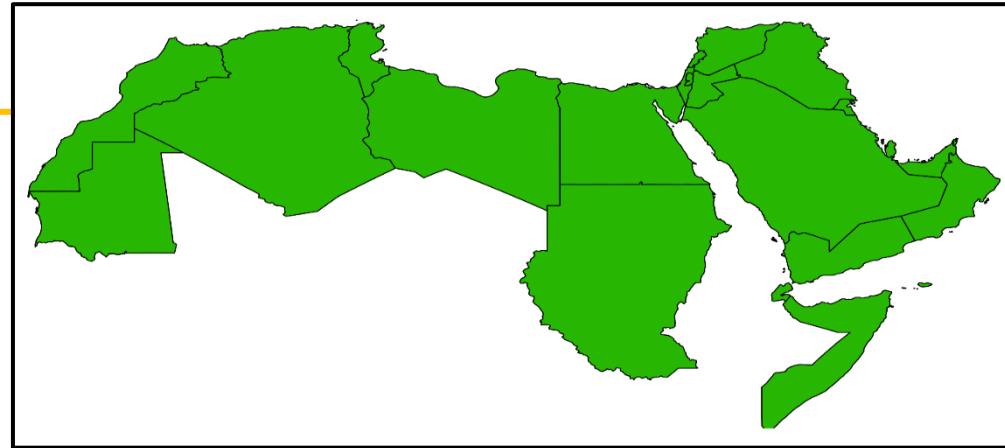


Direction Générale de la Météorologie Nationale  
MOROCCO



# CURRENT ATMOSPHERIC AND OCEANIC CONDITIONS APRIL 2021

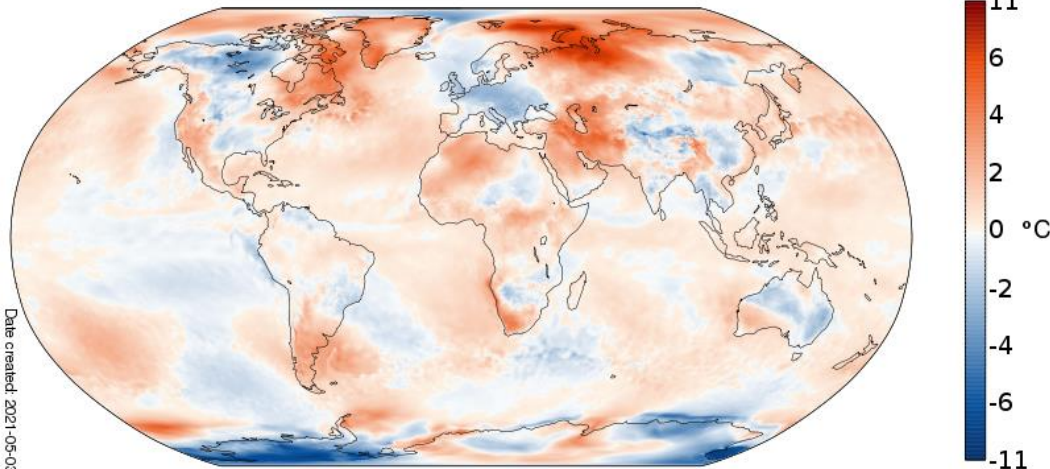


ArabCOF7, ON-LINE SESSION, June, 1st, 2020

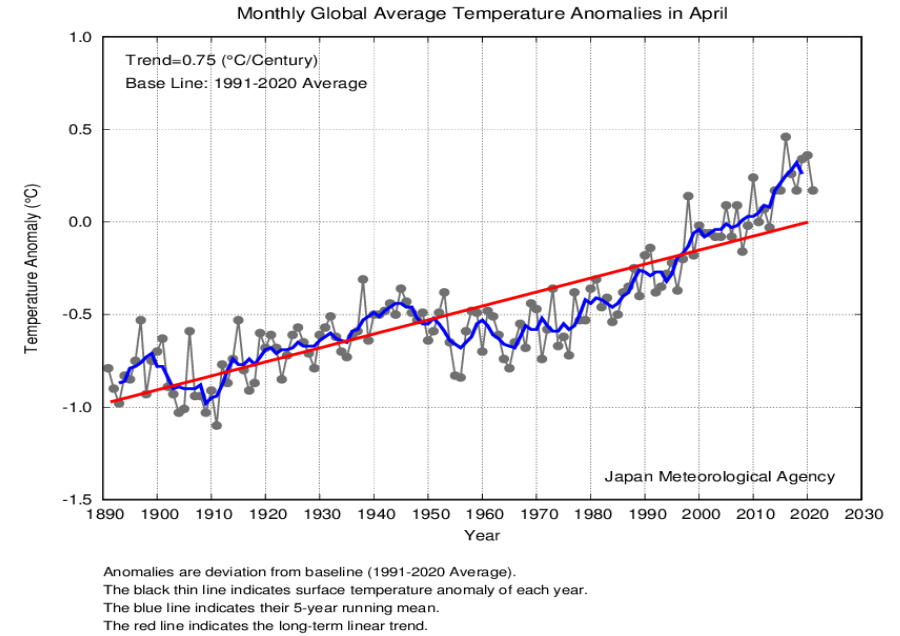
Wafae BADI

- *Temperature in April 2021*

Surface air temperature anomaly for April 2021

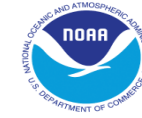


(Data: ERA5. Reference period: 1981-2010. Credit: C3S/ECMWF)



- The monthly anomaly of the global average surface temperature in April 2021 was +0.17°C above the 1991-2020 average,
- The 6th warmest since 1891.

# Selected Significant Climate Anomalies and Events: April 2021



## GLOBAL AVERAGE TEMPERATURE

April 2021 average global land and ocean temperature was the ninth highest for April since global records began in 1880.

## ARCTIC SEA ICE EXTENT

The April 2021 Arctic sea ice extent was 5.8% below the 1981–2010 average — the sixth-smallest April extent since satellite records began in 1979.

## CONTIGUOUS UNITED STATES

A late-season snowstorm on April 20-27 brought record snow for this time of year across parts of the Ohio Valley and the Northeast. The storm snapped trees and caused power outages and travel problems.

## SOUTH AMERICA

South America had its seventh-warmest April on record.

## EUROPE

Europe had its coldest April since 2003.

## AFRICA

Africa's April 2021 temperature departure was the fourth-warmest April on record.

## ANTARCTIC SEA ICE EXTENT

The Antarctic sea ice extent for April 2021 was 3.4% above average and was the 16th largest for April on record.

## ASIA

April 2021 was Asia's 12th-warmest April on record.

## TYPHOON SURIGAE

Surigae was an extremely powerful cyclone, with the strongest maximum wind speed ever recorded for a storm during the months of January-April anywhere in the world.

## CYCLONE SEROJA

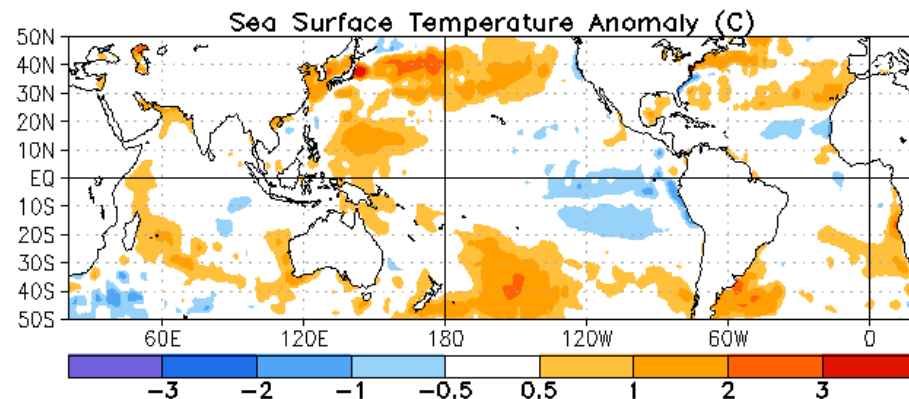
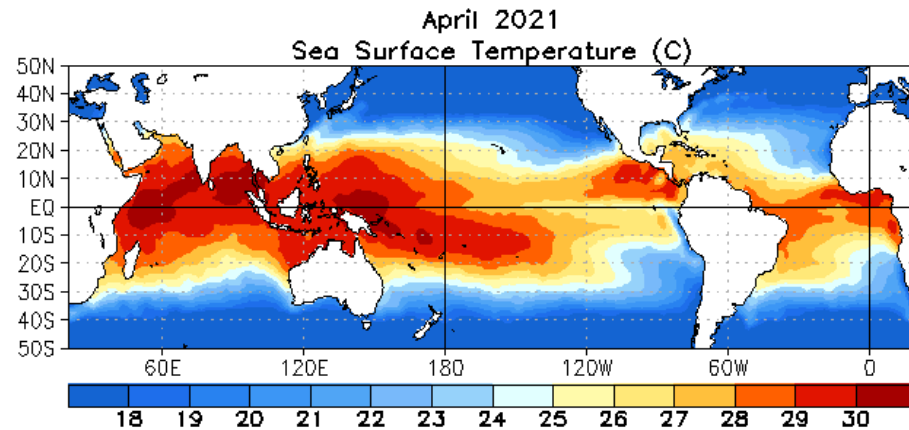
Cyclone Seroja brought heavy rain and strong winds to parts of Western Australia. Several locations had their highest daily rainfall on record. Seroja also affected Indonesia, causing historic floods and landslides.

## NEW ZEALAND

This was the fourth-warmest April for New Zealand.

Please note: Material provided in this map was compiled from NOAA's State of the Climate Reports. For more information please visit: <http://www.ncdc.noaa.gov/sotc>

- Oceanic conditions in April 2021



- Tropical Pacific**  
Neutral ENSO conditions  
-Near average negative SST anomalies were observed over **NINO 3.4** region.
- North Atlantic:**  
-Negative SST anomalies (near average) were observed over **NTA** region.
- Indian Ocean:**  
-Near average SST anomalies were observed over Indian ocean  
-**Neutral** Indian Ocean Dipole (**IOD**) (No significant east-west gradient)

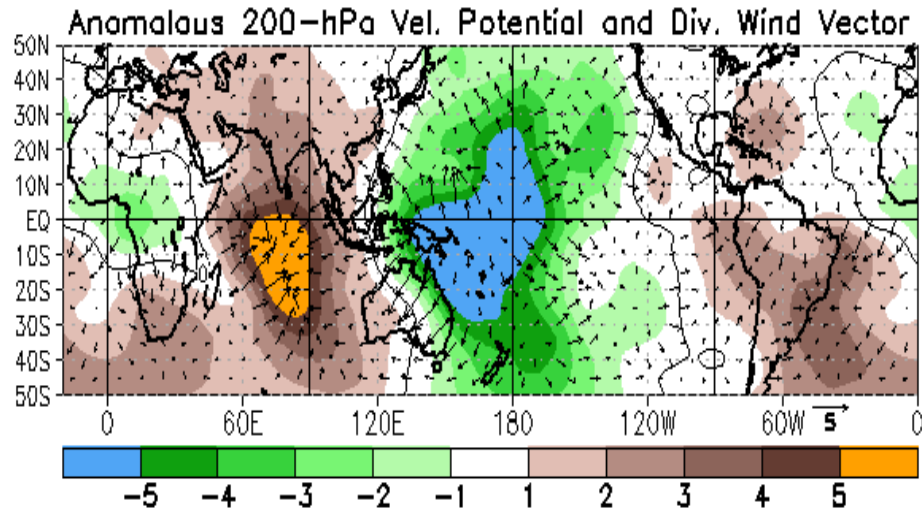
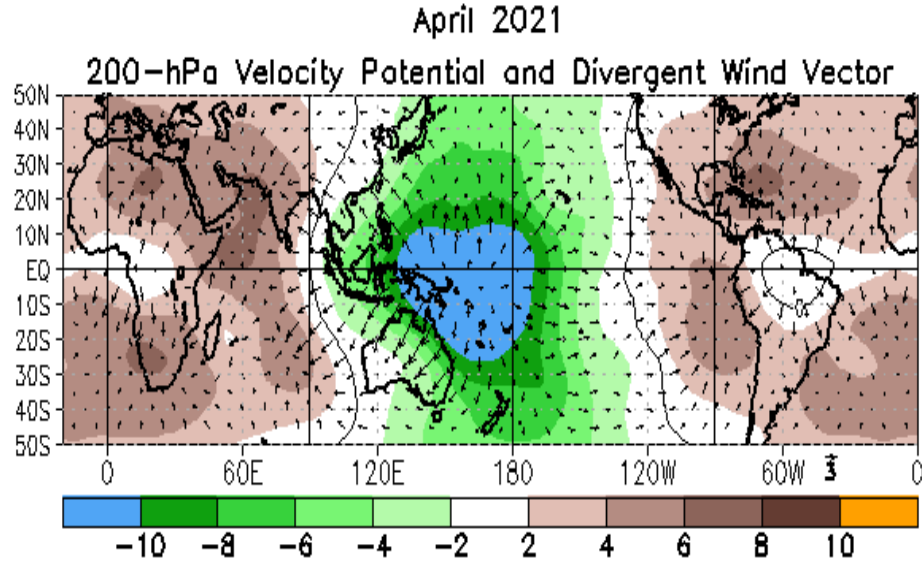
Global Seasonal Climate Update  
Outlook



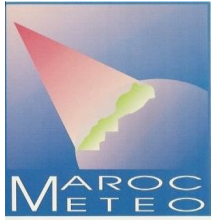
Month	Niño 1+2	Niño 3	Niño 4	Niño 3.4	IOD	NTA	STA
February 2021	-0.7	-0.6	-1.0	-0.9	0.18	0.2	-0.4
March 2020	-0.3	-0.4	-0.6	-0.5	0.1	0.0	-0.4
April 2021	-0.8	-0.7	-0.2	-0.5	0.28	-0.2	-0.1
February-April 2021	-0.6	-0.6	-0.6	-0.6	0.2	0.0	-0.3

Table 1. Large-scale oceanic indices (°C). Anomalies are with respect to the 1981-2010 average. (Source: U.S. Climate Prediction Center)

- Convective activity in April 2021



- Over the Pacific:  
Convection over the West but absence of dipole (convection and suppressed convection reflecting **Neutral conditions**)
- Over Indian Ocean:  
Subsidence cell but absence gradient between East and West → Neutral IOD
- Over Atlantic Ocean:  
Weak convection cell over West Africa

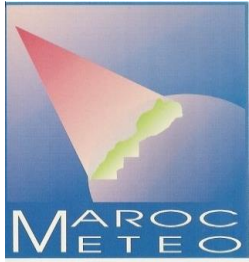


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CURRENT ATMOSPHERIC AND OCEANIC  
CONDITIONS  
APRIL 2021

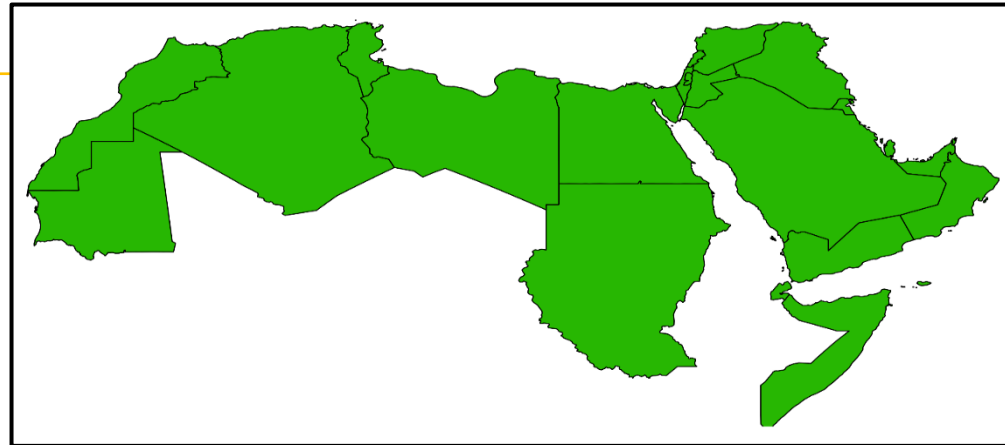
THANKS 😊



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# SEASONAL FORECAST OVER ARAB REGION JJA 2021

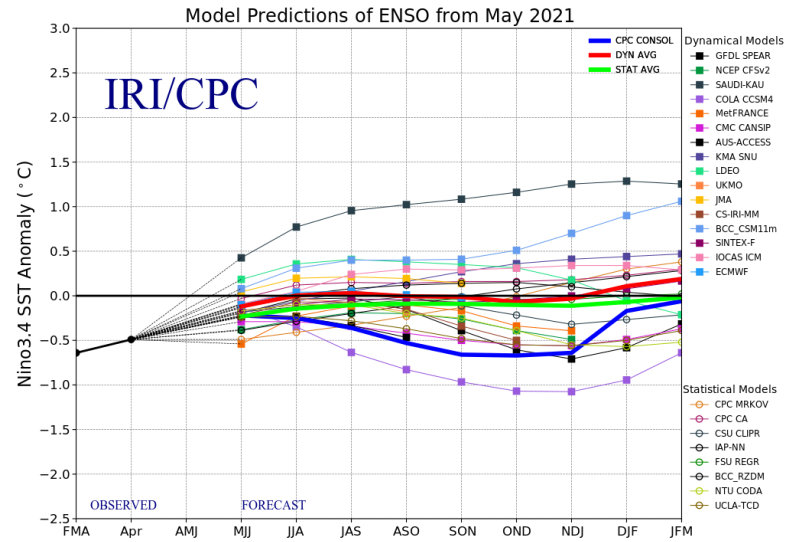


ArabCOF7, ON-LINE SESSION, June, 1st, 2020

Wafae BADI

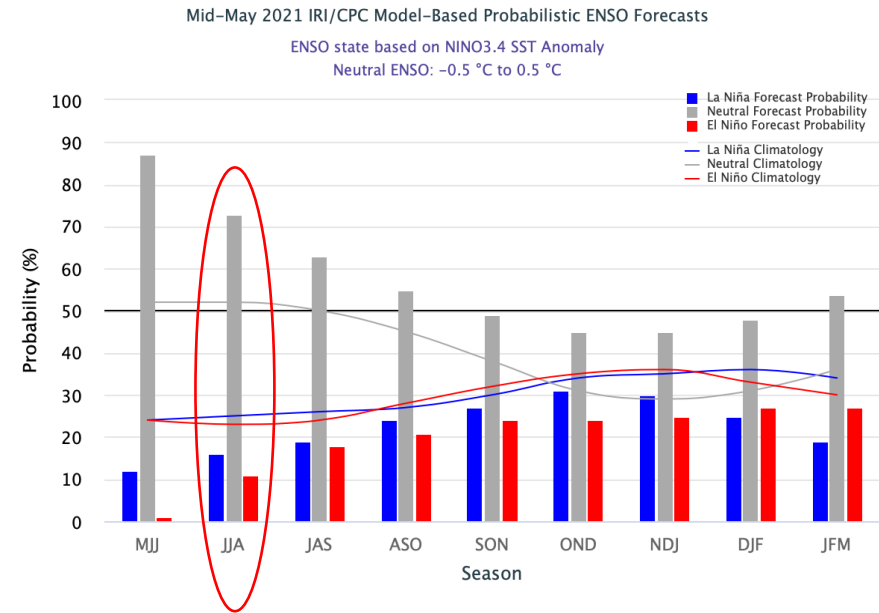
# MULTI-MODEL OUTPUT

- ENSO prediction



<https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

- Most of the models predicts ENSO-neutral conditions during summer



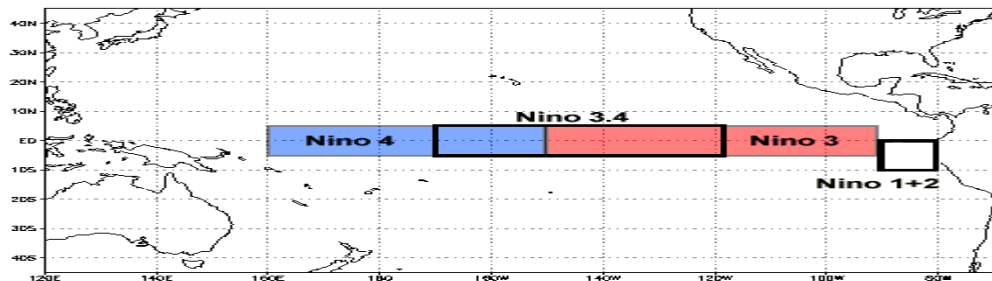
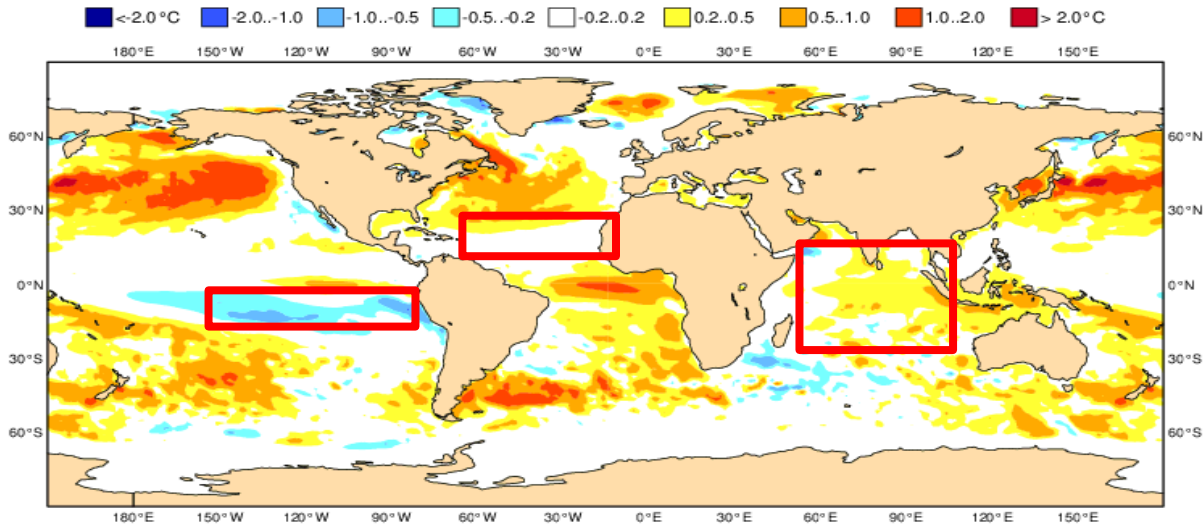
**There is a ~67% chance of ENSO-neutral during JJA 2021**



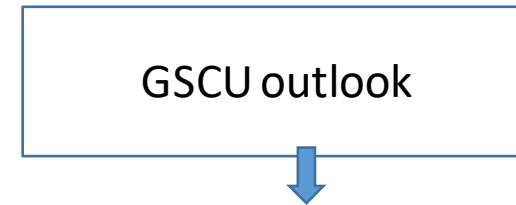
# Tropical Atlantic, Pacific and Indian Ocean

ECMWF Seasonal Forecast  
 Mean forecast SST anomaly  
 Forecast start is 01/05/21, climate period is 1999-2016  
 Ensemble size = 51, climate size = 600

System 5  
 JJA 2021



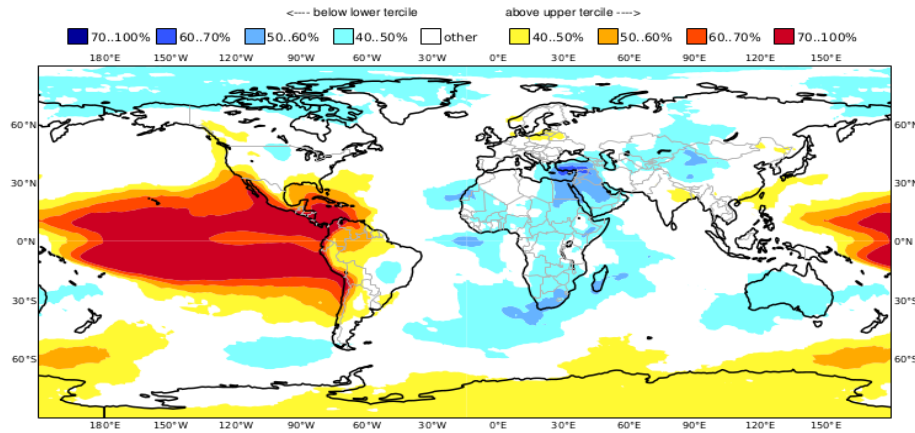
- Positive SSTs (weak) over NTA (Niño of Atlantic)
- Positive SSTs (near average) over Indian ocean
- Negative SSTs (weak) over NINO4, NINO 3,4
- Positive SSTs (weak) over NINO 1+2 and NINO 3



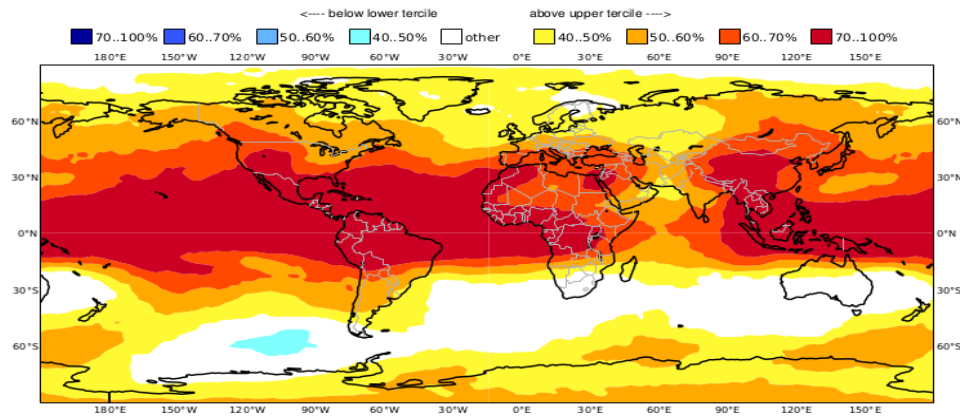
Month	Nino 1+2	Nino 3	Nino 4	Nino3.4	IOD	NTA	STA
June 2021	0.0±0.3	0.0±0.2	0.0±0.1	-0.1±0.1	-0.1±0.3	0.2±0.2	0.1±0.1
July 2021	0.2±0.3	0.1±0.3	-0.1±0.2	-0.1±0.2	-0.1±0.3	0.3±0.2	0.1±0.1
August 2021	0.2±0.3	0.6±0.3	-0.1±0.2	-0.1±0.3	-0.2±0.3	0.3±0.2	0.2±0.1
June-August 2021	0.1±0.3	0.1±0.3	-0.1±0.2	-0.1±0.2	-0.1±0.3	0.2±0.2	0.2±0.1

# • Dynamical Circulation (SLP&Z500)

C3S multi-system seasonal forecast    ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP/JMA/ECCC  
 Prob(most likely category of MSLP)    JJA 2021  
 Nominal forecast start: 01/05/21  
 Unweighted mean



C3S multi-system seasonal forecast    ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP/JMA/ECCC  
 Prob(most likely category of Z500)    JJA 2021  
 Nominal forecast start: 01/05/21  
 Unweighted mean



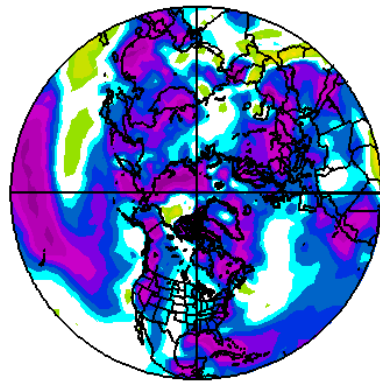
- **Z500**: above normal conditions over the whole region
- **SLP**: below normal sea level pressure is projected over Southern Morocco and Mauritania and Middle East



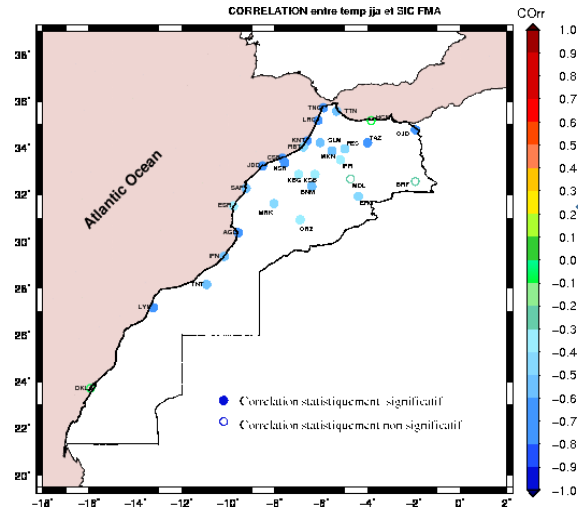
Strengthening of Saharan Low → Extreme temperature over S. Morocco and Mauritania

# *CLIMATE DRIVERS*

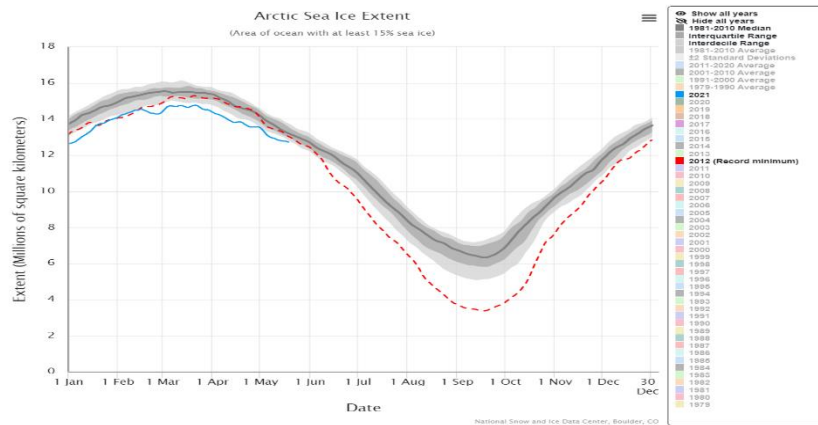
# Sea Ice Extent: FMA



Jun to Aug; 1979 to 2015: Surface Air Temperature  
Seasonal Correlation w/ Feb to Apr / Public/incoming/timeseries/sic\_testLaocli (index leads by 4 months)  
NCEP/NCAR Reanalysis  
NOAA/ESRL Physical Sciences Division



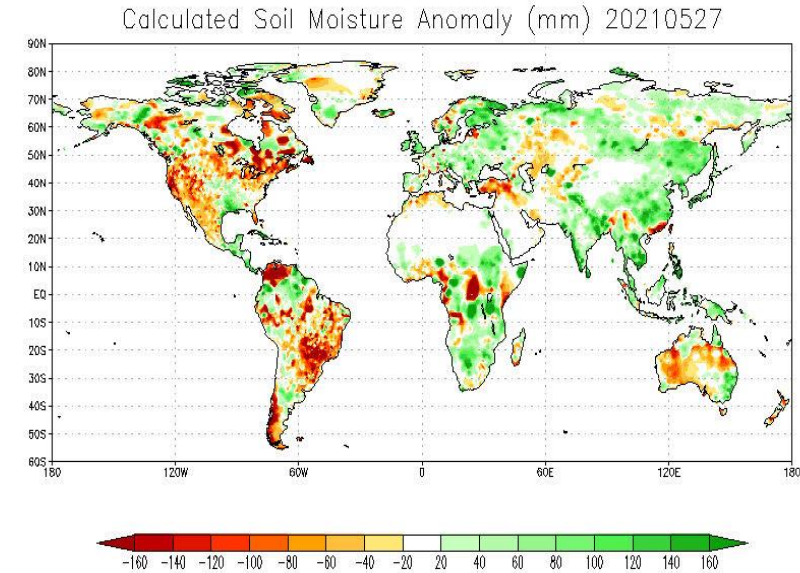
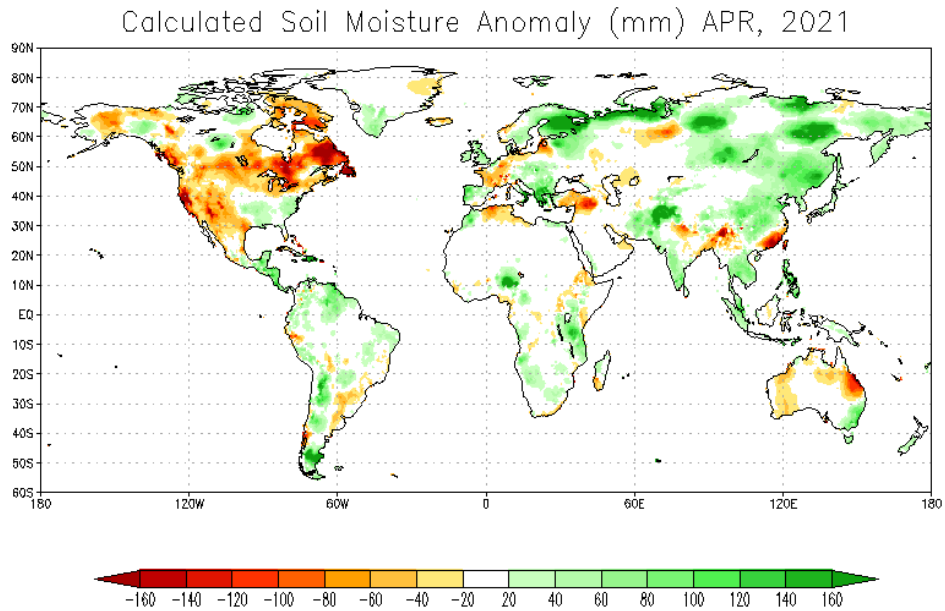
Negative link between SIC of FMA and temperature of JJA over most of North Africa domain especially over Southern Morocco and Mauritania and Arabian Peninsula



SIC index for February, March and April 2021 which may favor above normal temperature during JJA2021 over most of North Africa.

-Above normal temperature over S.Morocco, Mauritania, Egypt and ARP

- *Soil Moisture:*



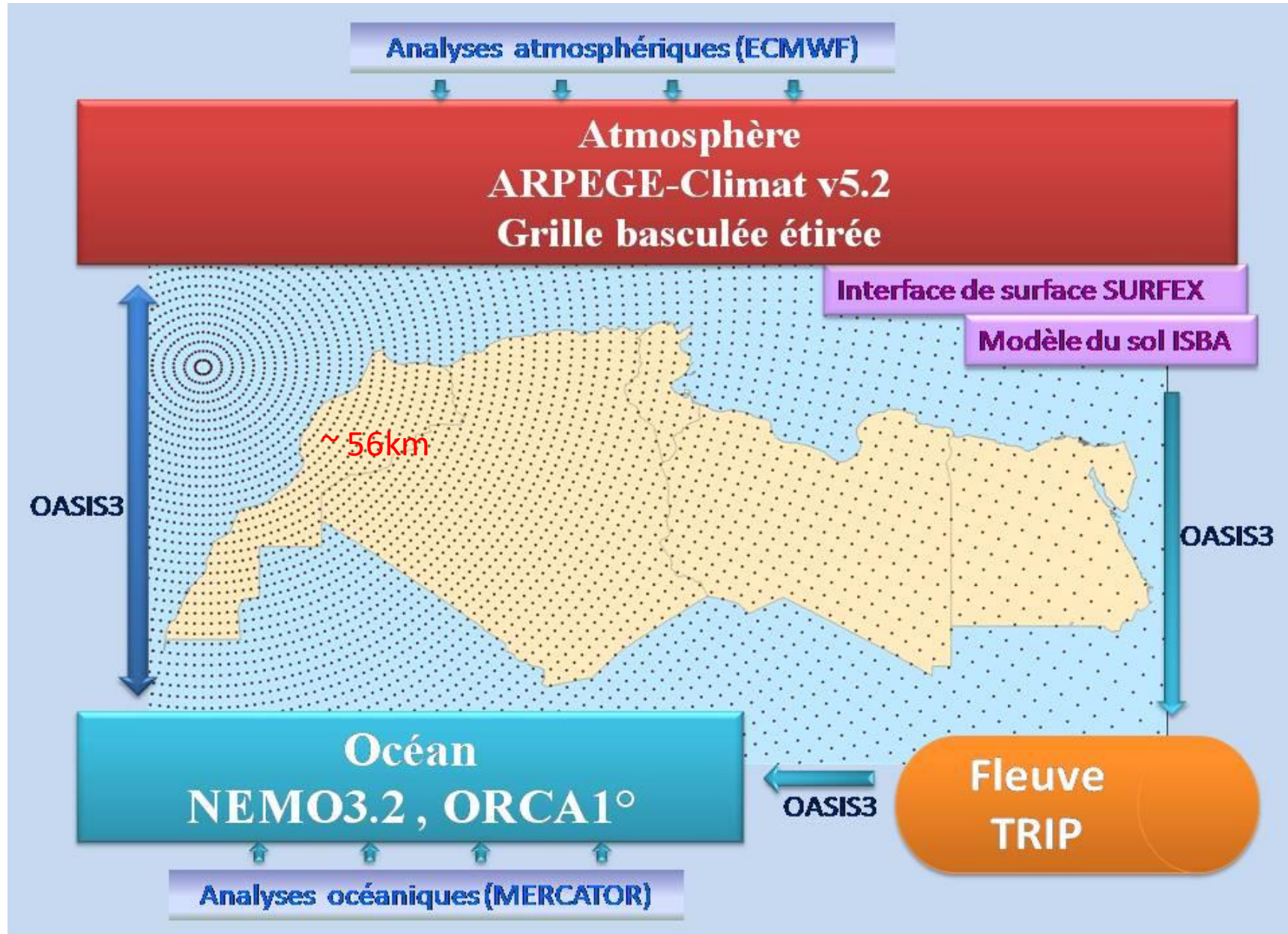
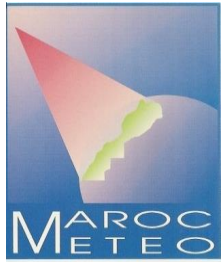
- Positive soil moisture over NW Morocco, Northern Egypt and Iberia
- Negative soil moisture over Northern Algeria and Tunisia



- Favor heat waves
- Modulate the temperature

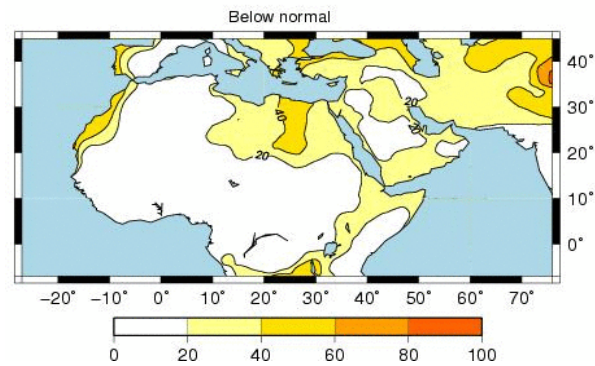
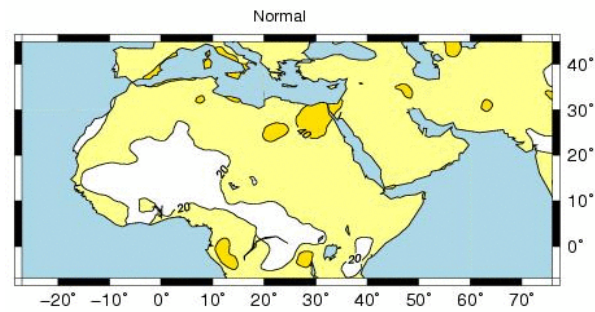
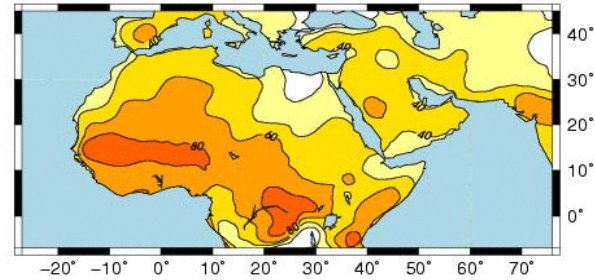
# *PRECIPITATIONS & TEMPERATURES*

*Operational system of seasonal forecast at Maroc-Météo*

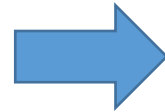


# ARPEGE-Climat Morocco

Probability of tercile category of 2m temperature for JJA 2021 over ARAB region  
(ARPEGE-Climat V5.2 coupled model, issued MAY 2021)  
Ocean initial conditions issued from MERCATOR-OCEAN



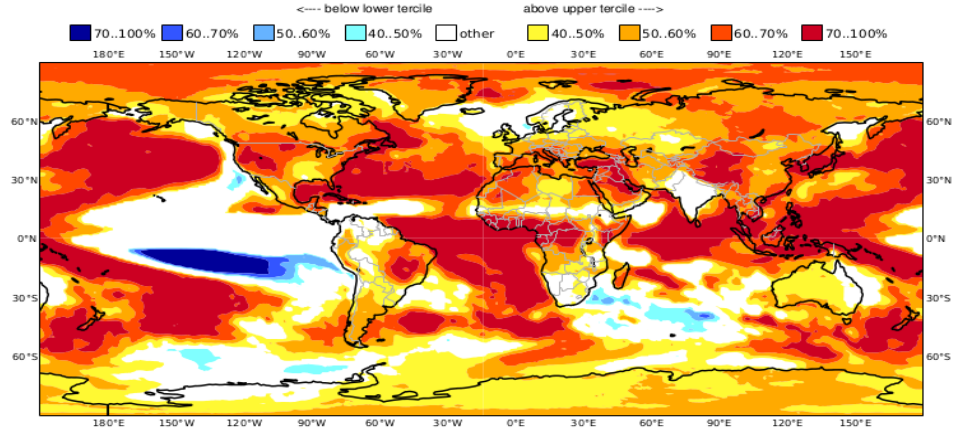
TEMPERATURE





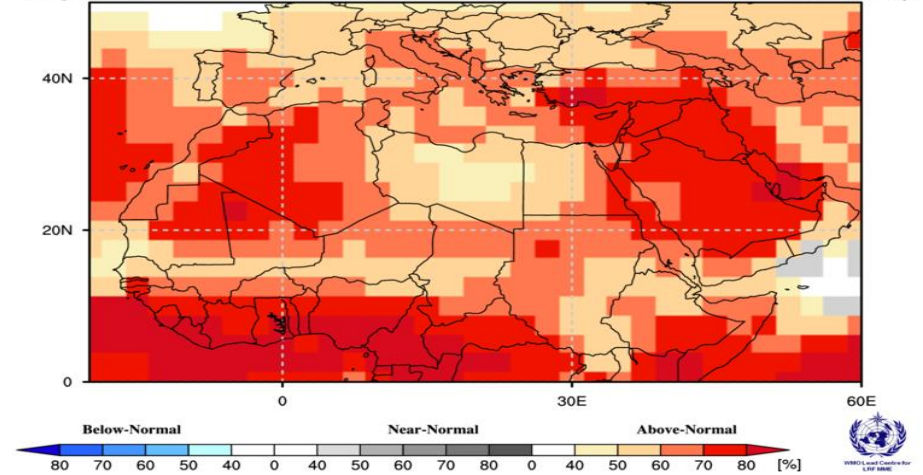
# • TEMPERATURE

C3S multi-system seasonal forecast    ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP/JMA/ECCC  
 Prob(most likely category of 2m temperature)  
 Nominal forecast start: 01/05/21  
 Unweighted mean

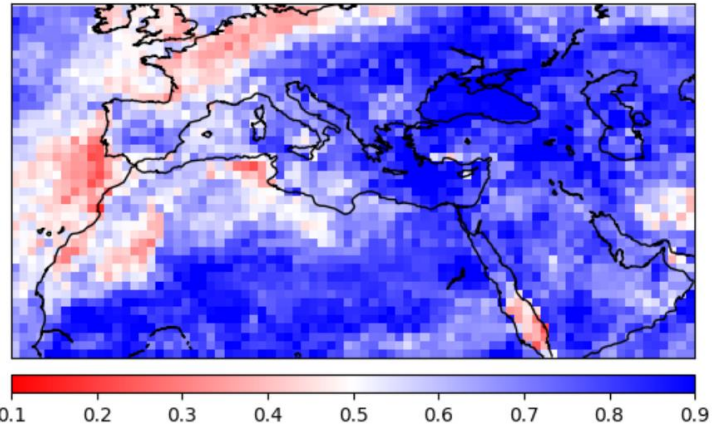


**Probabilistic Multi-Model Ensemble Forecast**  
 Beijing, CPTEC, ECMWF, Exeter, Melbourne, Montreal, Moscow, Seoul, Tokyo, Toulouse, Washington

**2m Temperature : JJA2021** (issued on May2021)



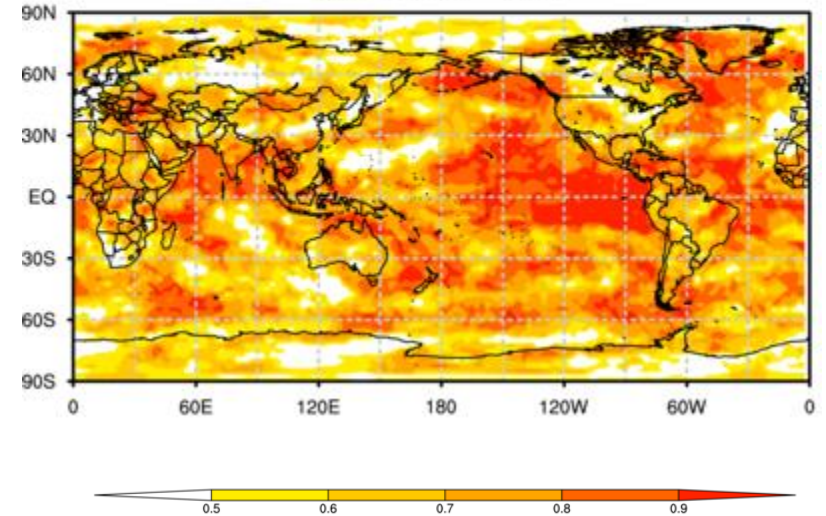
ROC area tercil superiorT JJA



ROC\_upper.png (69.88 Kib) Viewed 2 times

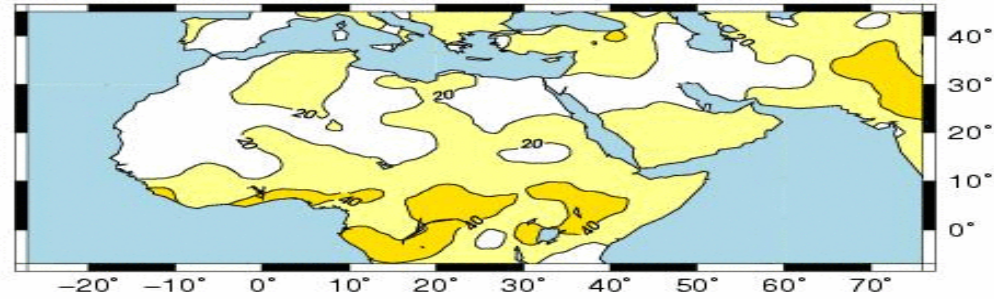
**2m Temperature : JJA**

Above-normal 0.714

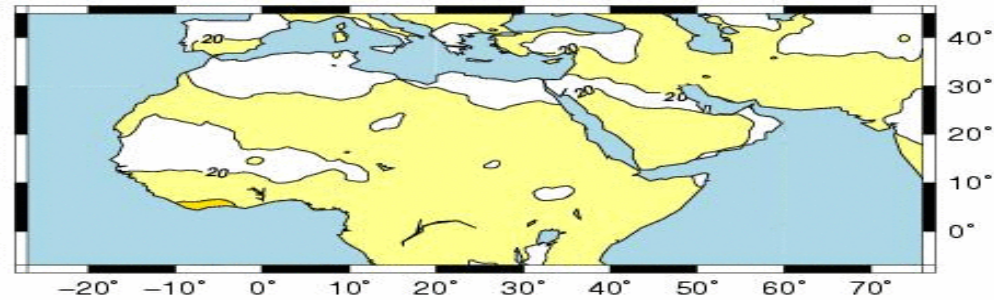


# ARPEGE-Climat Morocco

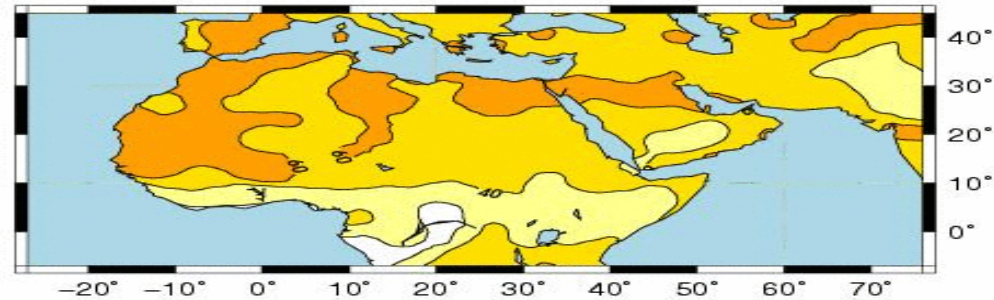
Probability of tercile category of precipitation for JJA 2021 over ARAB region  
(ARPEGE-Climat V5.2 coupled model, issued MAY 2021)  
Ocean initial conditions issued from MERCATOR-OCEAN  
Above normal



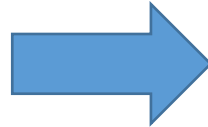
Normal



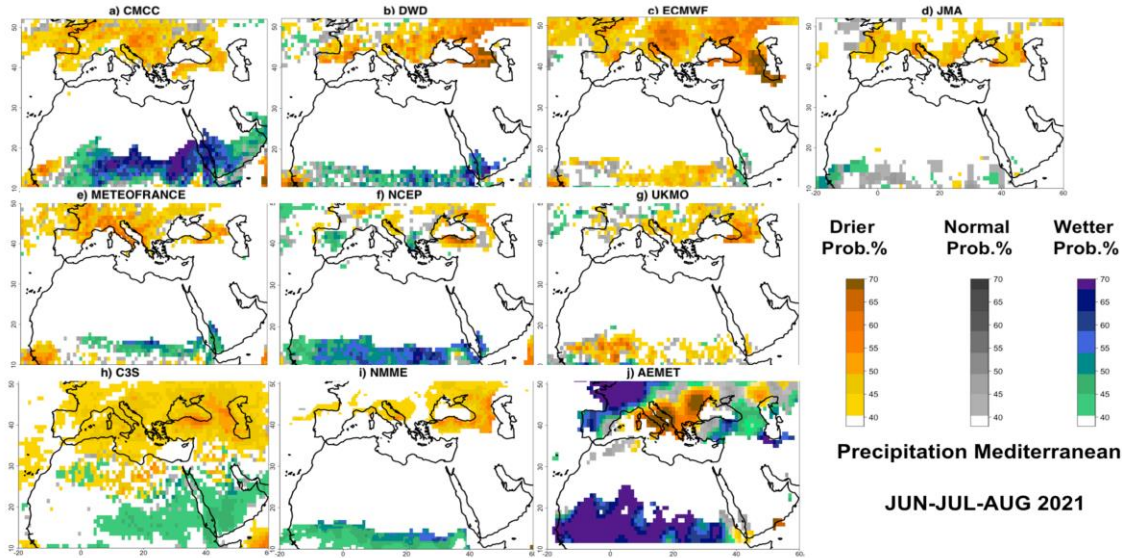
Below normal



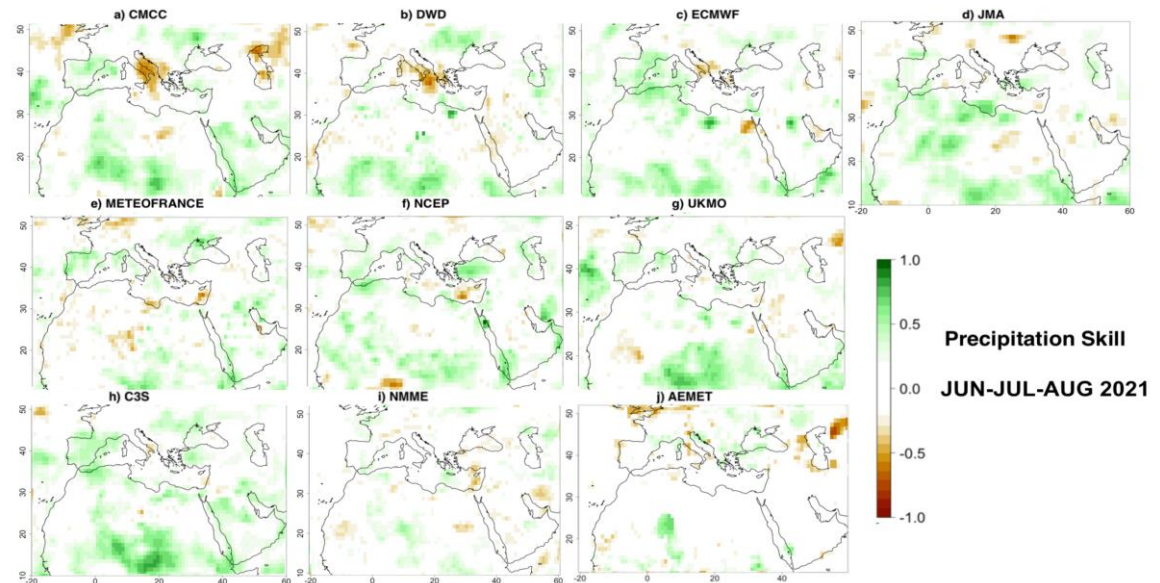
PRECIPITATIONS



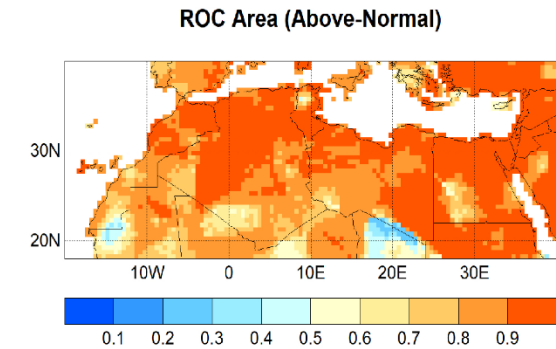
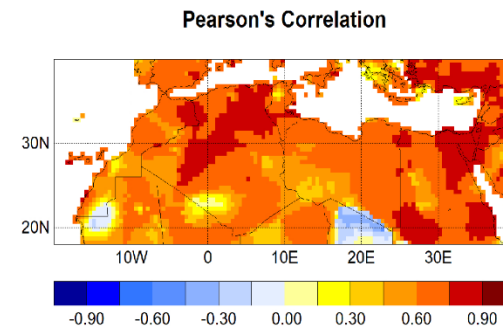
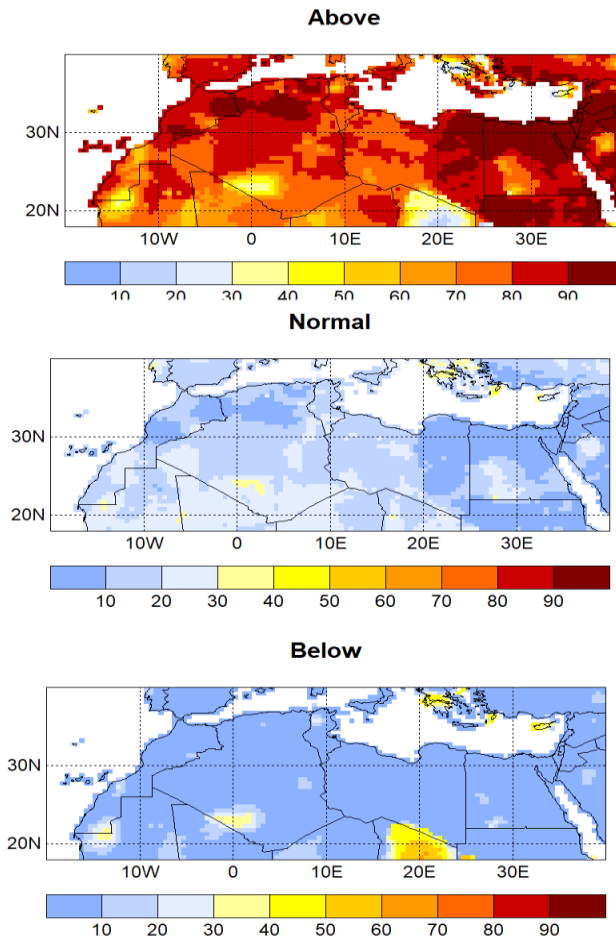
# • PRECIPITATIONS



- Wetter than normal over central and southern ARP from C3S
- NMME: No signal
- CMCC, MF, NCEP: Wetter conditions over SW ARP with good scores



- **STATISTICAL FORECAST**



**Fig: Skill of statistical forecast using CCA method (predictor: April predicted SST(CFSv2); predictand North Africa T2m(CPC/GHCN\_CAMS))**



# Summary from NA RCC-LRF

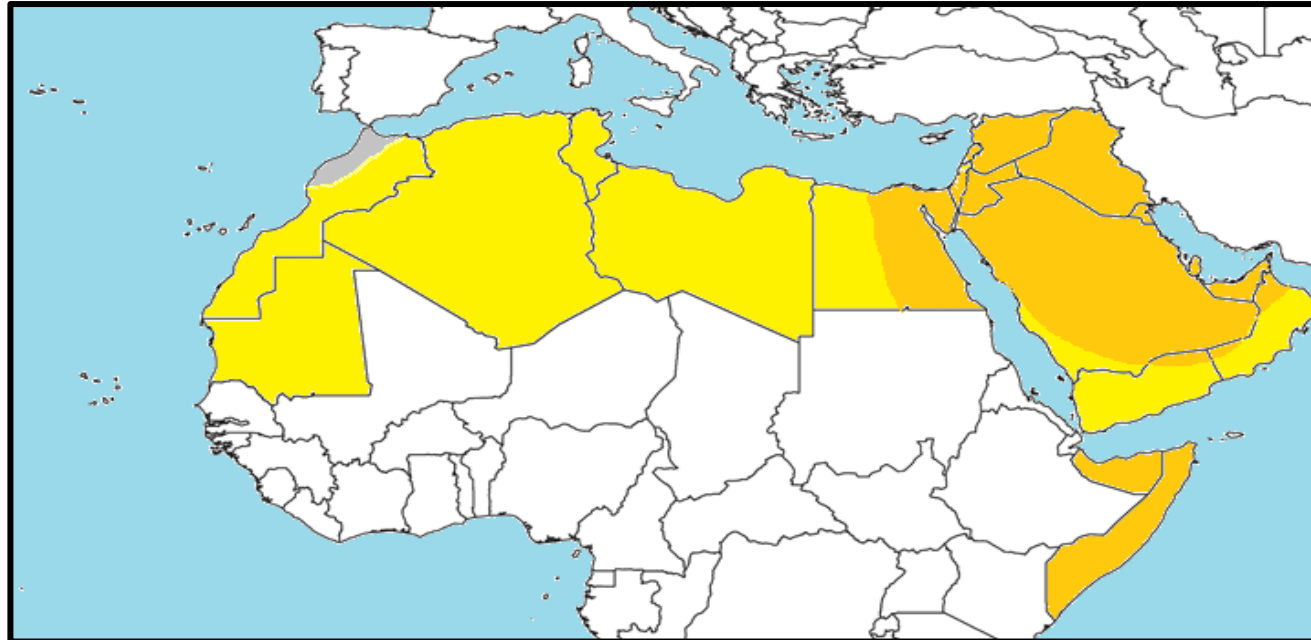


## ARAB CLIMATE OUTLOOK FORUM

### ARABCOF-7

SEASONAL TEMPERATURE FORECAST FOR JUNE-JULY-AUGUST 2021

ISSUED ON MAY 2021





# Summary from NA RCC-LRF

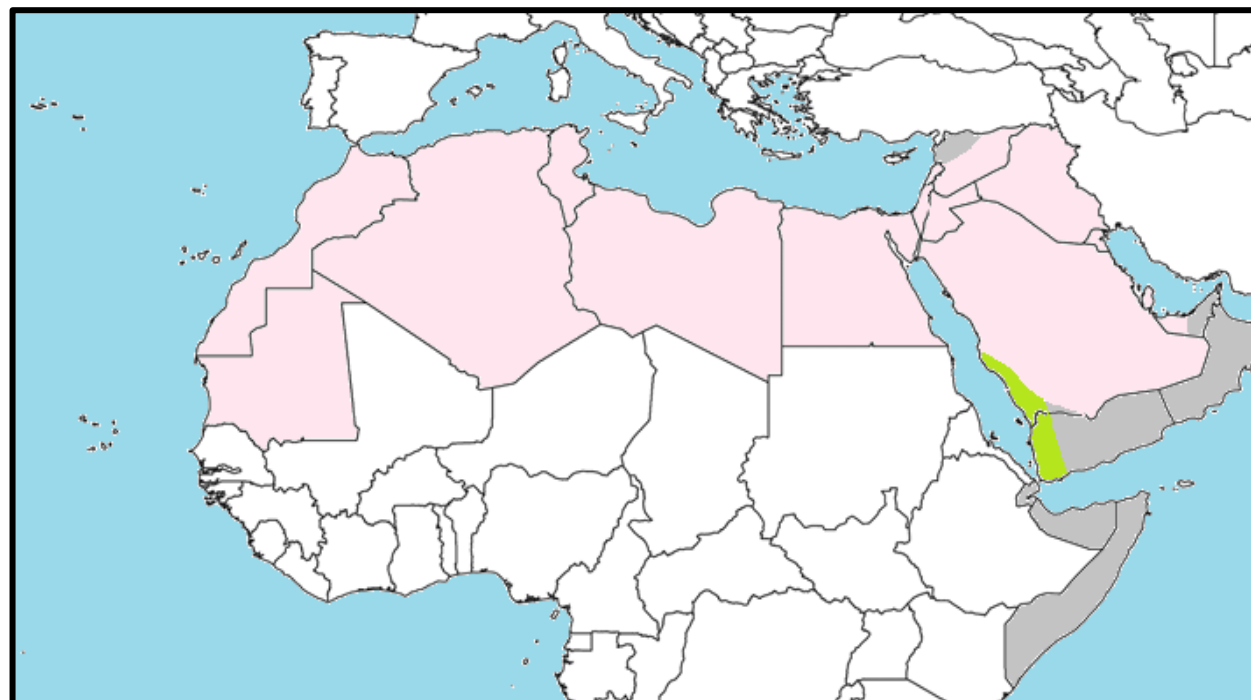


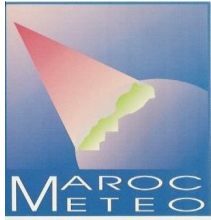
**ARAB CLIMATE OUTLOOK FORUM**

**ARABCOF-7**

SEASONAL PRECIPITATION FORECAST FOR JUNE-JULY-AUGUST 2021

ISSUED ON MAY 2021





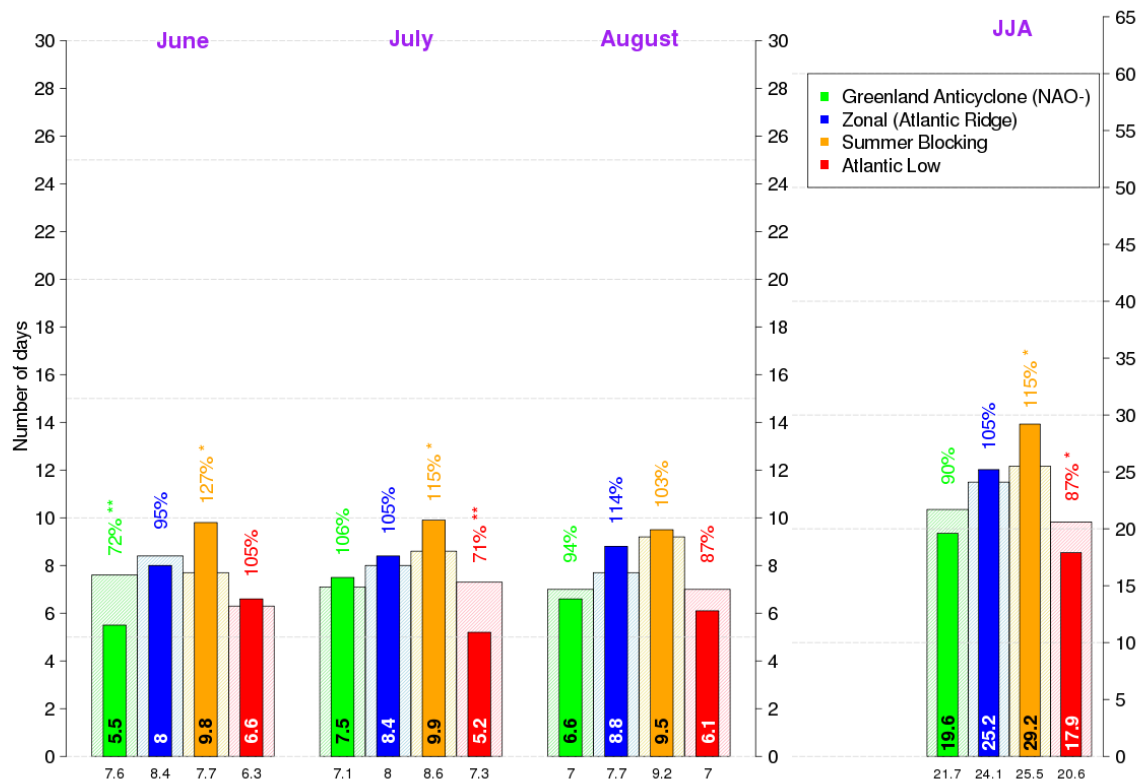
Direction Générale de la Météorologie Nationale  
MOROCCO



# SEASONAL FORECAST OVER ARAB REGION JJA 2021

THANKS 😊

### Summer Weather Regimes (based on PMER) - Forecast and climatology ECMWF SEAS5 - Issued May 2021



### Weather Regime frequency Ensemble Forecast: 20210531

