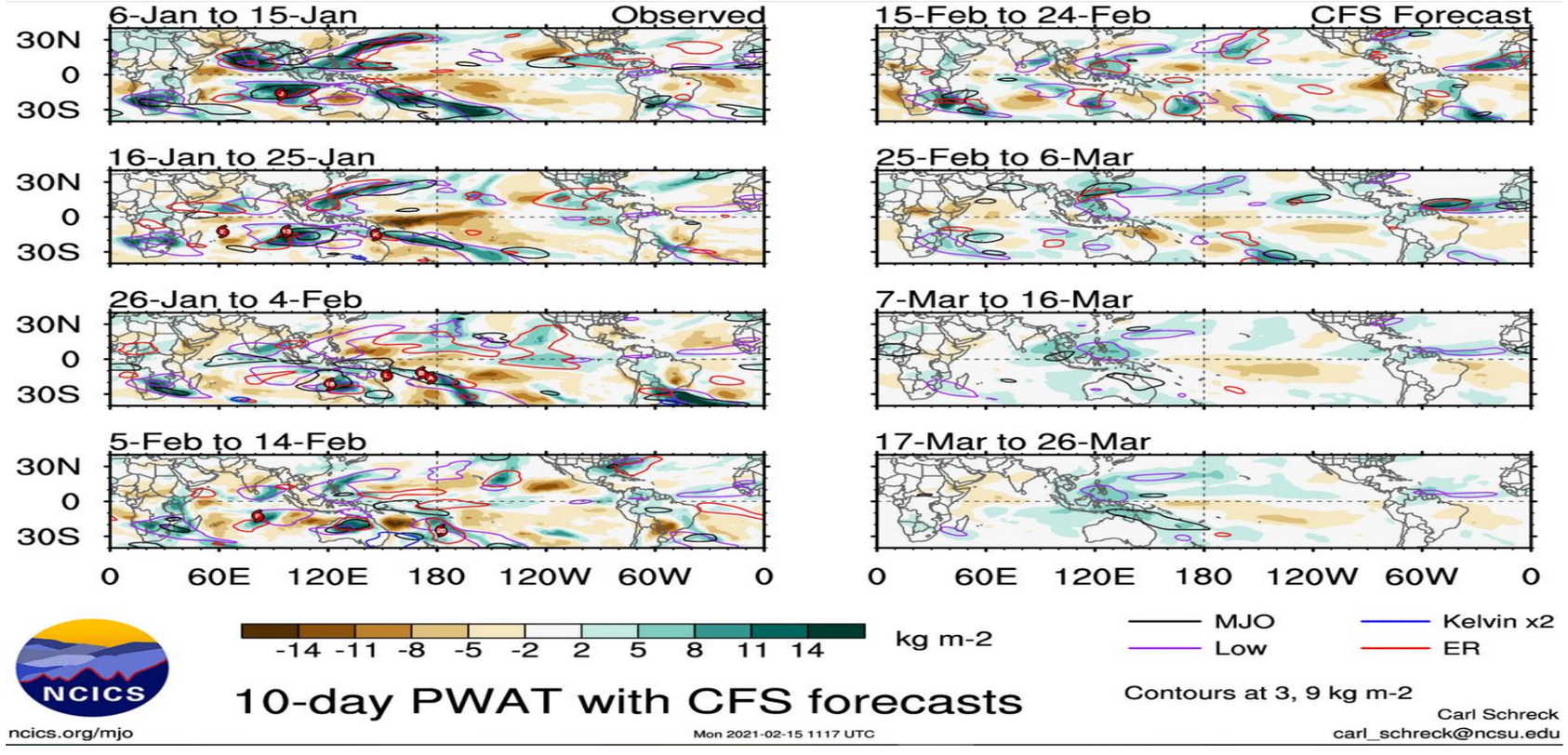
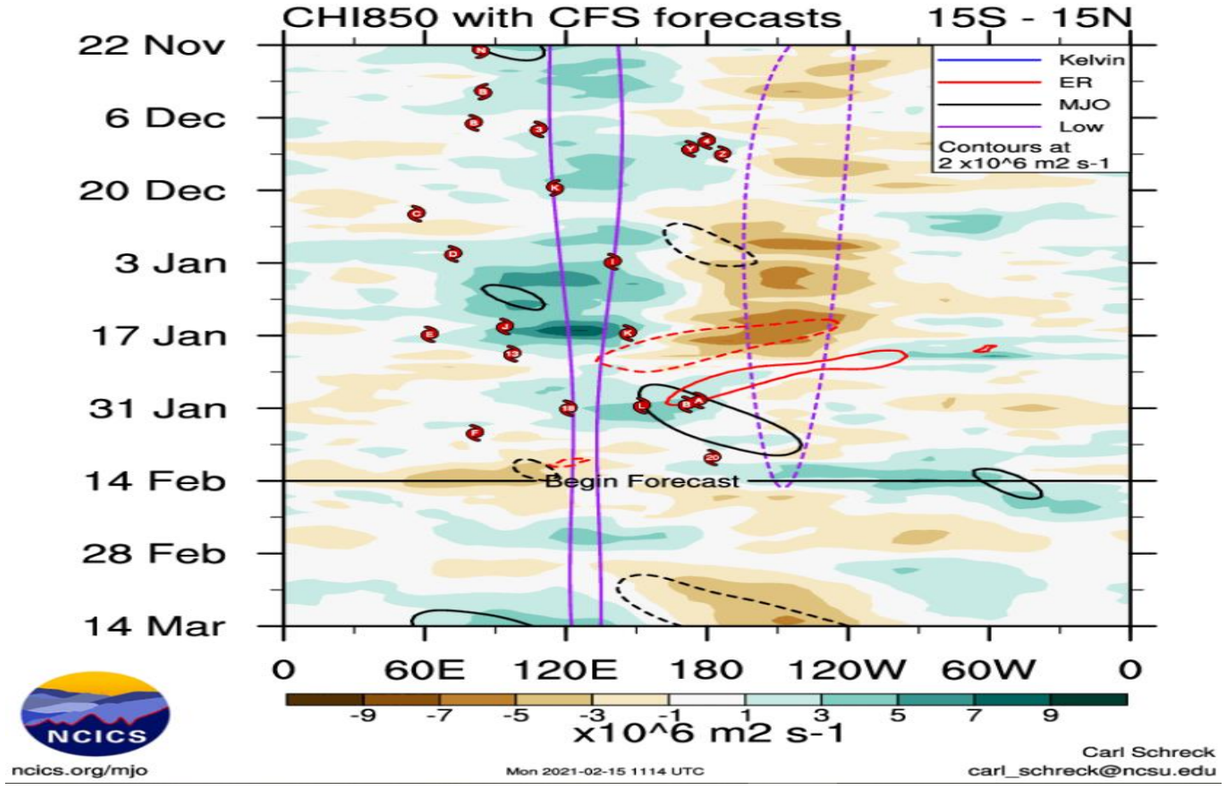


Figure 7: **past 4 weeks precipitable water and outlooks**

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

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

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



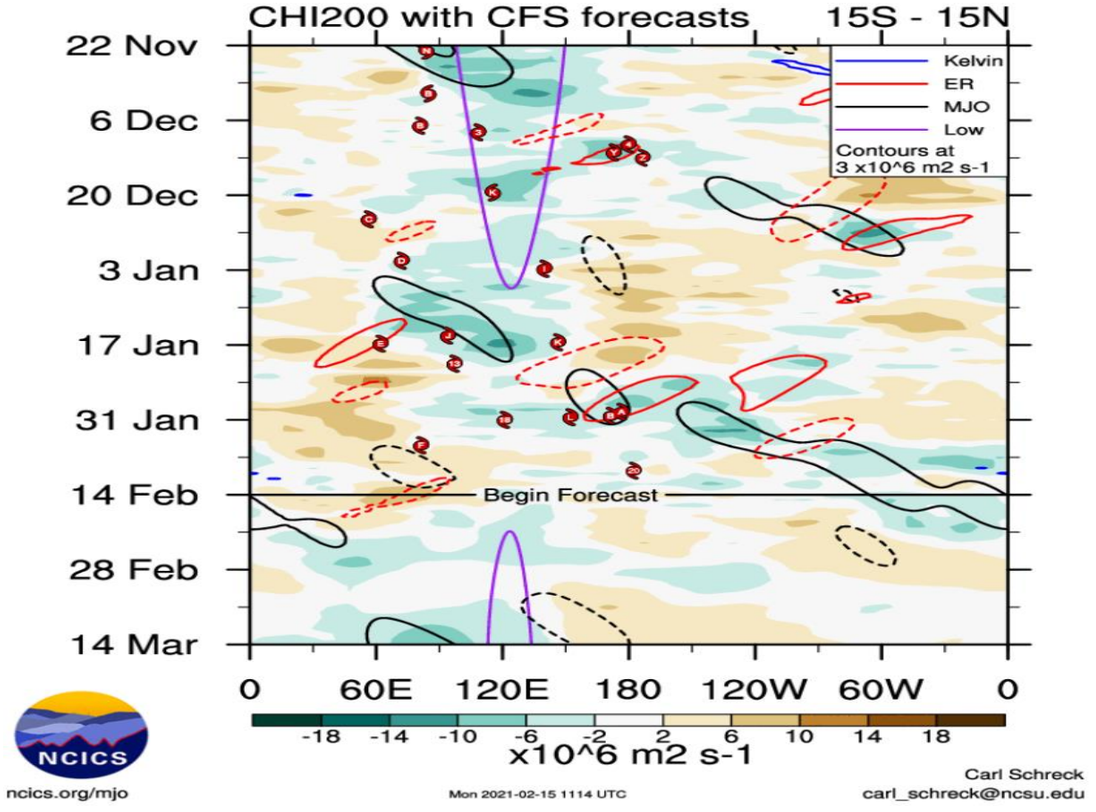
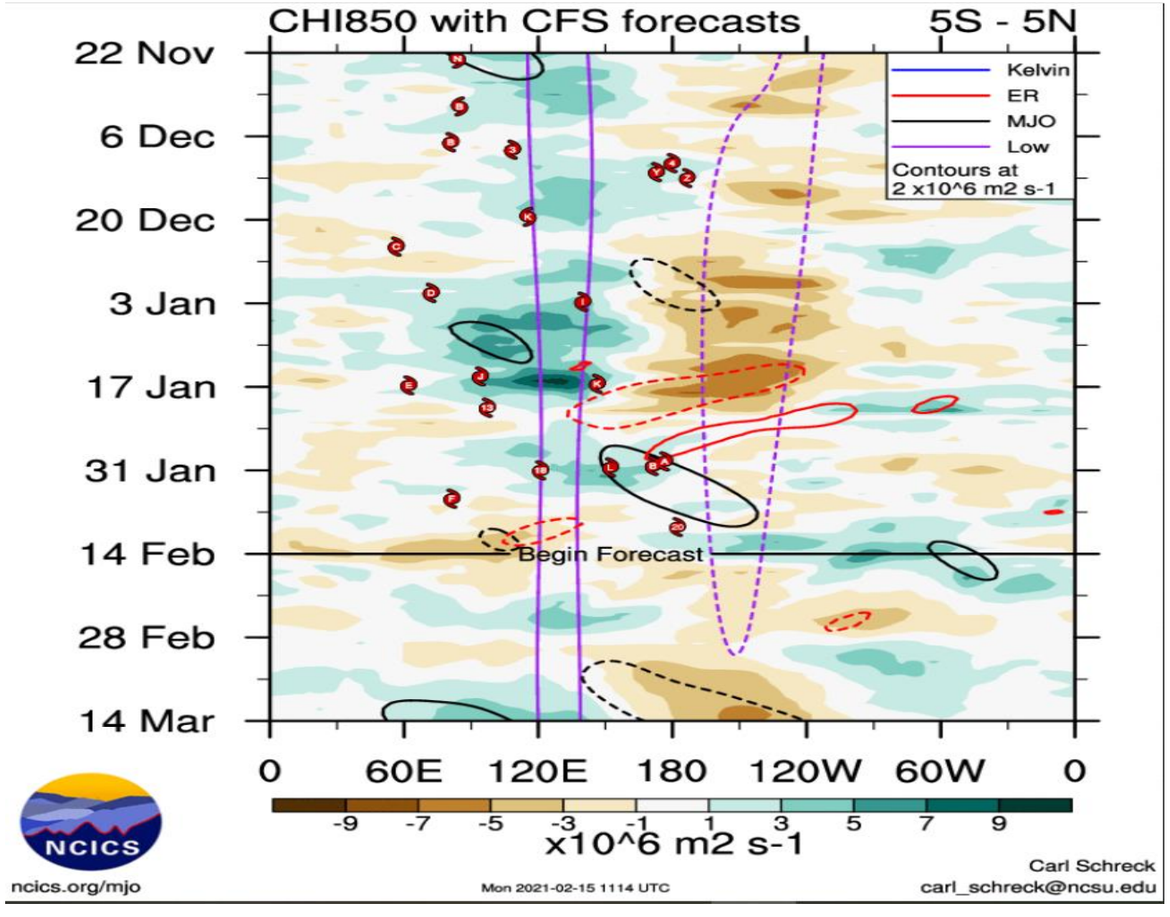


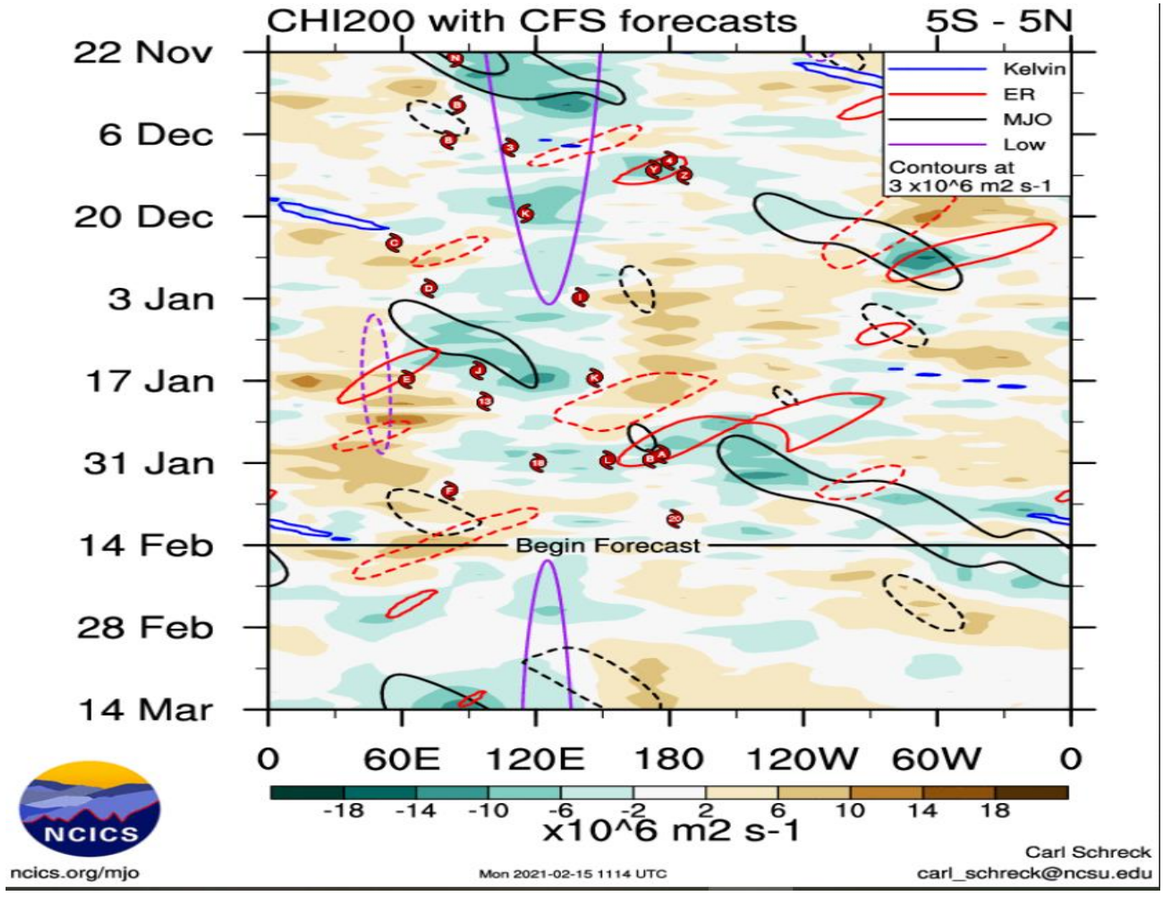
Figure 8: anomalies for 15n-15s with waves overlay including outlooks

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

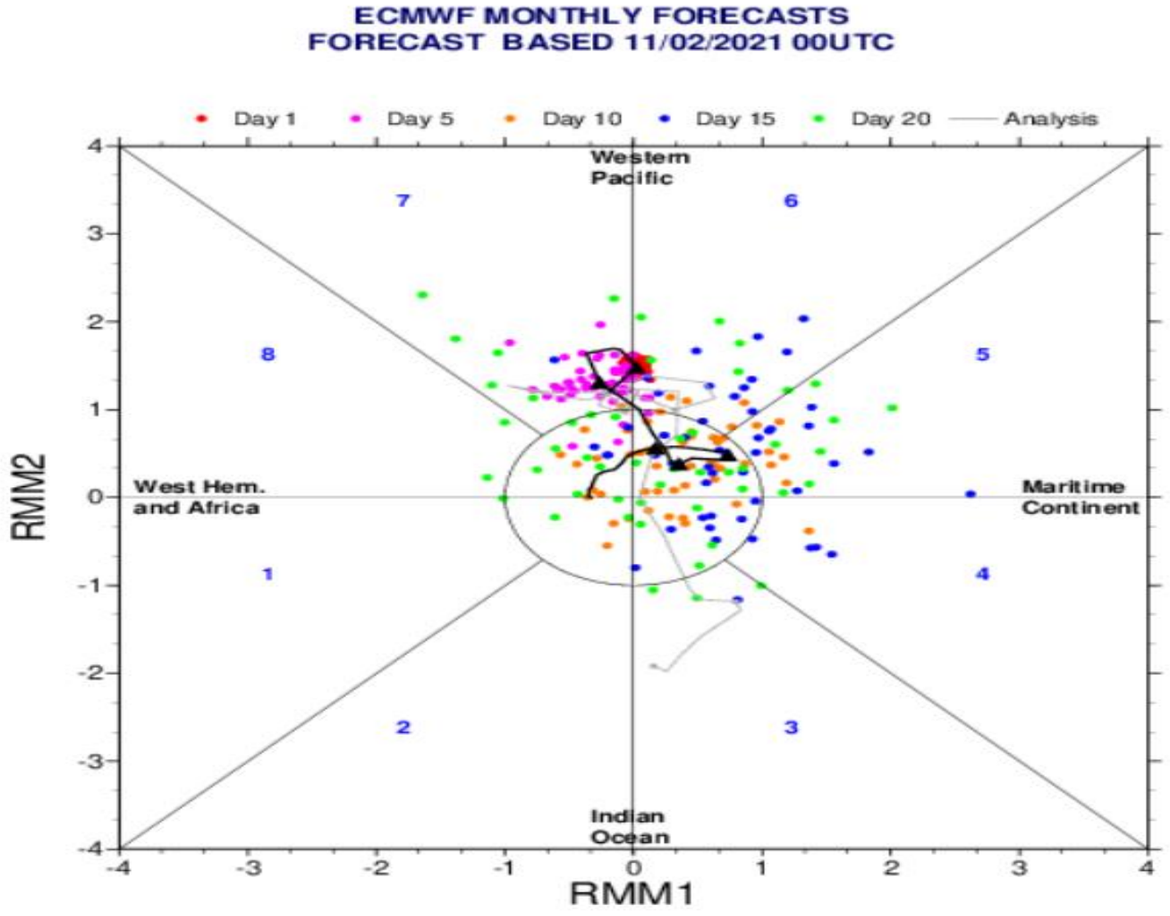
https://ncics.org/portfolio/monitor/mjo/

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





ECMWF MJO FORECAST



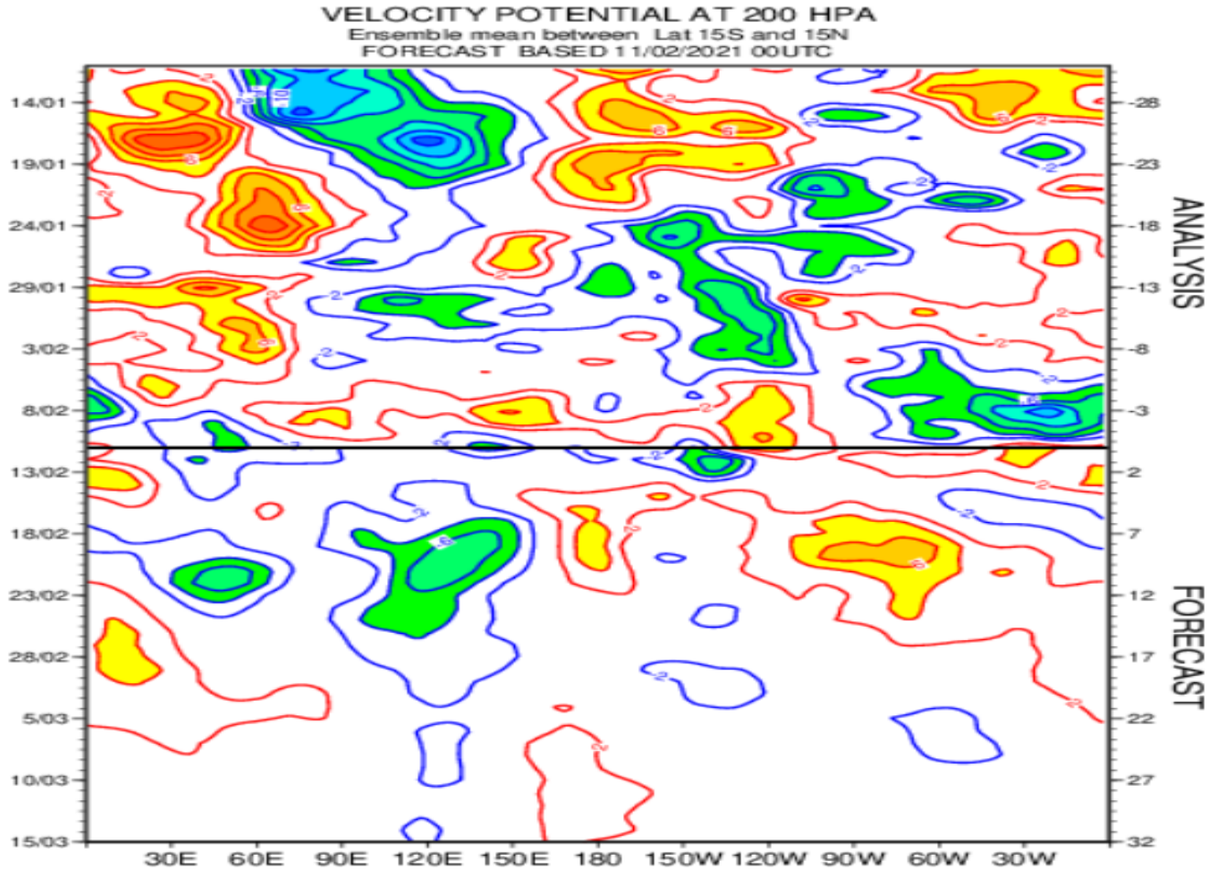


Figure 10a and b: **ECMWF MJO FORECAST**

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

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

PAST 3 WEEKS OLR ANOMALIES

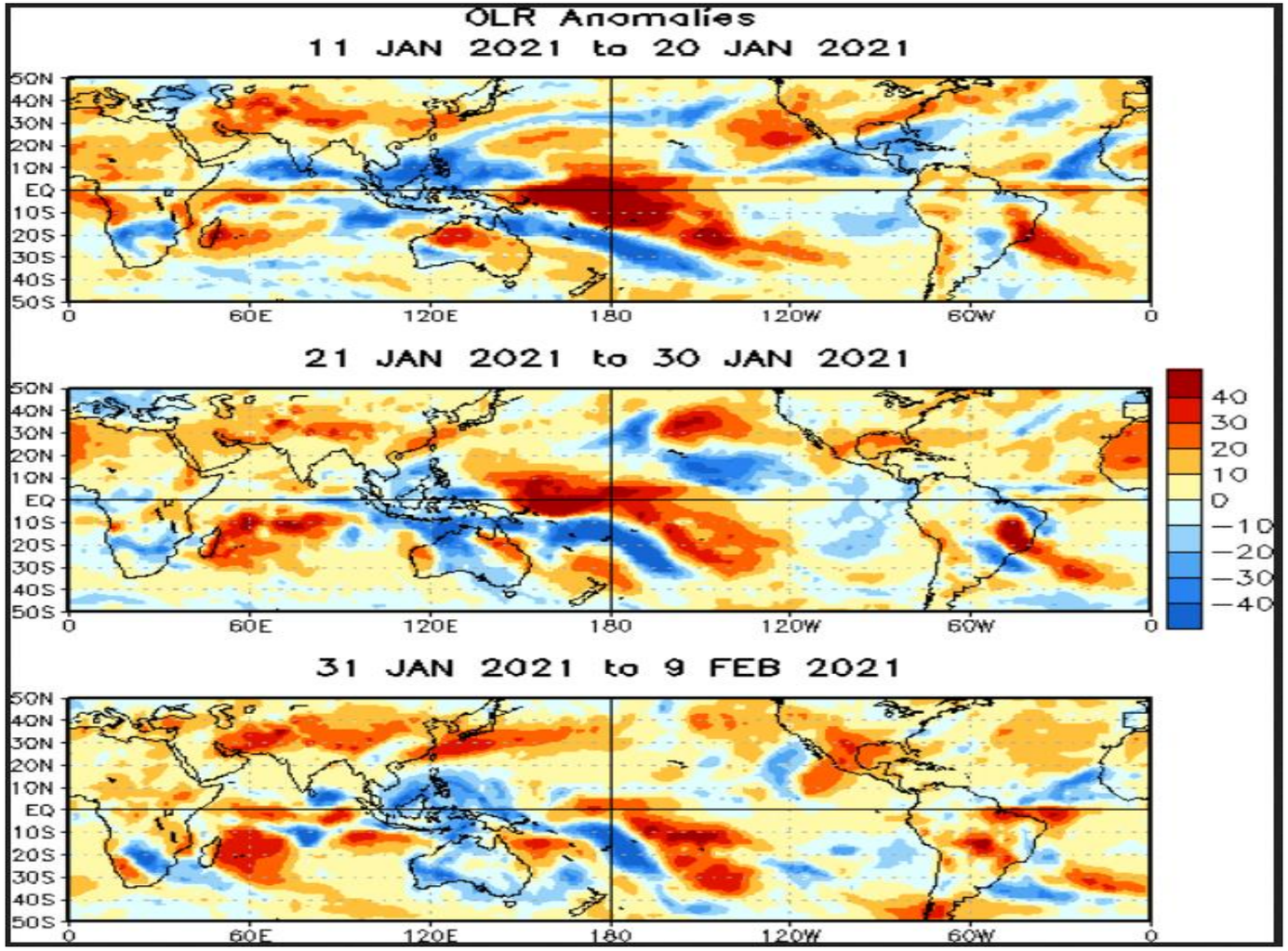


Figure 11: PAST 3 WEEKS OLR ANOMALIES

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

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

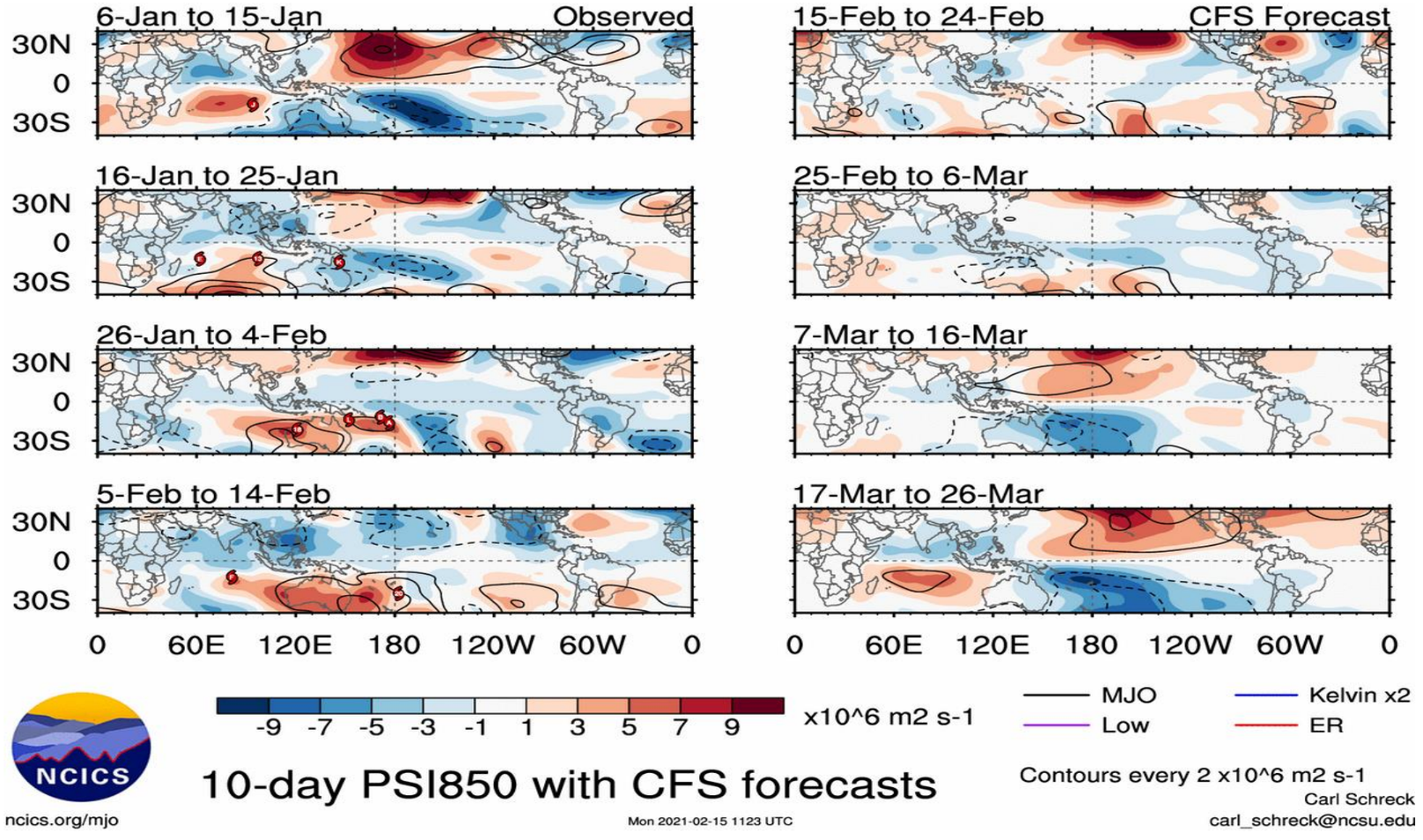


Figure 12: PAST 4 WEEKS VELOCITY POTENTIAL

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

MEAN SEA LEVEL PRESSURE OF THE DEKAD 3 JANUARY 2021 WITH THE ANOMALIES COMPARED THE AVERAGE 1971-2000

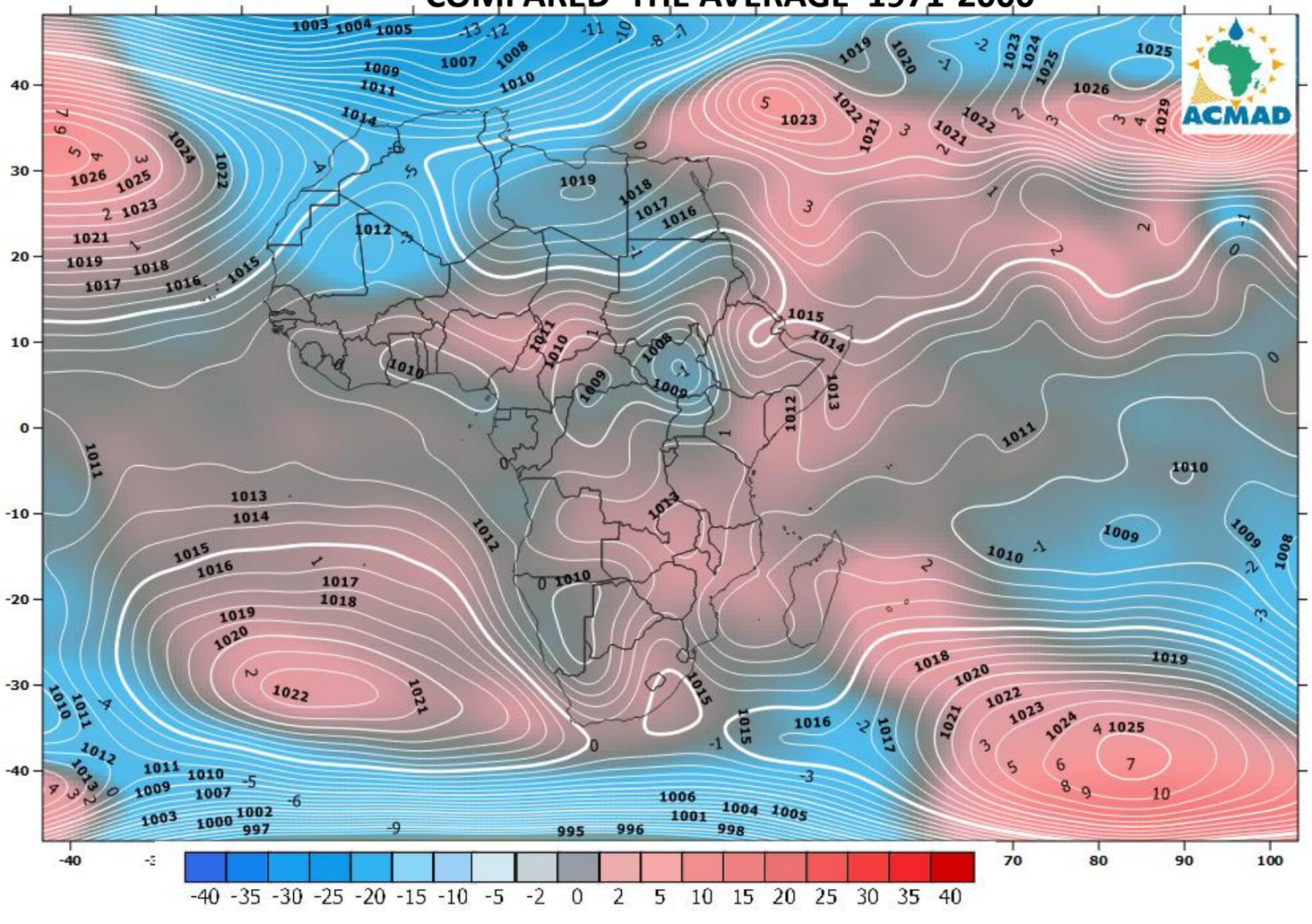


Figure 13: MSLP obs-anom and MSLP-climatology

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

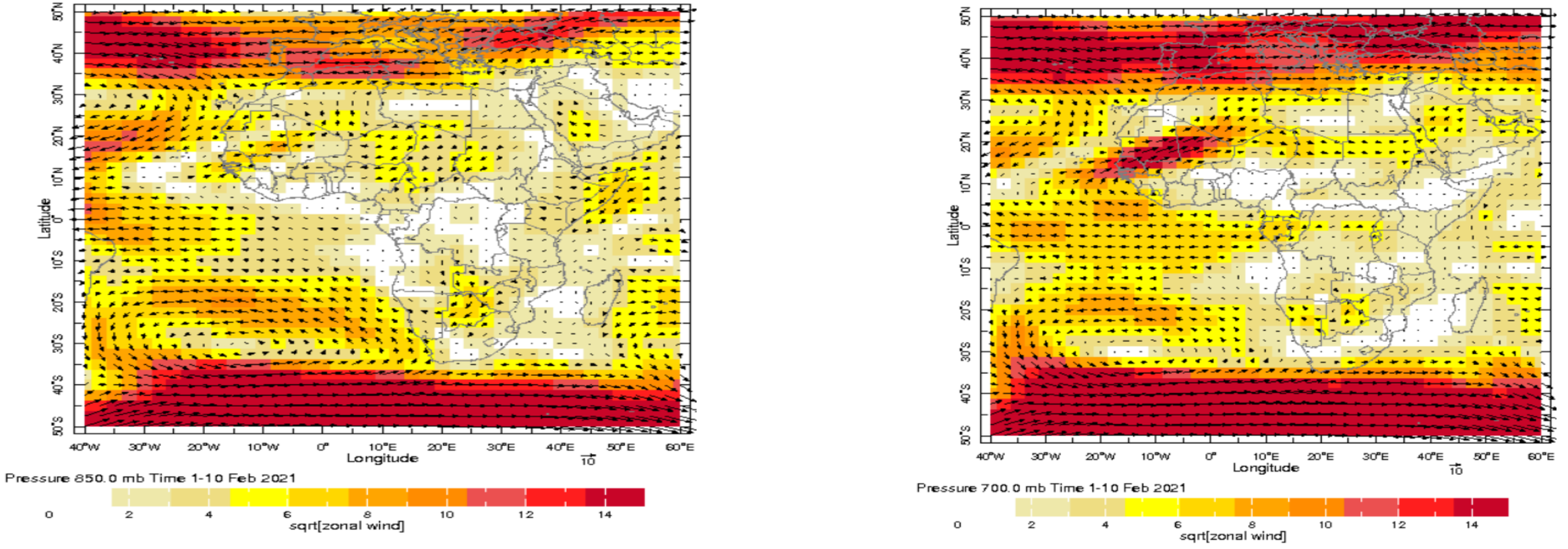


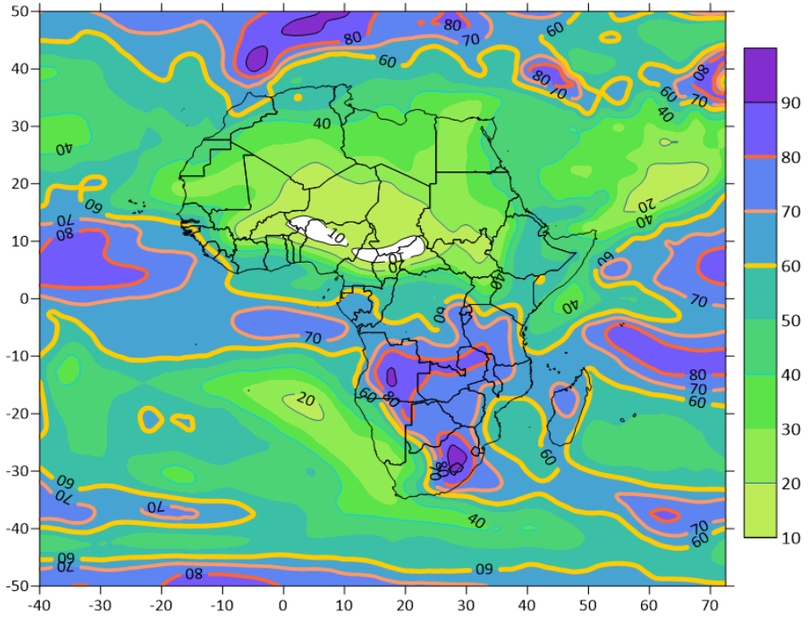
Figure 15: Wind anomalies for 850 and 700hPa

For the wind anomalies for the 850 hpa, over northern Morocco, Algeria, Tunisia, costal parts of Somalia and Botswana. The weak wind from north-eastern and eastern was prevailed over the rest of the continent.

For the 700 hpa, the figure indicates a moderate to strong westerly wind over over northern Morocco, Algeria, Tunisia, Moritania, Senegal and Mali. The weak wind from north-eastern and eastern was observed over the rest of the continent.

RELATIVE HUMIDITY 850 hPa DEKAD 1 FEBRUARY 2021 and ANOMALIES COMPARED OF AVERAGE 2002-2011

RH observed at 850 hPa during 1st dek of February 2021



Wet atmospheric conditions (RH ≥60%) were observed over the central region countries, SADC region. Dry air (humidity relative between 20 and 50%) was observed over the rest of continent

The relative humidity anomalies for the first dekad of February 2021 were negative over Guinea gulf region countries, East Africa region Countries, Egypt, Libyan and Madagascar

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

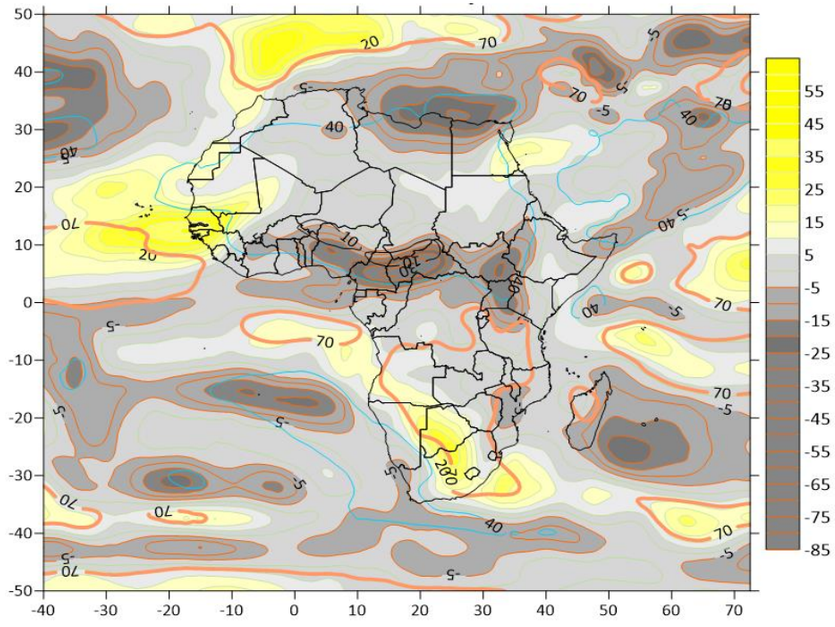
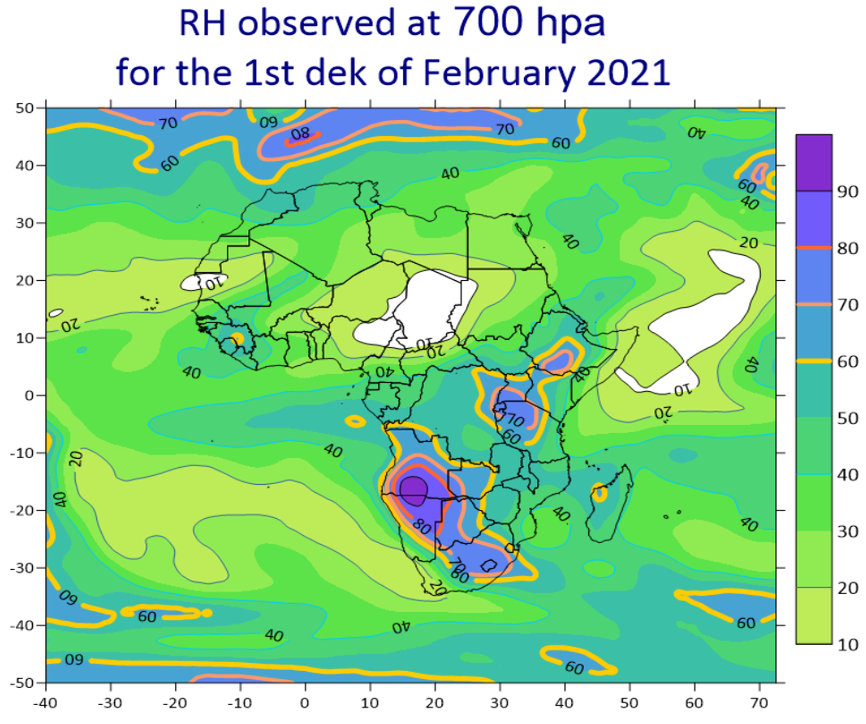


Figure 17a, b and : Relative humidity, Anomaly and climatology cards

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

RELATIVE HUMIDITY 700 hpa DEKAD 3 JANUARY 2021 and ANOMALIES COMPARED OF AVERAGE 2002-2011



wet relative humidity with values ≥ 60% at 700hPa were observed over the south-western East Africa region and western of the SADC region. Dry air (humidity relative between 20 and 50%) was observed over the rest of continent.

The relative humidity anomalies for the first dekad of February 2021 were negative over West Africa region, Libya, costal parts of Nambia, Mauritania, Madagascar and East Africa region.

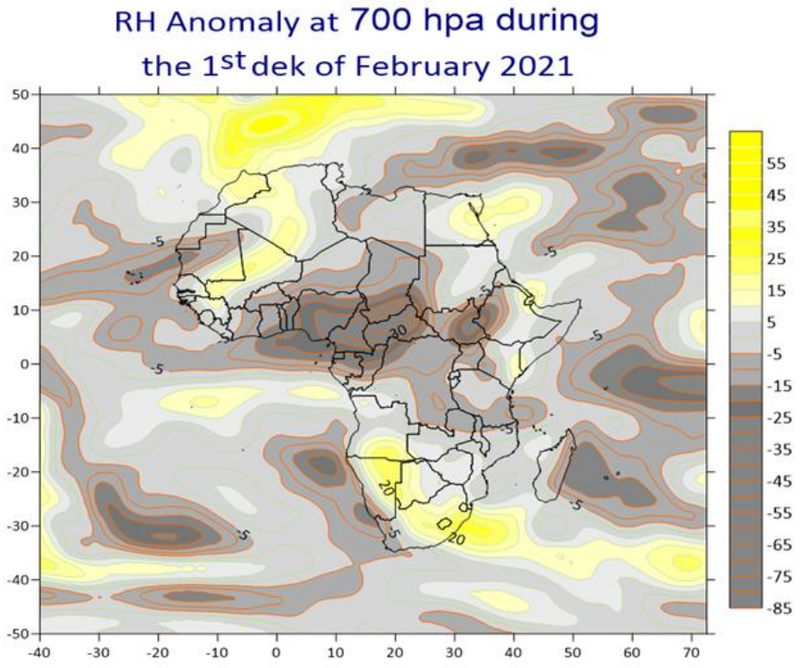


Figure 16a, b and : Relative humidity, Anomaly and climatology cards

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

IR IMAGE AND VELOCITY POTENTIAL ANOMALY

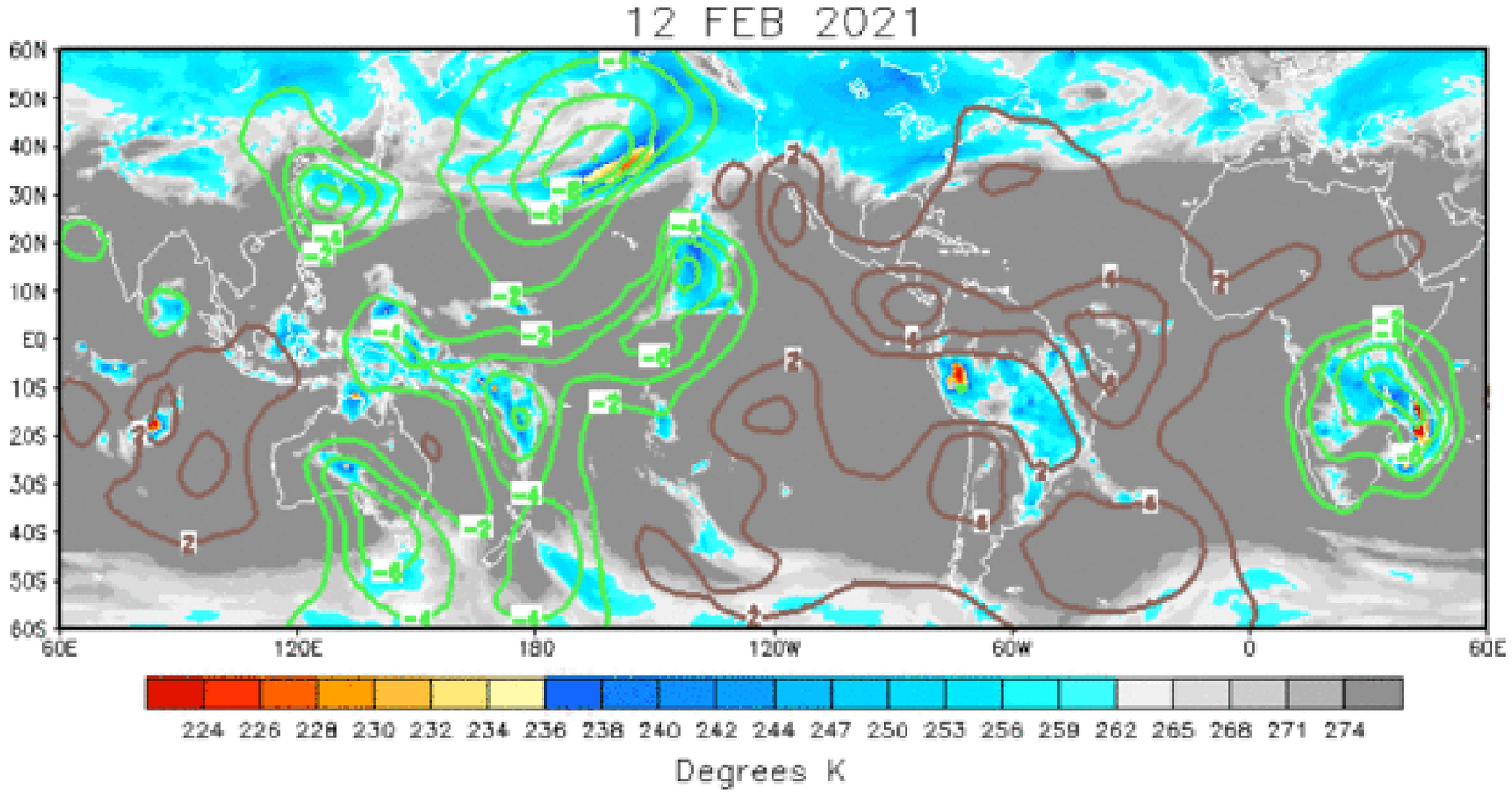
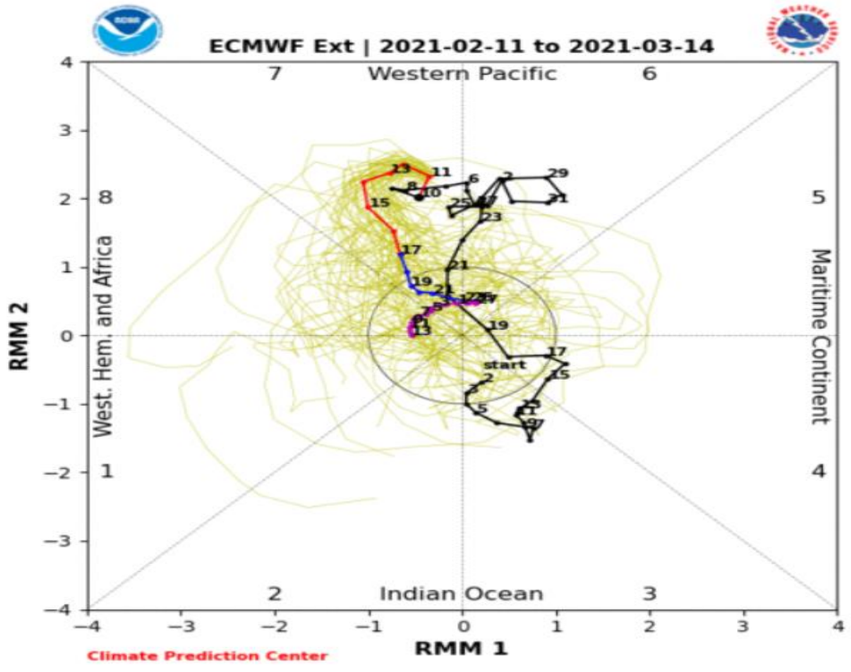
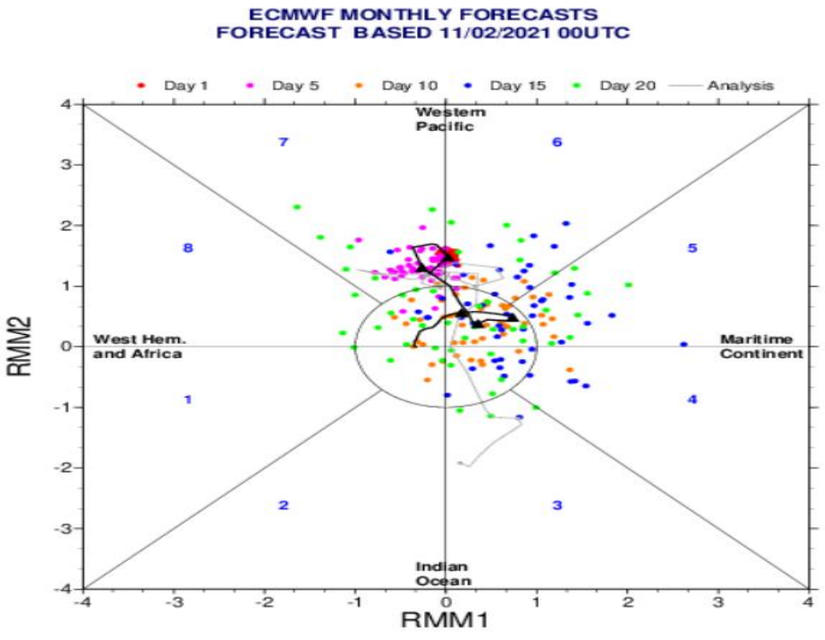


Figure 18: IR image and velocity potential anomaly

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

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





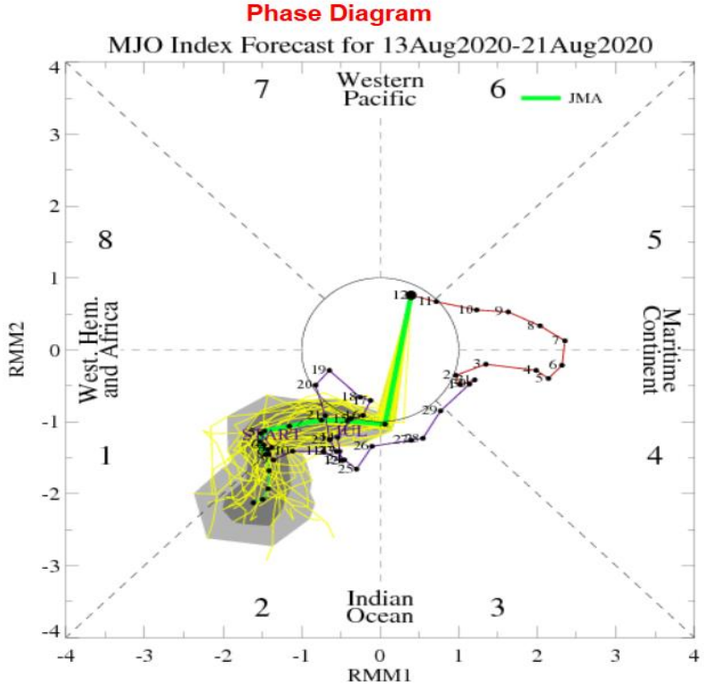


Figure 19:FORECASTS FRO ECWF, NCEP, UK MET OFFICE

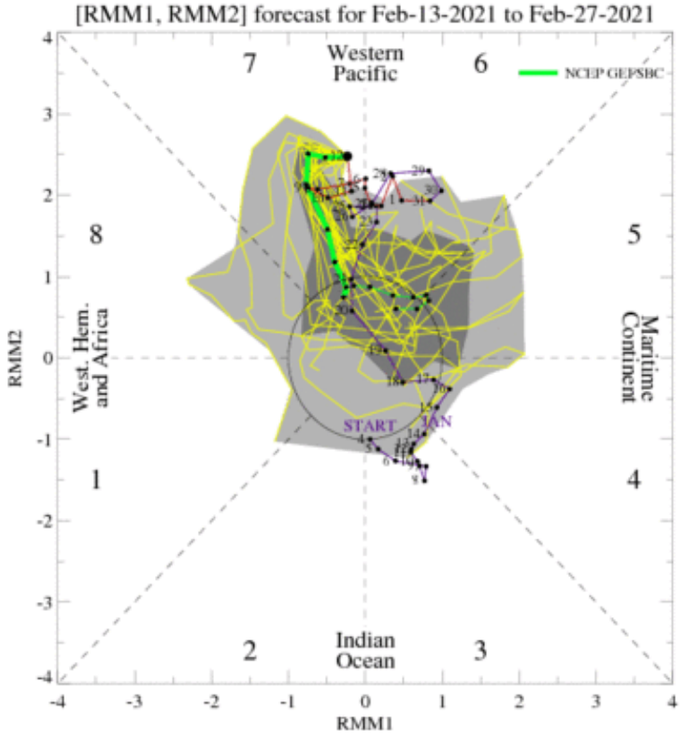
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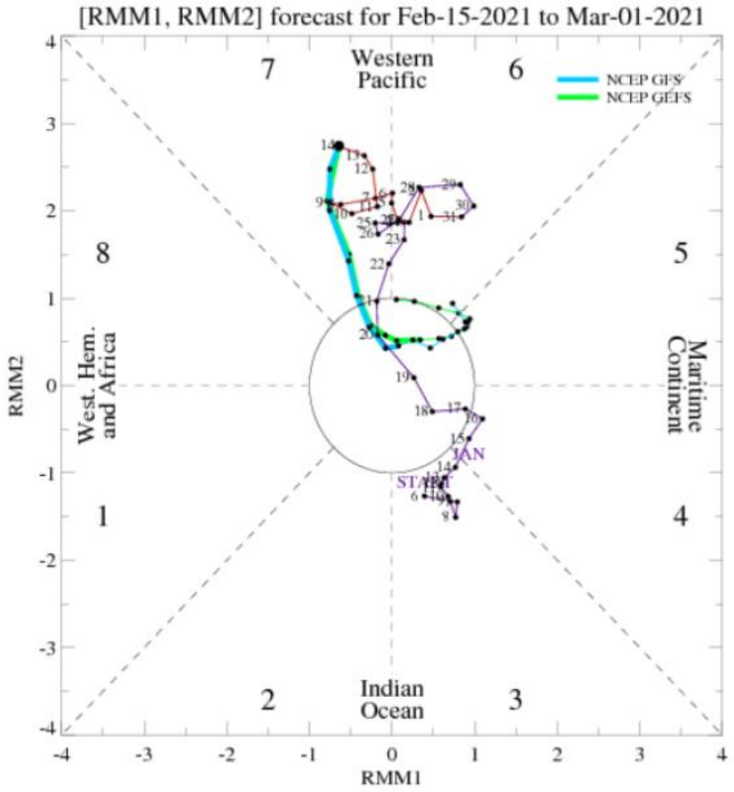
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https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/jman.shtml

WEEKLY FORECAST

MJO FORECAST





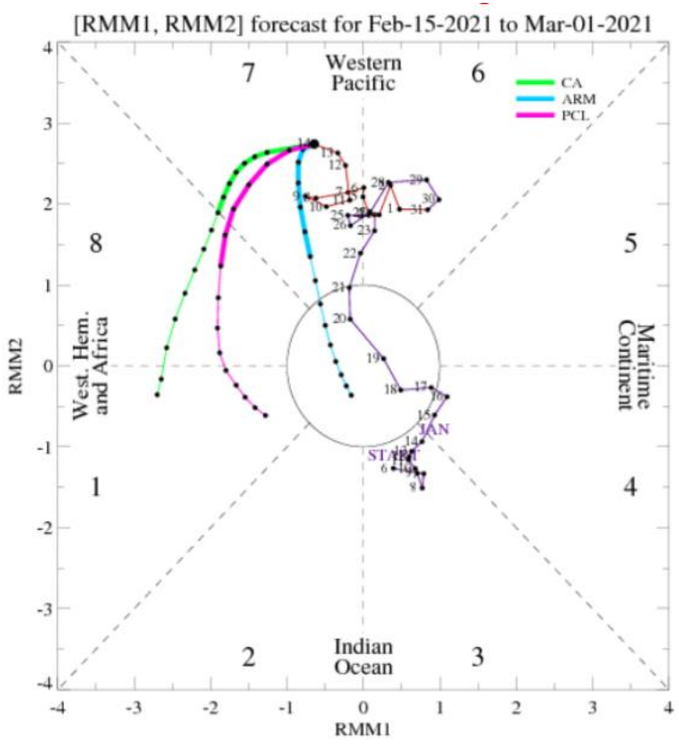


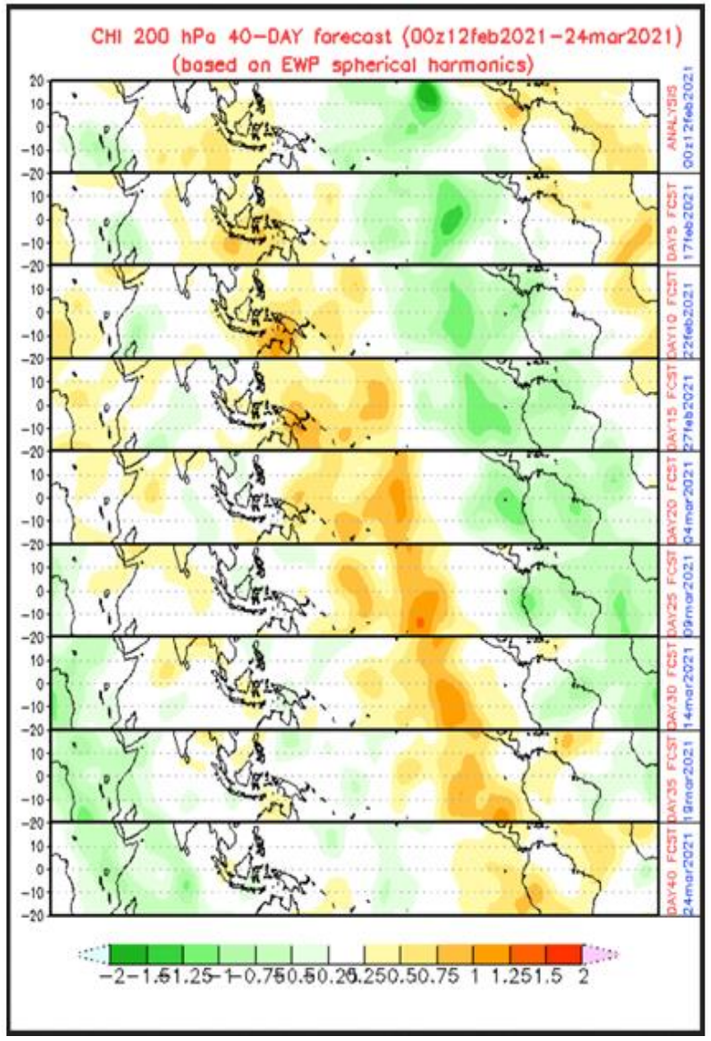
Figure 20: Mjo forecast

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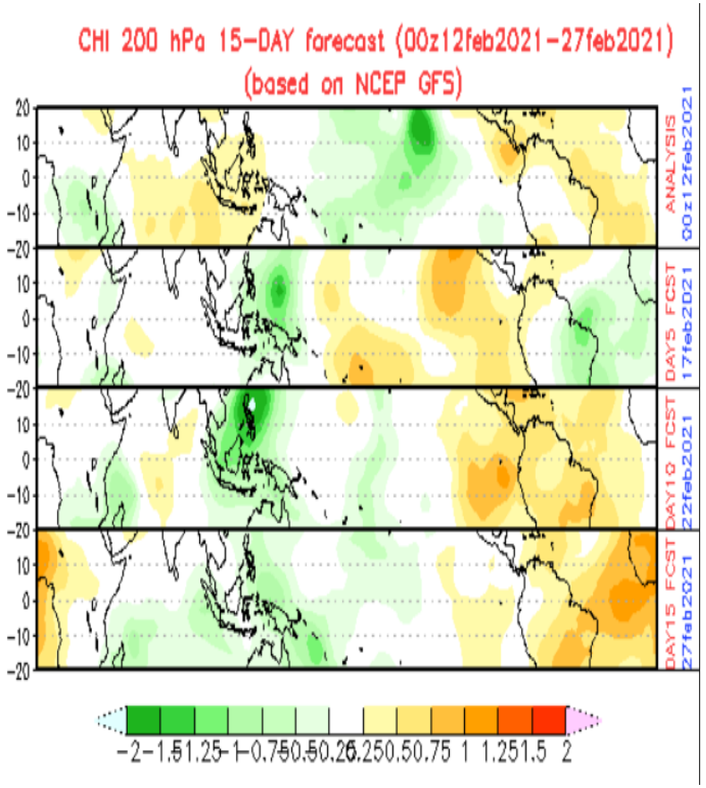
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/foroper.shtml

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

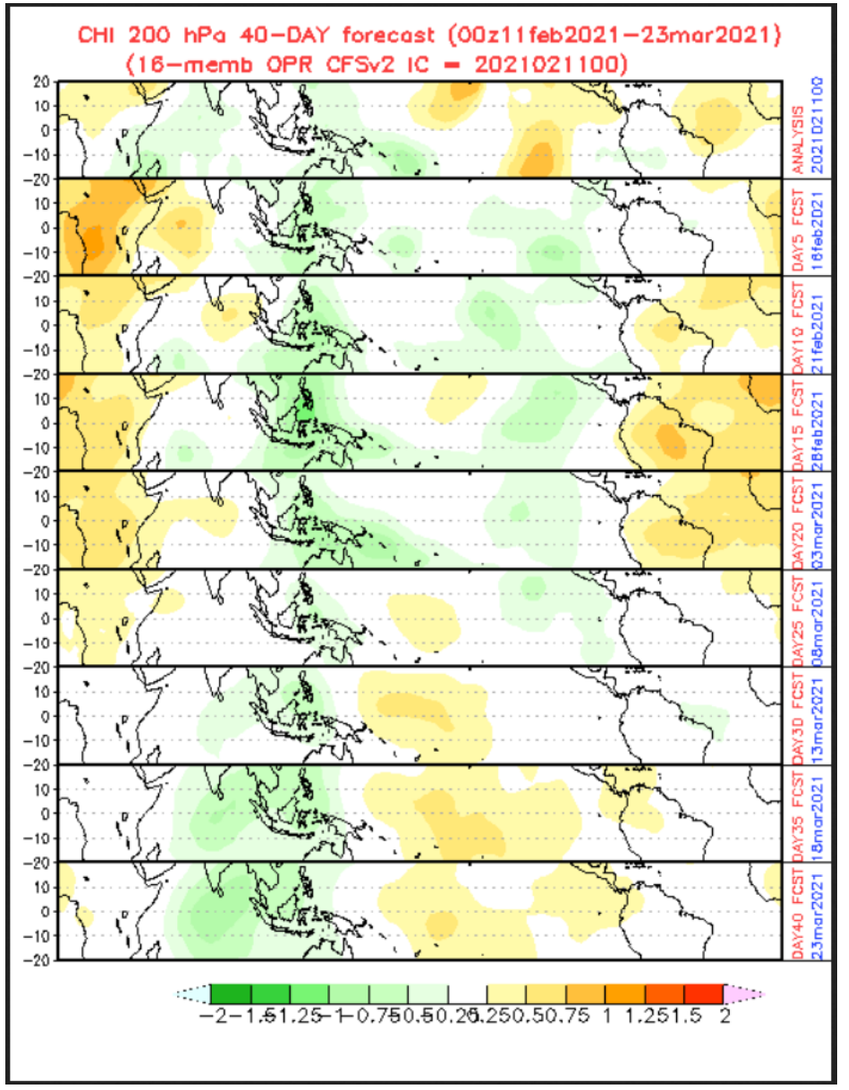
MJO FORECAST



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



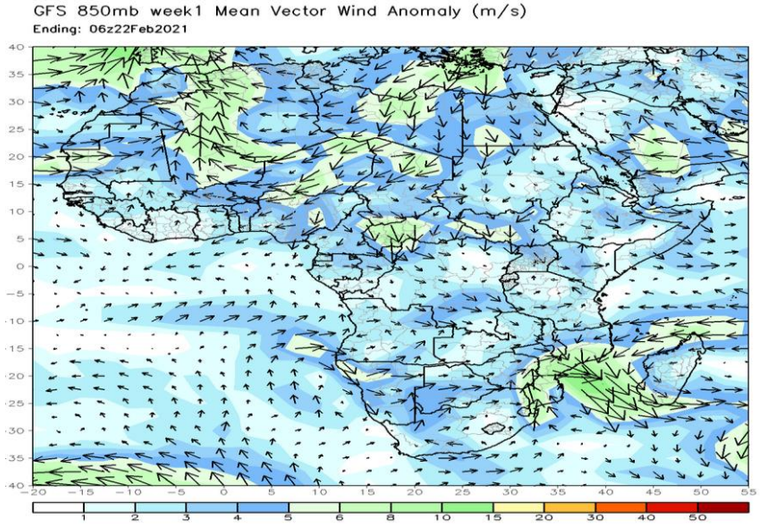
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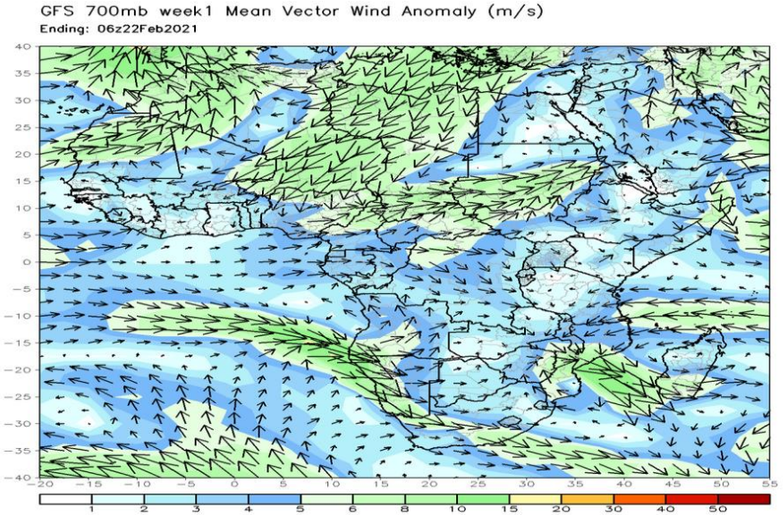


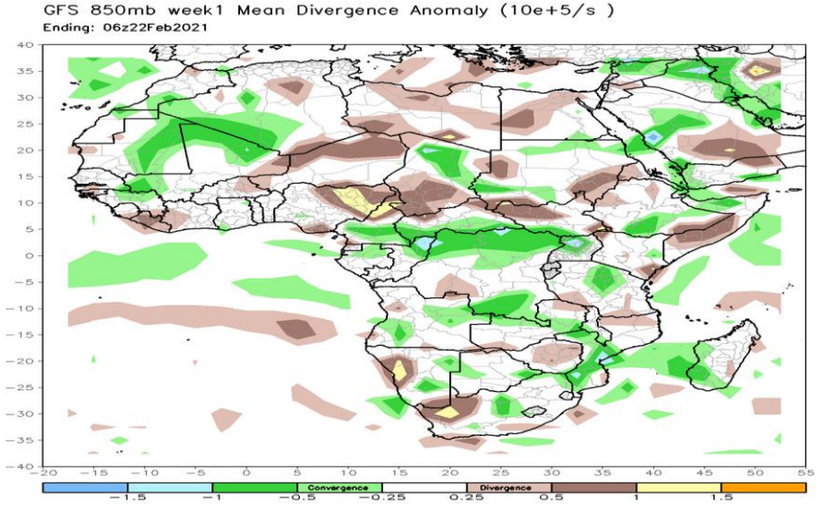
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Figure 21: Mjo forecast

WIND ANOMALY AND DIVERGENCE FORECAST FROM GFS WEEK1: 16-22 Feb 2021







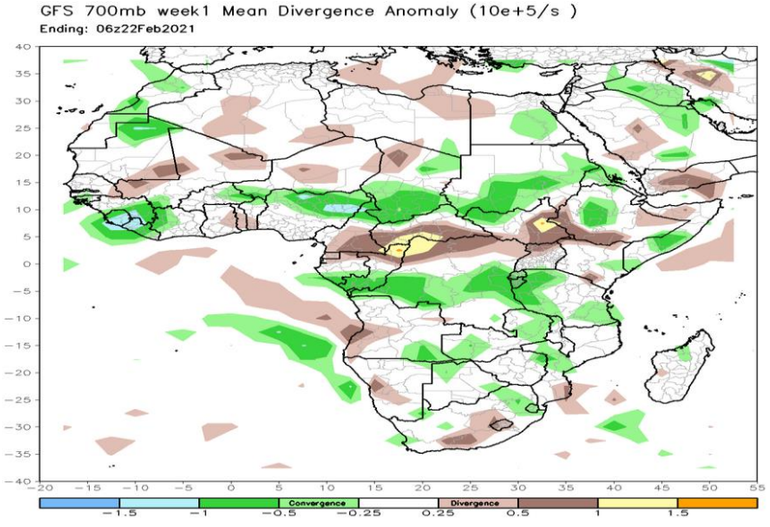
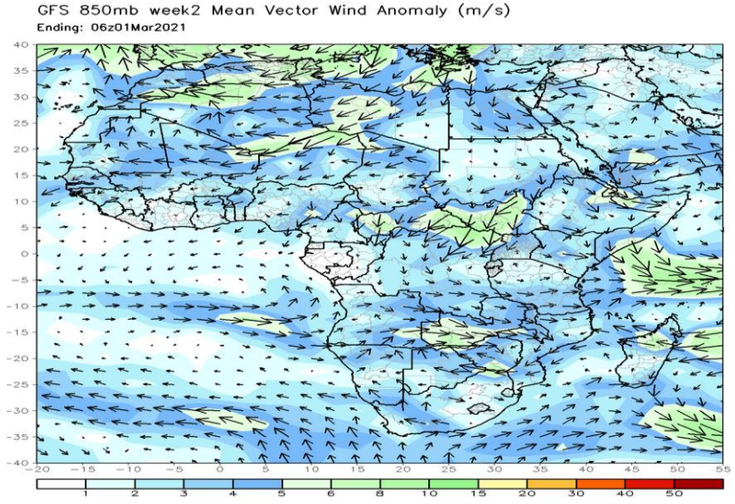
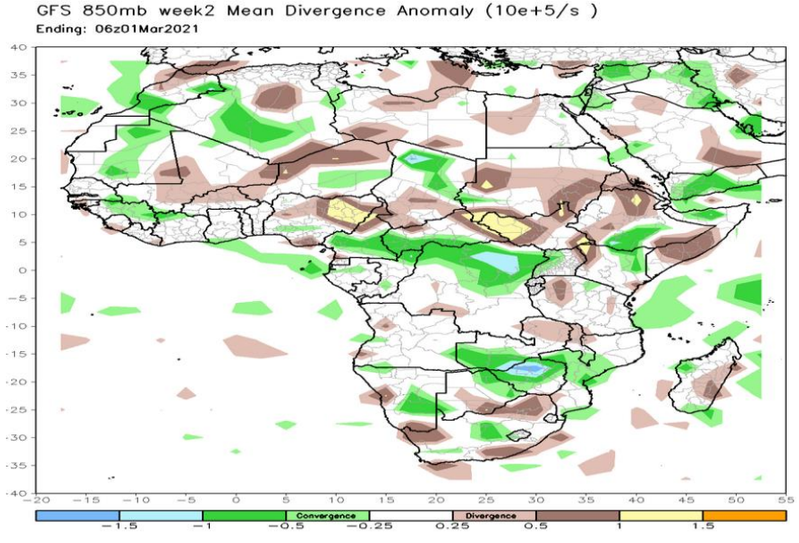


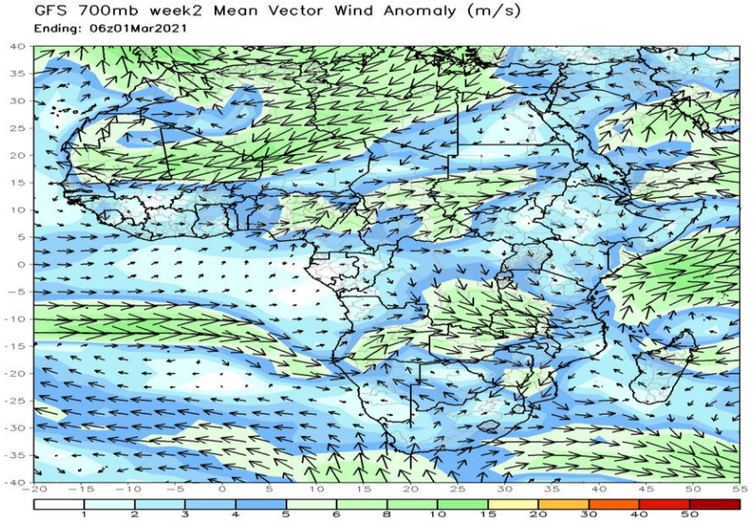
Figure 22 : Forecast from GFS https://www.cpc.ncep.noaa.gov/products/international/africa/africa.shtml

WIND ANOMALY AND DIVERGENCE FORECAST FROM GFS WEEK2: 23-01 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



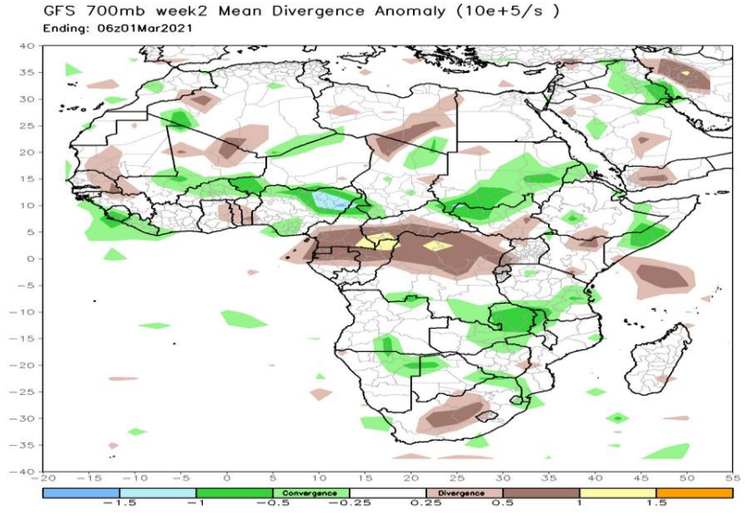
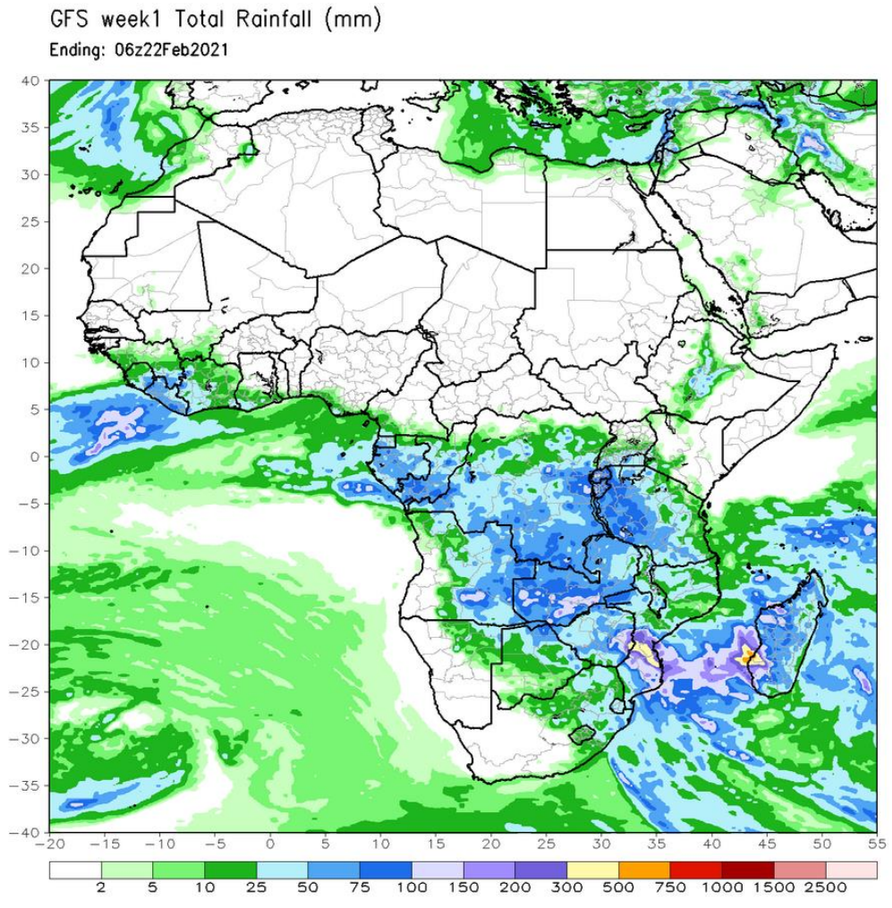


Figure 23 : Gfs divergence forecast, https://www.cpc.ncep.noaa.gov/products/international/africa/africa.shtml

GFS WIND ANOMALY AND DIVERGENCE FORECAST Week2: -23 Feb-1 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

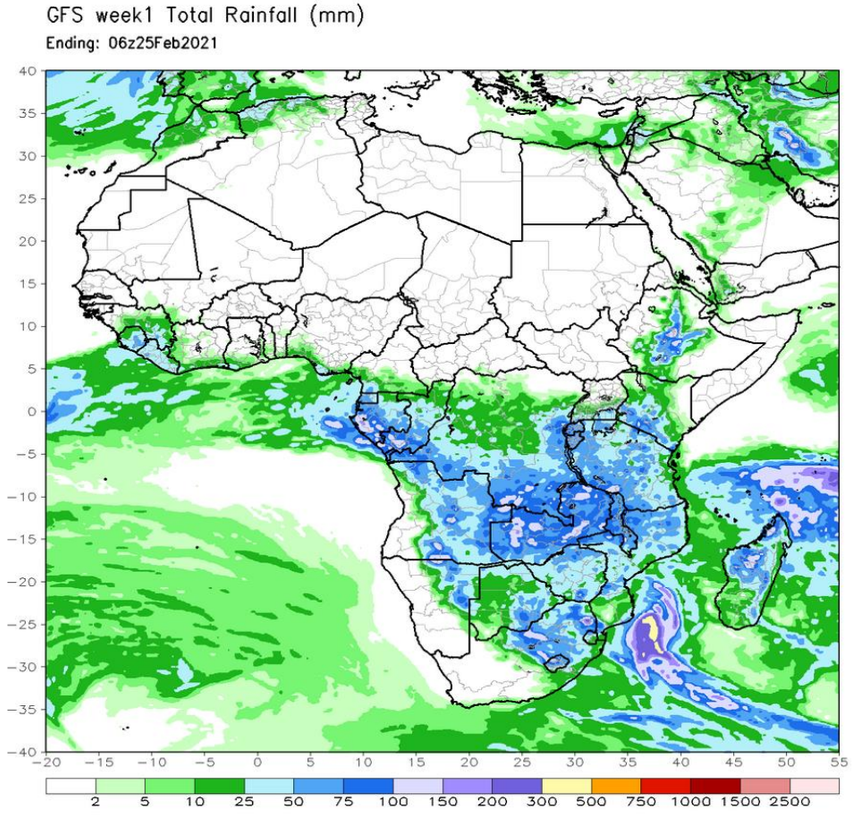


Figure 24 : Gfs total precipitation forecast week1

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

WEEK 1 (15 – 24 FEB) AT 700 hPa RELATIVE VORTICITY FORECAST FROM CFS ECMWF

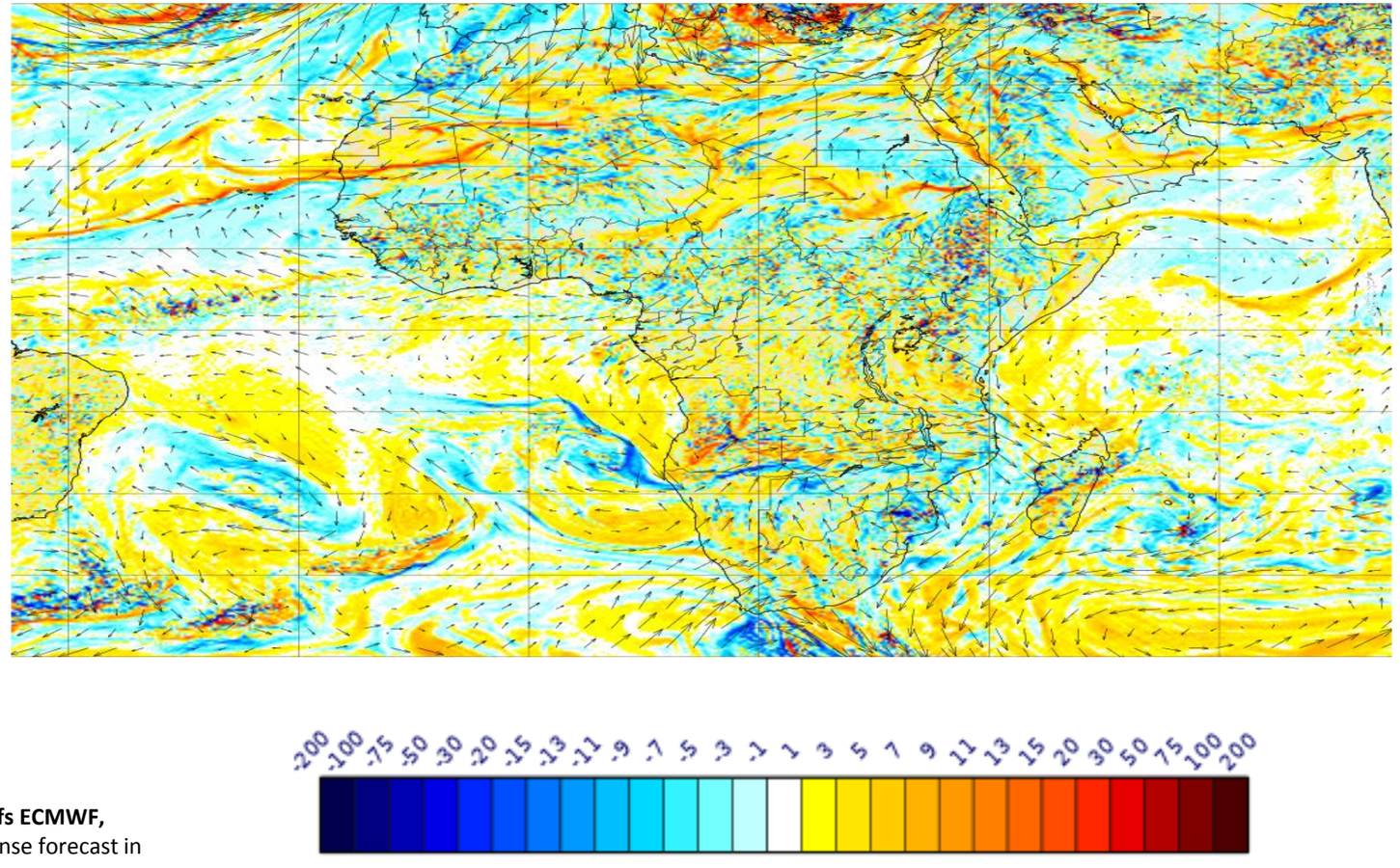


Figure 25: Relative vorticity forecast from cfs ECMWF,
For the forecast we see that there is an intense forecast in Kenya, Tanzania, Namibia, and South Arica

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

WEEK 1 (11 – 17FEB) AT 700 hPa DIVERGENCE WIND FORECAST ECMWF

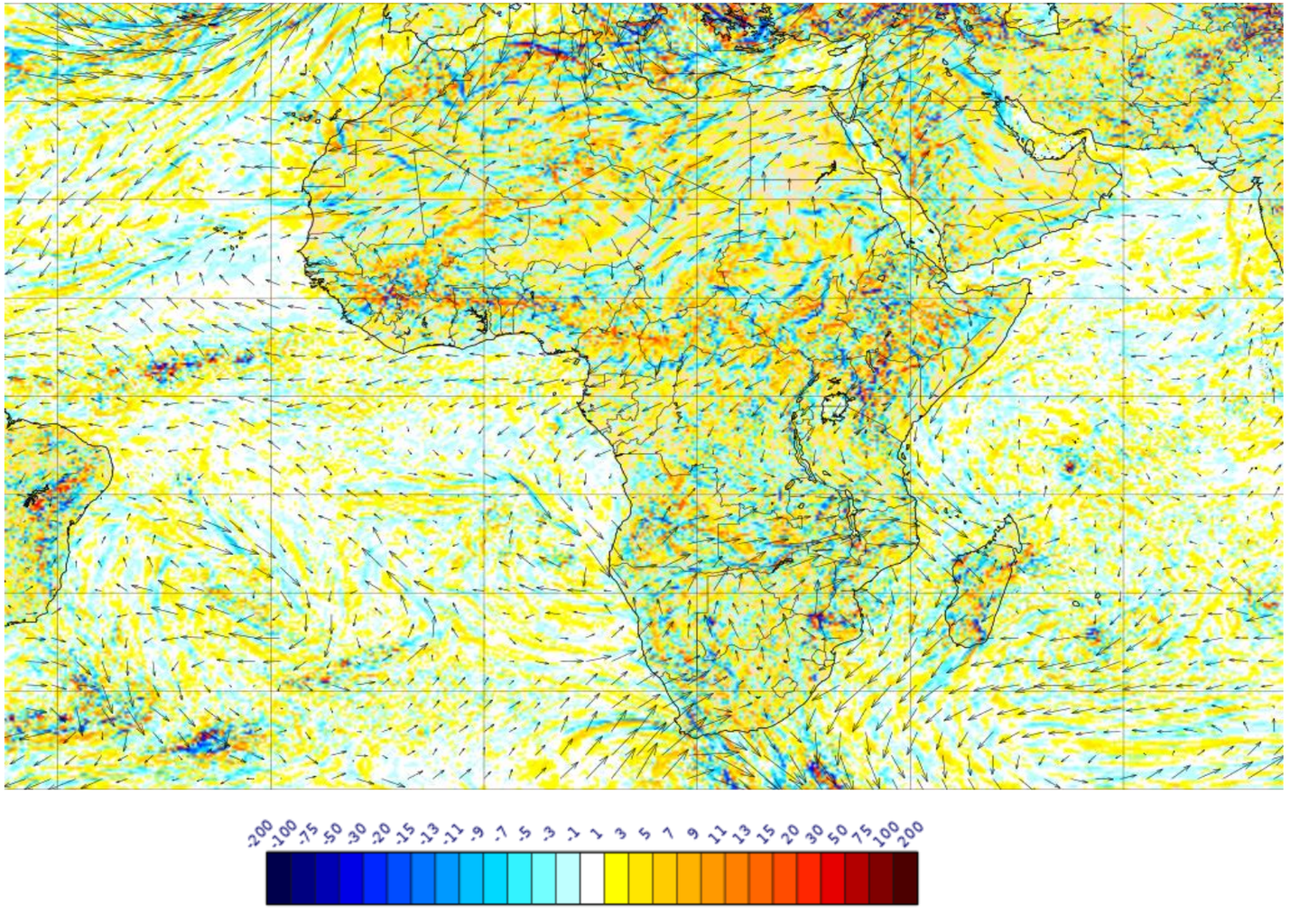


Figure 26: Divergence Wind forecast ECMWF
Always for the first week the wind is divergent

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

MONTHLY FORECAST FROM WMO LEAD CENTRE SINGLE ENSEMBLE AND MULTIMODE

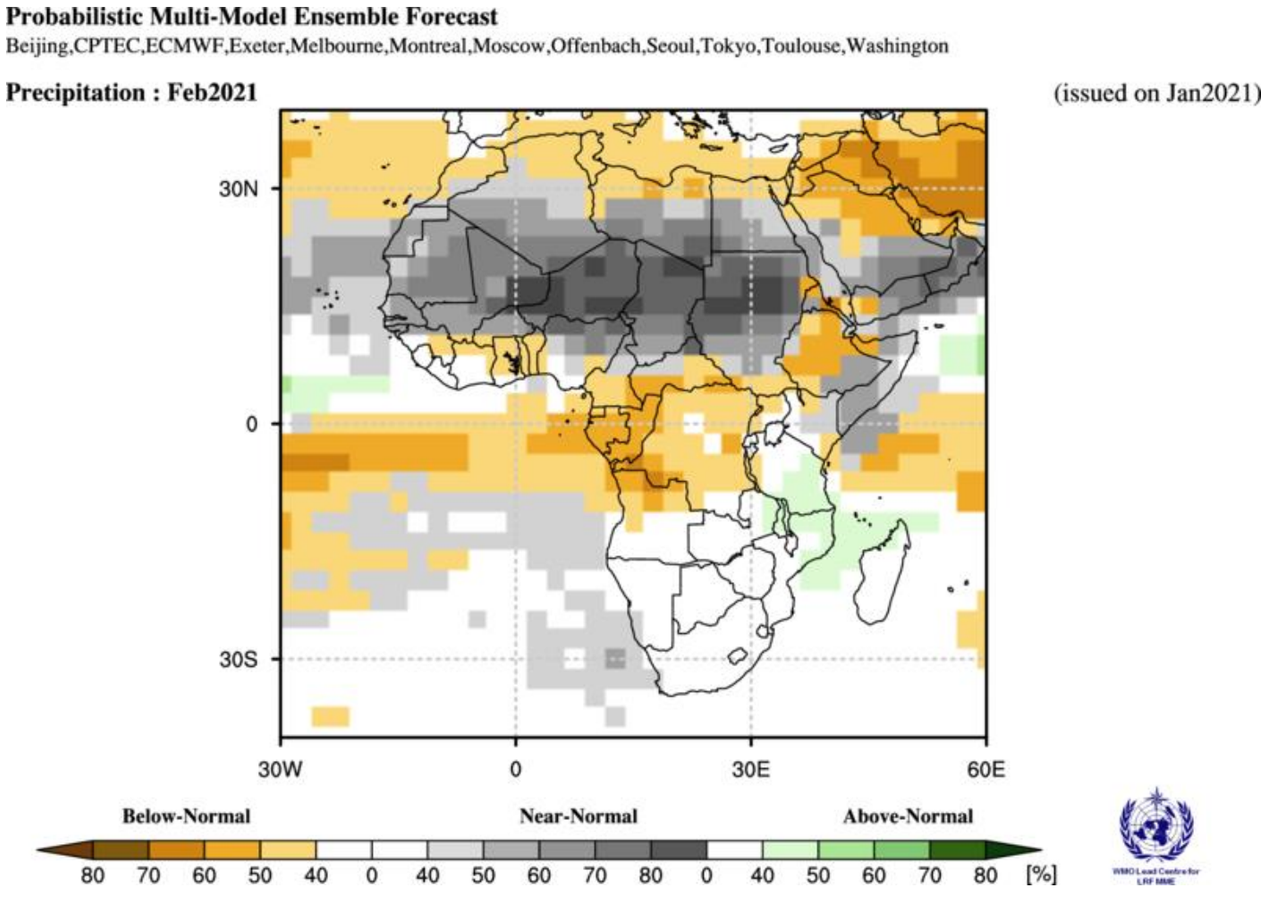
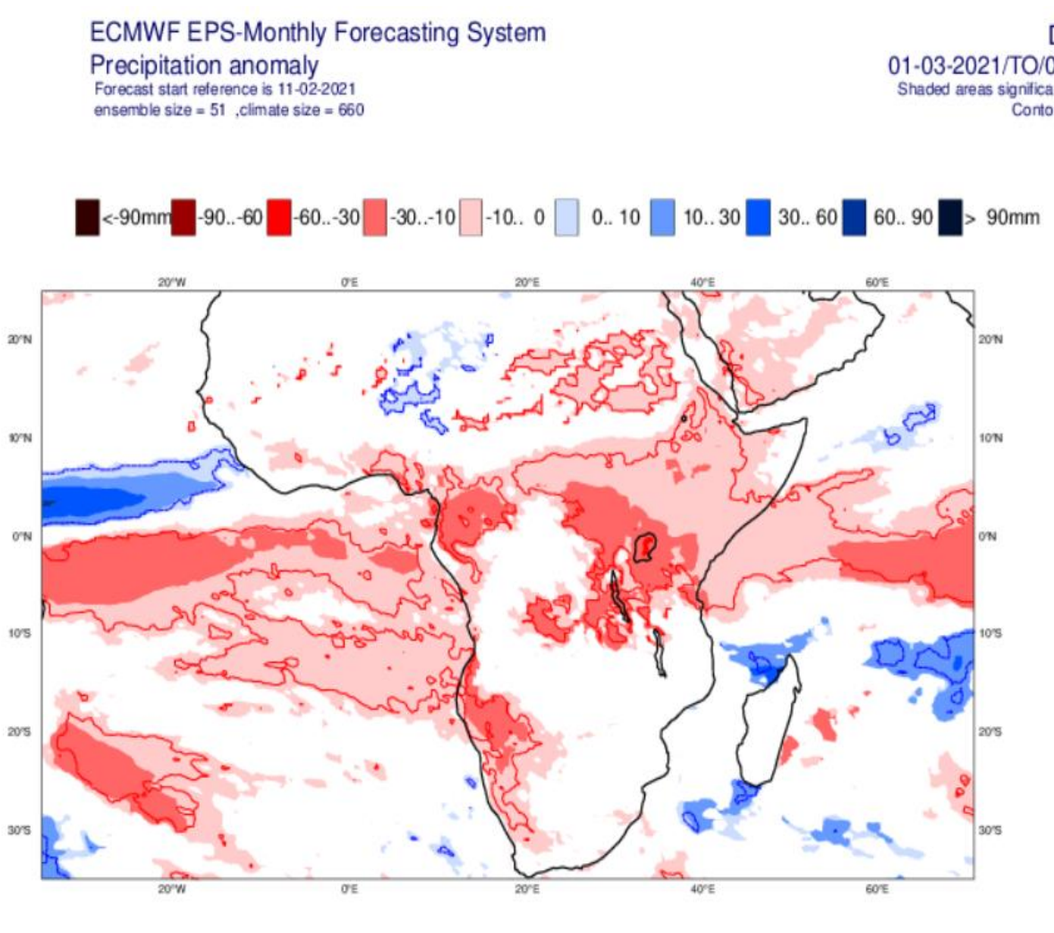


Figure 27: Monthly forecast

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



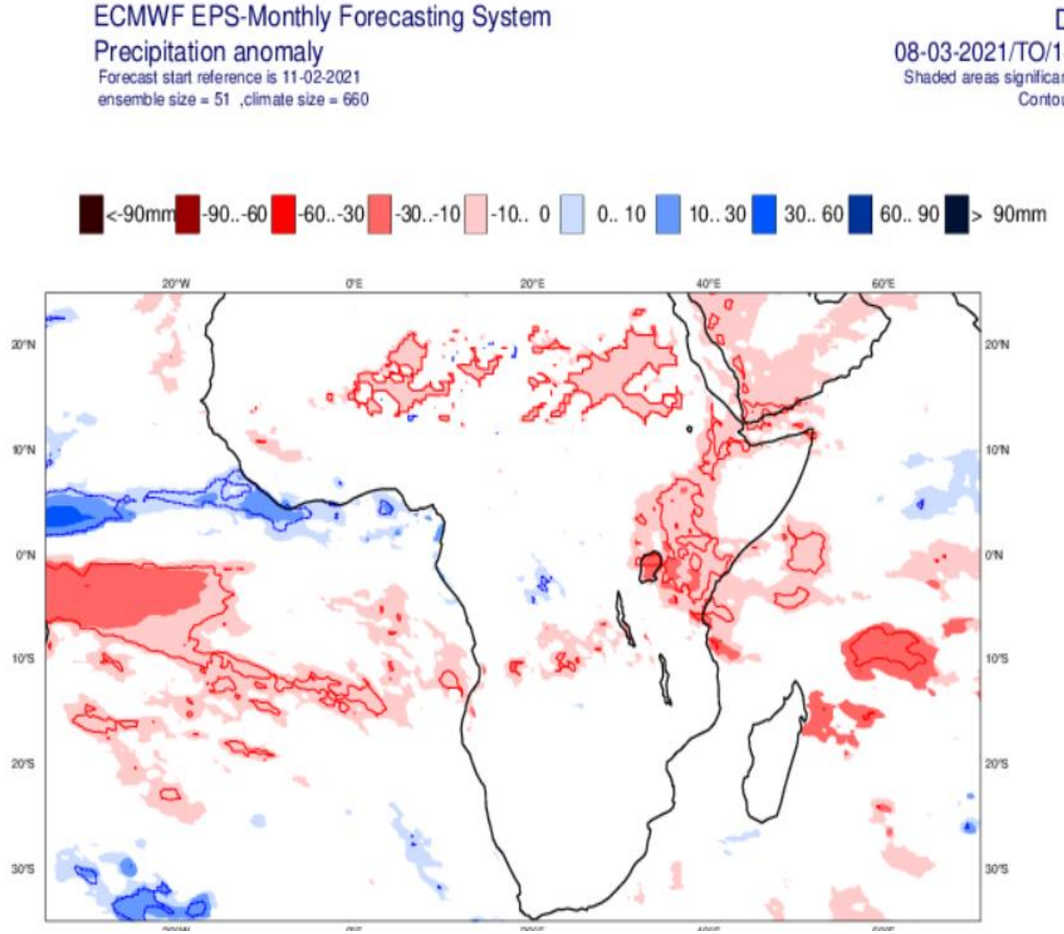
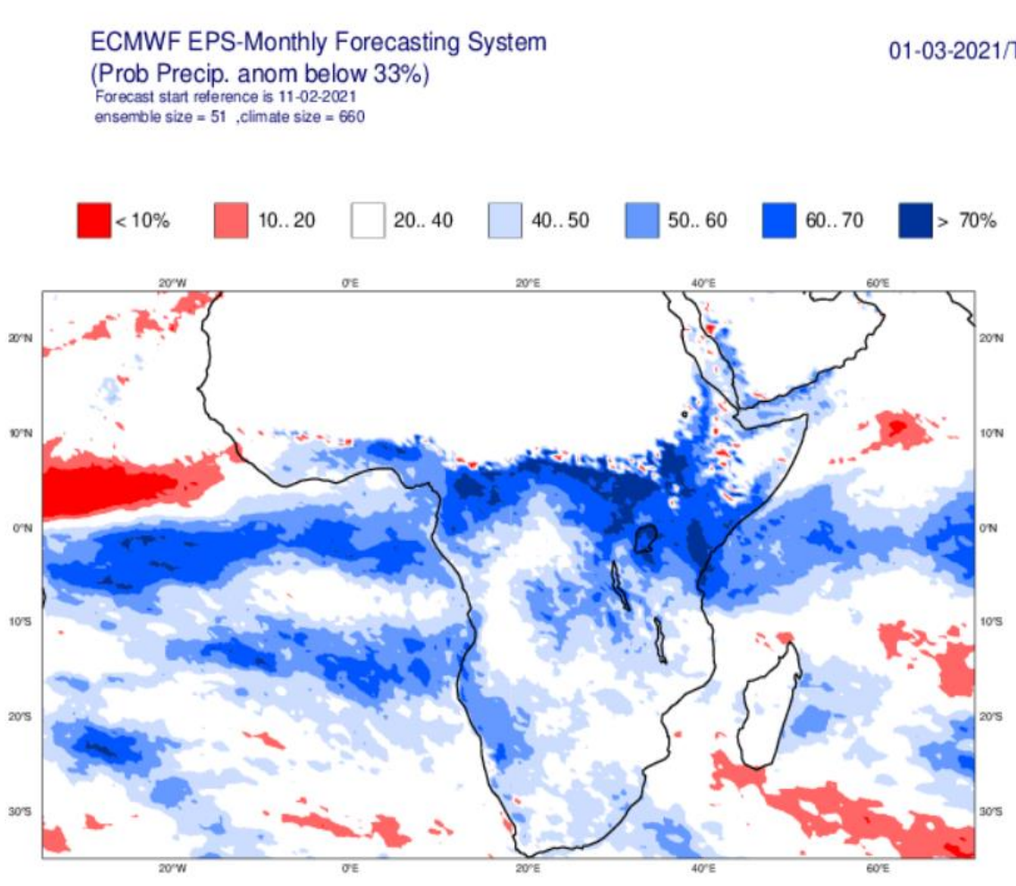


Figure 28: Precipitation forecast

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: Tercile 33 & 66



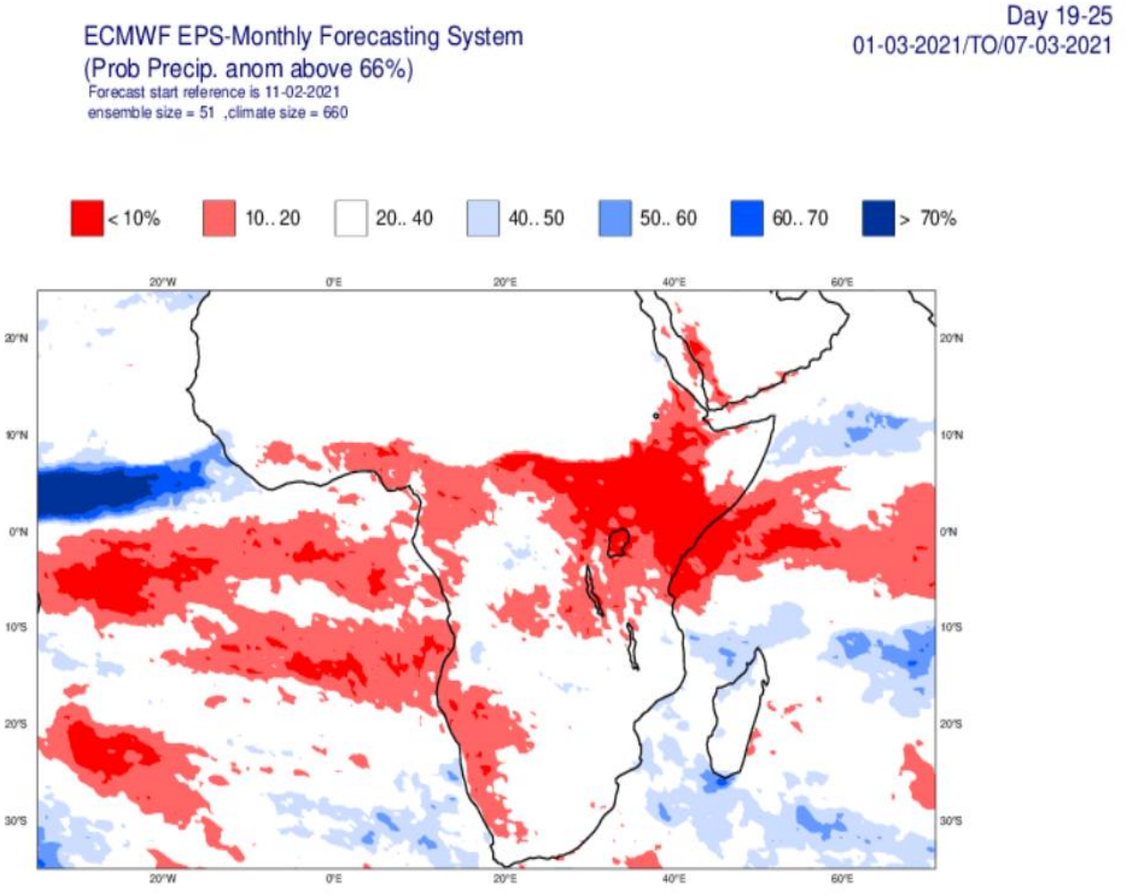
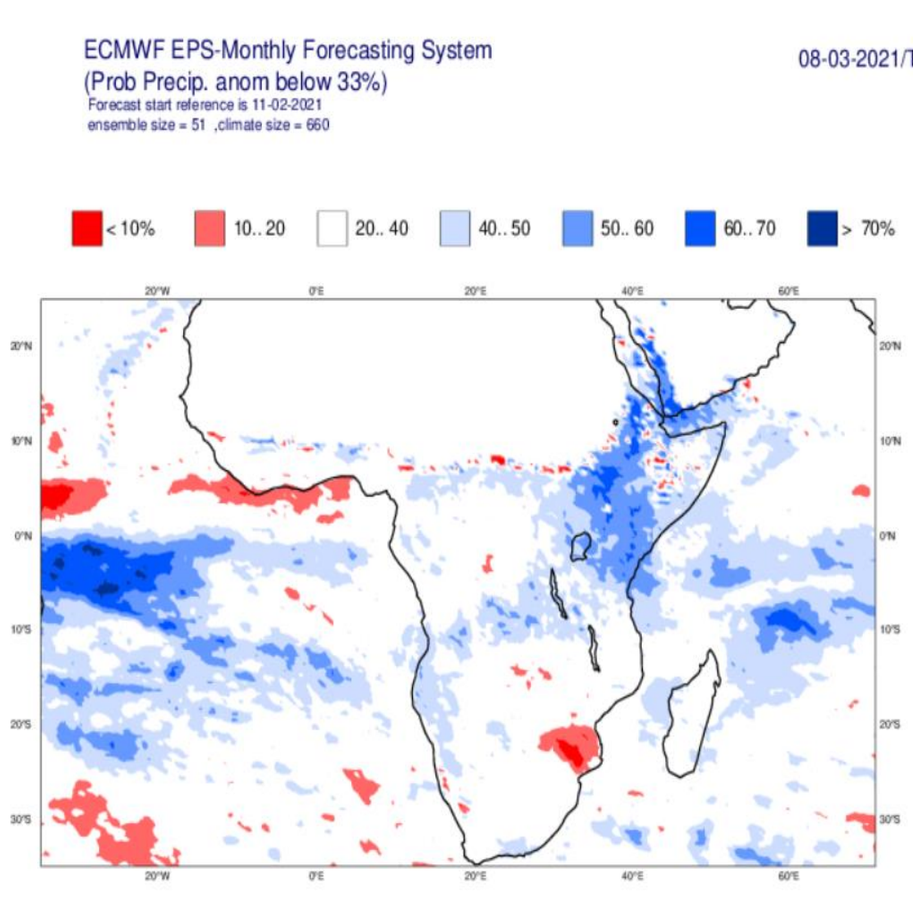


Figure 29: Monthly forecasting system

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: Tercile 33 & 66



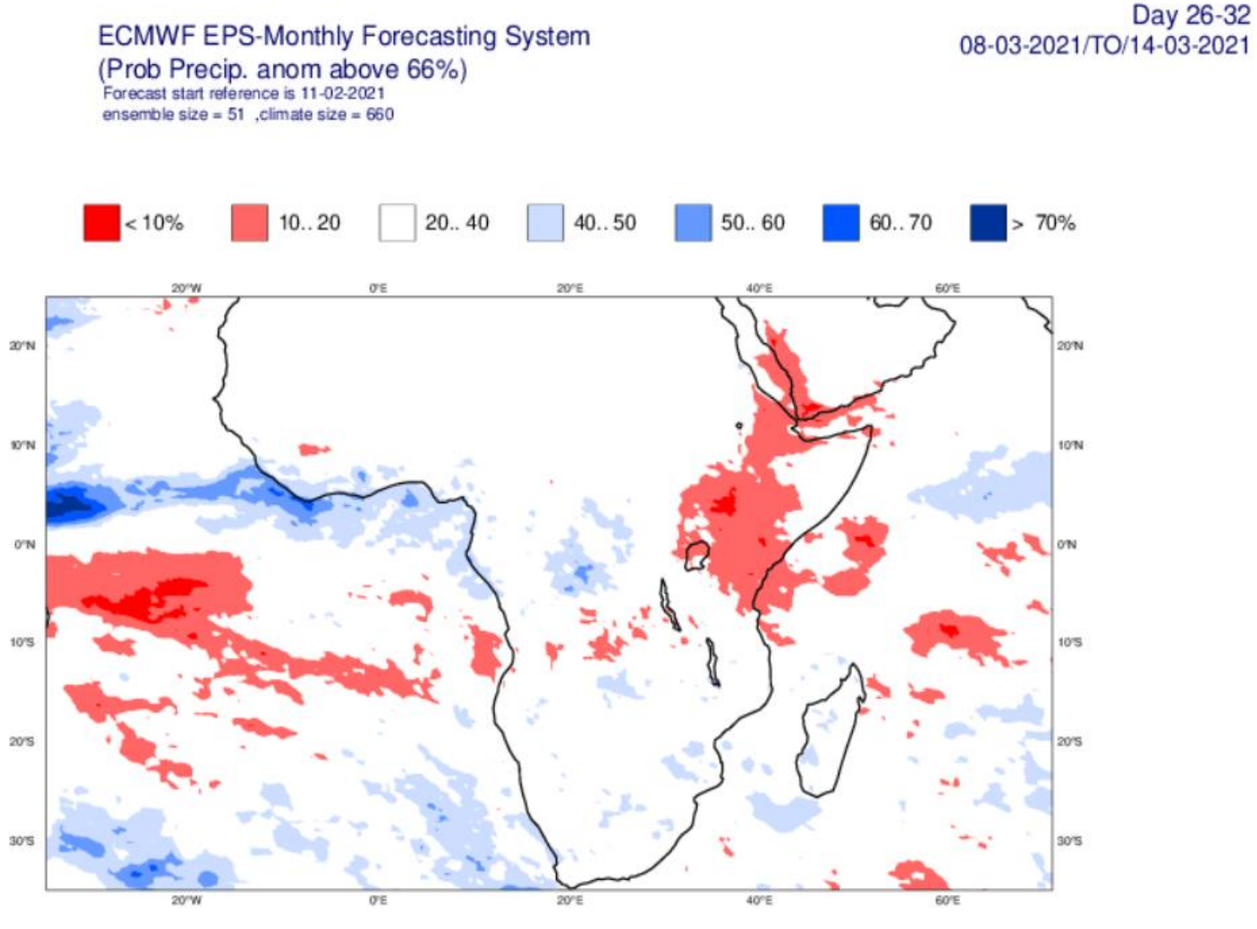
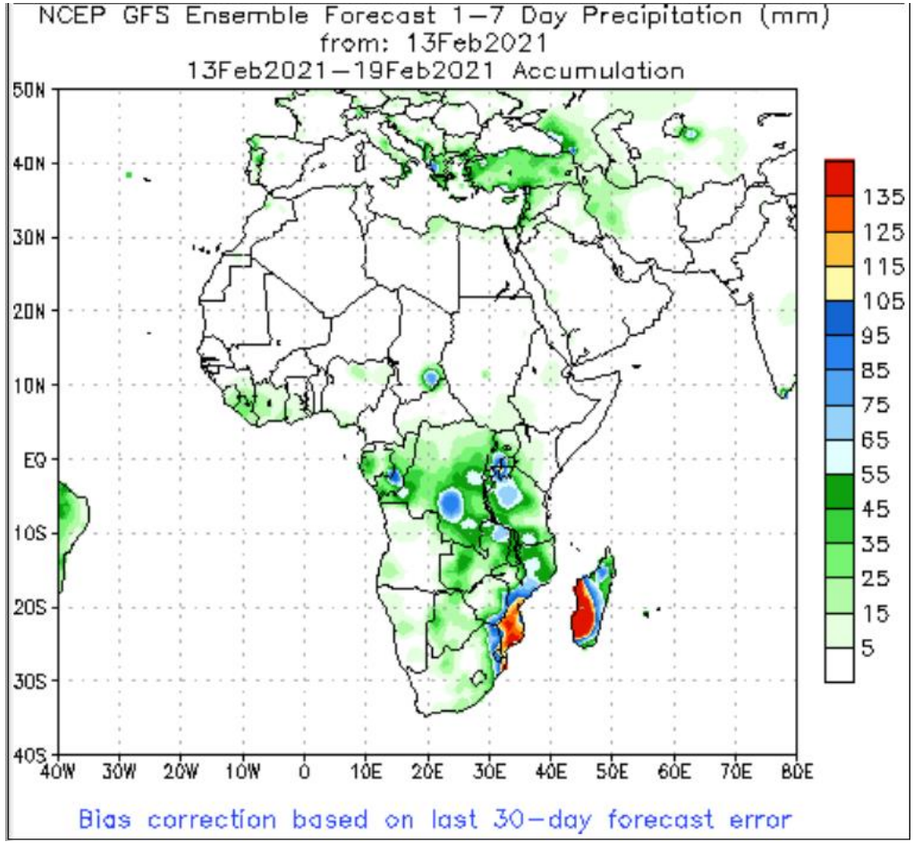


Figure 30: Monthly forecasting system

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

PRECIPITATION AND ANOMALY FORECAST

NCEP/GFS Ensemble Weather Forecast Week One



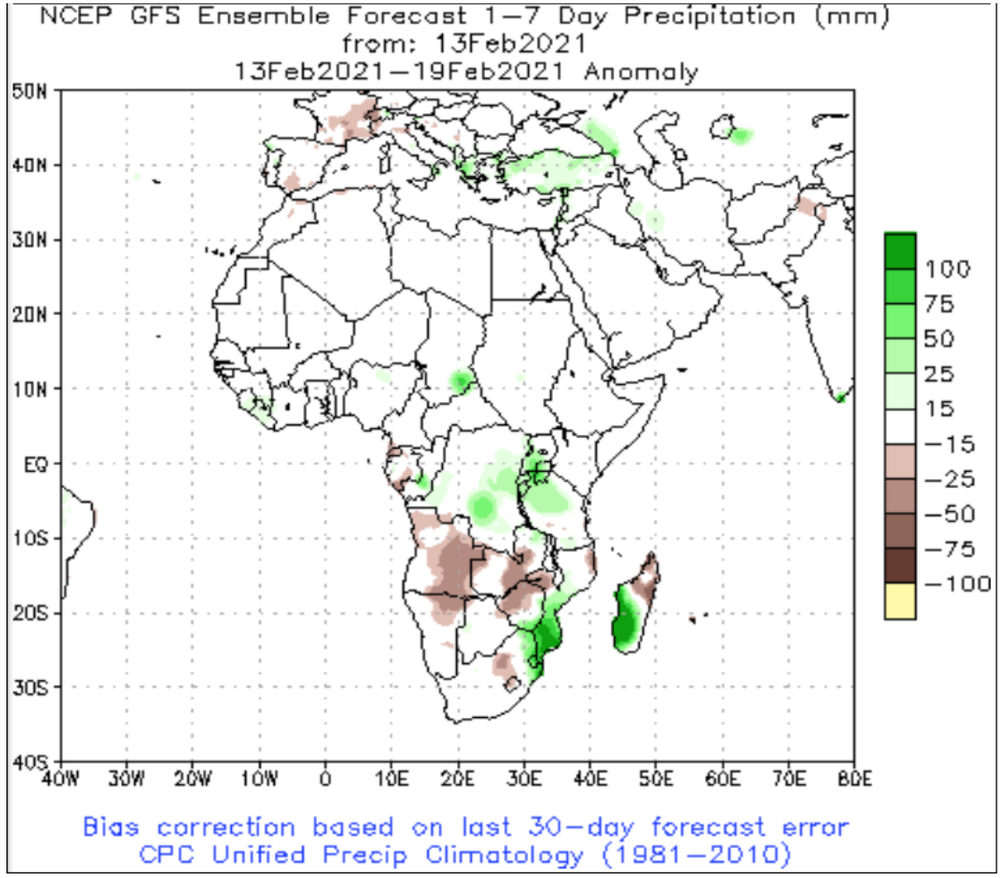


Figure 31- Précipitation and Anomaly forecast

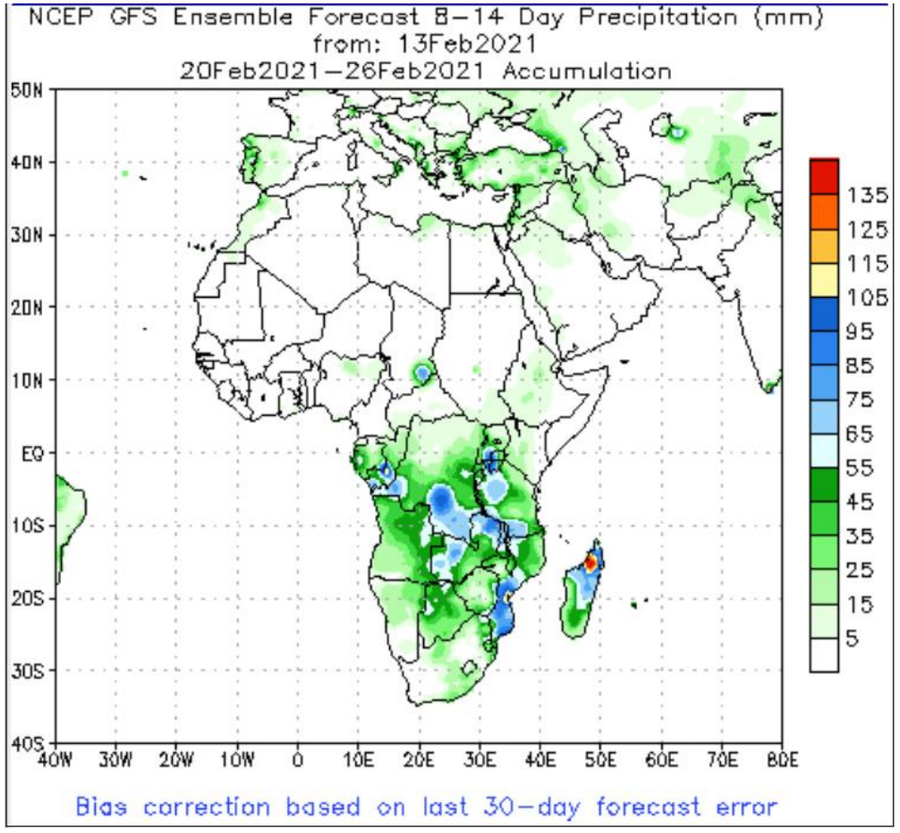
Precipitation of anomalies for the first week will generate more precipitation at the level of East Africa when we look at the level of the anomaly finds that this area is always in surplus.

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

PRECIPITATION AND ANOMALY FORECAST

NCEP/GFS Ensemble Weather Forecast Week Two



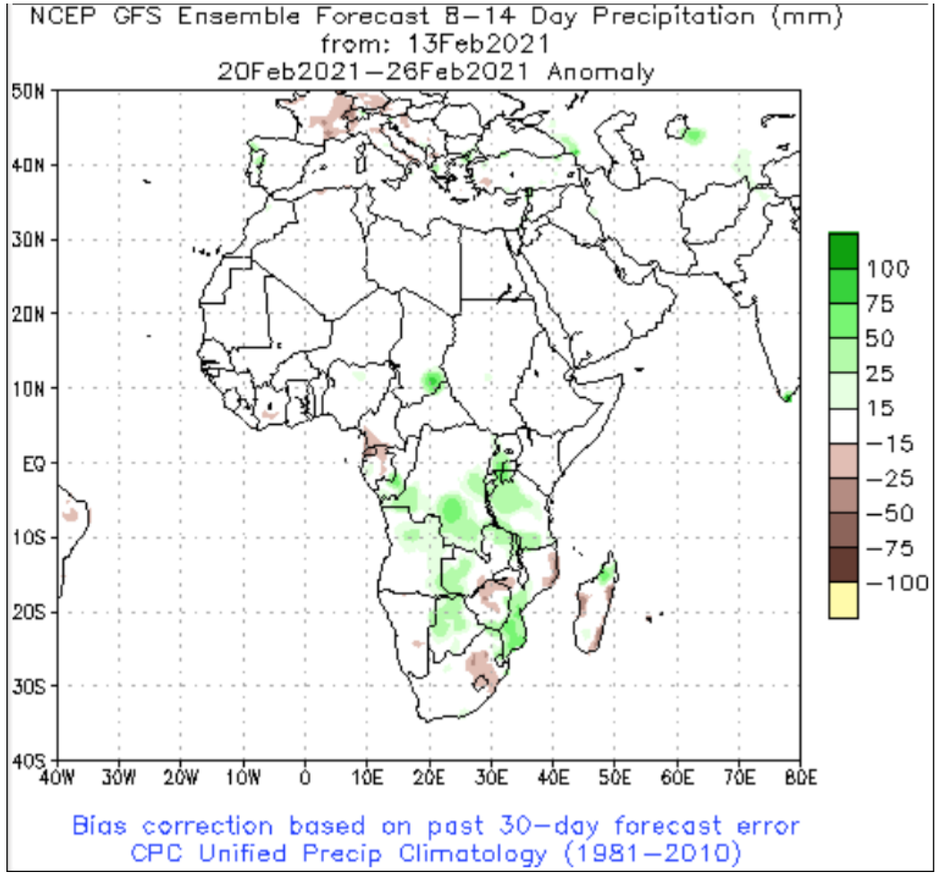


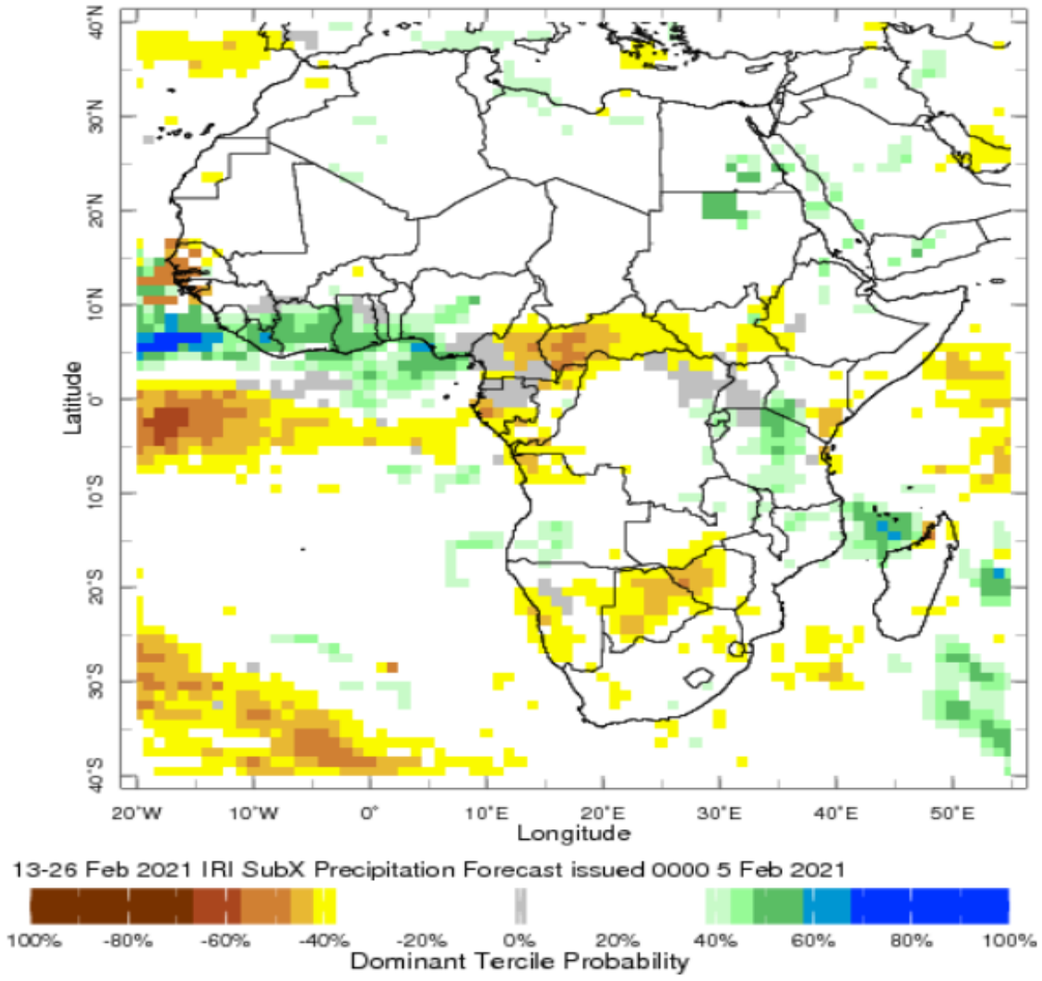
Figure 32: Précipitation and Anomaly forecast

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

PRECIPITATION PROBABILITY FORECAST subx: 30 Januay-19 February 2021



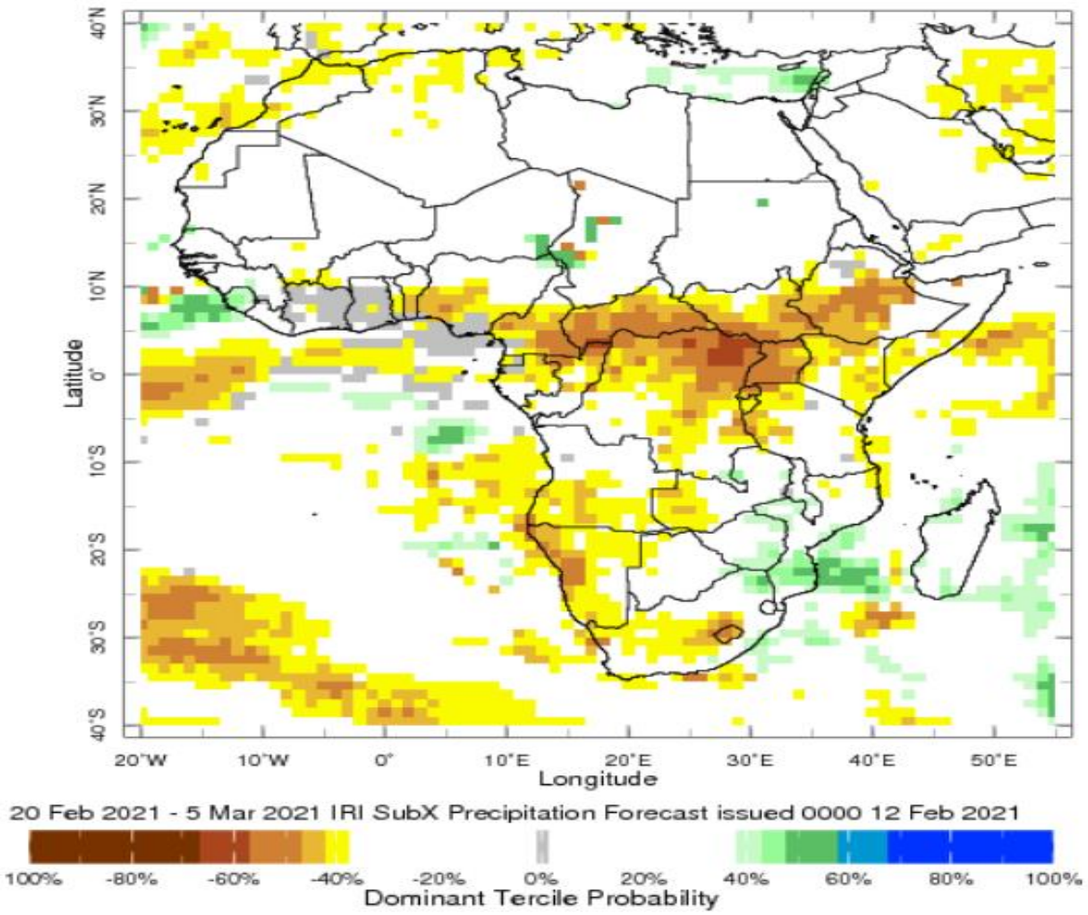


Figure 32: Precipation forecast subx

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

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%201%20Nov%202019&region=bb%3A-20%3A-40%3A55%3A40%3Abb

PRECIPITATION PROBABILITY FORECAST subx: 13-26 February 2021

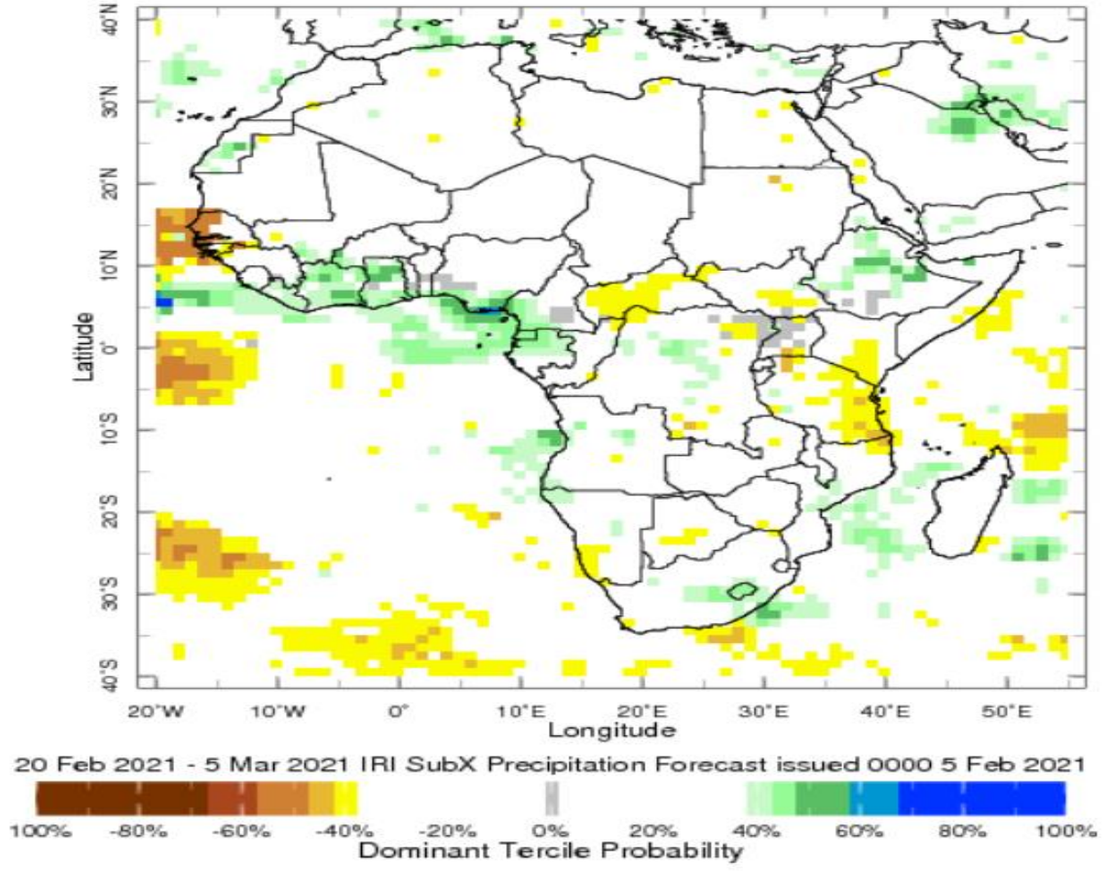


Figure 34- Précipitation and Anomaly forecast

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 [2]

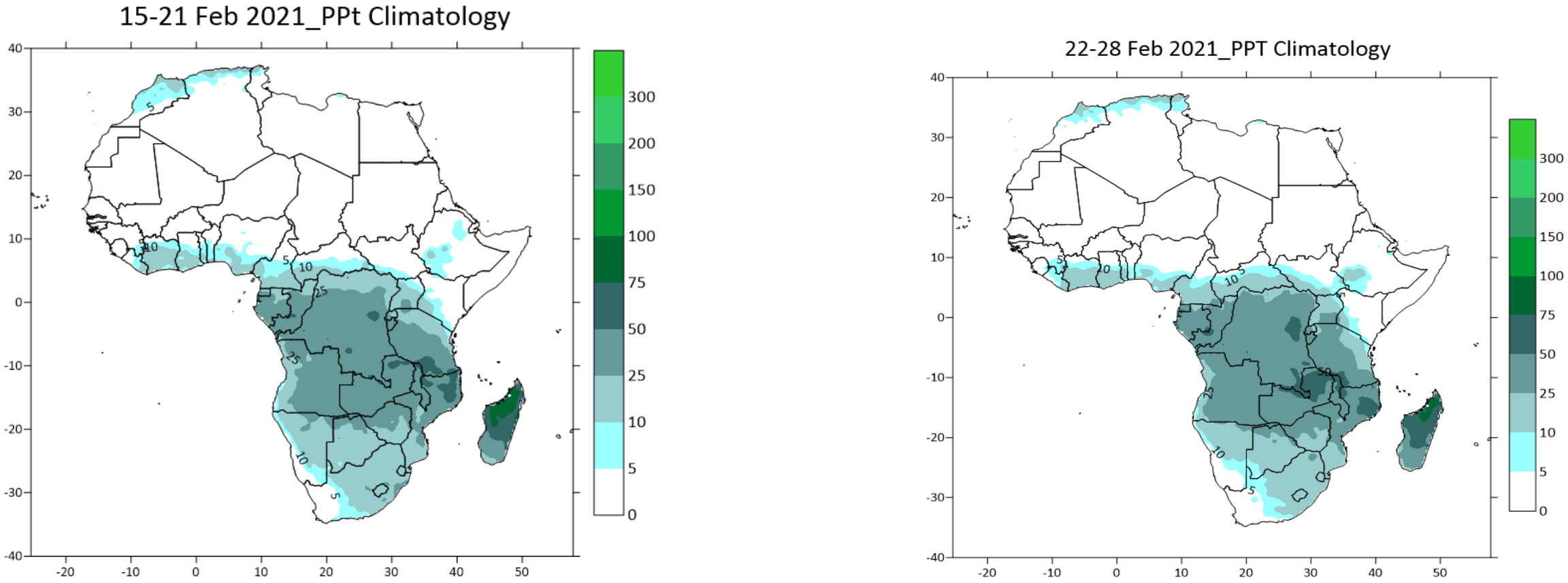
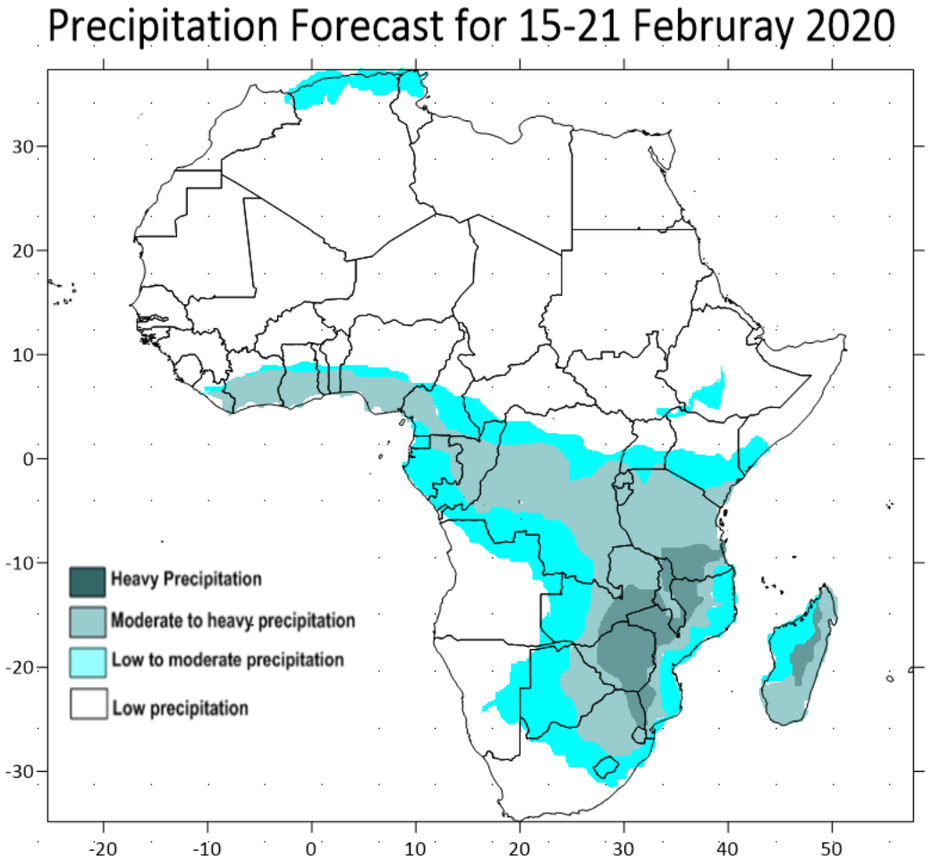


Figure 34: Climatology of Precipation

PRECIPITATION FORECAST FOR THE COMING TWO CONSECUTIVE WEEKS



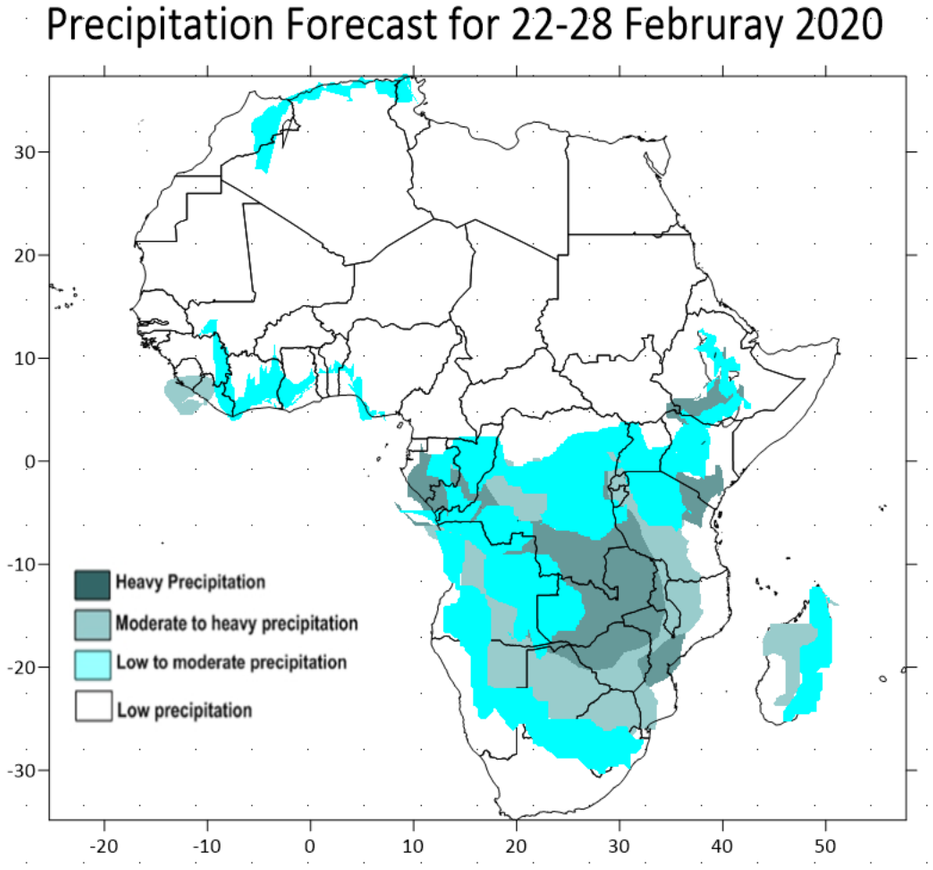


Figure 35: Precipation forecast Analysis