

Météo-France Seasonal Forecast Bulletin

APRIL - MAY - JUNE 2024

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General synthesis : AMJ 2024

The "El Nino" phase fully subsides during the quarter.

A) Oceanic forecast :

- ENSO : Return to neutral conditions.
- IOD : Neutral or positive.
- Equatorial and north tropical Atlantic, Northeastern Atlantic : Strong positive anomaly.

B) Drivers :

Warm anomaly over the North Atlantic.

C) Atmospheric circulation :

In the Pacific zone, the atmospheric response differs from model to model: residual lift for models which attenuate El Nino less quickly, or subsidences for others.

Current function patterns are similar from one model to another, with anticyclonic curvature from eastern Pacific to North Atlantic and Mediterranean Basin.

EA+ remains the preferred mode.

D) Most likely conditions :

Temperatures : Warmer-than-normal scenario over the southern two-thirds of Europe.

Precipitations : Scenario wetter than normal on eastern Europe.

Next bulletin : scheduled on April 19th

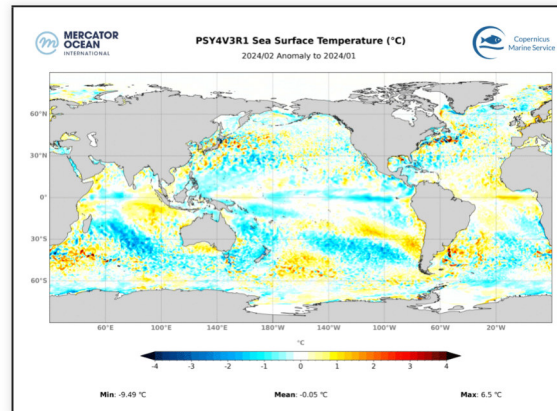
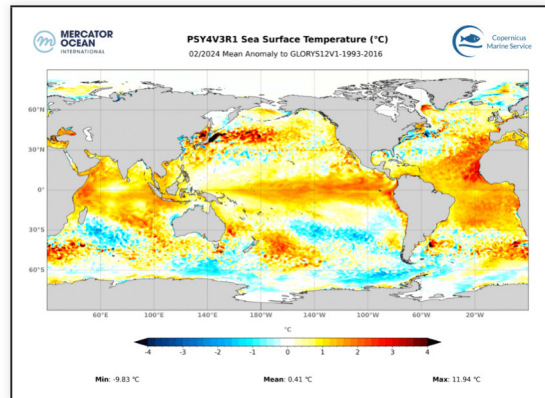
Oceanic analysis of February 2024 : SST anomalies

Current ENSO situation : positive phase

In the Pacific Ocean : In the equatorial zone, the positive anomaly is still present, but is beginning to fade. Further north, the PDO-pattern is also fading.

In the Indian Ocean : The East/West contrast has faded.

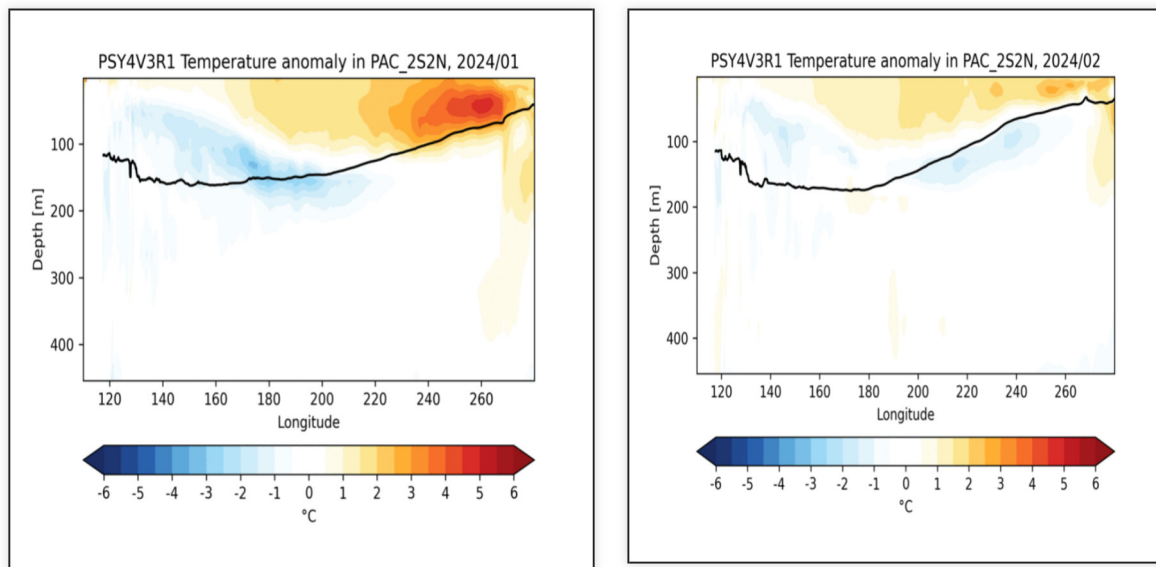
In the Atlantic Ocean : Warm anomalies persist in the south-east part of the basin.



SST Anomalies and trend with the previous month (c) Mercator-Ocean

Oceanic analysis of February 2024 : Pacific vertical section

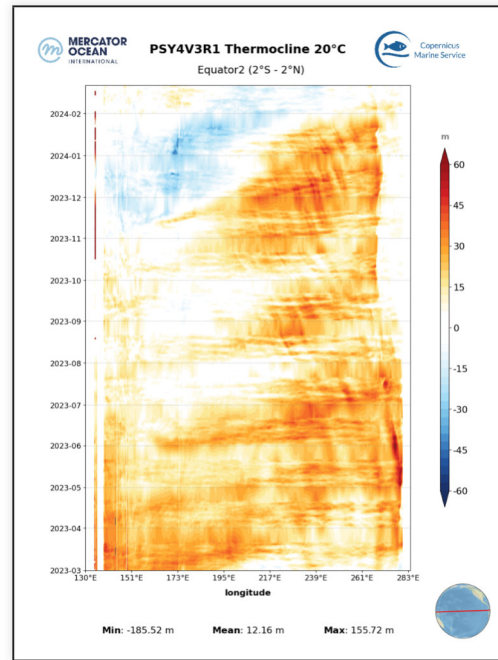
In the subsurface, the warm anomaly is clearly receding, persisting only over the eastern part of the basin near the surface.



Ocean temperature anomalies in the first 500 meters of the equatorial Pacific basin, monthly average. (c) Mercator-Ocean

Oceanic analysis of February 2024 : Hovmüller diagram of the 20°C isotherm

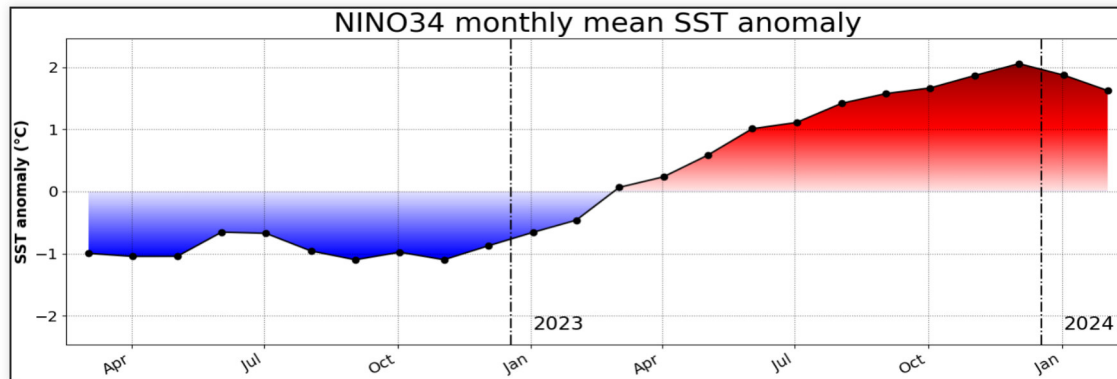
Same remark as before.



Evolution of the anomalies of depth of the thermocline (m) (materialized by the 20 ° C isotherm) (c) Mercator-Ocean

Oceanic analysis of February 2024 : Pacific Ocean - Nino3.4 index history

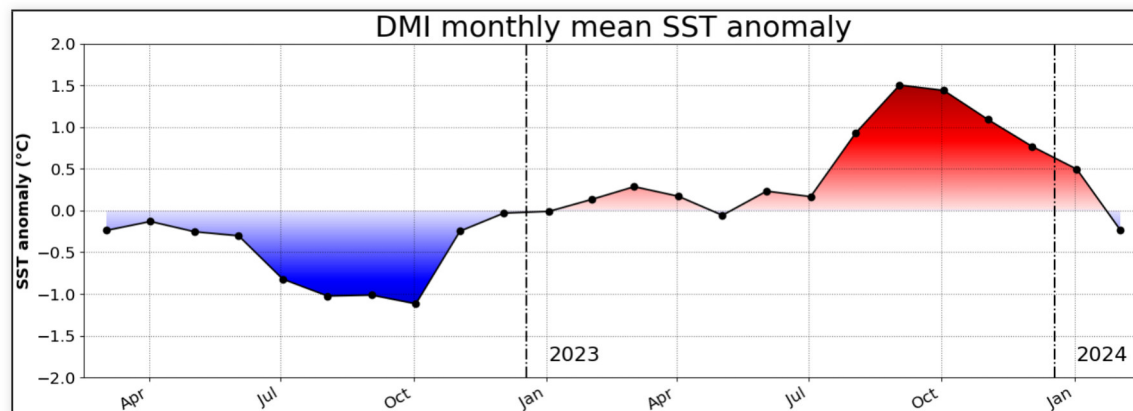
Nino3.4 index issued from Mercator Ocean PSYV4R2 analysis : close to +1.6 °C
(see BOM site for weekly values : http://www.bom.gov.au/climate/enso/monitoring/nino3_4.png)



Evolution of SST in the NINO3.4 box (c) Mercator-Ocean

Oceanic analysis of February 2024 : Indien Ocean - DMI index history

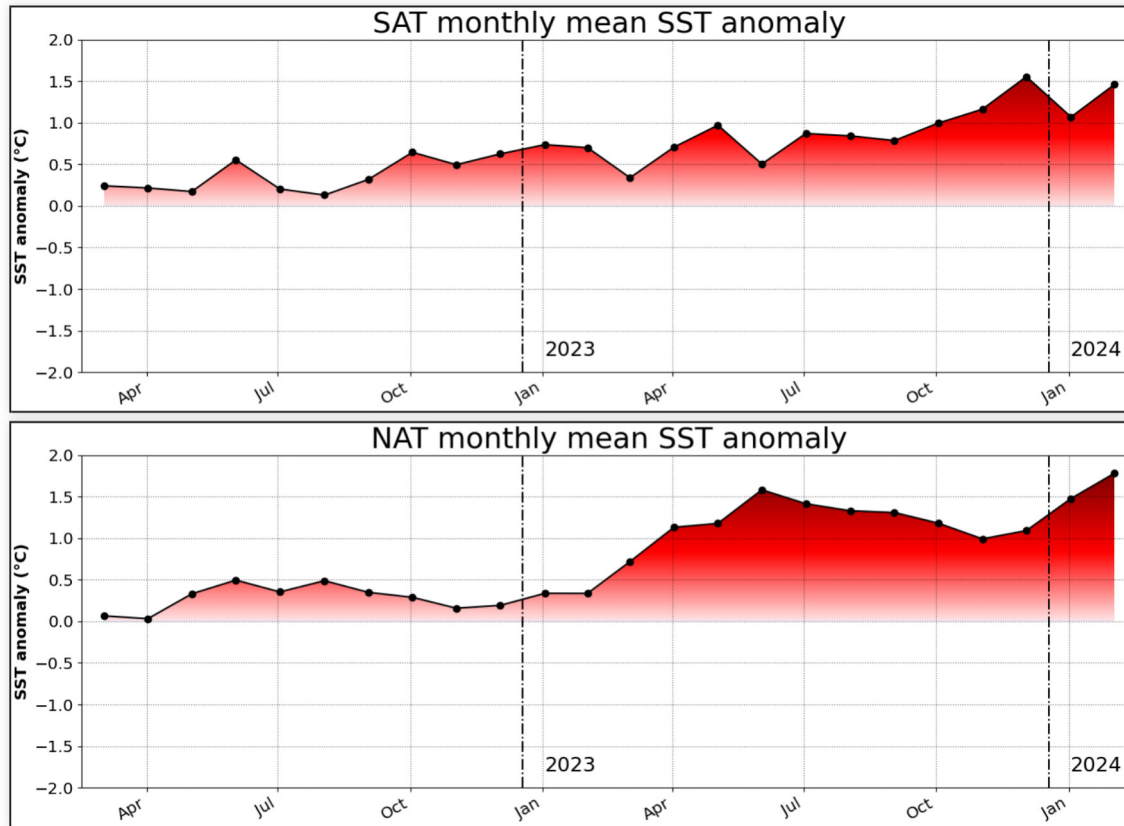
DMI Index issued from Mercator Ocean PSYV4R2 analysis : close to +0°C
(see BOM site for weekly values : <http://www.bom.gov.au/climate/enso/monitoring/iod1.png>)



Evolution of SST in the DMI box (c) Mercator-Ocean

Oceanic analysis of February 2024 : Atlantic Ocean : SAT and NAT index

Warm anomalies remain marked, with an attenuation in the equatorial zone and an increase in the northern tropical zone.



Evolution of SST in the SAT and NAT box (c) Mercator-Ocean

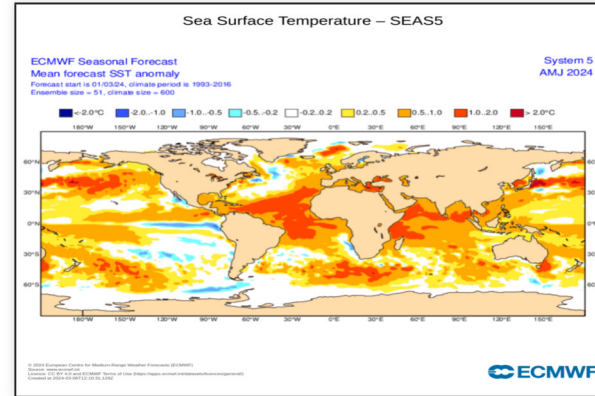
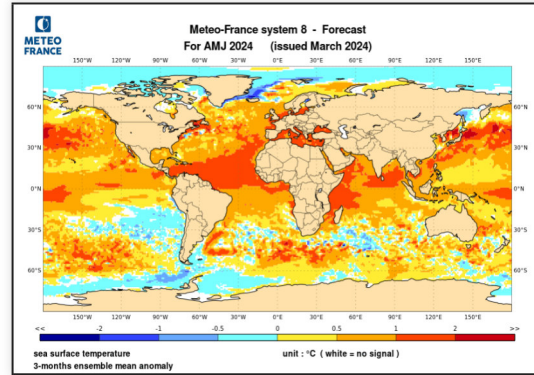
Oceanic forecast : SST anomaly

The patterns proposed by the two models are very close.

In the Pacific Ocean : In equatorial regions, the warm anomaly spreads westwards across the basin, attenuating as El Nino weakens. In the Northern Hemisphere, the PDO- pattern is barely visible.

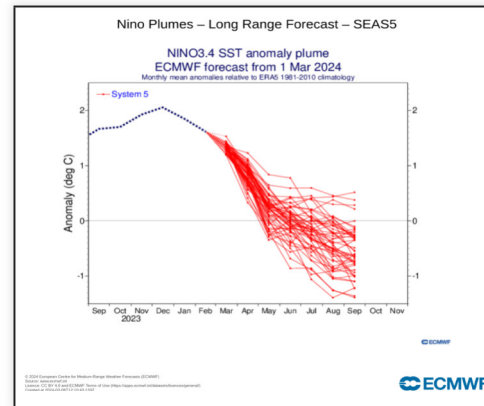
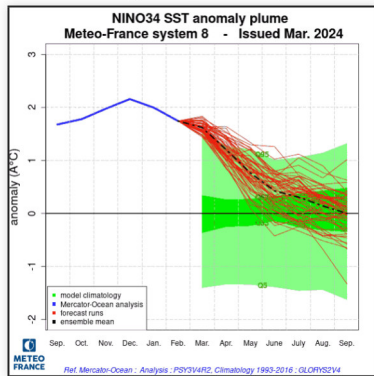
In the Indian Ocean : The warm anomaly stretches eastwards across the basin.

In the Atlantic Ocean : The warm anomaly remains widespread, from the equator to 30°N and Europe.



Oceanic forecast : NINO3.4 Plume diagrams

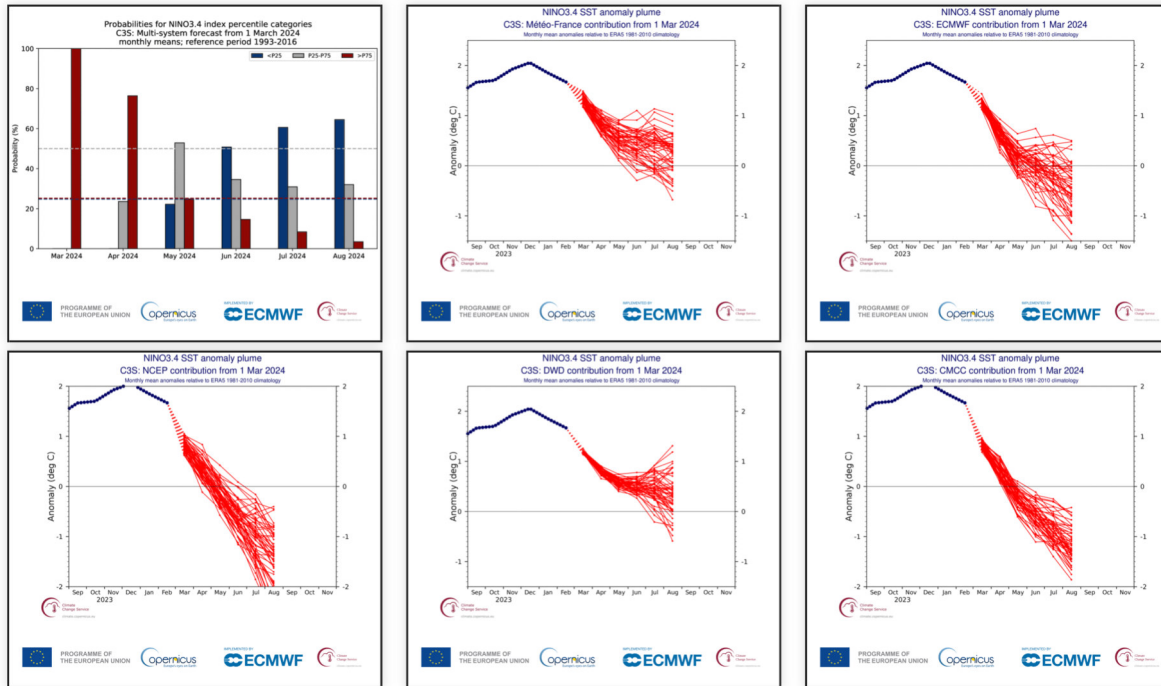
Both models are in agreement on a rapid decline in the index and a return to neutral values.



Oceanic forecast : C3S Nino3.4 re-scaled plume diagrams

All models agree that the index will fade rapidly at the end of the quarter. Beyond that, divergences are clearly visible.

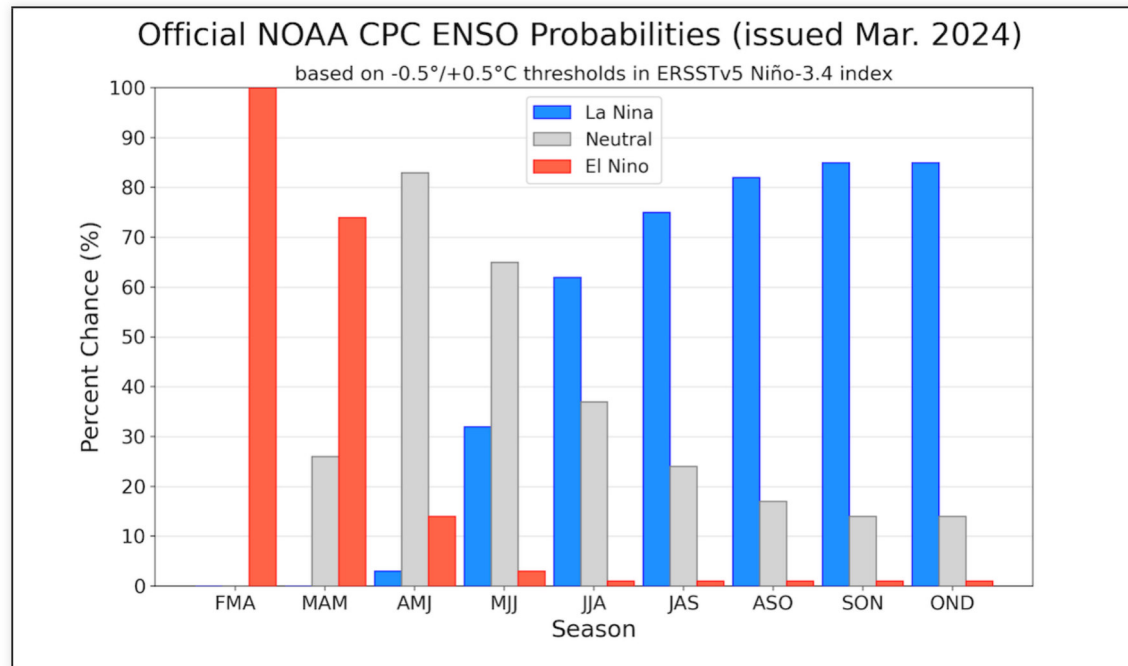
The most likely phase for the next three months : Return to neutral phase



C3S multi-system probability forecast (top left figure) and C3S plume diagrams re-scaled from the variance of observations for the period 1981-2010.

Oceanic forecast : Synthesis from IRI

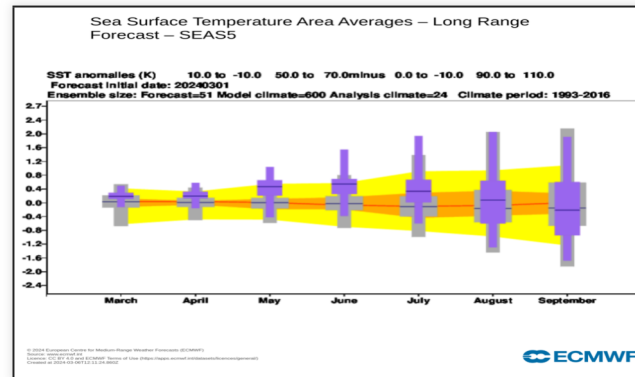
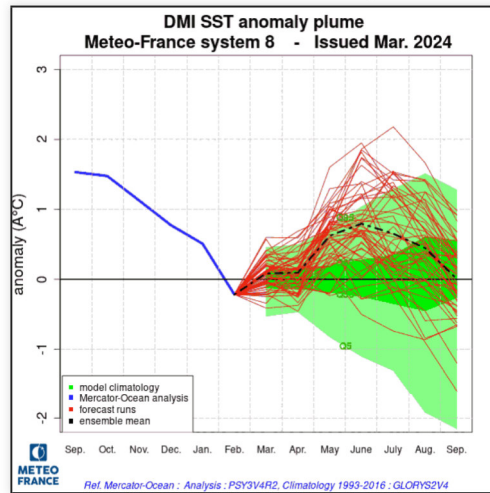
IRI forecast : more than 80% probability of El Niño conditions for AMJ.



Probability of Niño, Niña, and neutral phases for the next 8 quarters. source <http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

Oceanic forecast : Indian ocean - DMI evolution

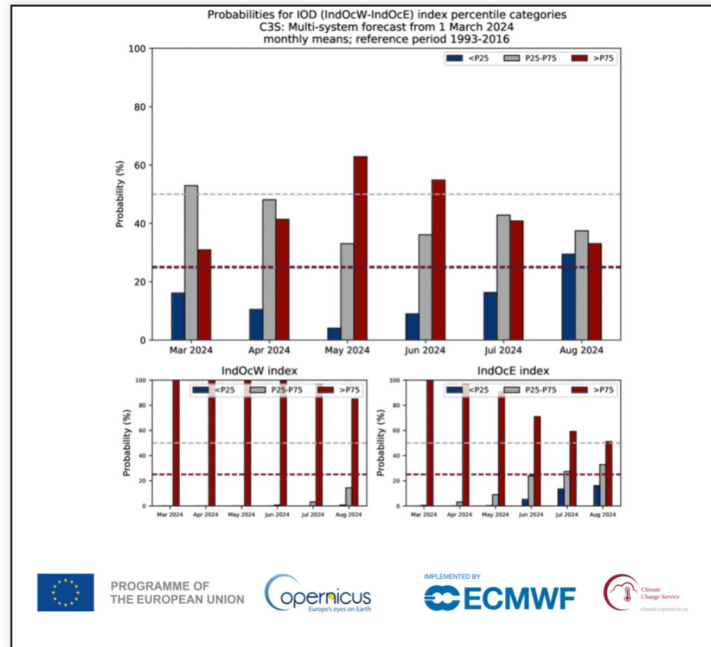
The DMI index remains in neutral for the quarter or becomes slightly positive with MF8.



DMI index : analysis, forecasts and model climatology with MF-58 on the left and ECM-SEAS5 on the right

Oceanic forecast : C3S IOD re-scaled plume diagrams

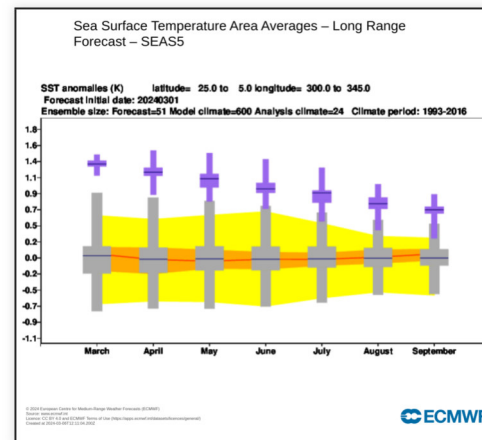
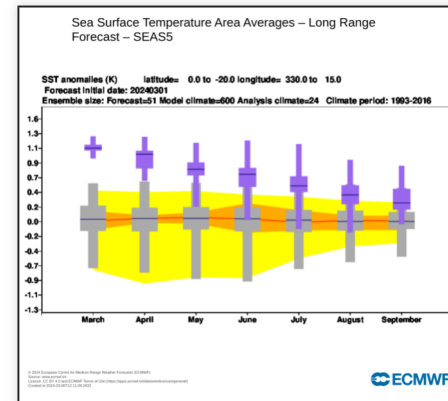
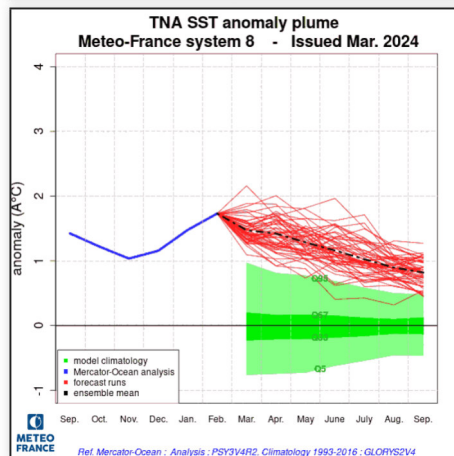
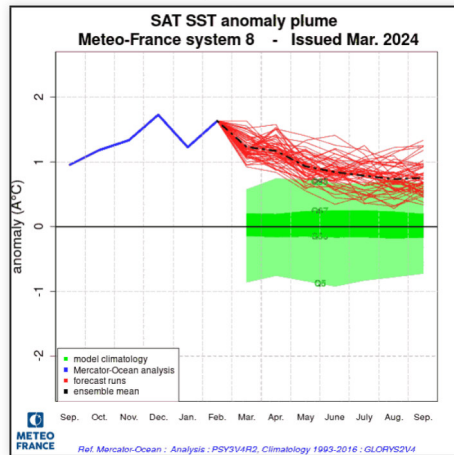
Expected Phase for the next three months : neutral or positive conditions



C3S multi-system probability forecast for IOD, west box and east box Index

Oceanic forecast : Atlantic Ocean - SAT and TNA evolution

Both models maintain a very marked warm anomaly for the quarter.

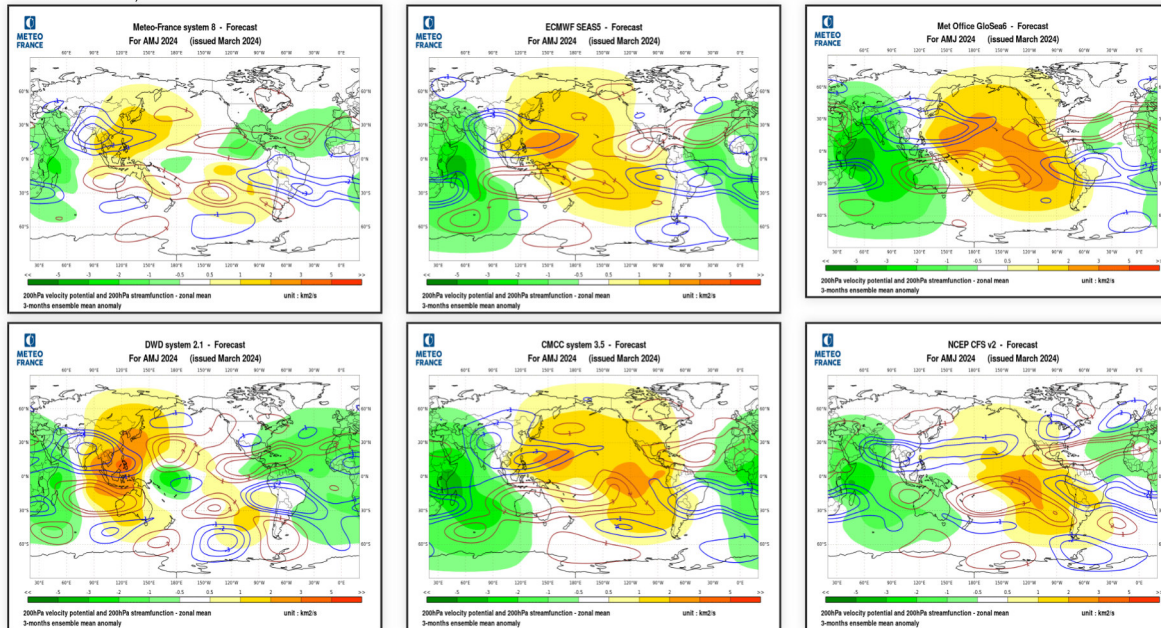


Anomaly on the SAT and TNA box : analysis, forecasts and model climatology with MF-S8 on the left and SEAS5 on the right

Atmospheric circulation forecasts : velocity potentiel and stream function at 200hPa

Velocity Potential : The models are divided into two patterns. MF8 and DWD retain a pattern still marked by the influence of El Nino (ascendances on Equatorial Pacific Basin). The other four models forecast subsidences over the Pacific Ocean.

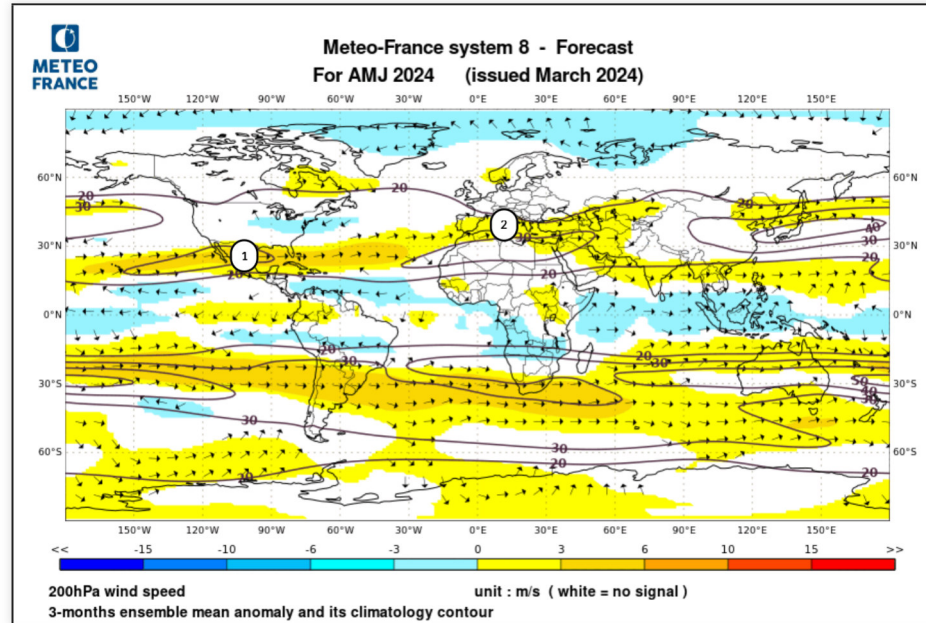
Streamfunctions : Fewer discrepancies between models around the equator (dipole over the Maritime Continent and dipole over the eastern Equatorial Pacific Basin). No more teleconnections to North America. Extension of the anticyclonic circulation from the eastern Pacific towards North Africa and the Mediterranean Basin, but less marked with MF8).



MF8, SEASS, UKMO, DWD, CMCC and NCEP 200hPa velocity potential anomalies (color range, green : ascending, orange : subsidence) and stream function anomalies (isolines, red : anticyclonic in the northern hemisphere, blue : cyclonic in the northern hemisphere).

Atmospheric circulation forecasts : tropospheric jets

Strengthening of the extratropical jet from the eastern Pacific to the Atlantic and jet shifted northward over the Mediterranean.

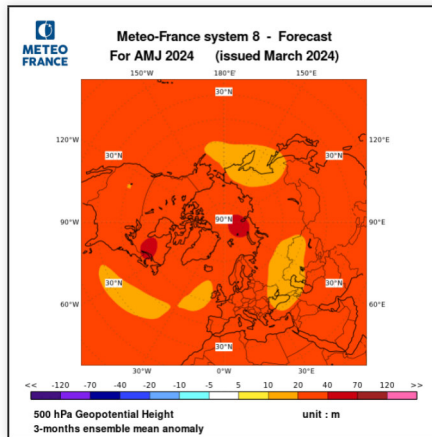


climatology of wind strength at 200 hPa (isolines) and wind force anomalies (color ranges)

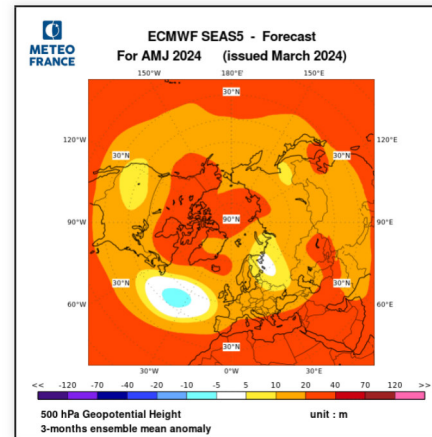
- 1 - Reinforced jet stream
- 2 - Jet shifted to the north

Atmospheric circulation forecasts : 500 hPa Geopotential anomalies

Signals are weaker with MF8 than with ECMWF. Over northern America we note a PNA+ pattern (positive anomaly on Canada and relative negative anomaly on the US). The divergences are stronger towards Europe, with a negative anomaly off Europe as well as over western Russia for ECMWF and almost no signal with MF8.

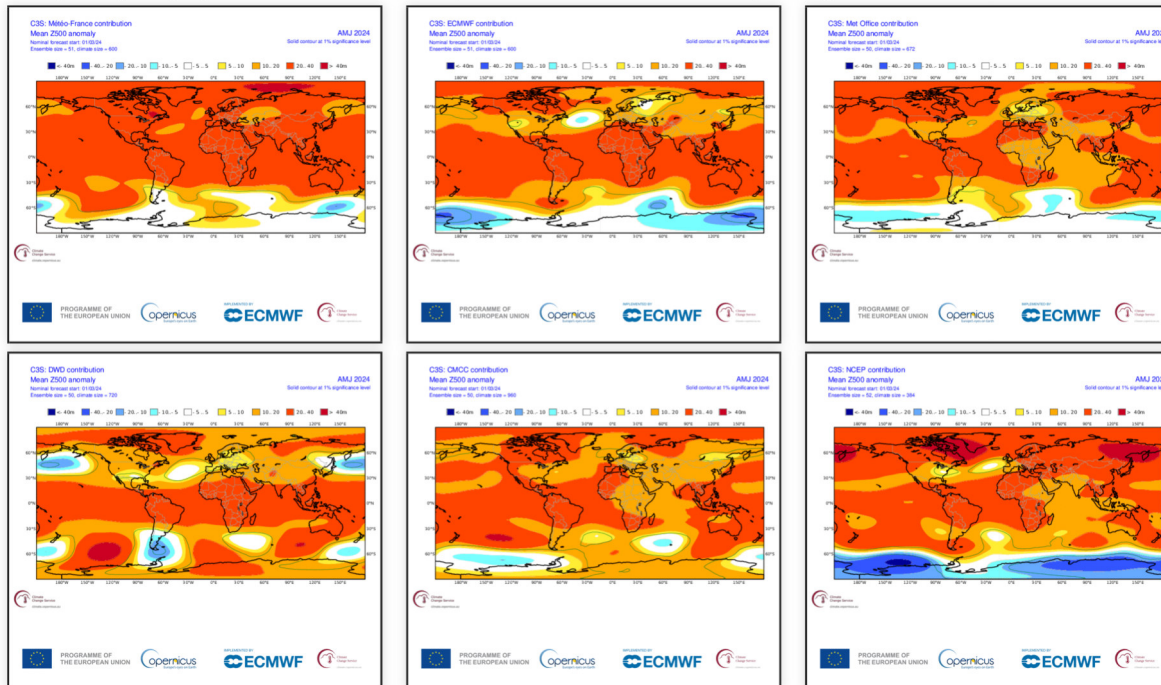


polar projection of MF8 and SEAS5 500hPa geopotential height anomalies.



Atmospheric circulation forecasts : Z500 anomalies in C3S models

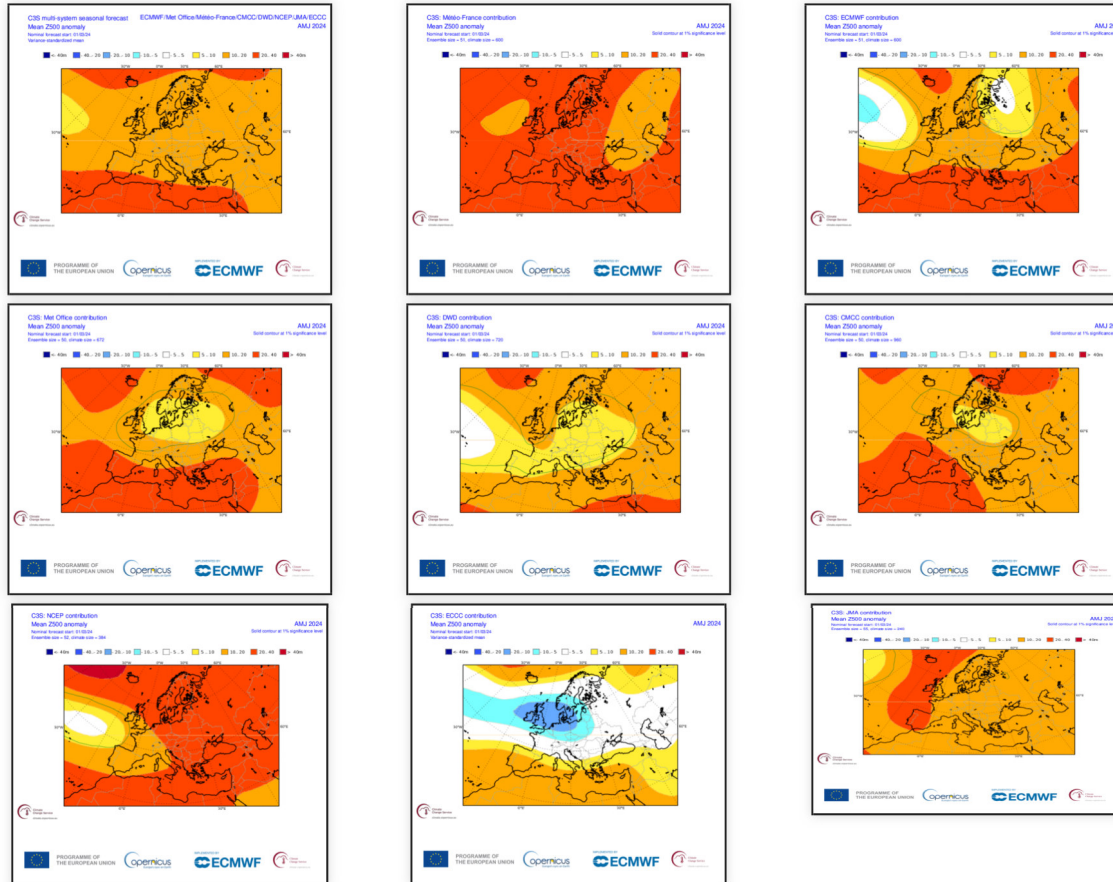
Most models show positive anomalies from Alaska to Canada and an axis of more or less marked negative anomalies from the USA to Europe. Only MF8 proposes much softer fields. The position of the minimum near Europe changes from model to model.



MF-S8, SEAS5, UKMO, DWD, CMCC and NCEP 500hPa geopotential height anomalies.

Atmospheric circulation forecasts : Z500 anomalies in C3S models

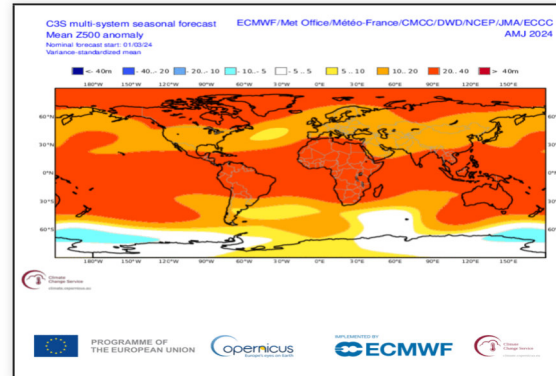
Most models forecast one or even two relative minimums around the 50th degree north latitude between the near Atlantic and western Russia , as well as a positive anomaly over the Mediterranean Basin.



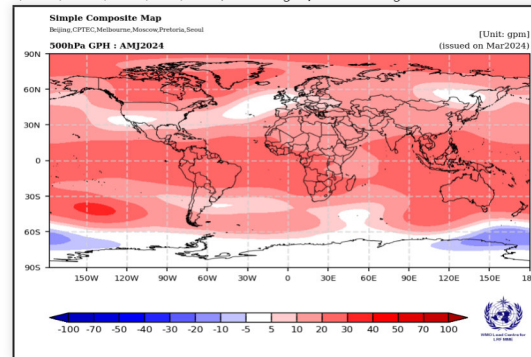
multi-models 500hPa geopotential height anomalies

Atmospheric circulation forecasts : Z500 anomalies multi-systems

The two multi-models share many similarities (PNA+, NAO- and weakness from the Azores to Europe)



C3S multi-models (MF-S8, ECMWF-SEASS, UKMO, DWD, CMCC, NCEP, JMA, ECCC) 500hPa geopotential height anomalies.

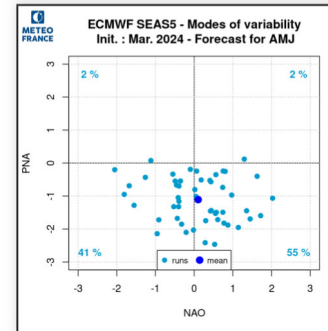
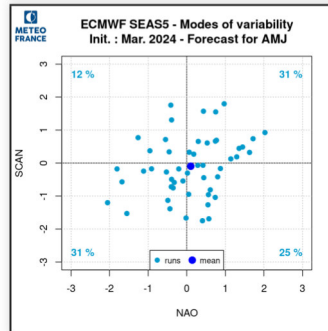
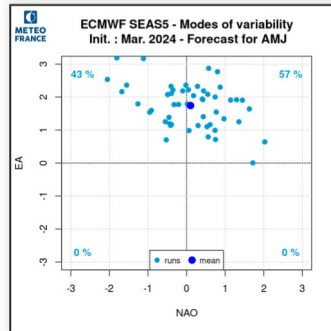
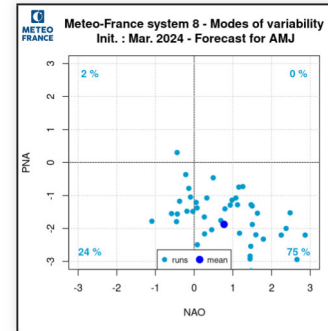
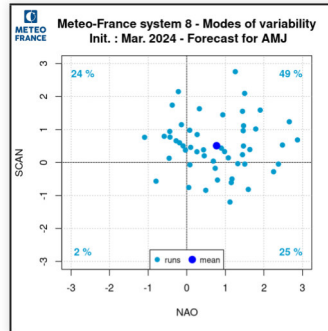
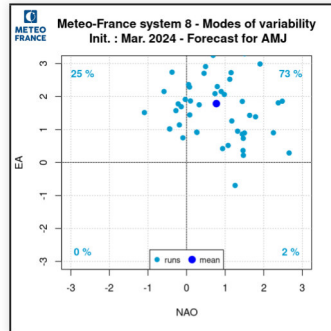


Others models of WMO multi-models 500hPa geopotential height anomalies.

Modes of variability : forecast

Both models foresee EA+ and PNA- modes.

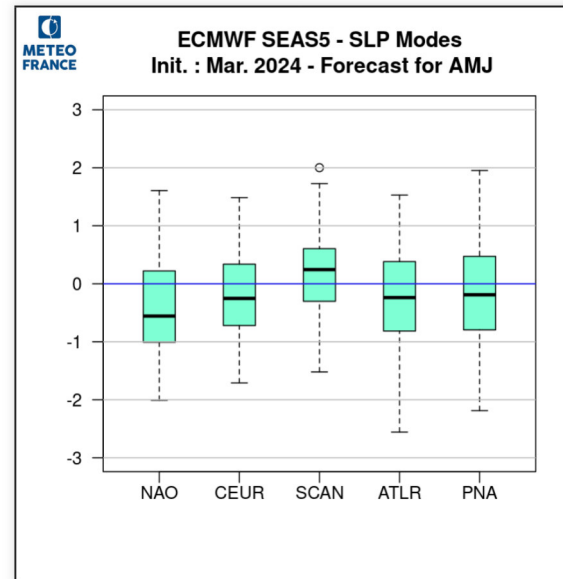
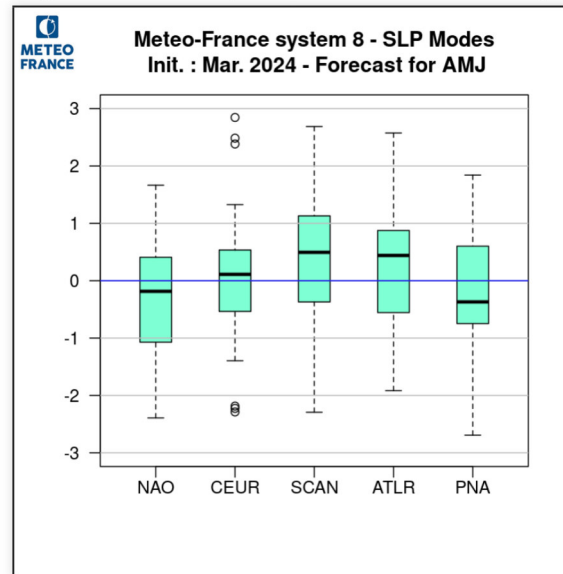
Other signals are weak, close to neutral for ECMWF and slightly positive for MF8.



[See the modes of variability patterns](#)

Modes of variability : SLP Modes forecast

Negative NAO mode and positive SCAN modes are favoured by both models.

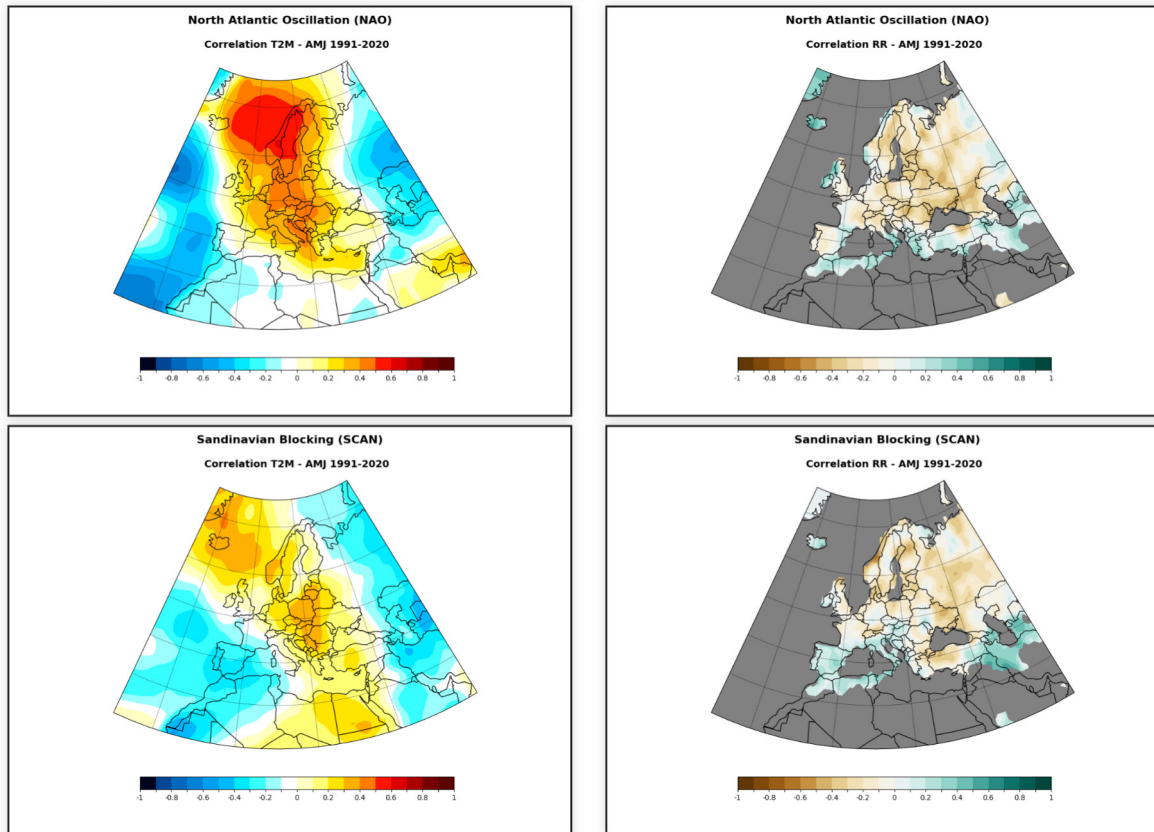


MF-S8 and ECMWF-SAES-S5 boxplot of MSLP modes of variability. [link to pattern](#)

Modes of variability : SLP Modes impacts

Two modes favored : negative NAO and positive SCAN.

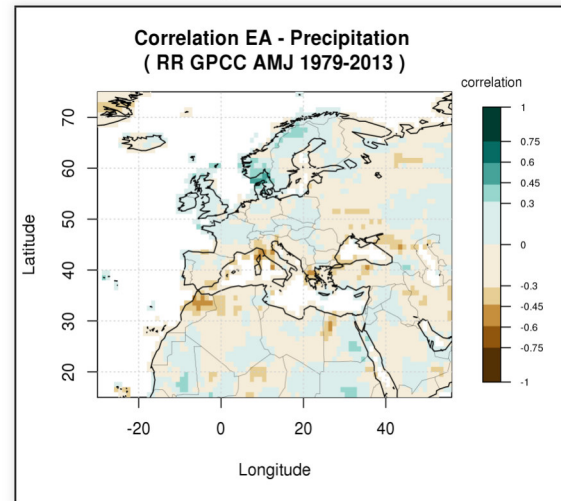
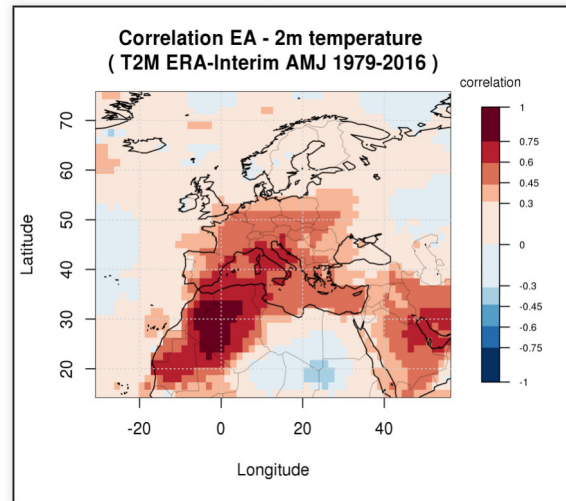
They have opposite consequences on Europe (wet scenario with negative NAO/ mostly dry with positive SCAN)



Impact of NAO and Blocking mslp Modes on temperature and precipitation. (ref ERA5 1991-2020) [link to impact](#)

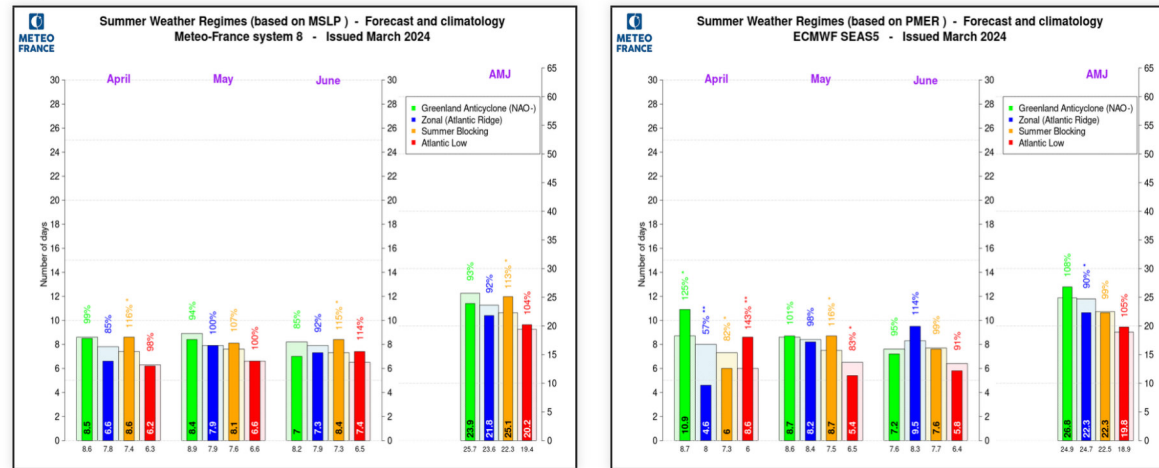
Modes of variability : EA impacts

Positive EA is expected next quarter. This mode has a strong influence in particular on the temperature on southern Europe.



Weather regimes : summer MSLP

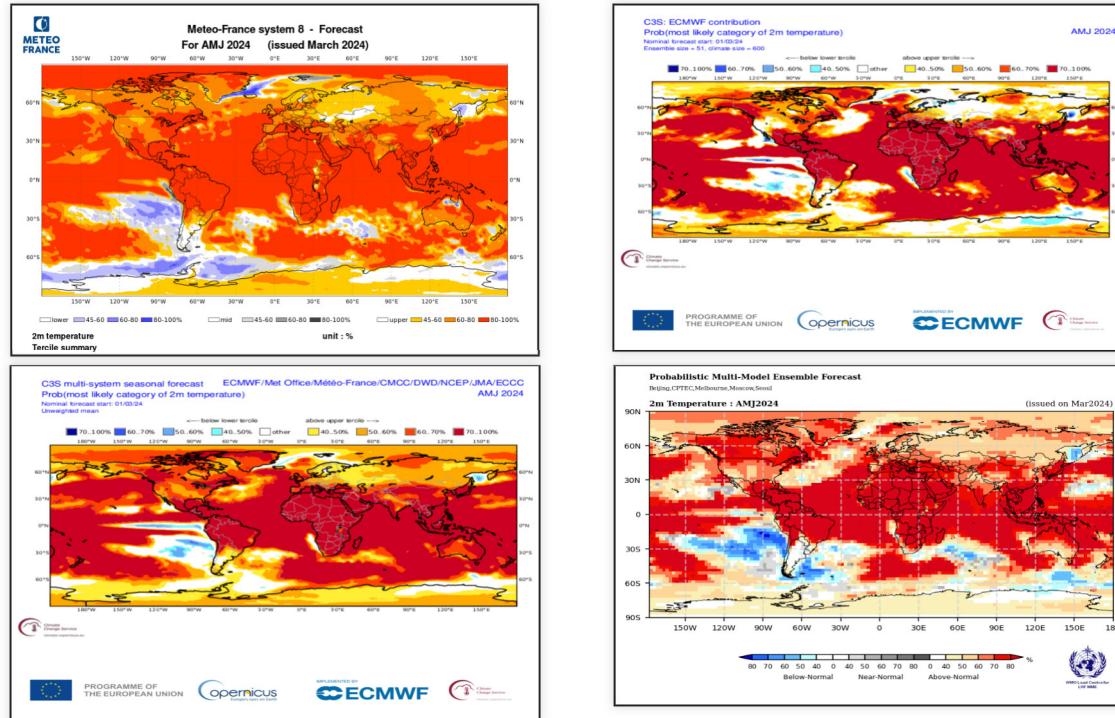
MF8 and ECMWF are divergent for the first month (April). The Greenland Anticyclone NAO- regime and Atlantic Low regime are clearly dominates for ECMWF, unlike MF8 wich favors the blocking regime. Finally, over the quarter, climatological deviations are different between the two models. MF8 favors summer blocking regime while ECMWF forecast a lower frequency than normal for the zonal regime.



Frequency of SLP weather regimes, compared to model's own climatology, for the next three months and aggregation over the entire quarter, for MF-S8 (left) and SEAS5 (right).

Forecast of climatic parameters : Temperature probabilities

A warmer-than-normal signal is most likely over most of the globe, with the exception of southern South America.

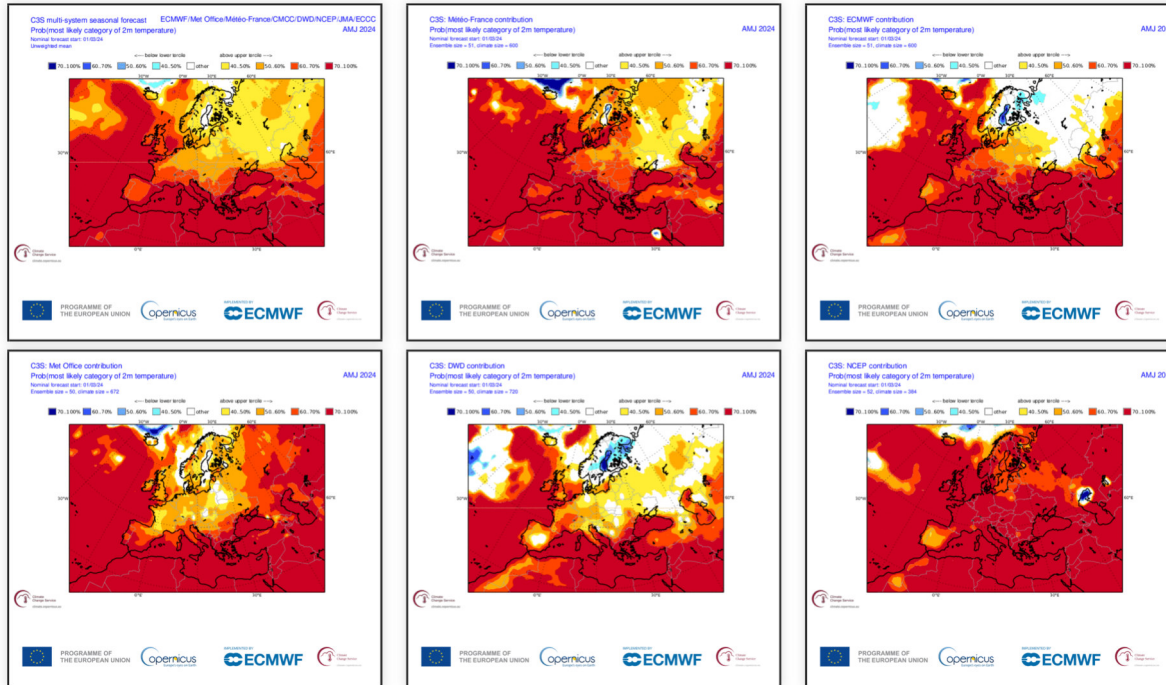


2m temperature probability map from MF-S8 (top left), ECMWF-SEAS5 (top right), C3S multi-models(bottom left) and others models of WMO multi-models (bottom right)

Forecast of climatic parameters : T2M probabilities over Europe in C3S models

A warmer-than-normal scenario is likely over the Mediterranean Basin related to the anticyclonic curvature at 200 hPa.

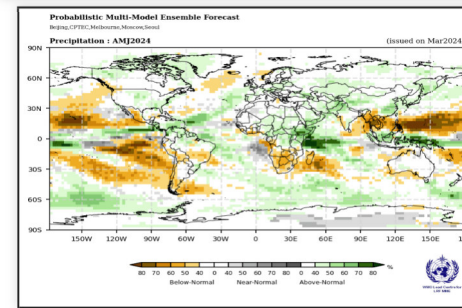
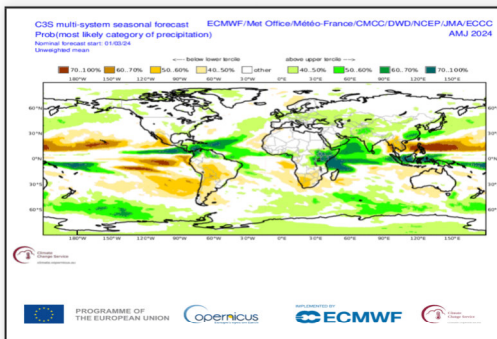
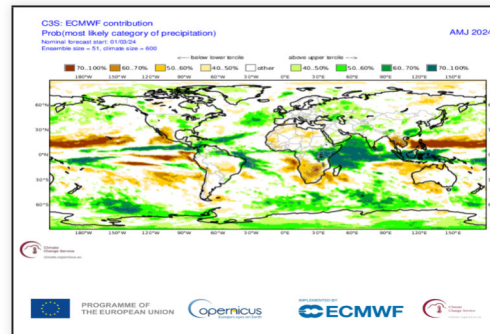
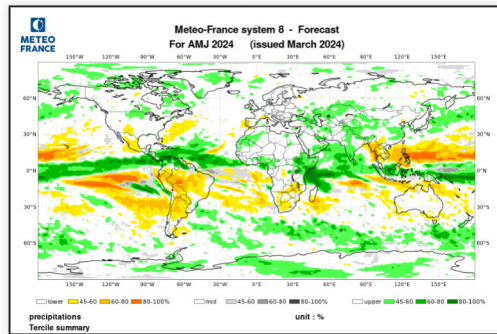
Scenarios are more divergent as we move towards Northern Europe



C3S multi-models probability map (top left) and MF-S8, ECMWF-SEAS5, UKMO, DWD, CMCC models.

Forecast of climatic parameters : Precipitation

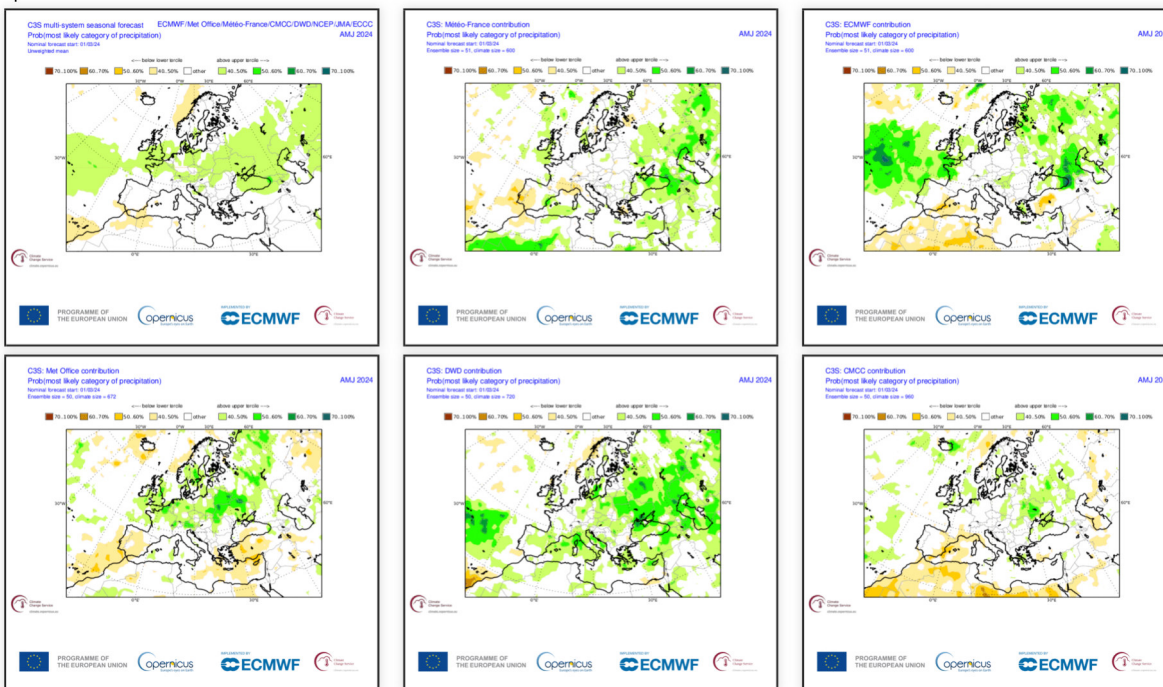
The impacts of the El Nino phase are becoming less visible.
In the Northern Hemisphere, signals are fairly weak.



precipitation probability map from MF-S8 (top left), ECMWF-SEA55 (top right), C3S multi-models (bottom left) and others models of WMO multi-models (bottom right)

Forecast of climatic parameters : Precipitation probabilities over Europe in C3S models

Wetter-than-normal signals are predicted by each model, but depend on the atmospheric circulation adopted by each and thus on the position of the Z500 minima.

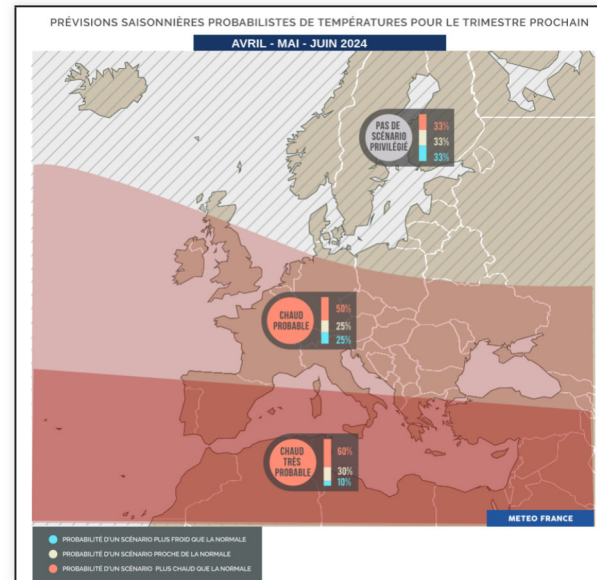


C3S multi-models probability map (top left) and MF-S8, SEAS5, UKMO, DWD, CMCC models.

Synthesis map for Europe : Temperature

A warmer-than-normal scenario is favored from Western Europe (and France) to the Black Sea and Mediterranean Basin.

No scenario emerges elsewhere.

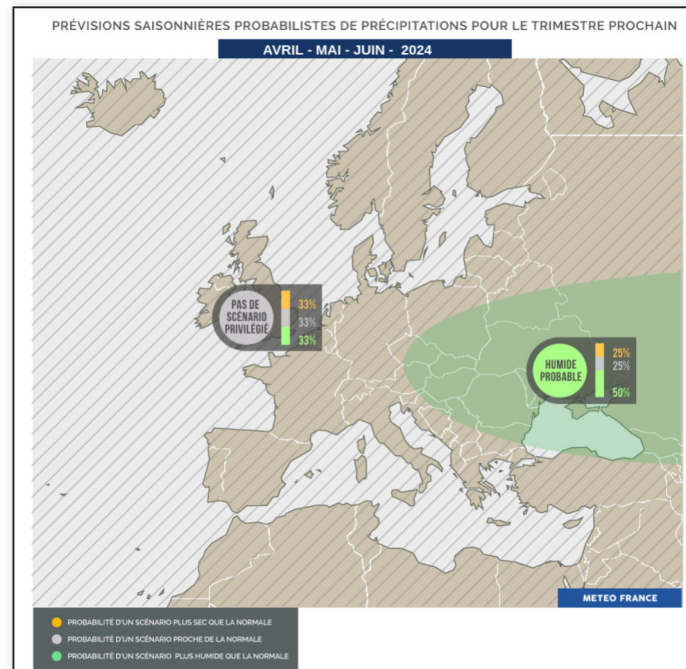


Synthesis map of probabilistic forecast for Europe. (c) Météo-France/DCSC/ACS

Synthesis map for Europe : Precipitation

A wetter-than-normal scenario is favoured over Eastern Europe.

No scenario emerges elsewhere.



Synthesis map of probabilistic forecast for Europe. (c) Météo-France/DCSC/ACS