MEDCOF-21

RCC-LRF Météo-France report for DJF 2023-2024 – DRAFT

Current state of the climate

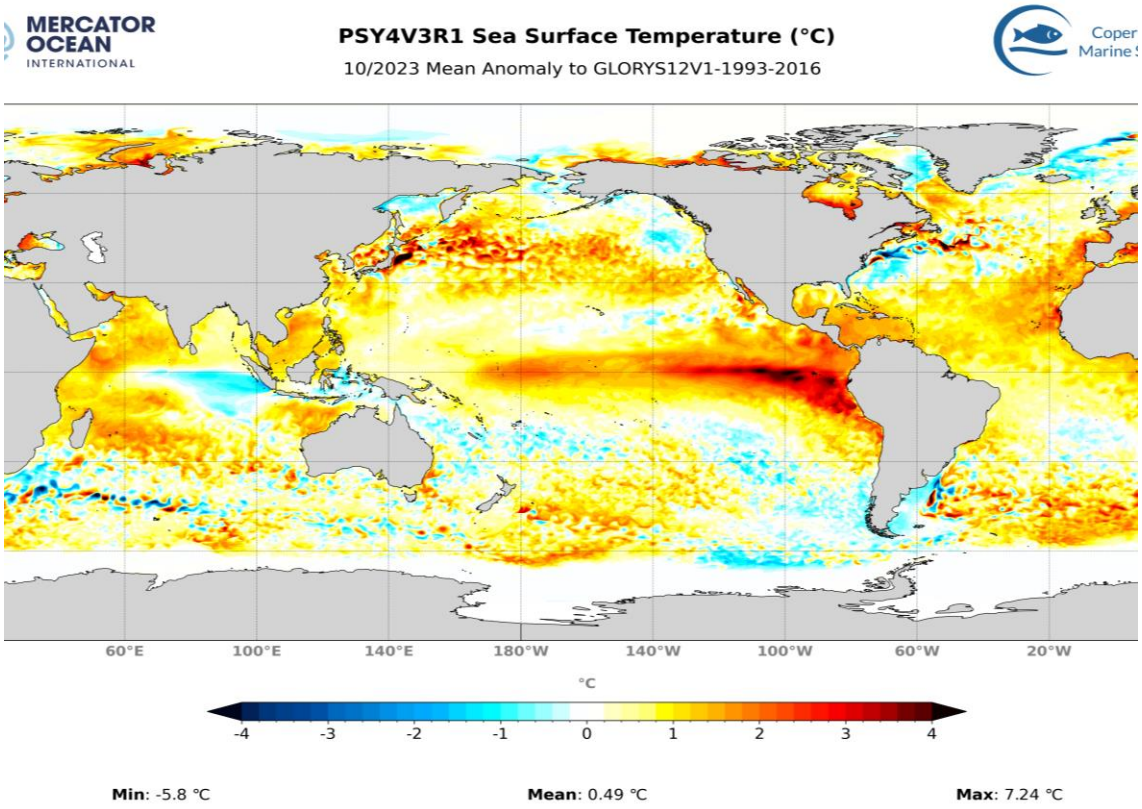
A) Oceanic Analysis :

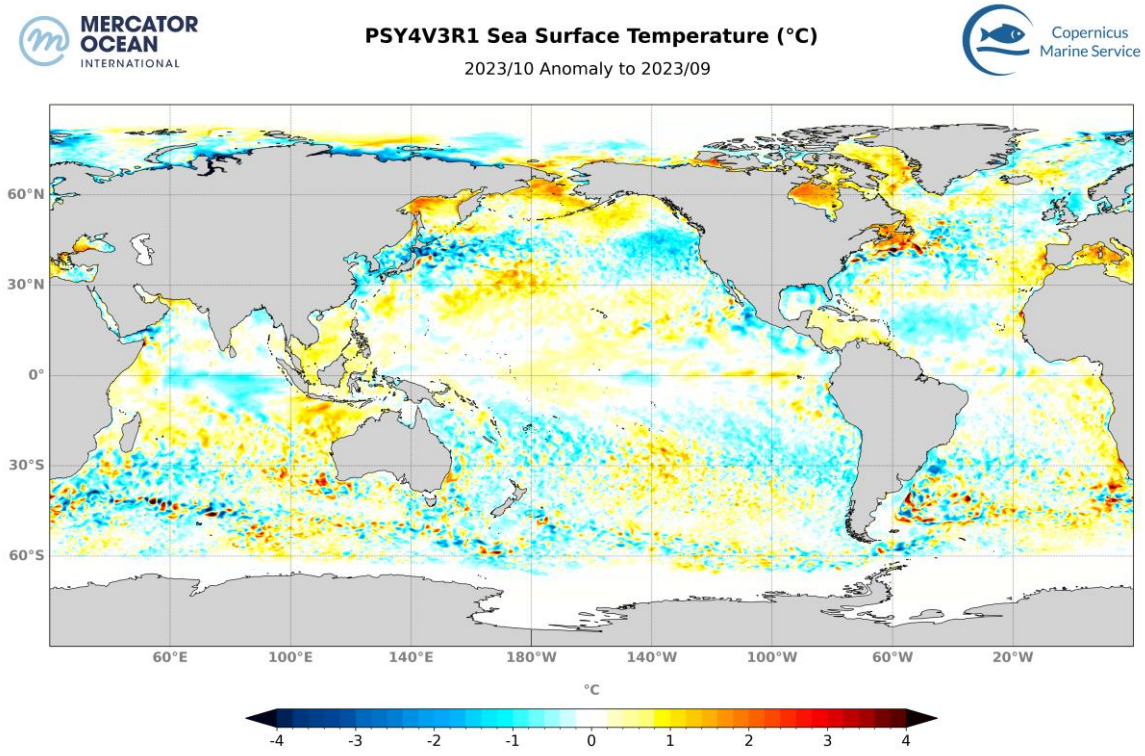
Significant change in ocean state across all basins from the last winter.

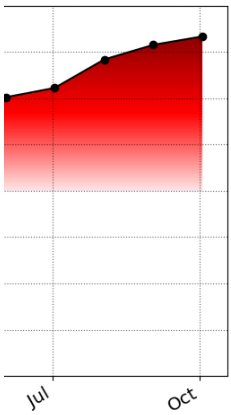
- **Pacific Ocean :** El Niño has developed over the summer and has strengthened to reach moderate to strong intensity level. However the PDO remains in negative phase. https://stateoftheocean.osmc.noaa.gov/atm/pdo.php

- **IOD** : Positive value of DMI (positive phase of IOD)

-**Atlantic** : Warm anomaly over all of the tropical North Atlantic, more pronounced off the African coast and Caribbean.

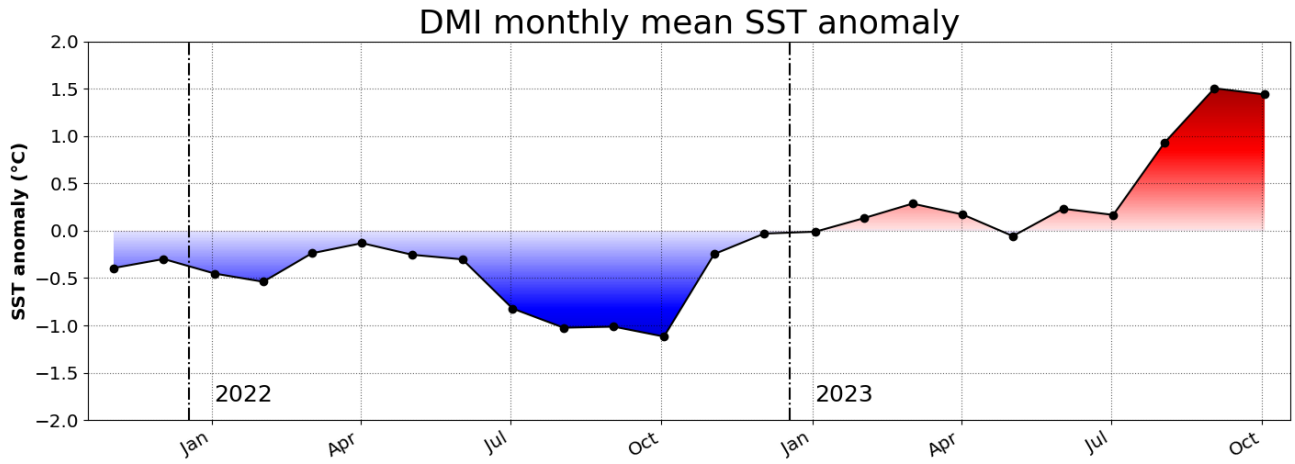

MERCATOR OCEAN INTERNATIONAL
PSY4V3R1 Sea Surface Temperature (°C)
10/2023 Mean Anomaly to GLORYS12V1-1993-2016
60°E 100°E 140°E 180°W 140°W 100°W 60°W 20°W
°C
-4 -3 -2 -1 0 1 2 3 4
Min: -5.8 °C
Mean: 0.49 °C
Max: 7.24 °C


MERCATOR OCEAN INTERNATIONAL
PSY4V3R1 Sea Surface Temperature (°C)
2023/10 Anomaly to 2023/09
Copernicus Marine Service
60°N
30°N
0°
30°S
60°S
60°E 100°E 140°E 180°W 140°W 100°W 60°W 20°W
°C
-4 -3 -2 -1 0 1 2 3 4

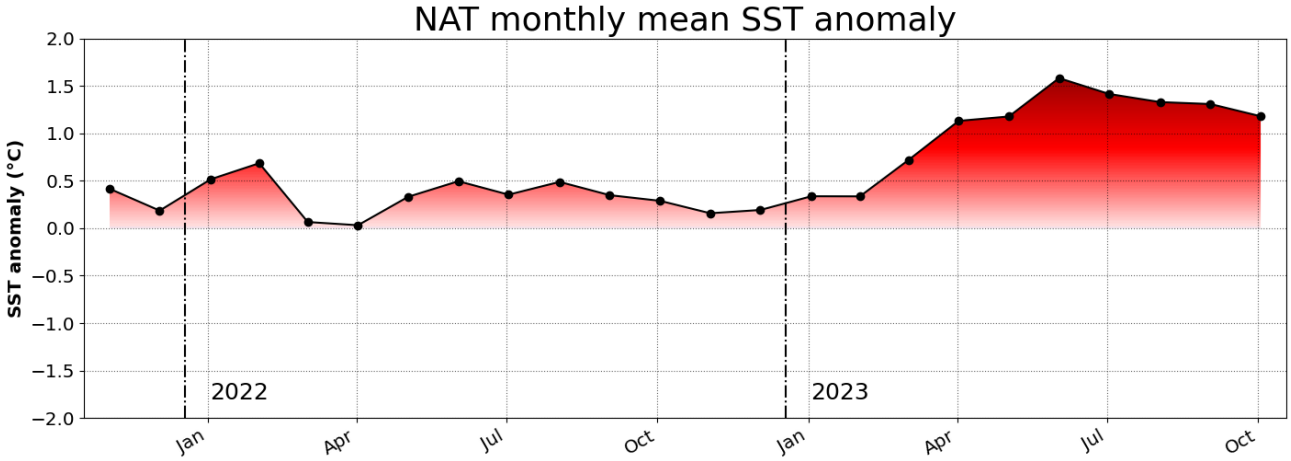

Jul
Oct

Nin
o3.4
mon

thly index issued from Mercator Ocean analysis : 1,6°C



DMI monthly index issued from Mercator Ocean analysis : 1,5°C

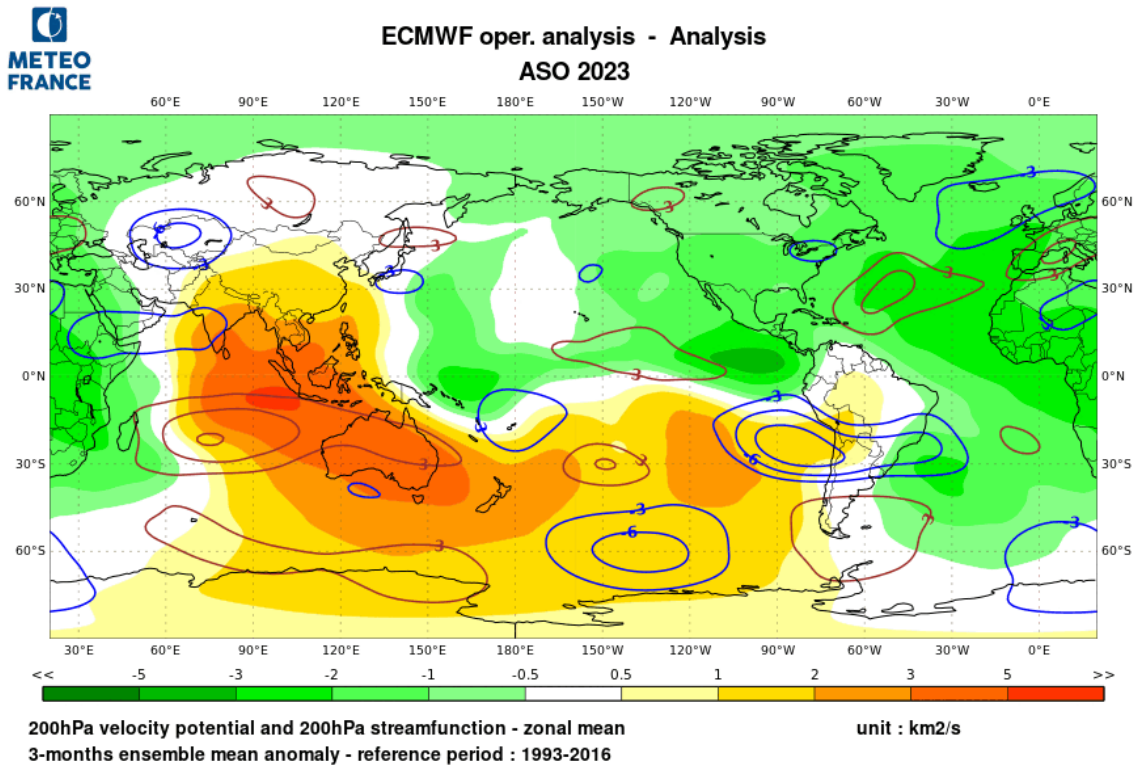


NAT monthly index issued from Mercator Ocean analysis : 1,2°C

B) Atmospheric circulation :

Velocity Potential 200 hPa : Upward anomaly motion around the equatorial Pacific (linked to El Nino) and over the north tropical Atlantic (warm anomalies of sea surface). Dipole with downward anomaly over the eastern Indian Ocean and upward anomaly motion over the extreme west of the Indian Ocean and over Africa (positive IOD).

Streamfunction at 200 hPa : neither a dipole around the equator nor a clear teleconnection towards mid-latitudes are observed.



Over North Atlantic and Europe, weather regime frequencies show intra-seasonal variability during the ASO season. Nevertheless the Atlantic Low regime has been dominant each of the three months; Over the quarter Atlantic Low and Greenland Anticyclone were observed at a higher frequency than normal.

It is difficult to make a link with the MJO which was especially active in September in phases 3 and 4 favoring the NAO+ regime.

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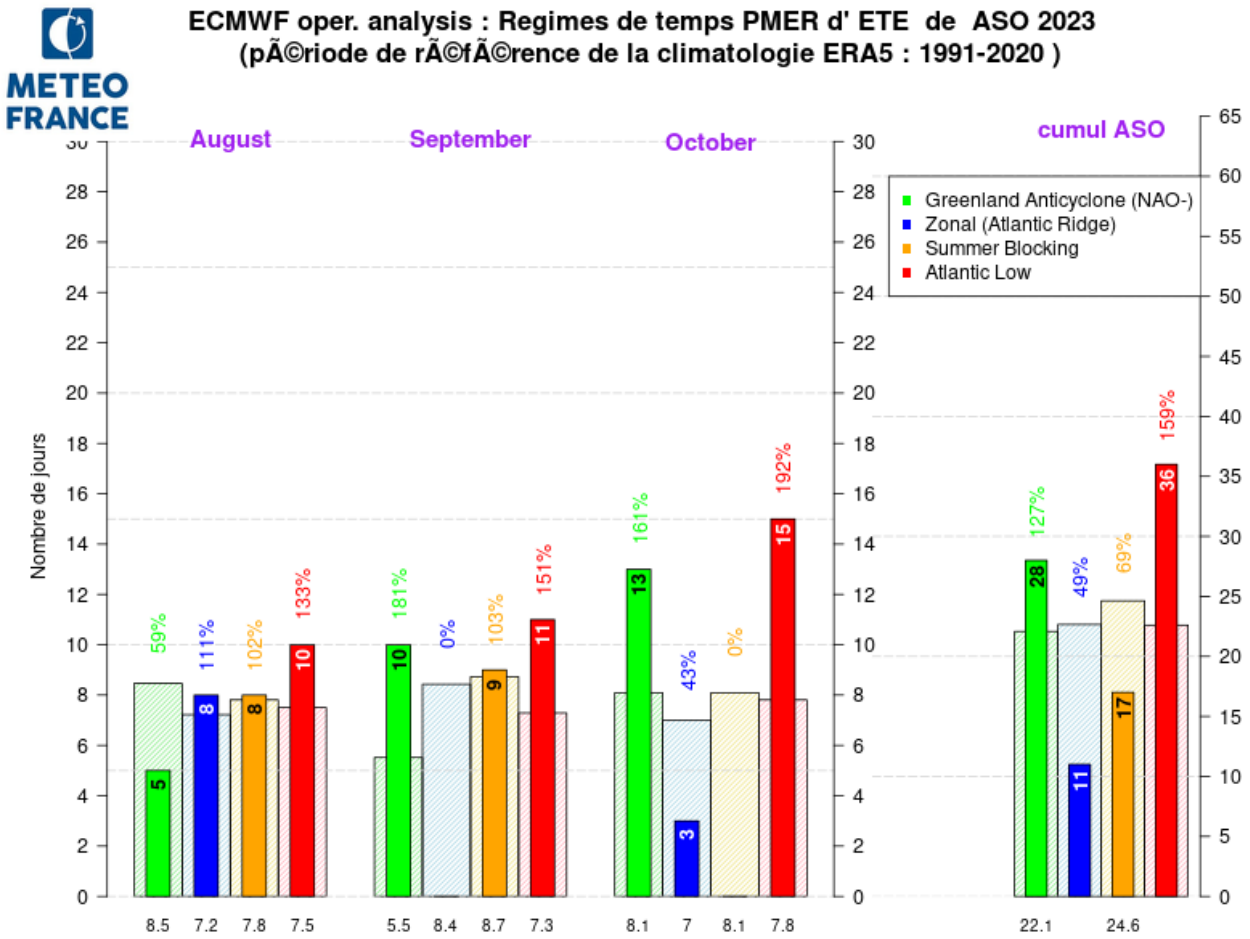
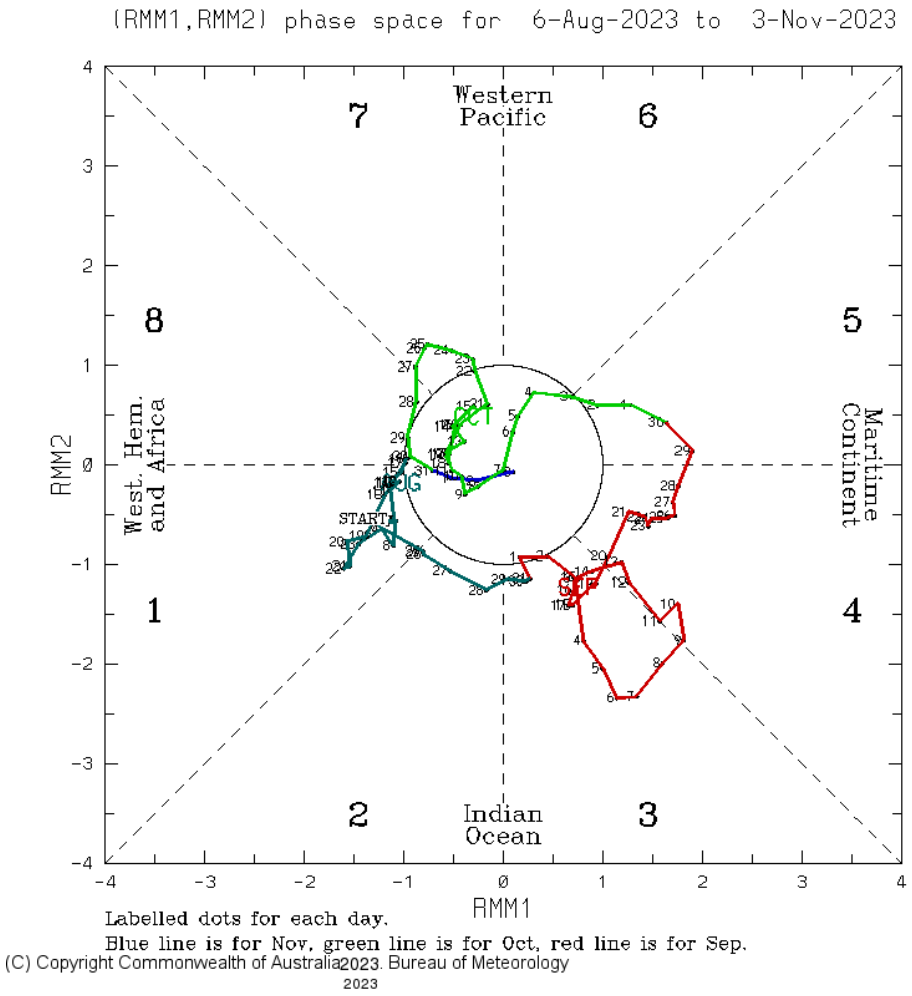
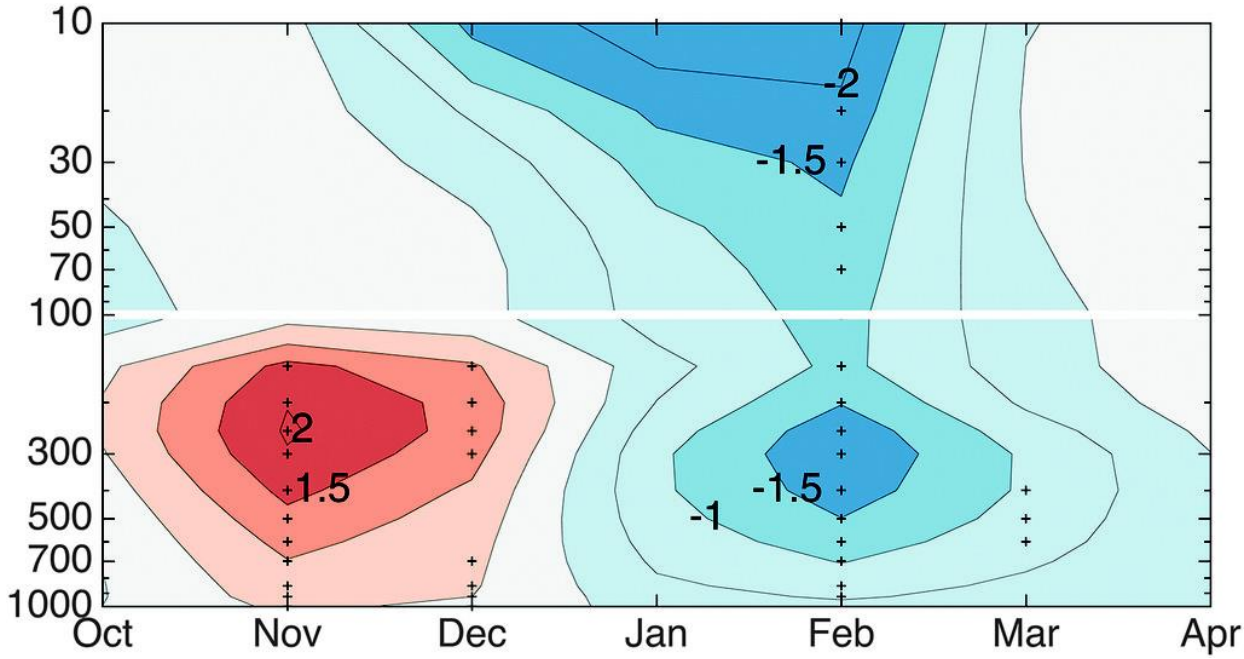


Frequency of SLP weather regimes, compared to climatology, for the past three months and aggregation over the entire quarter, using ERA5.



C) Drivers :

- El Niño ==> Statistical effect on the Atlantic/Europe sector is different



between the beginning and the end of winter

fig 1 : Regression of zonal wind (m s^{-1}) on the Niño-3.4 index on a pressure level–month plane. The zonal wind time series is defined as the area average of the zonal wind in the area 40°–50°N, 90°W–0° for levels below 100 hPa, and the zonal mean is in the latitude band 50°–60°N for levels at and above 100 hPa (Citation: Martin P. King et all, Bulletin of the American Meteorological Society 99, 7; 10.1175/BAMS-D-17-0020.1)

At the end of autumn and beginning of winter, the westerly flow is renforced while at the end of winter and beginning of spring it is attenuated (following an increased frequency of SSW)

- IOD ==> In the case of a strong positive phase of the IOD, it is an NAO+ type circulation which is favored during winter

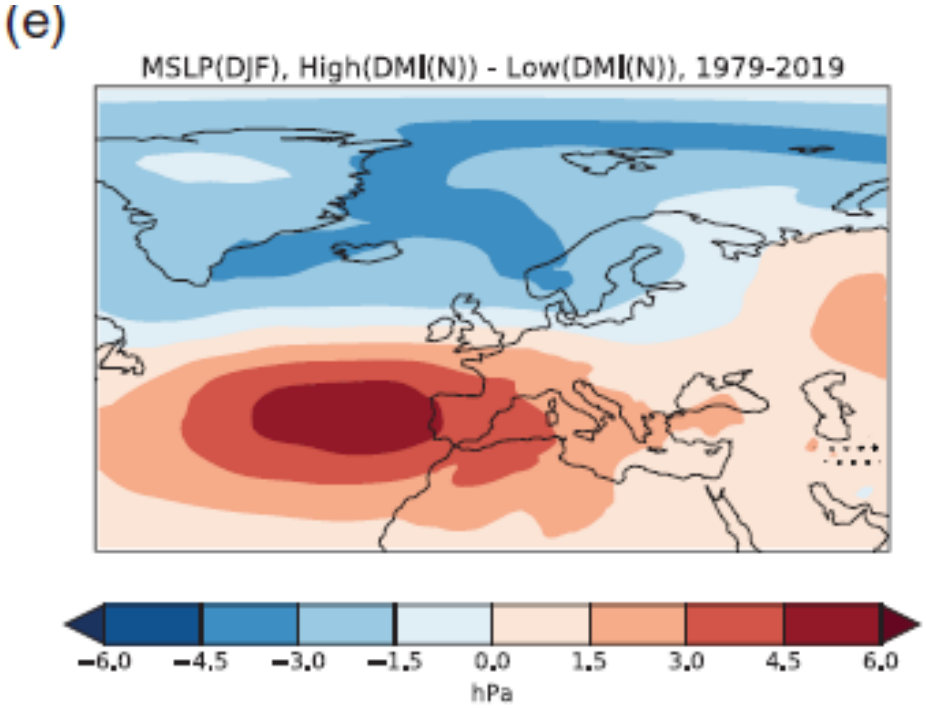


fig 2 : MSLP (hPa) with ENSO signal removed and stippling denoting statistical significance at the 90% level (source : Hardiman et al. Predictability of European winter 2019/20: Indian Ocean dipole impacts on the NAO. *Atmospheric Science Letters*, *21*(12), e1005)