Earth Sciences Department

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

Forecast Briefing

February 2026

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Climate Services Team (CST)

Earth System Services (ESS)

Barcelona Supercomputing Center (BSC)

Thursday 19th Feb 2026

Outline

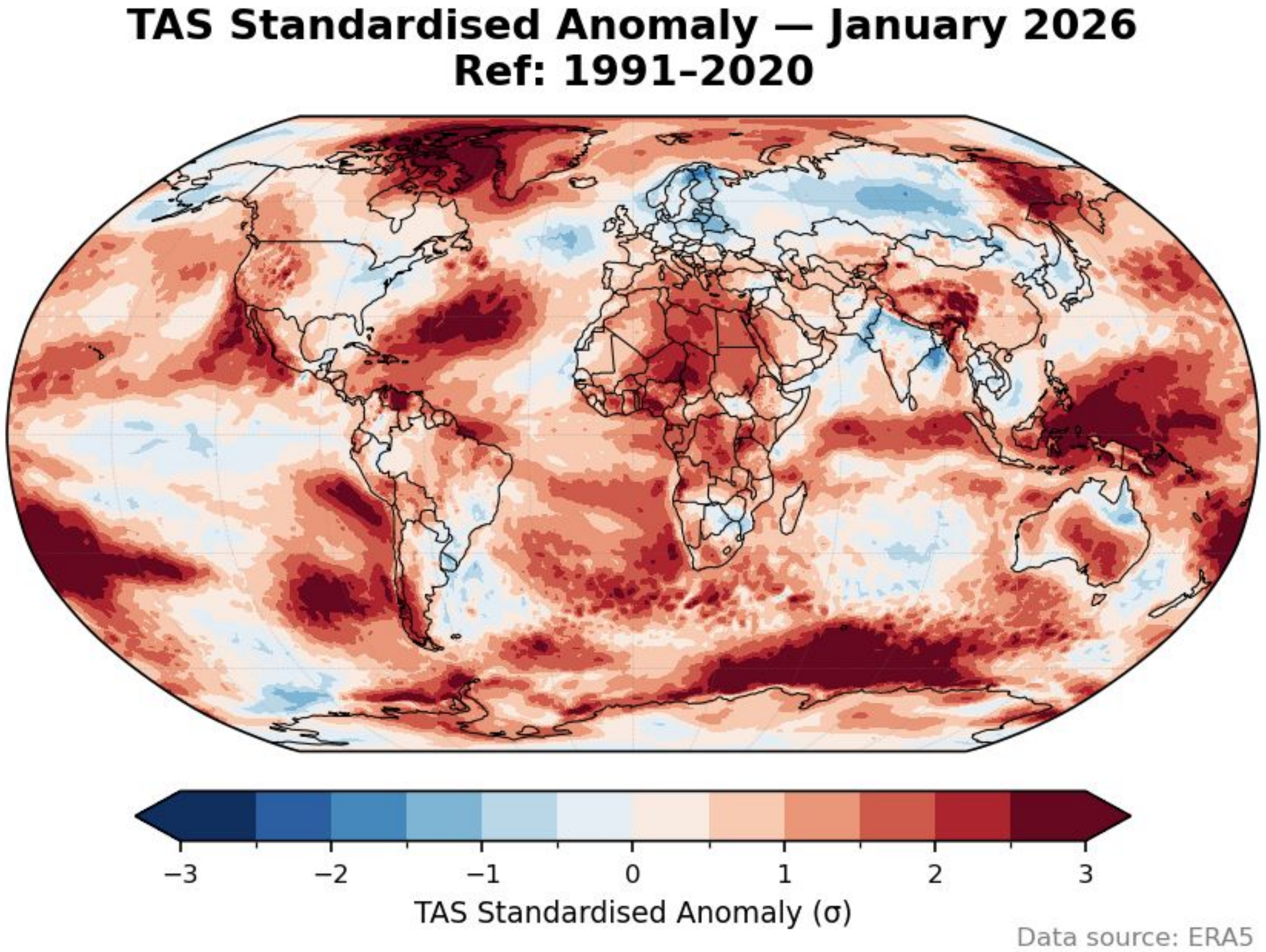
I. Recent state of the climate
II. Subseasonal forecasts
III. Seasonal forecasts
IV. Decadal forecasts
V. Discussion

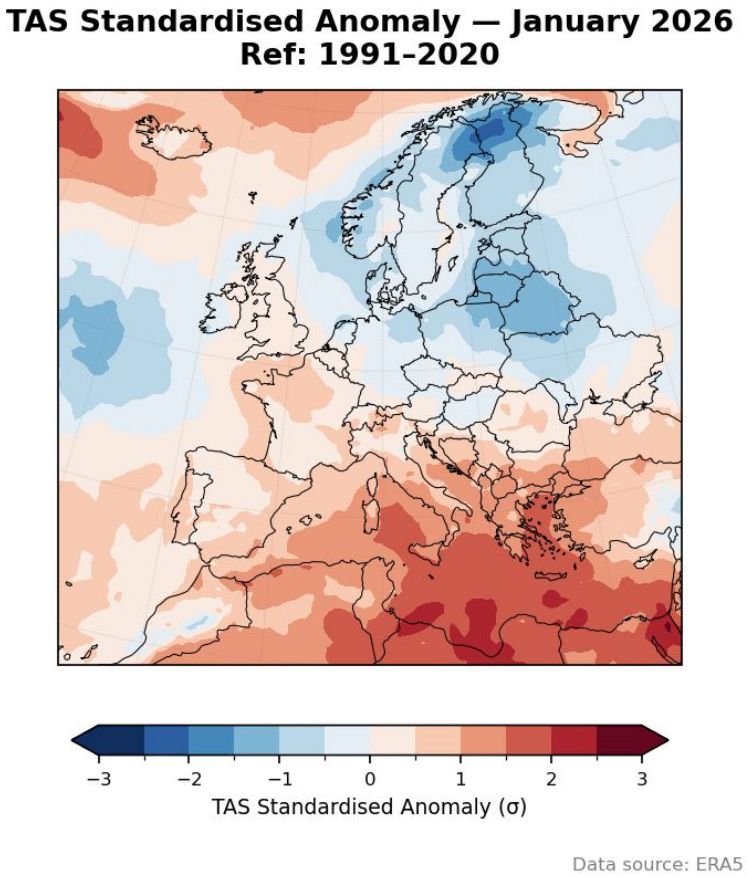
I. Recent state of the climate

I. Recent state of the climate

Temperature

1.47°C above Jan 1850-1900 (ERA5)





- Overall strong positive anomalies - 5th warmest January on record
- North-South Dipole in Europe. Wavier-than-usual polar jet stream allowed Arctic air into mid-latitudes -> coldest January in Europe since 2010
- Negative anomaly over Russia

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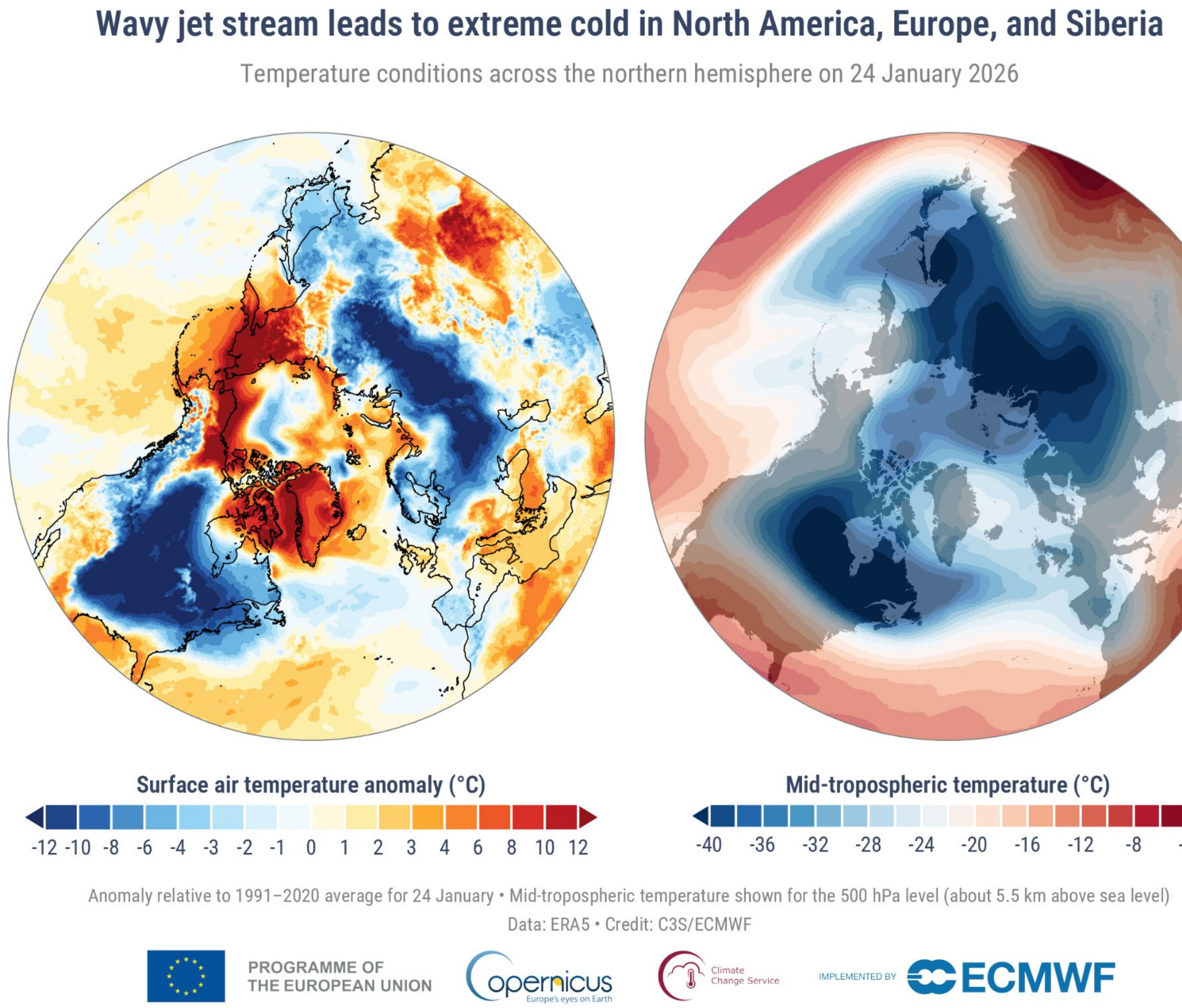
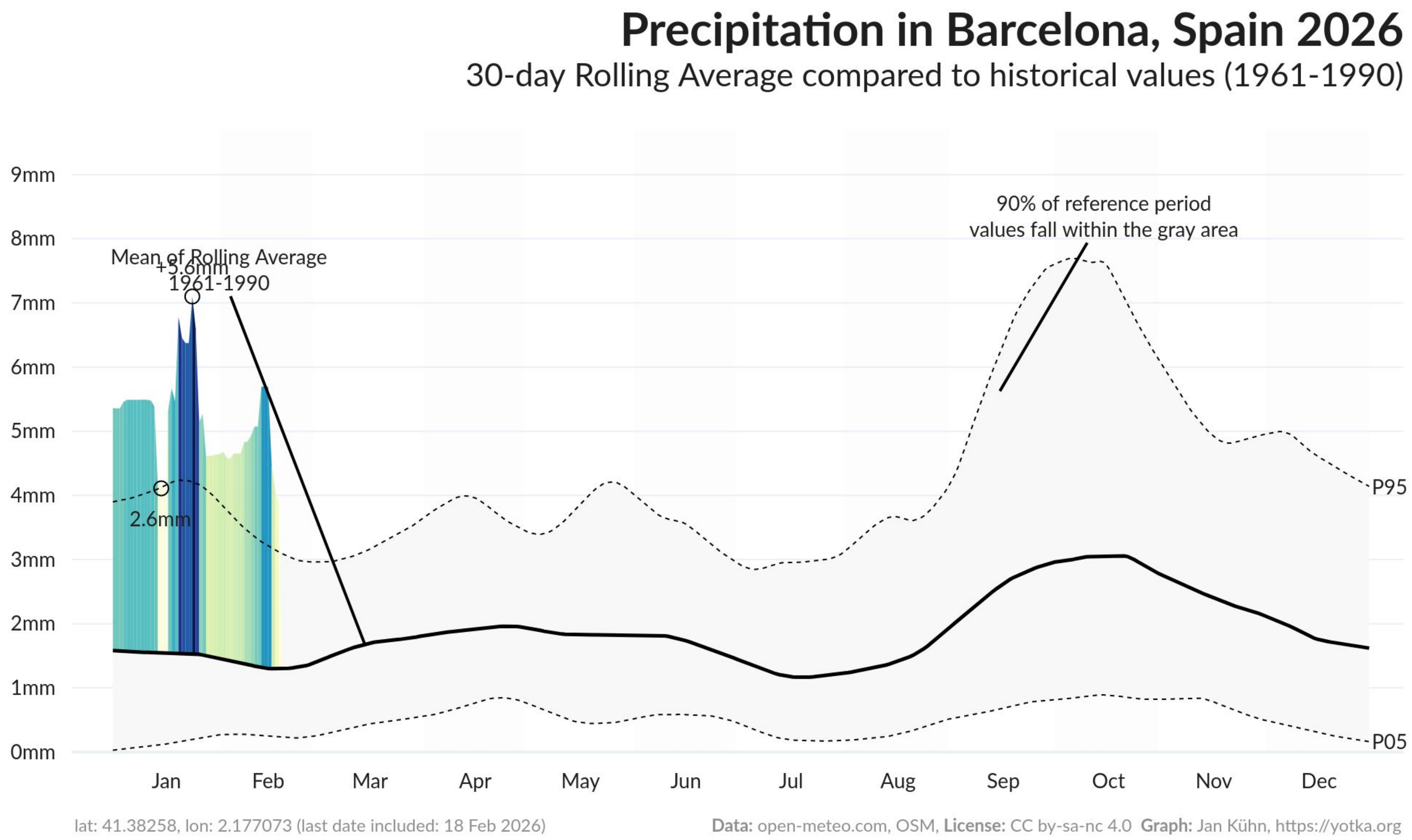
Temperature



- ➢ Wavier jet led to cold air intrusions
- ➢ Potential causes:
  - Changes in stratospheric dynamics
  - Weakened temperature gradient between the tropics and the pole.

Potential but **still uncertain** impact of climate change.

Barcelona



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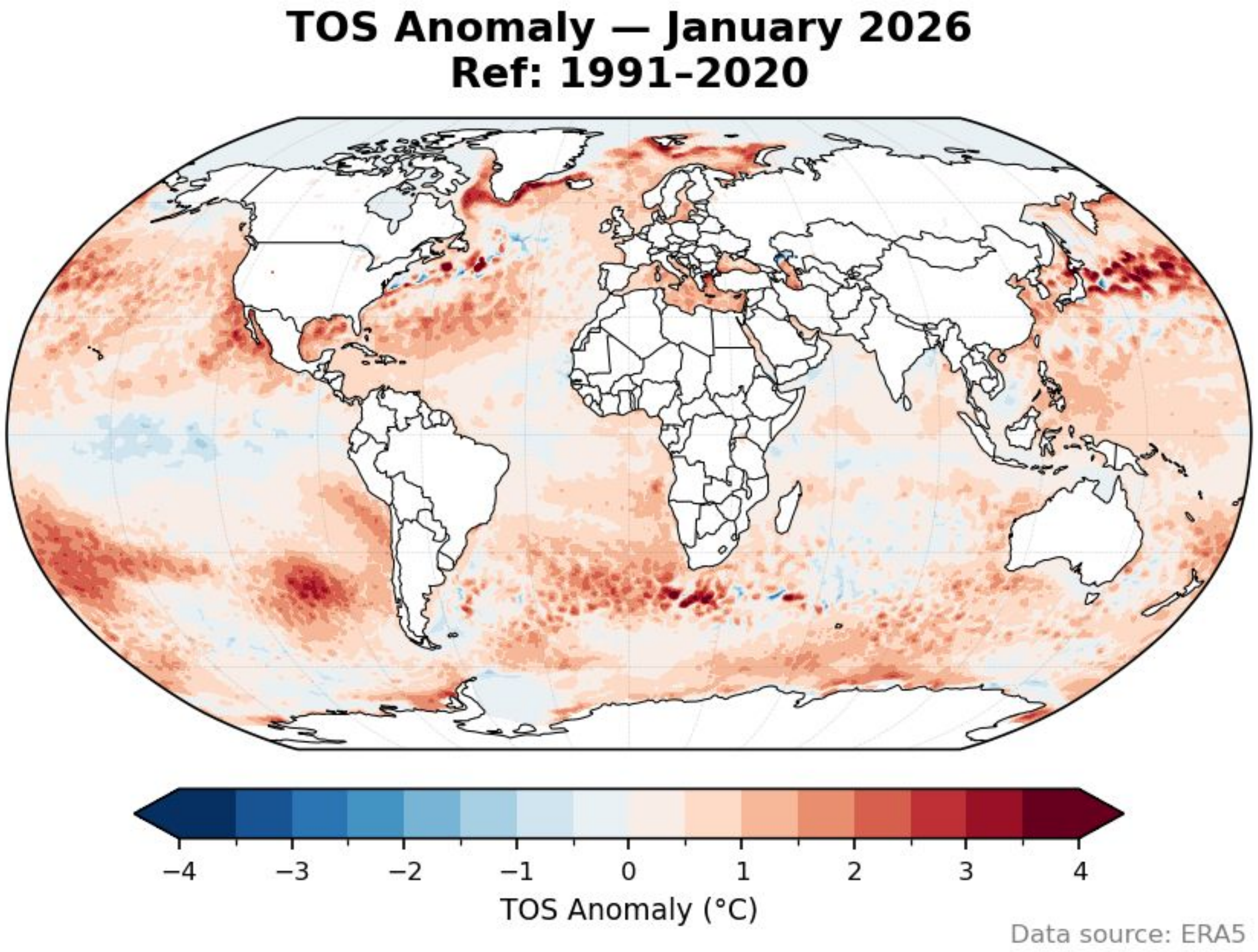
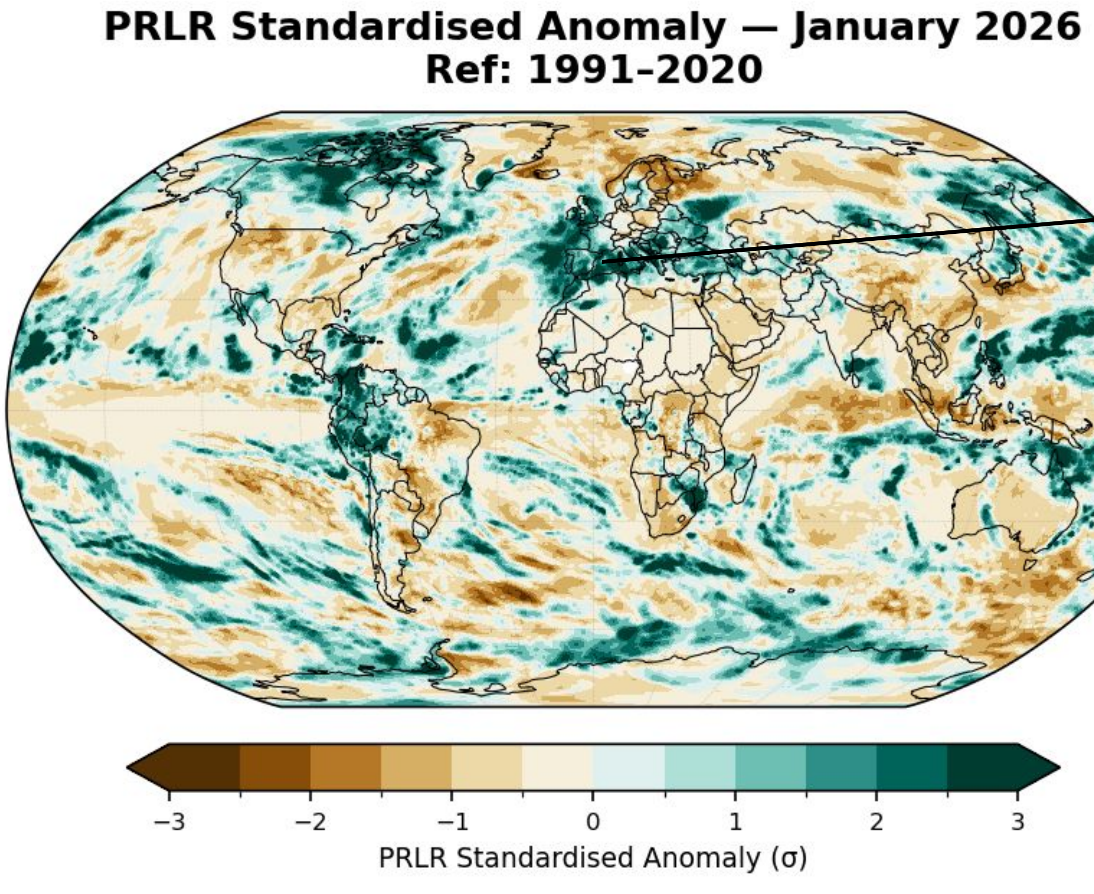
Source: https://yotka.org/meteo-hist

Sea surface temperature (SST)

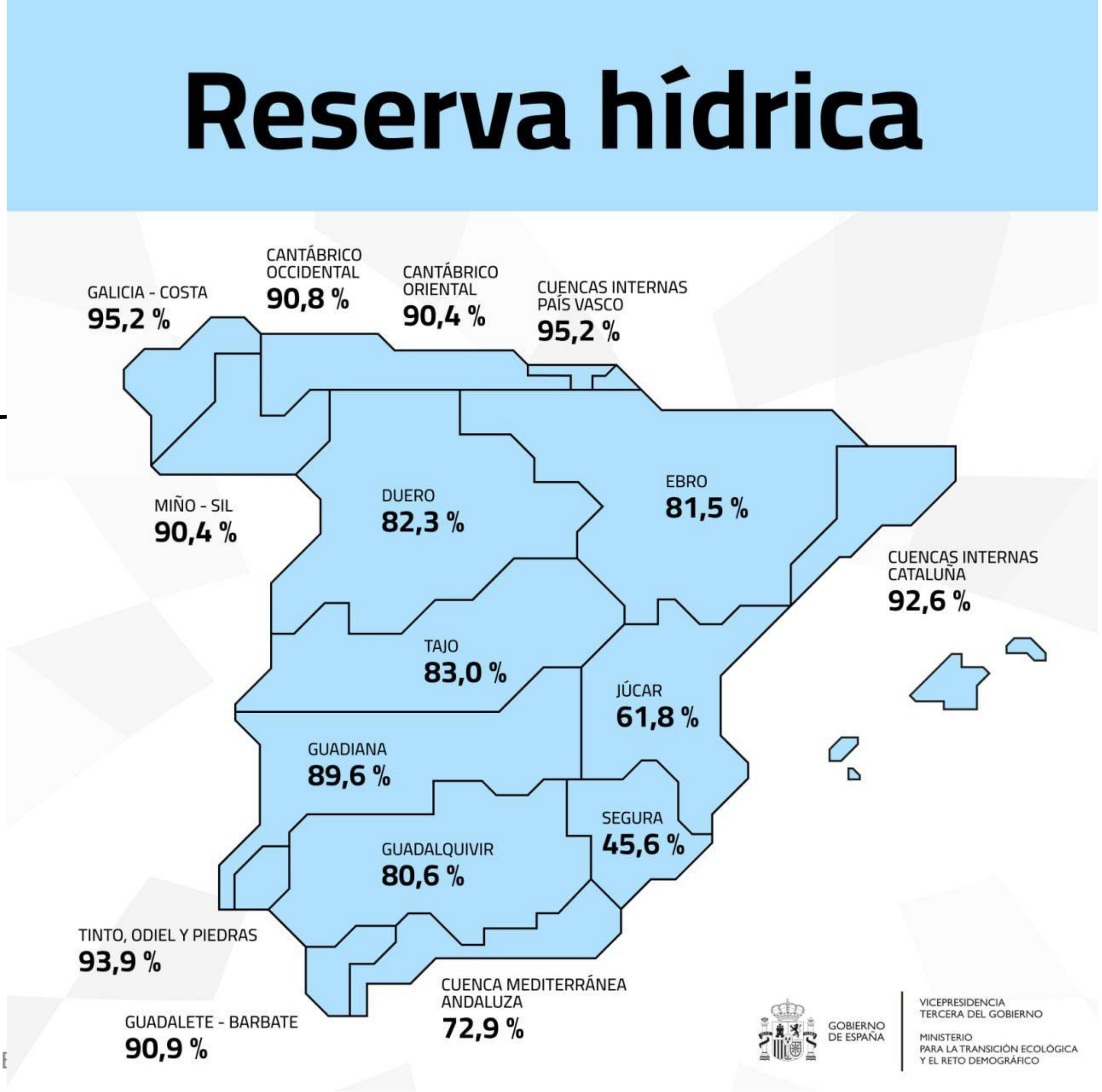


- ➢ SST between 60°S–60°N was 20.68C, 0.37C above the 1991-2020 average (4th highest on record for January).
- ➢ Are positive SSTs in the NW Atlantic responsible for higher amounts of precipitable water? **SPECULATION ALERT**
- ➢ Record breaking SST anomalies in TropAtl, Med, North Atlantic.
- ➢ Weak La Niña conditions

Precipitation



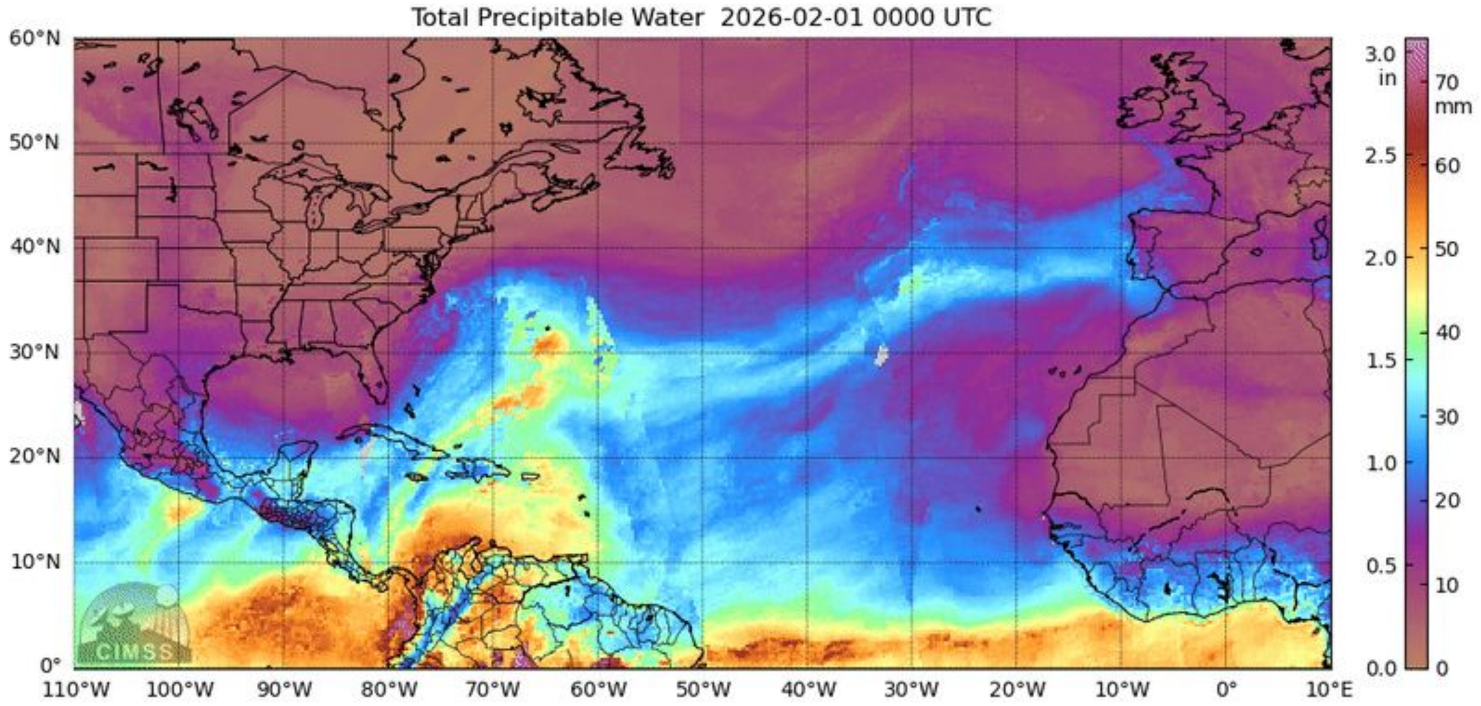
Data source: E

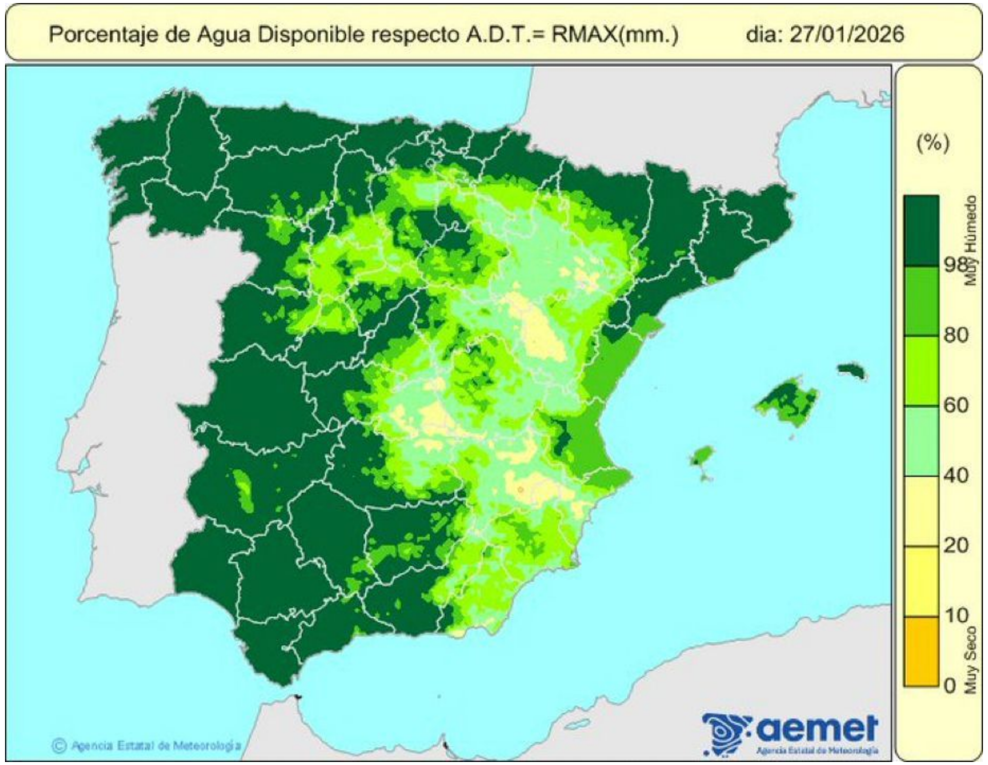


➢ Spain saw the wettest January in 25 years. Records in Portugal, Northern Ireland, Cornwall. Stroms Francis, Goretti, Harry, Kristin and Chandra.

I. Recent state of the climate

Precipitation





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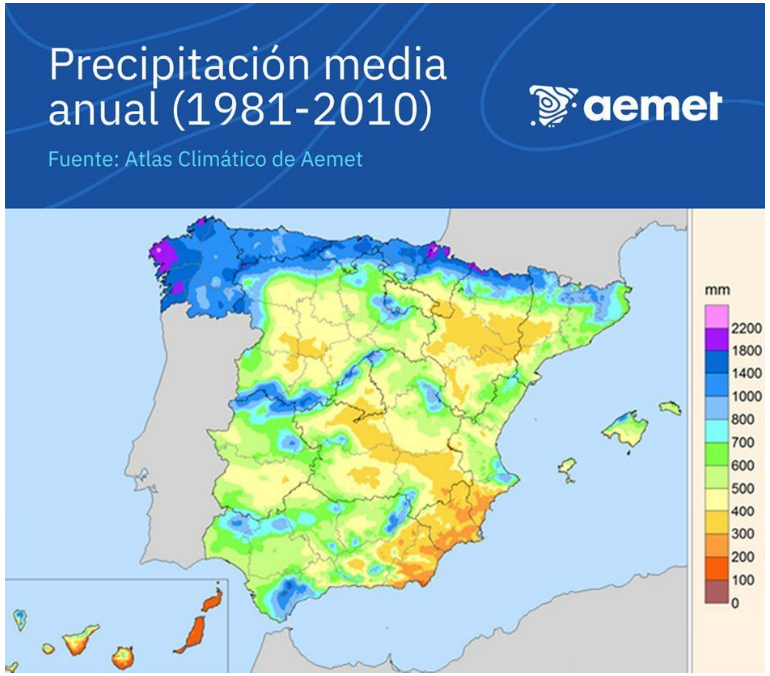
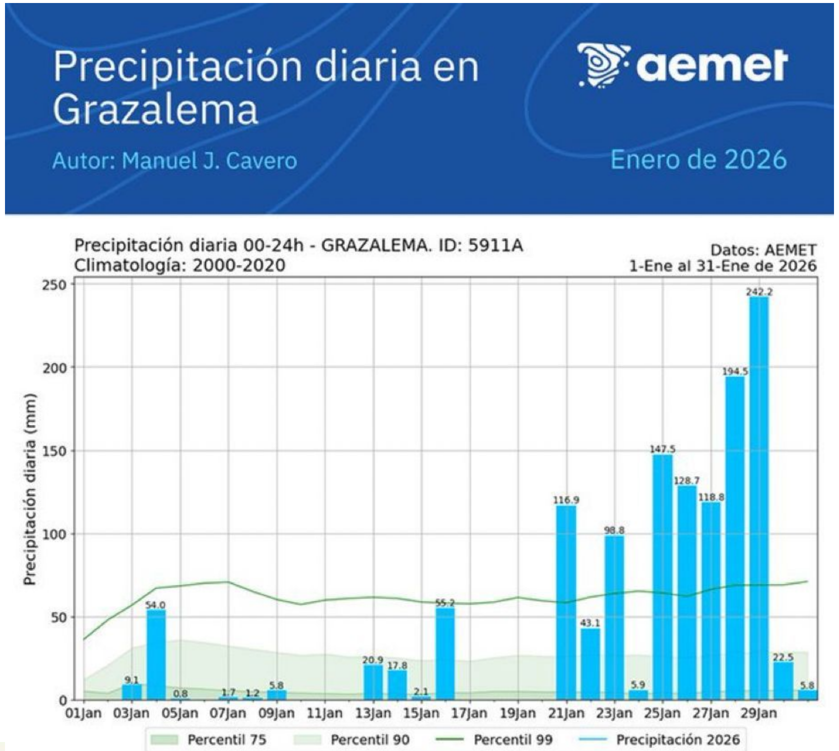
Source: https://bin.ssec.wisc.edu/pub/mtpw2/images/tpw_nrl_colors/natl/202602/

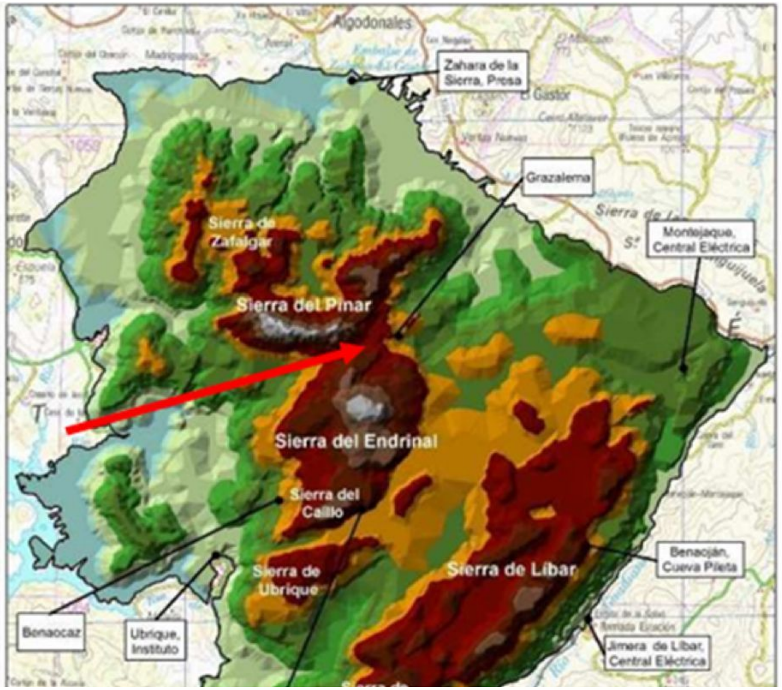
I. Recent state of the climate

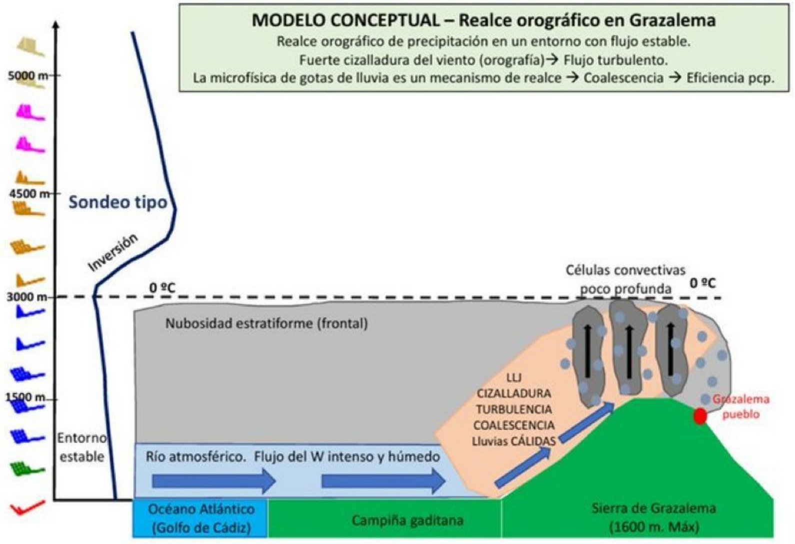
Precipitation





Plaza de España inundada (1963).

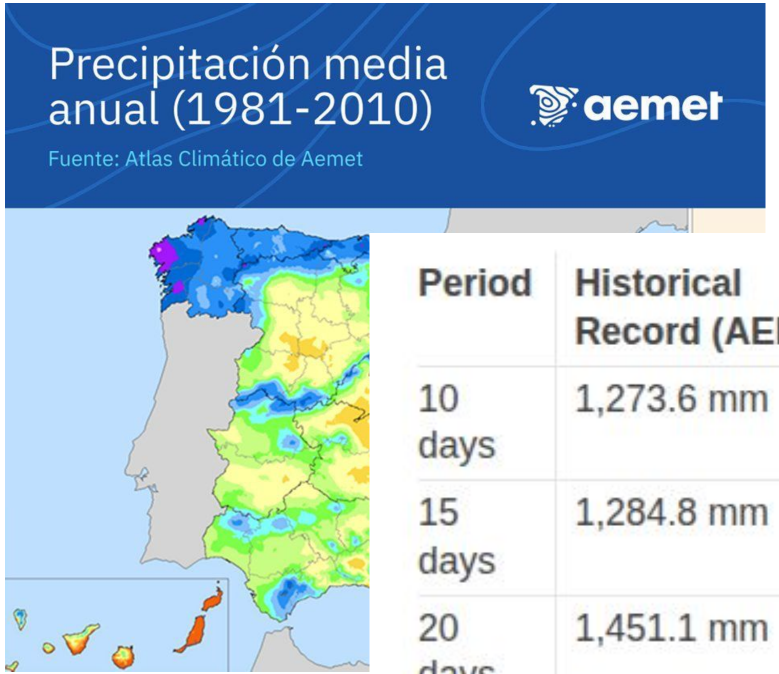


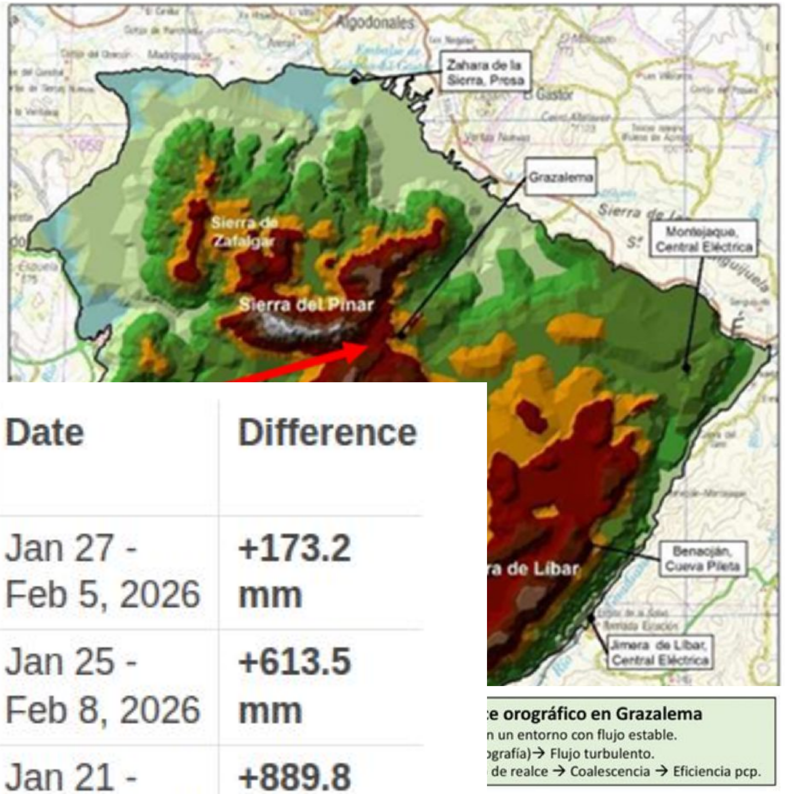


Source: AEMET

I. Recent state of the climate

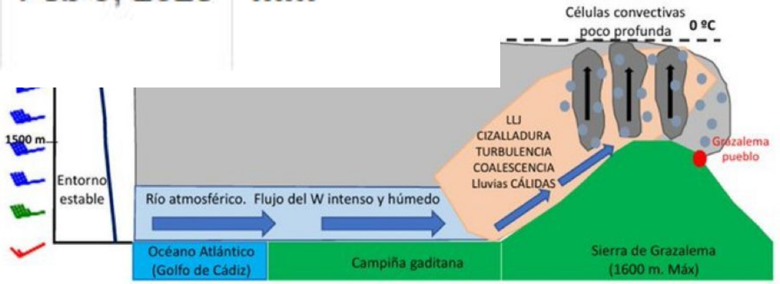
Precipitation





Period	Historical Record (AEMET)	Date	Location	Current Record	Date	Difference
10 days	1,273.6 mm	Dec 13-22, 1958	Grazalema	**1,446.8 mm**	Jan 27 - Feb 5, 2026	**+173.2 mm**
15 days	1,284.8 mm	Dec 9-23, 1958	Grazalema	**1,898.3 mm** [1]	Jan 25 - Feb 8, 2026	**+613.5 mm**
20 days	1,451.1 mm	Dec 3-23, 1958	Grazalema	**2,340.9 mm** [2]	Jan 21 - Feb 9, 2026	**+889.8 mm**
31 days	1,674.0 mm	Nov 18 - Dec 18, 1989	Cortes de la Frontera	**2,436.9 mm** [3]	Jan 10 - Feb 9, 2026	**+762.9 mm**


Plaza de España inundada (1963).

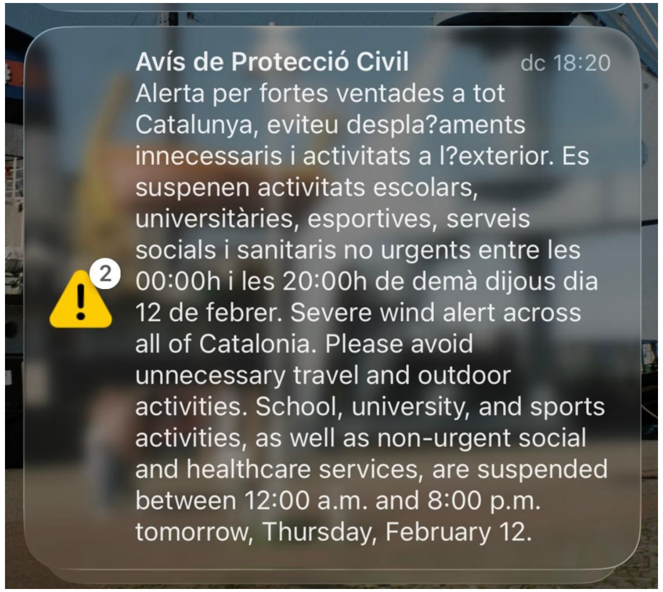


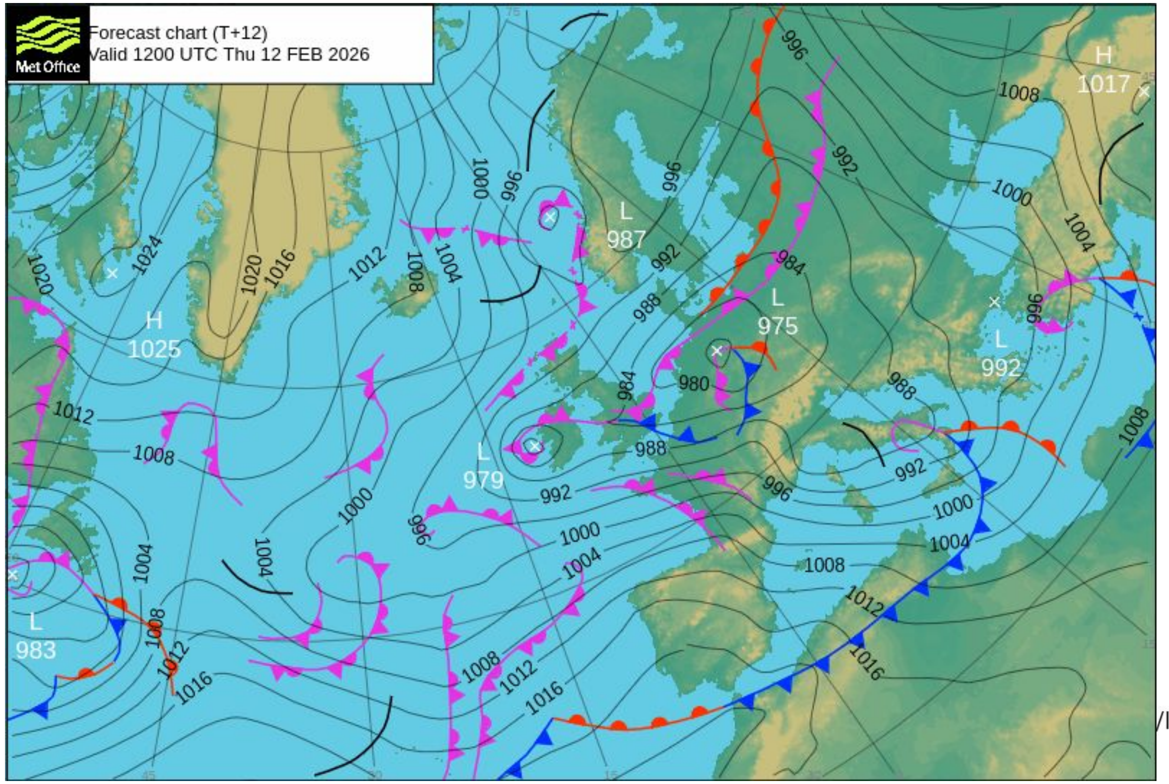
Source: AEMET

I. Recent state of the climate

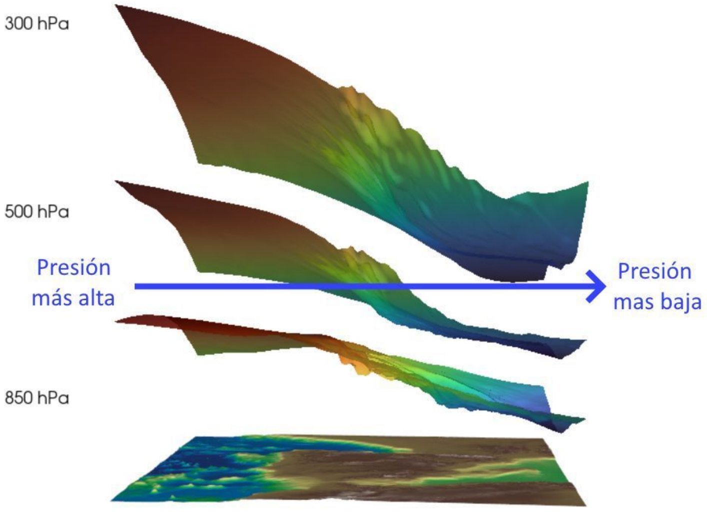
Wind

- Strong wind gusts event in Catalonia and S. of France, 6/6 extreme weather warning and ES-Alert triggered.





/IFS



Válido: 14/02/2026 12:00 UTC

@waveologist

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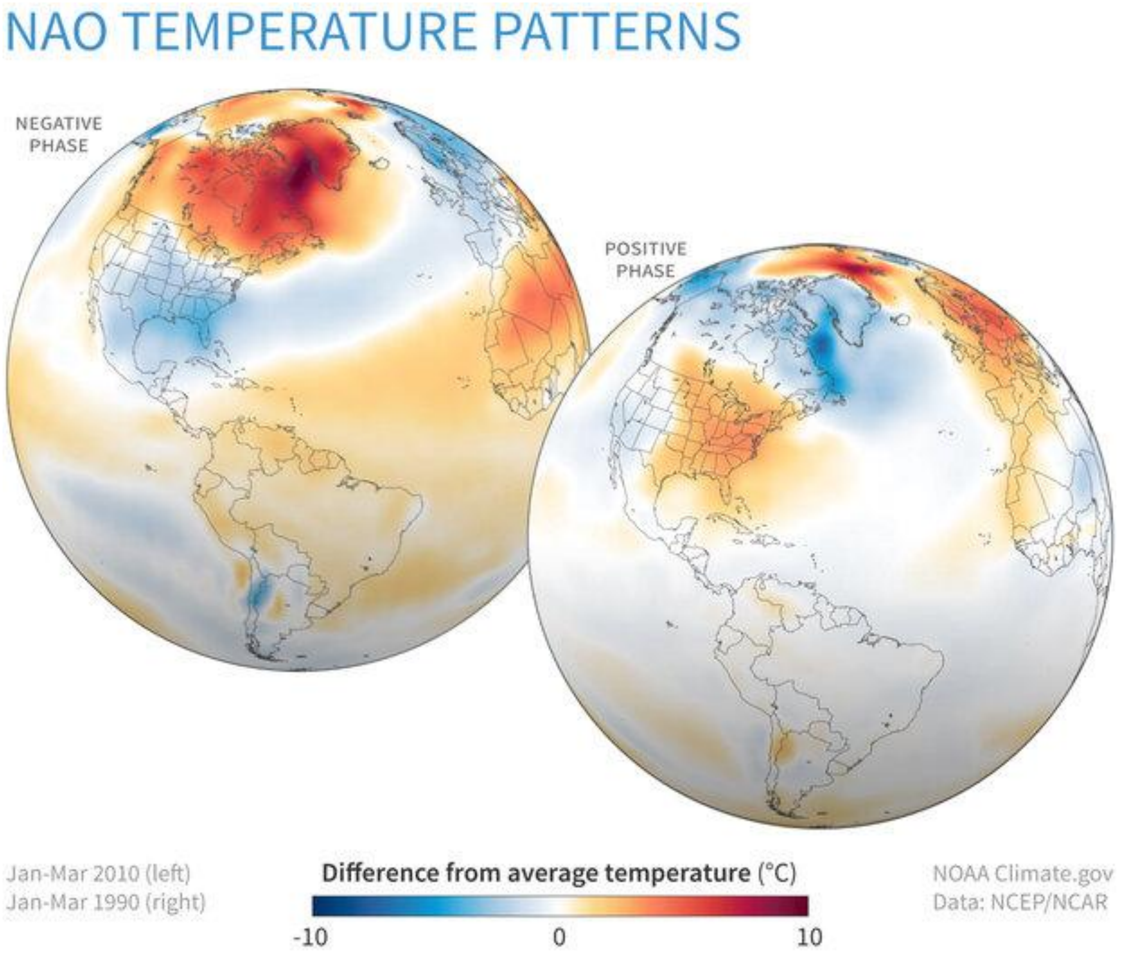
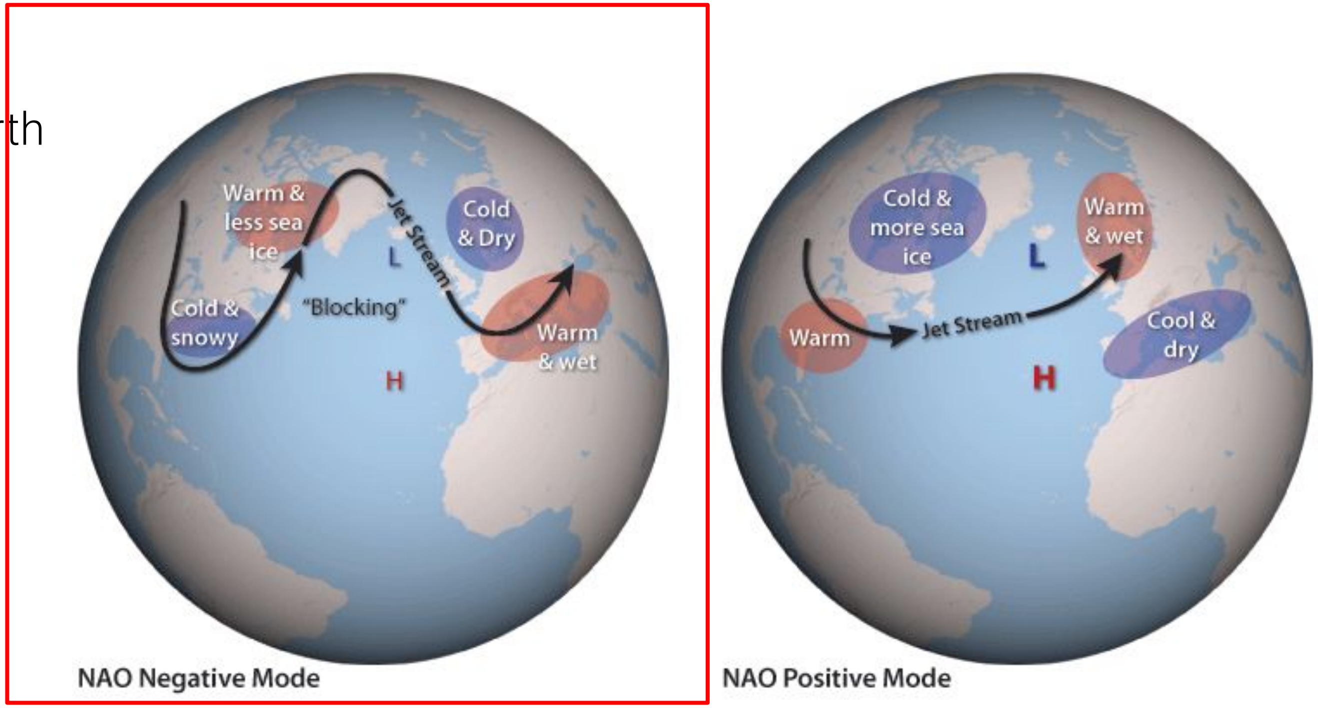
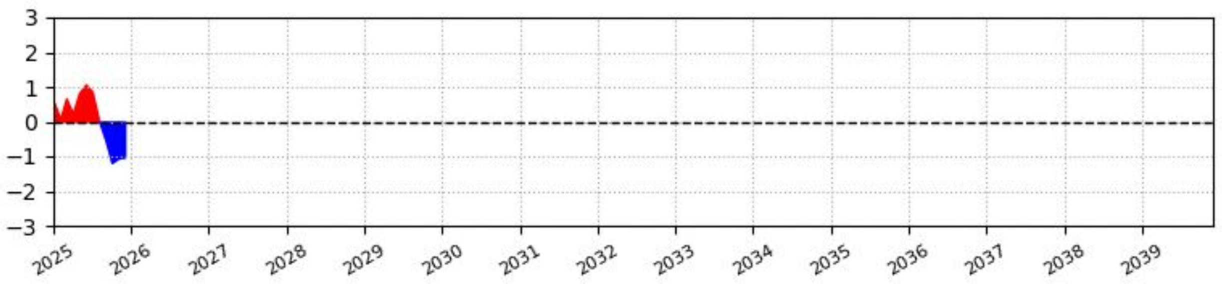
North Atlantic Oscillation (NAO)

- The North Atlantic Oscillation (NAO) is the leading mode of large-scale atmospheric variability in the North Atlantic basin.



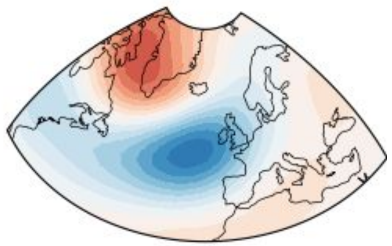


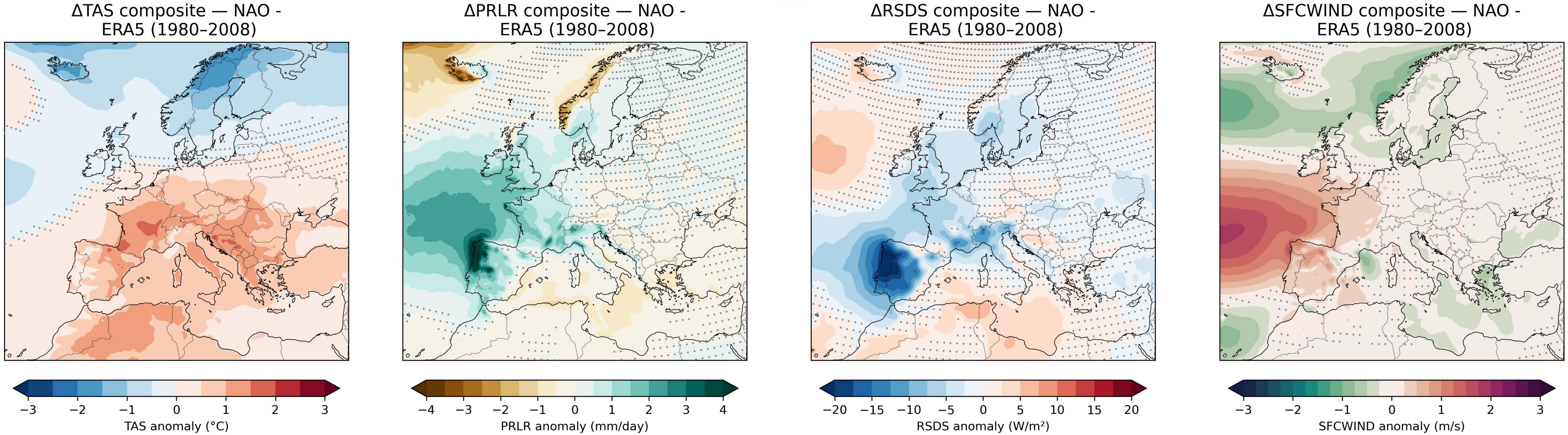
NAO index: Standardized 3-month Running Mean Index



Source: https://www.cpc.ncep.noaa.gov/data/teledoc/nao_ts.shtml

Composite of NAO- and surface climate





Temperature

Precipitation

Solar radiation

Surface wind

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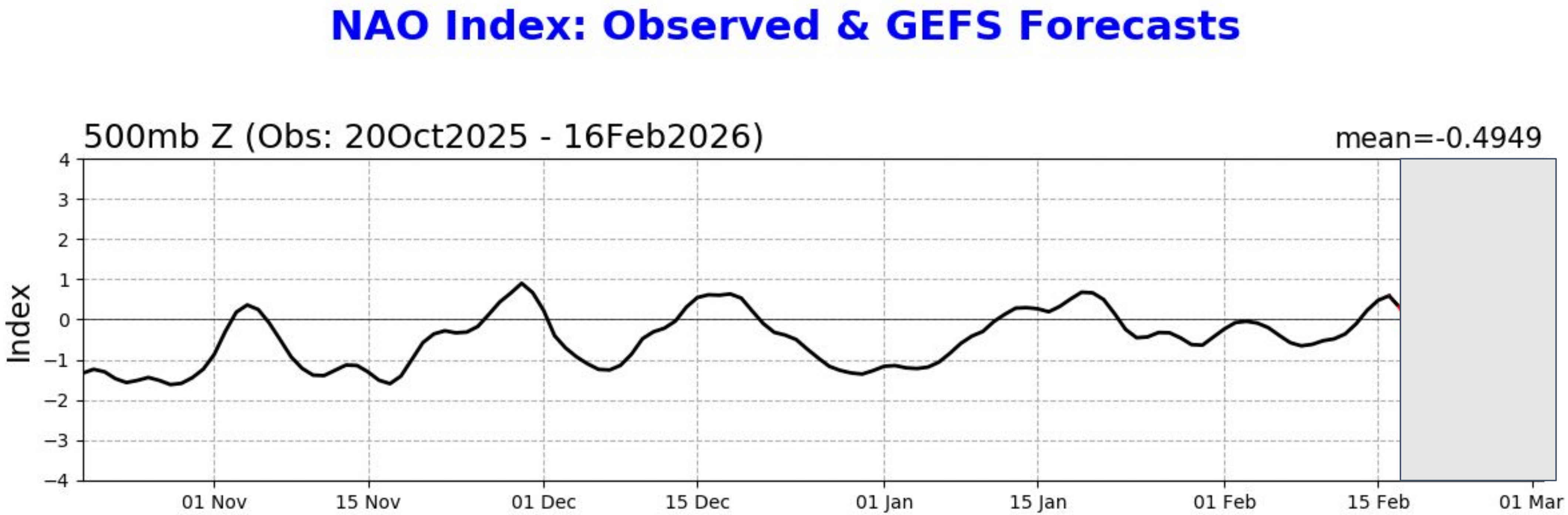
North Atlantic Oscillation (NAO)



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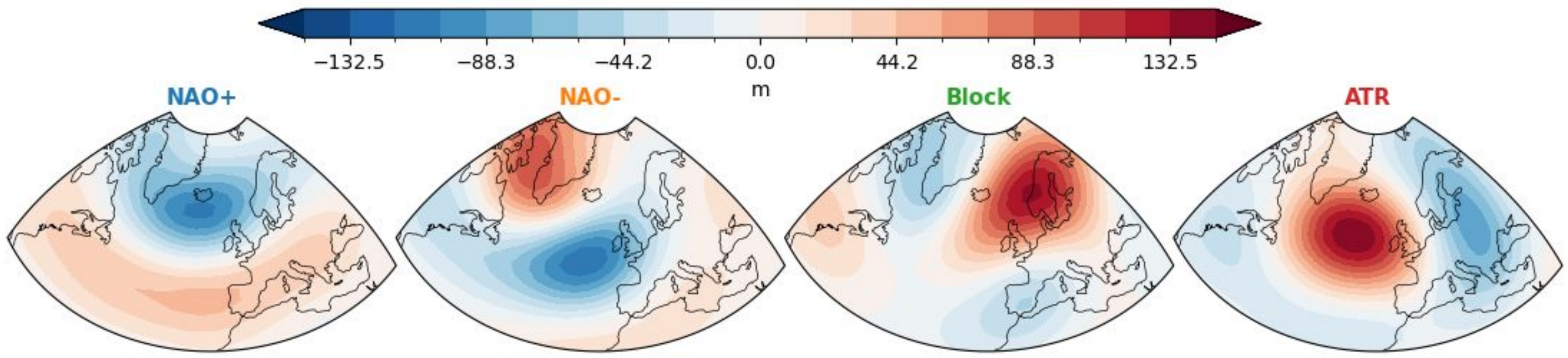
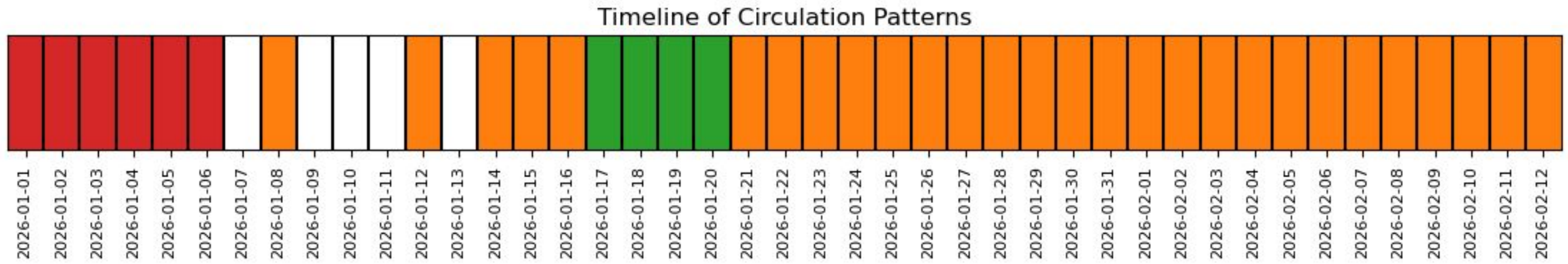
Source: https://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/nao_index_ensm.shtml

I. Recent state of the climate

European weather regimes



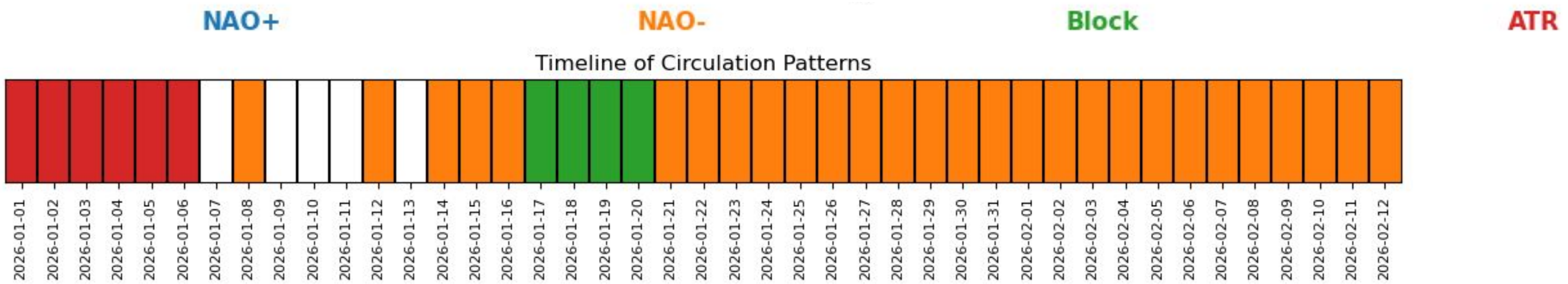
- ➢ Geopotential height anomaly composites at 500 hPa
- ➢ 1980 - 2008 ONDJFMA (k-means clustering)

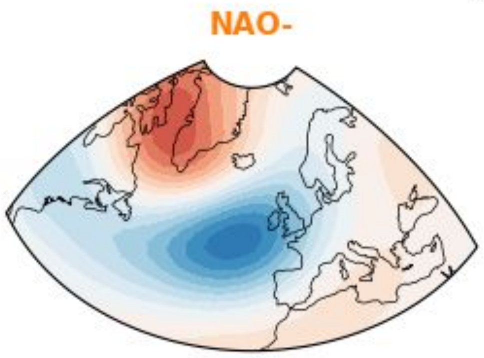


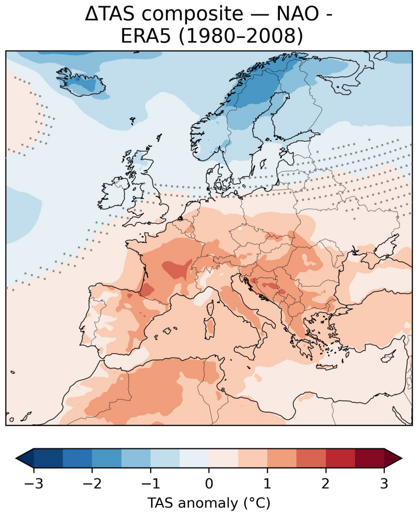
- ➢ **Blocking:** Cold and dry anomalies in Northern Europe, Wet anomalies in Southwestern Europe. Onset through anticyclonic wave breaking over Europe in the upper troposphere (Michel et al., 2012).
- ➢ **NAO+:** Westerly winds predominate bringing mild, wet and stormy winter conditions to northern Europe and eastern USA while southern Europe is more likely to see cold, dry winter conditions.
- ➢ **NAO-:** (Generally weaker pressure differences) Spells of easterly winds bring cold dry and calm winters with fewer and weaker storms to northern Europe and eastern USA.
- ➢ **ATR:** NEurope: Drier and slightly milder due to being under the influence of ridging on the upstream side. SEurope: Can be wetter (particularly Iberia and western Med) due to enhanced storm tracks directed southward. Eastern Med may be less affected.

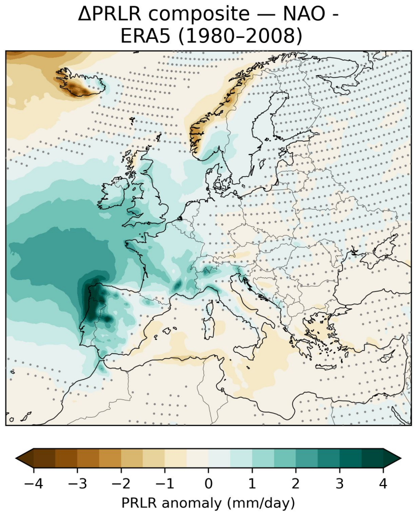
Weather regimes

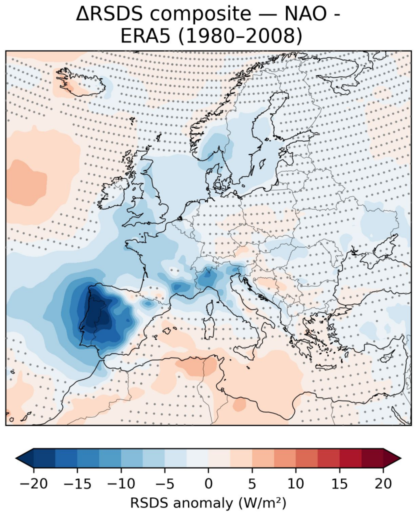
BOREAS

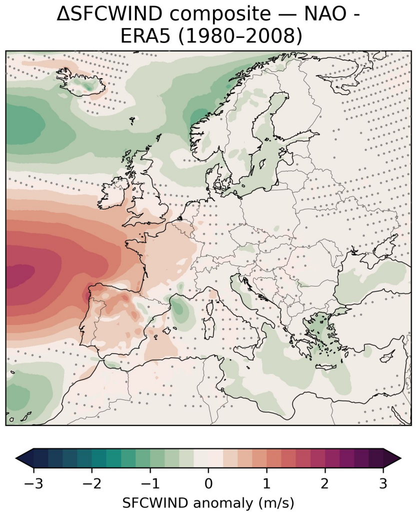












Temperature | Precipitation | Solar radiation | Surface wind

A negative NAO is characterised by a **southward shift of the jet stream**, that brings positive wind and precipitation anomalies to western Europe, alongside milder temperatures and reduced incoming solar radiation.

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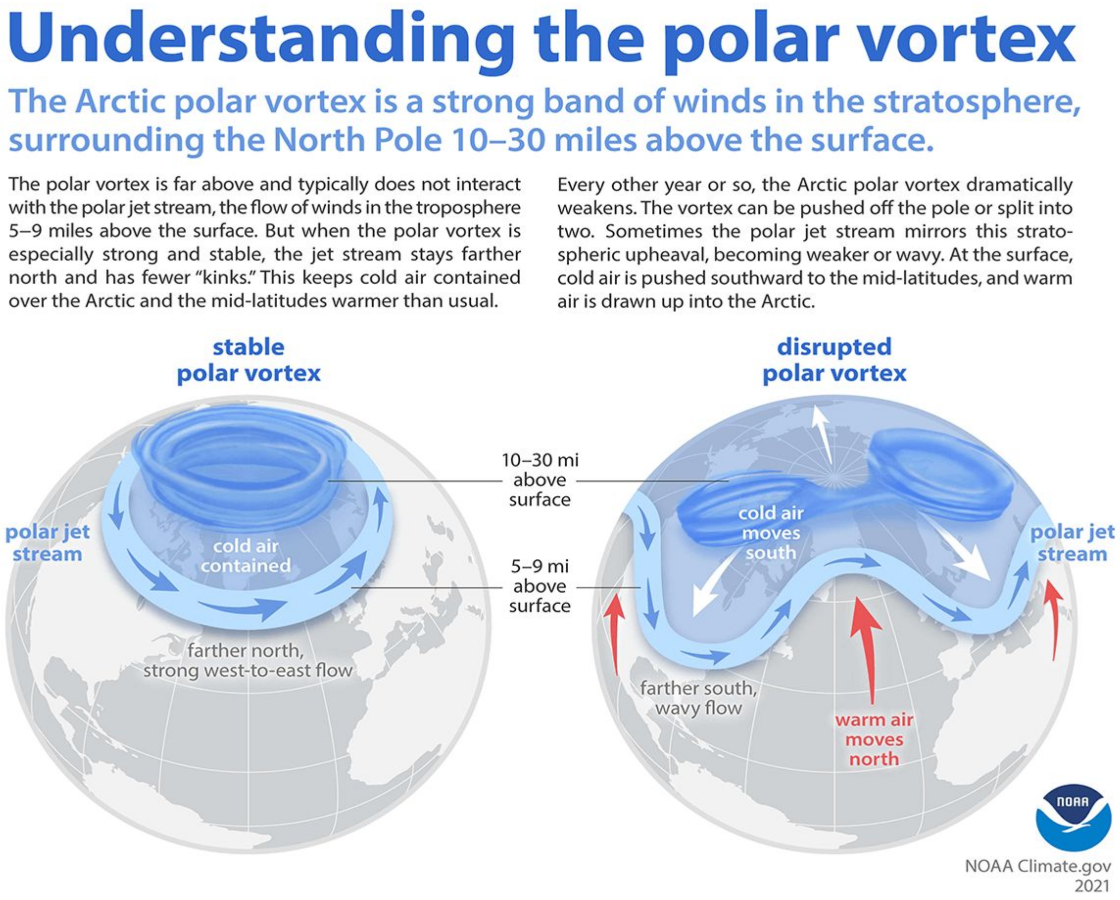
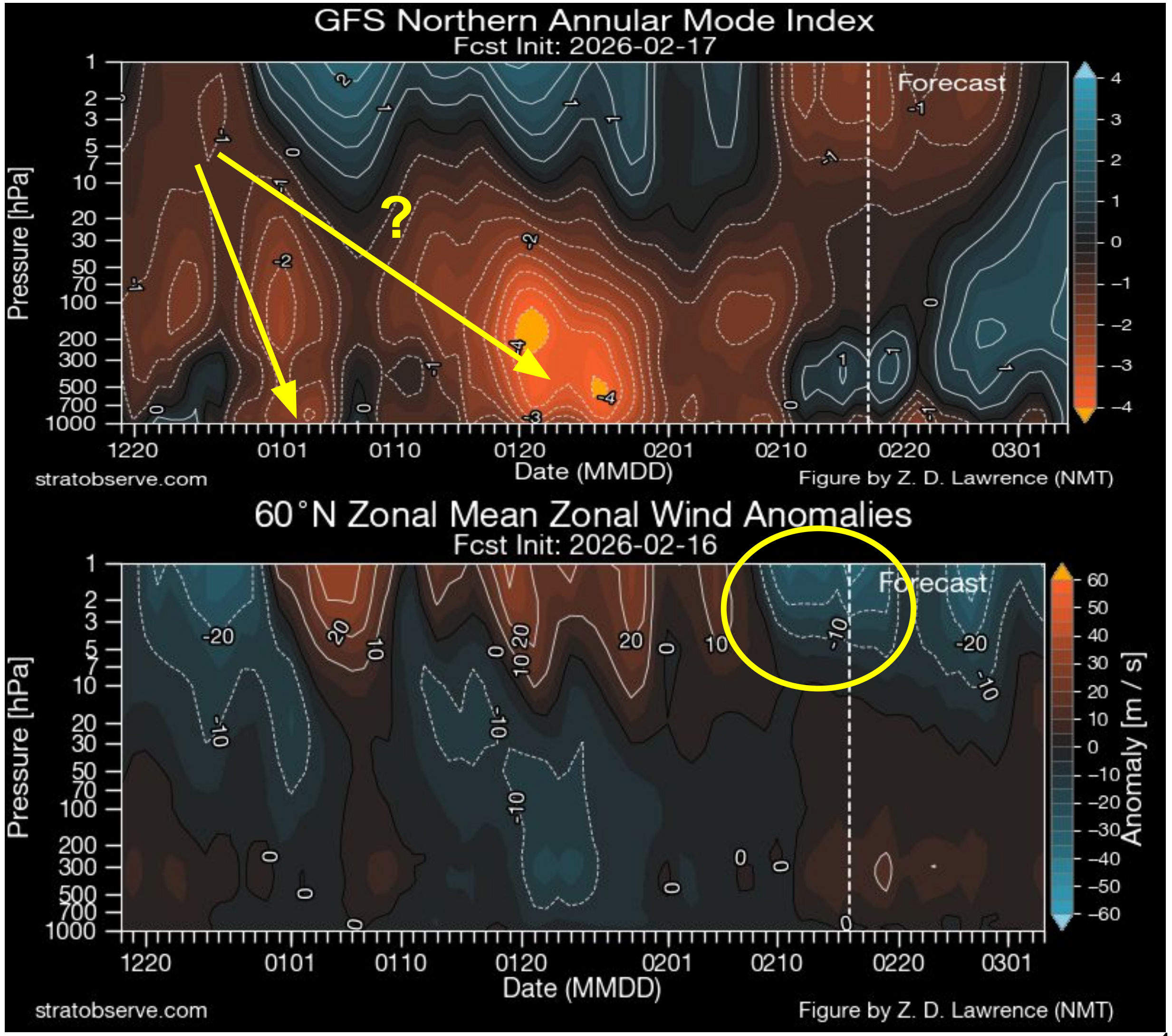
Stratospheric polar vortex (SPV)

➢ Weakening of the PV at the end of last November did not have impacts at the surface.

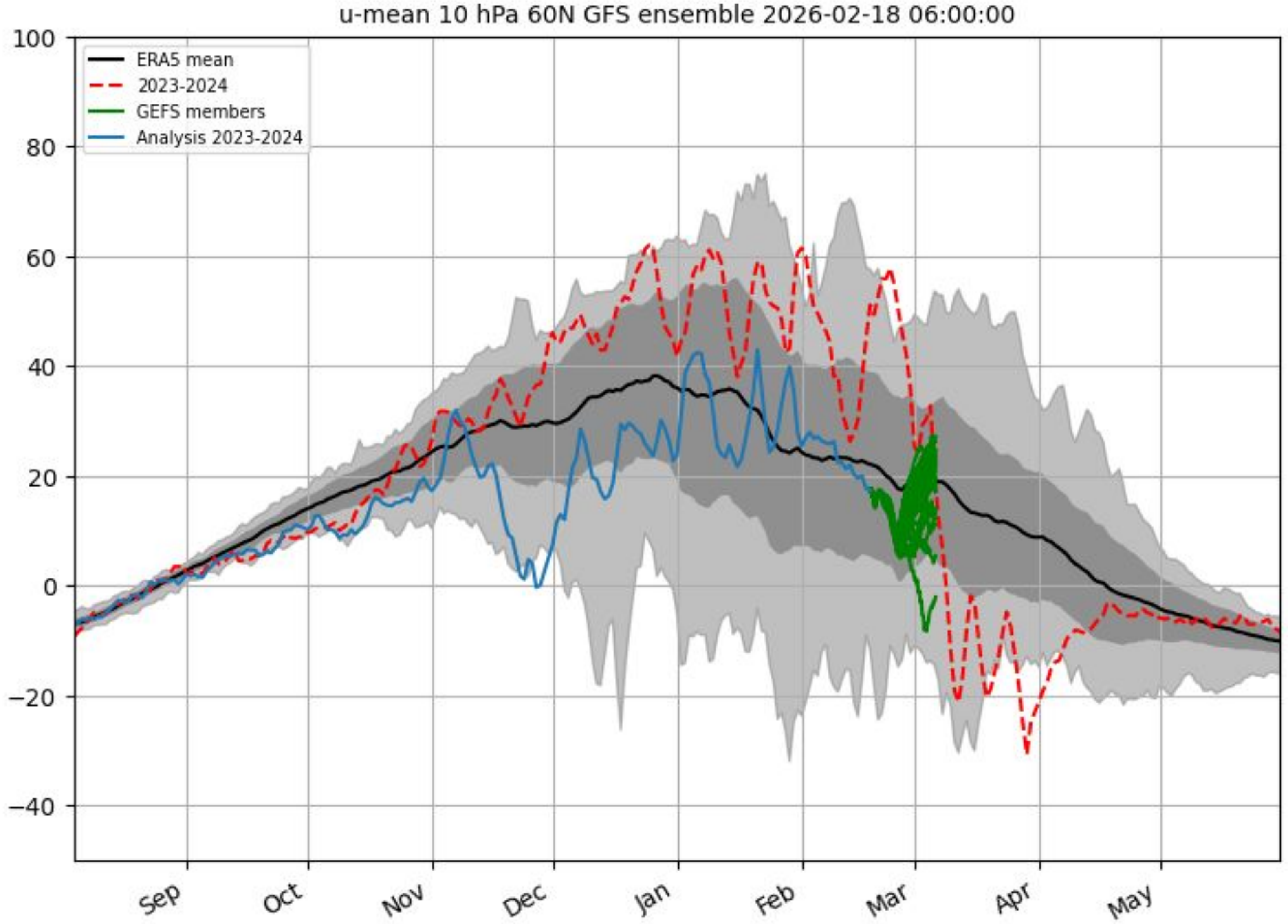




Source: https://stratobserve.com/anom_ts_diags

Stratospheric polar vortex

If SSW happens and reaches the surface, it will lead to NAO- like anomalies at the surface.



Source: https://www.cpc.ncep.noaa.gov/products/stratosphere/SSW/

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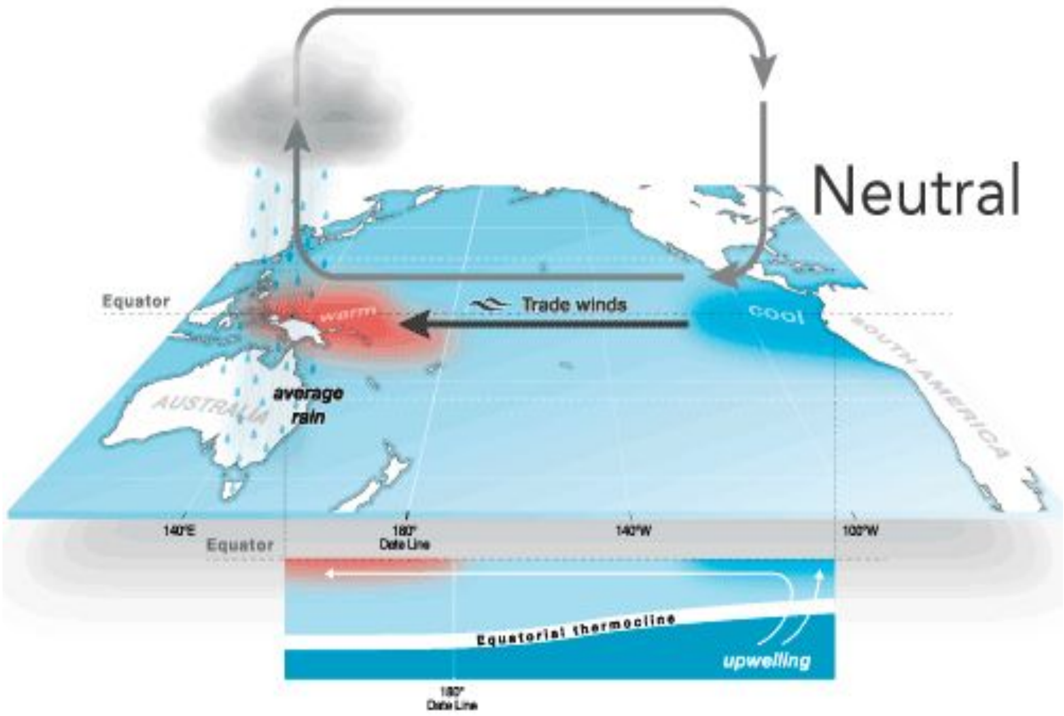
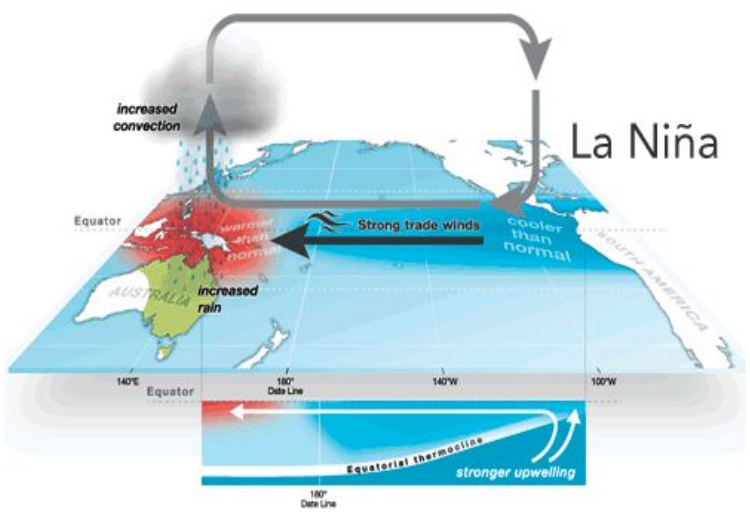
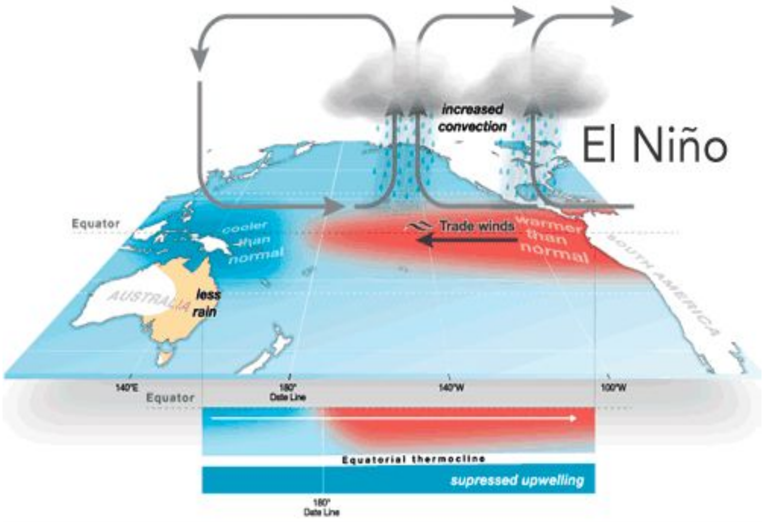
El Niño-Southern Oscillation (ENSO)

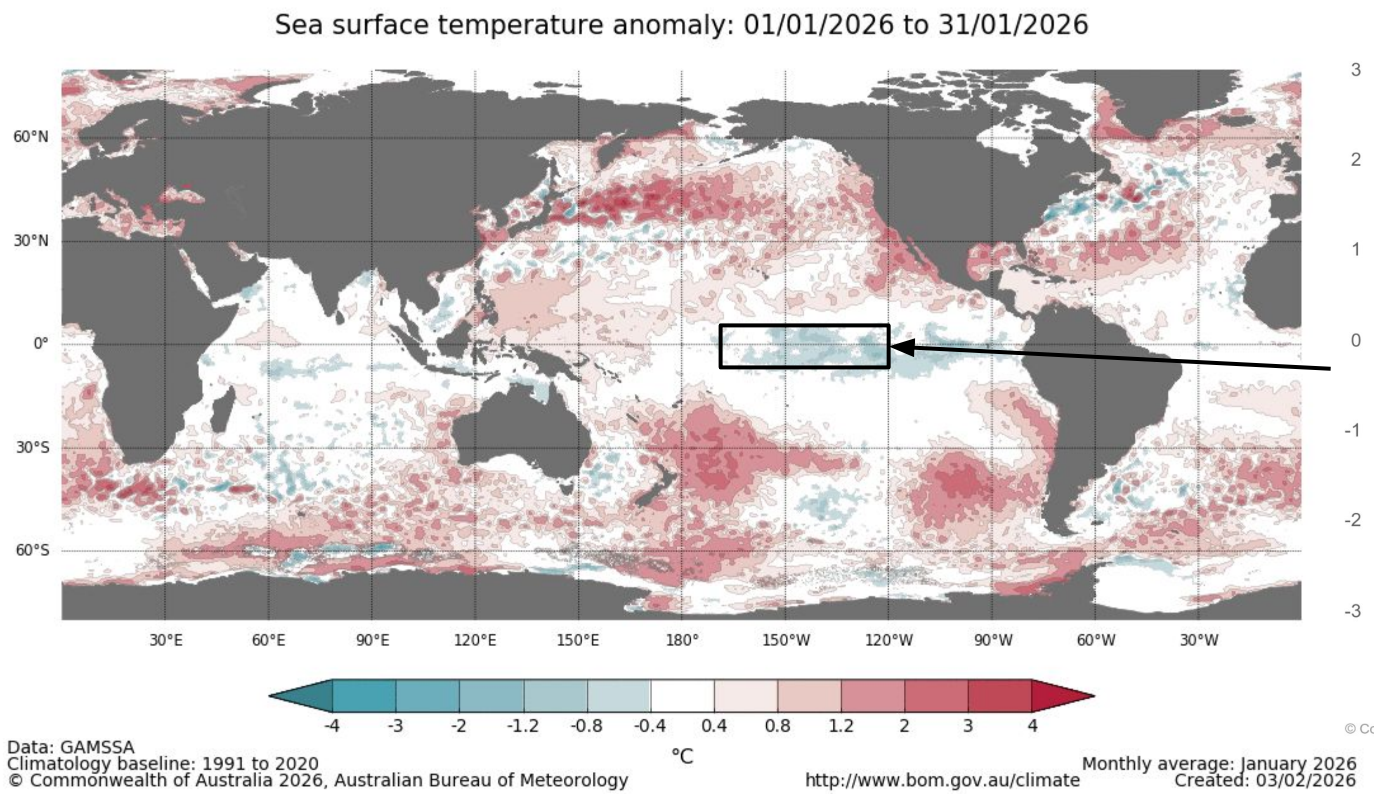
➢ ENSO is the leading mode of natural variability at seasonal to interannual (S2I) time scales and is considered as an internally occurring coupled ocean-atmosphere phenomenon.

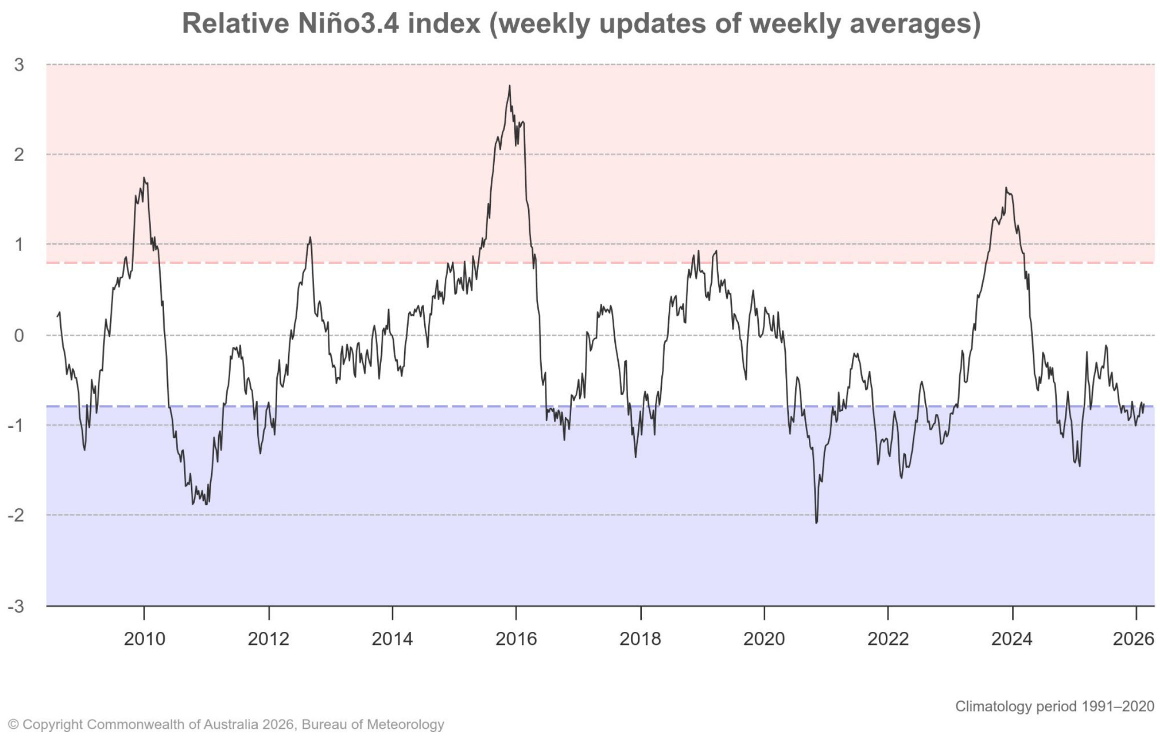






El Niño-Southern Oscillation (ENSO)





➢ Negative relative SST anomalies in the Niño 3.4 region, known as the Relative **Oceanic Niño Index** (RONI).

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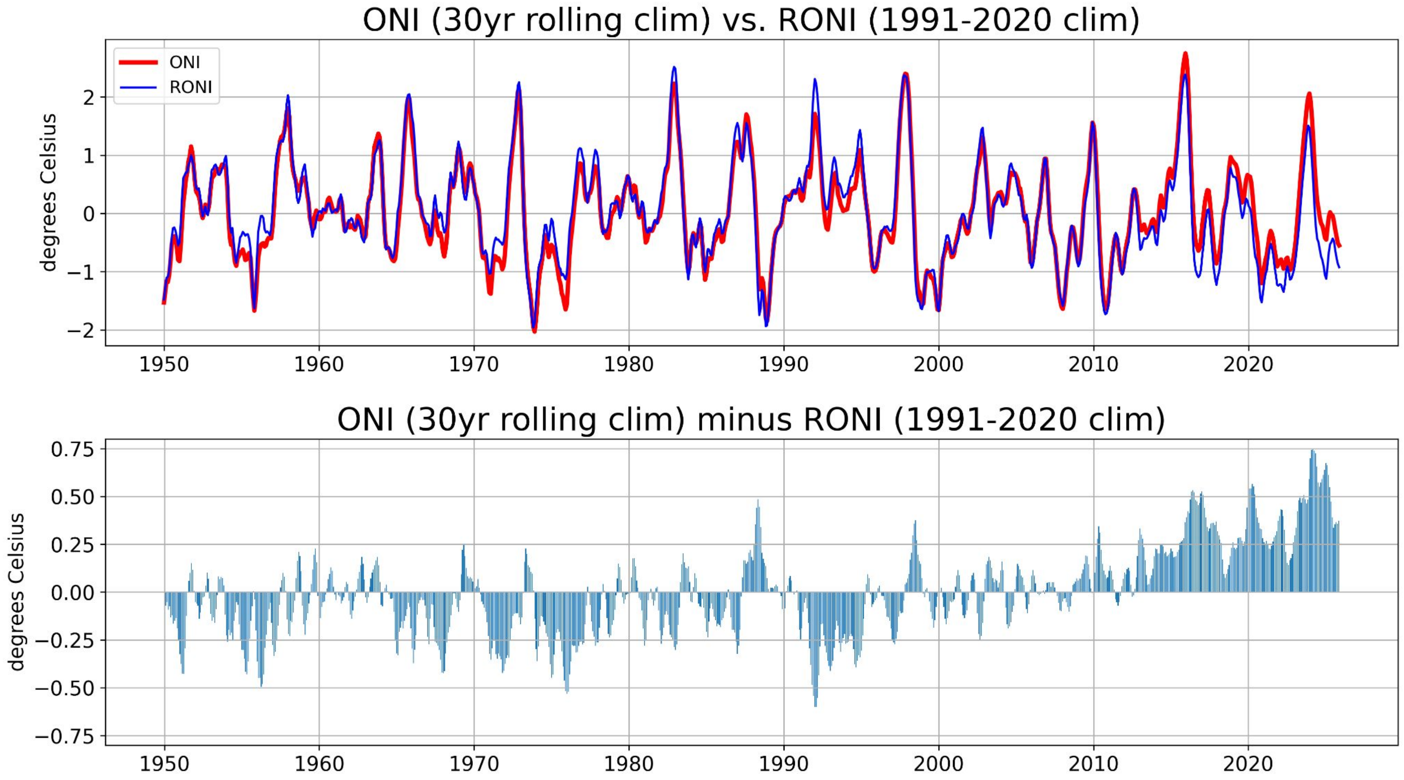
Source: https://www.climate.gov/news-features/blogs/enso / http://www.bom.gov.au/climate/enso/?ninoIndex=nino3.4&index=nino34&period=weekly#tabs=Pacific-Ocean&pacific=SOI / https://www.nnvl.noaa.gov/view/#SSTA

News in ENSO forecasts - Relative Oceanic Niño Index

Helps placing current events in a historical perspective. SSTs in the Niño3.4 region **minus tropical mean removed**.
El Niño = 5 or more overlapping 3-month running seasons with RONI > 0.5°C

- RSST is less sensitive to the chosen based climatology period.
- More related to rainfall in the tropical Pacific than the traditional index (captures better the source of ENSO teleconnections).



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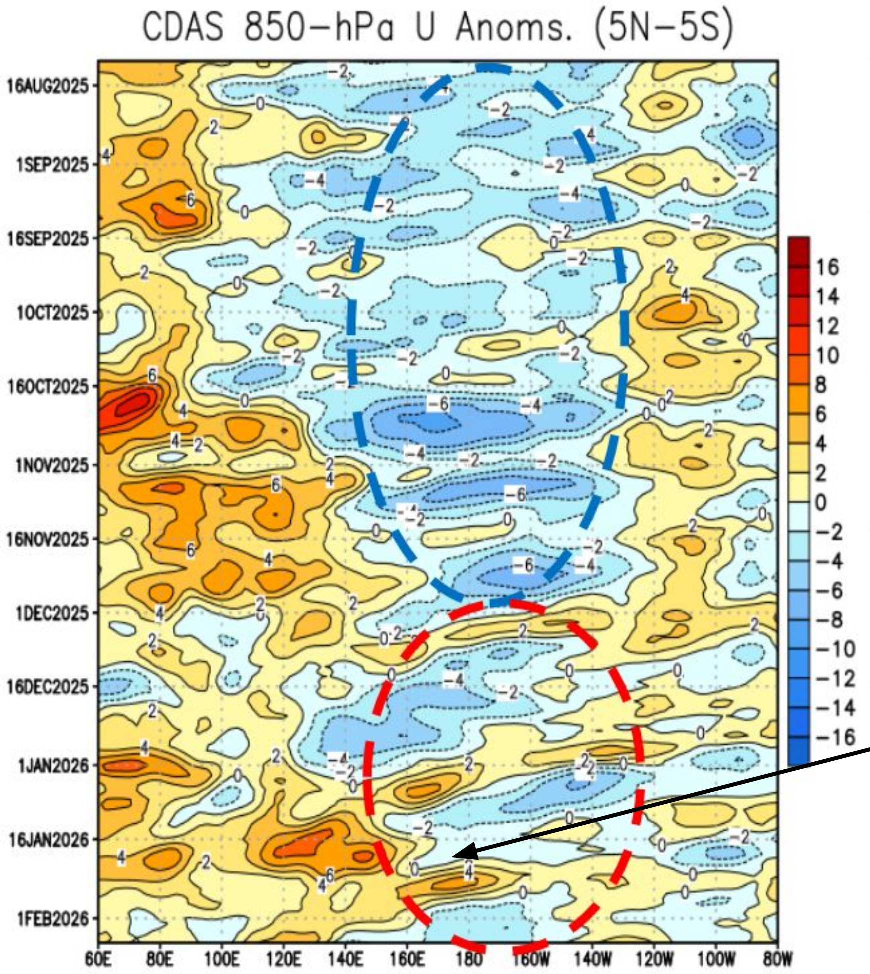
Source: https://www.weather.gov/media/notification/pdf_2026/pns26-05_Relative_ONI.pdf

El Niño-Southern Oscillation (ENSO) - **The atmosphere**

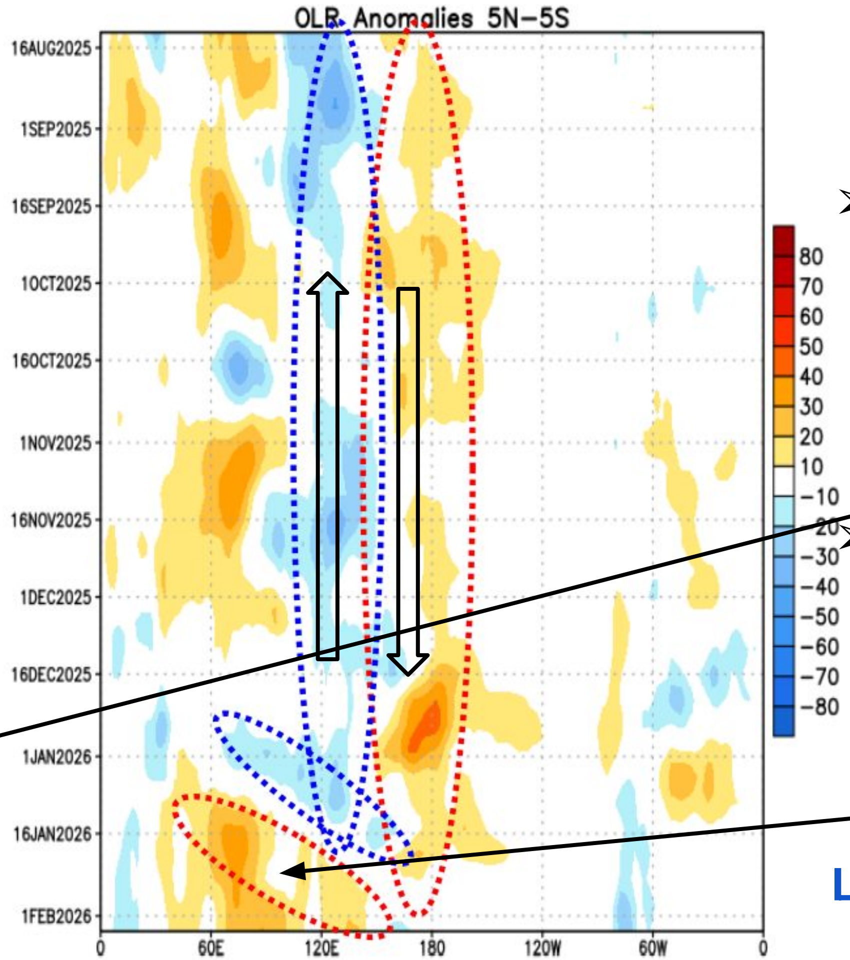
old

latest



Blue = easterly wind anomalies

Red = westerly wind anomalies



Blue = negative OLR, enhanced convection/rainfall.

Red = positive OLR anomalies, subsidence, suppressed rainfall

- Since early December 2025, wind anomalies have been variable with periods of easterly and westerly winds.
- Since mid January 2026, positive OLR anomalies have expanded from the Indian Ocean toward Indonesia.

La Niña is disappearing

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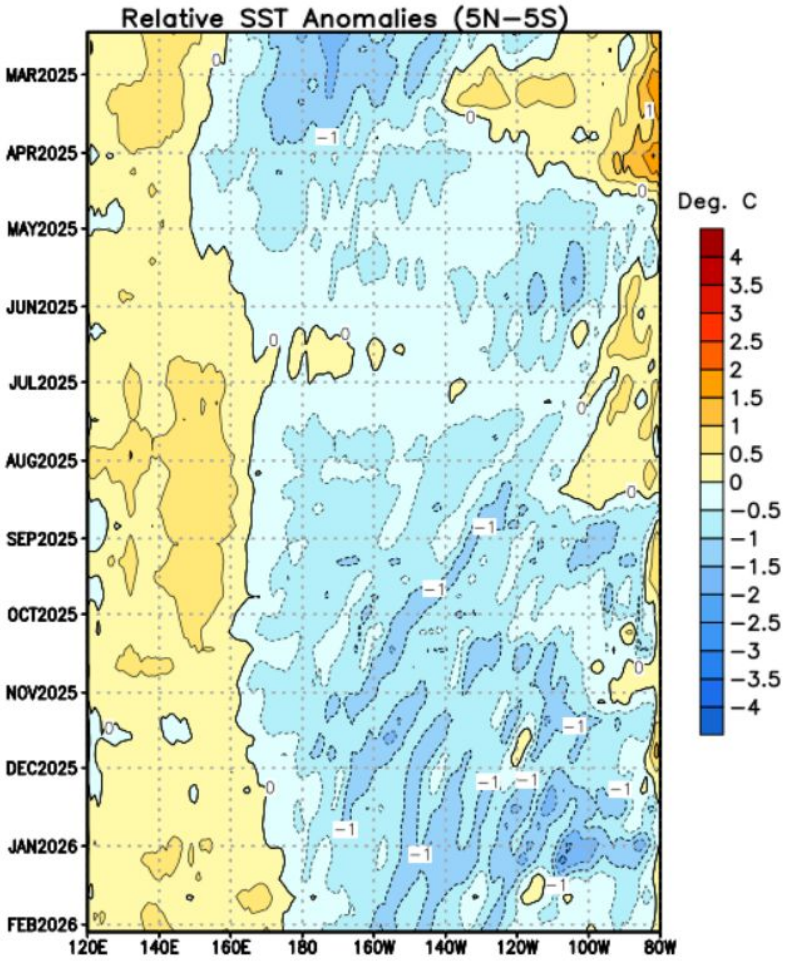
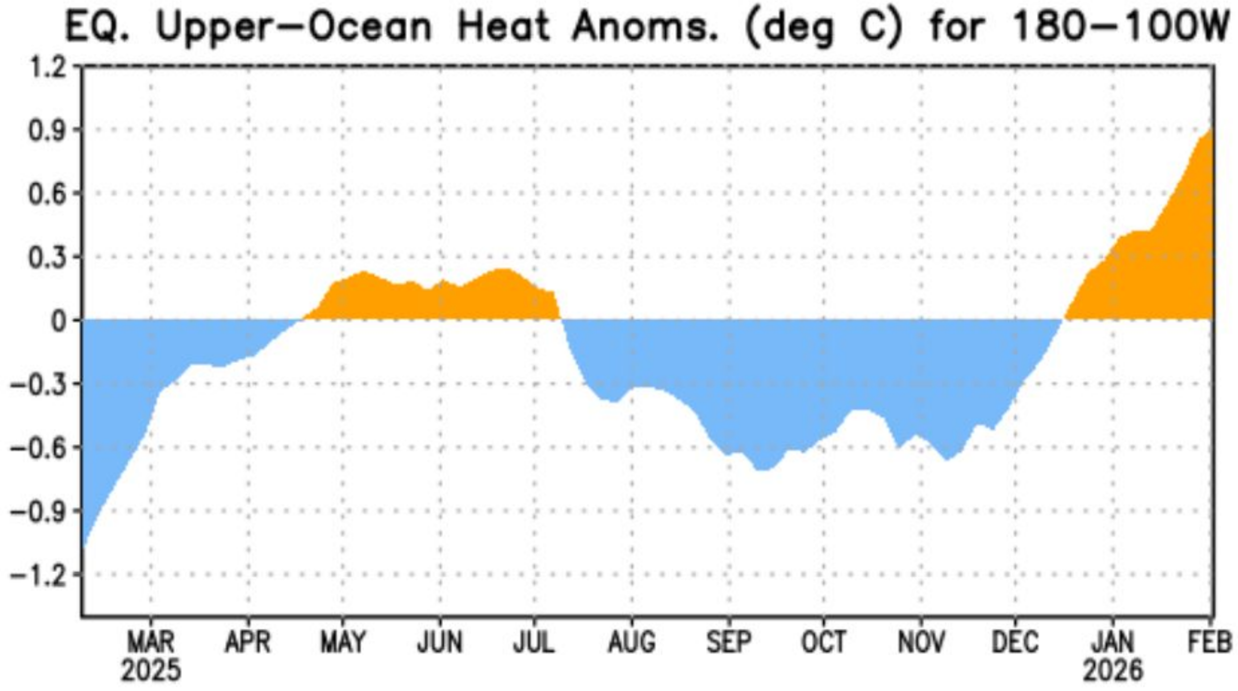
Source: https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf / https://www.pmel.noaa.gov/gtmba/assorted-plots

El Niño-Southern Oscillation (ENSO) - **The ocean**

old



latest



- ➢ The Eastern Pacific upper ocean has been warming since Jan 26
- ➢ **ENSO precursor** (most of the times!)

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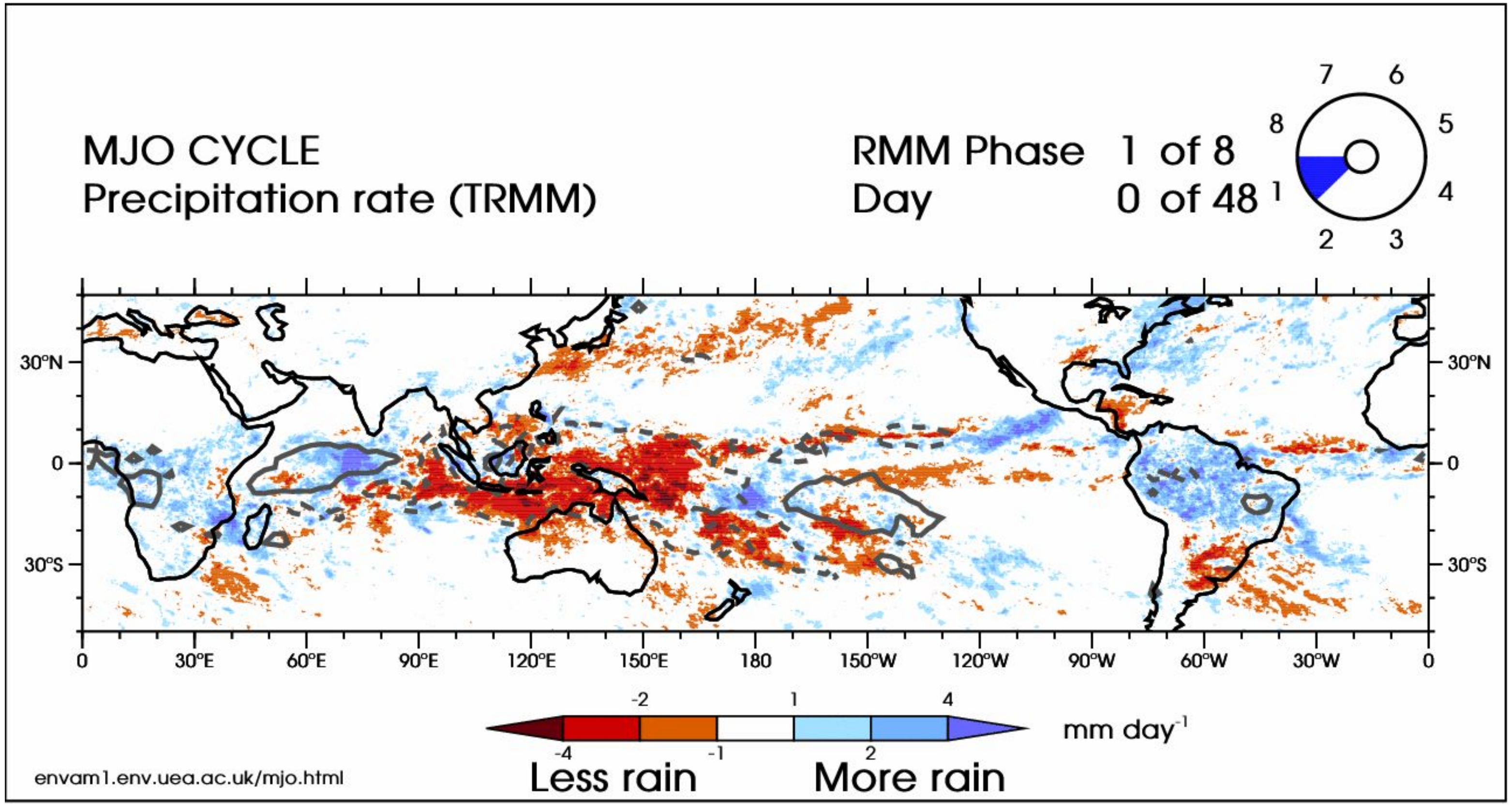
Source: https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf / https://www.pmel.noaa.gov/gtmba/assorted-plots

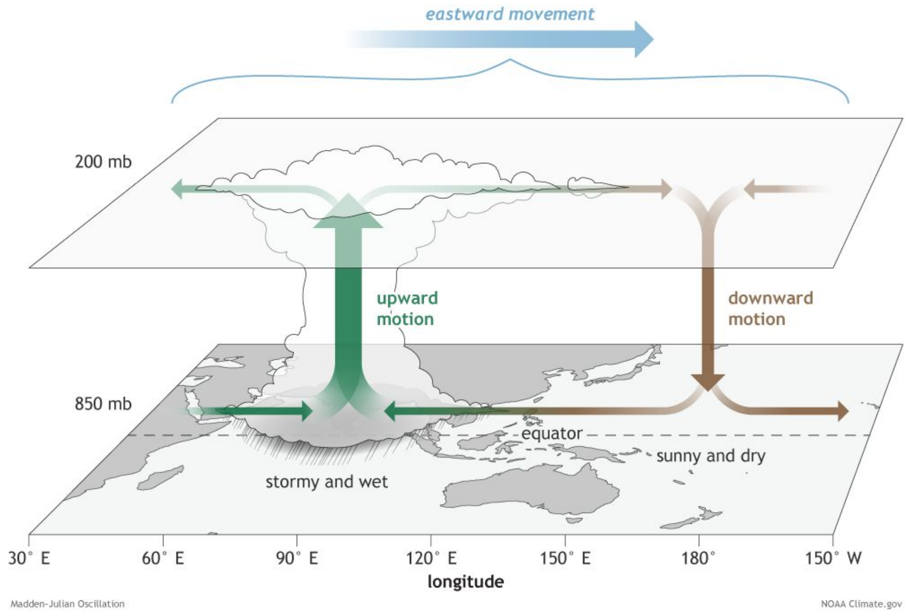
I. Recent state of the climate

II. Subseasonal forecasts

Madden-Julian Oscillation (MJO)

➢ The MJO is the leading mode of tropical subseasonal variability with a 20–90 days time scale. It is an important source of regional climate variability and predictability across the globe at subseasonal time scales.





Source: https://www.climate.gov/news-features/blogs/enso/what-mjo-and-why-do-we-care

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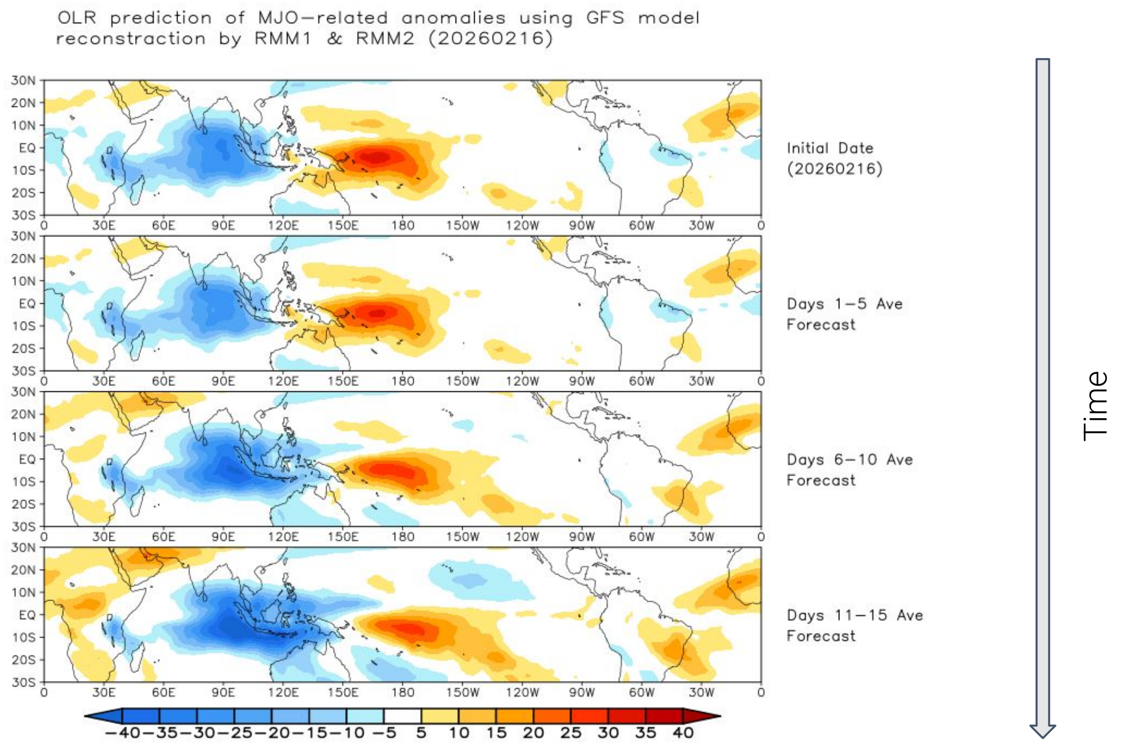
II. Subseasonal forecasts

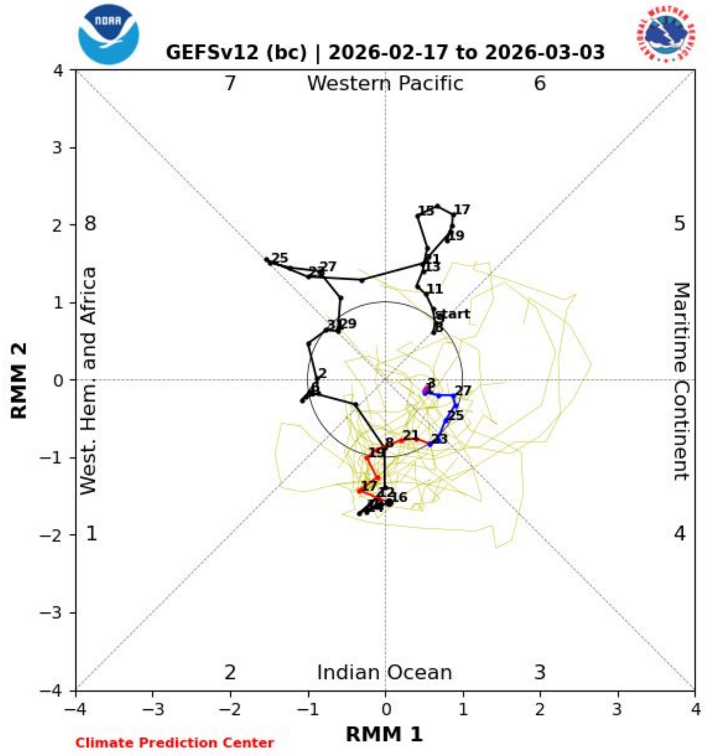
MJO forecasts

➢ OLR anomalies [W/m2] (ensemble mean GEFS)



Low OLR (enhanced convection) / High OLR (suppressed convection)

➢ Evolution of last 40 days of observations + ensemble forecast



Mean forecasts: 1-7 day, 8-14 day, >= 15 days

➢ MJO will slowly transition from phase 2 to 3 in the next week, and towards 4 (Maritime Continent in 15 days, competing with the disappearing of La Niña-like atmospheric anomalies

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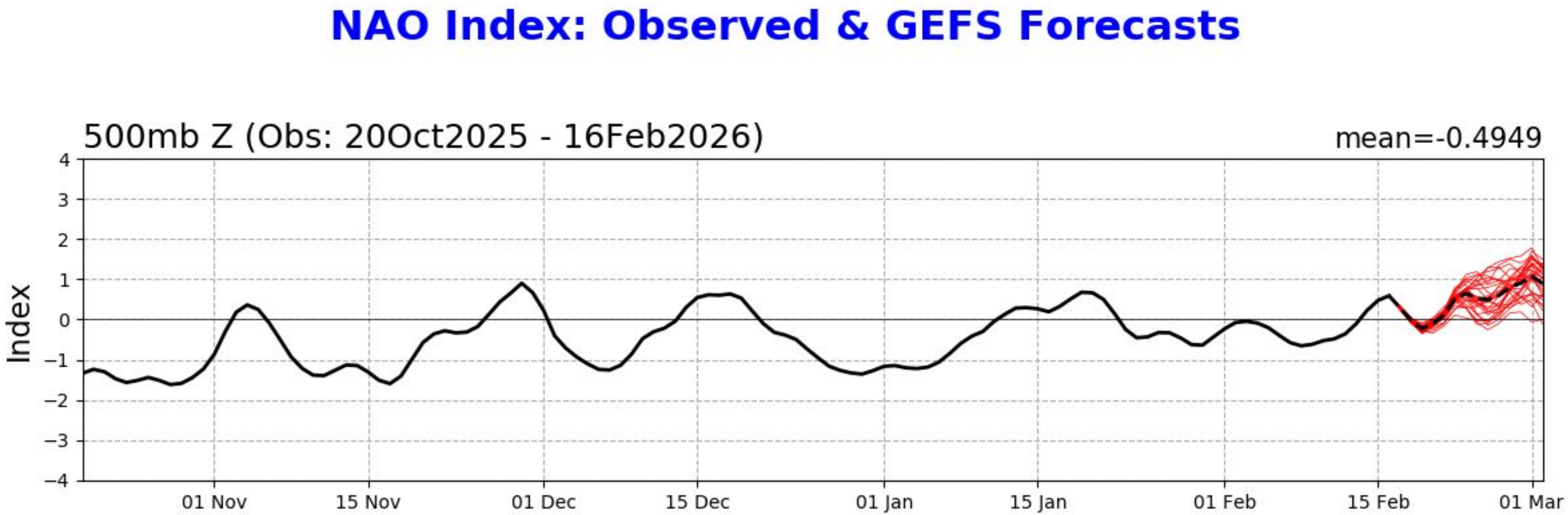
Source: https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/foregfs.shtml / https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/ecmf.shtml

NAO forecast

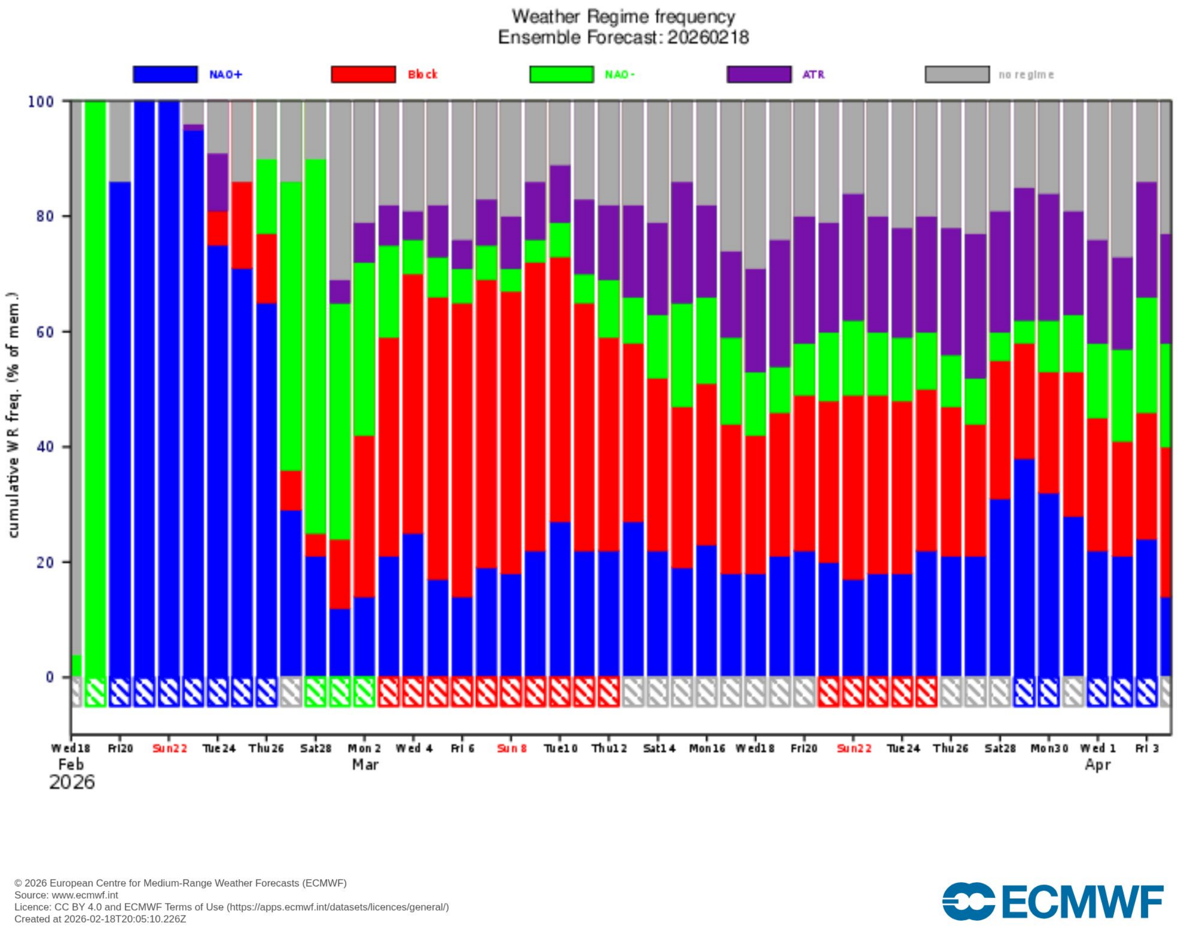


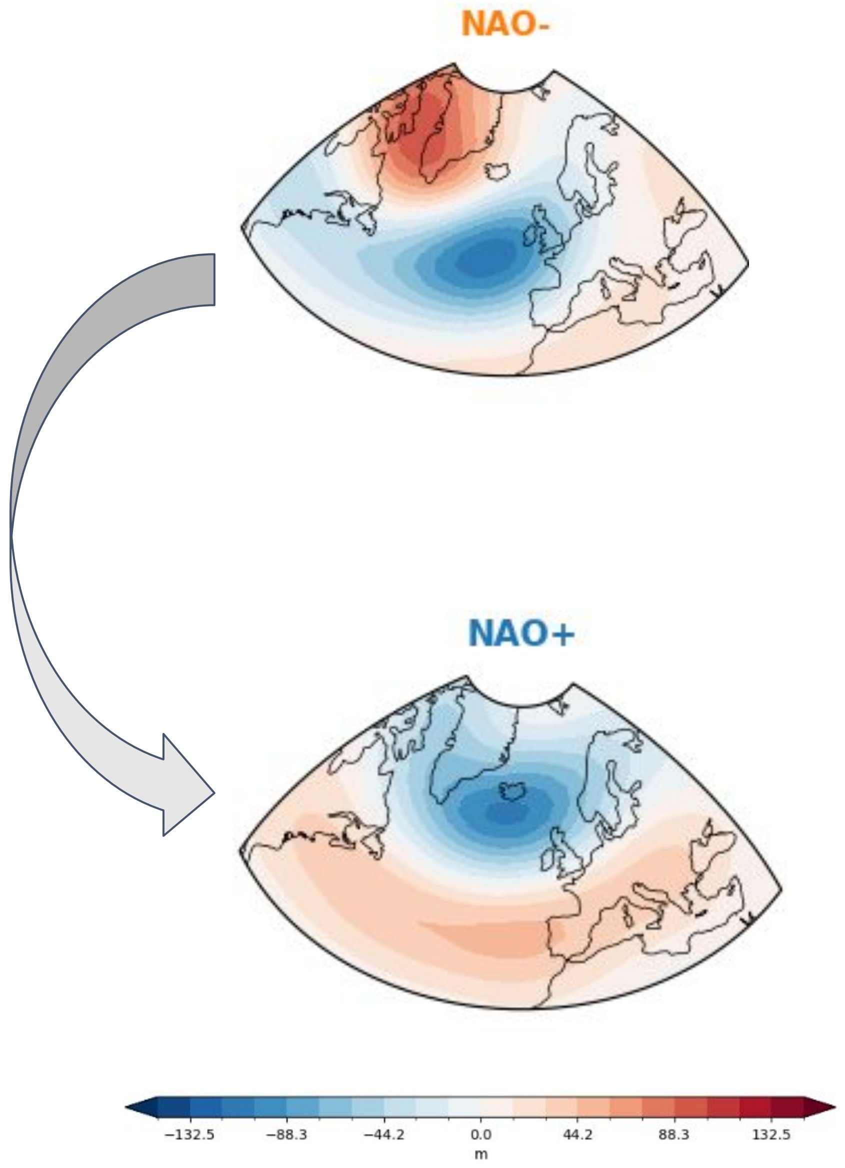
- ➢ Weak negative NAO through the winter, expected to shift towards positive NAO in the following days

Source: https://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/nao_index_ensm.shtml

II. Subseasonal forecasts

Weather regimes





➢ Transition to NAO+ from the end of the week followed by uncertainty

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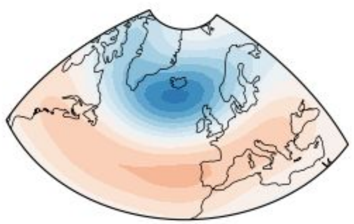
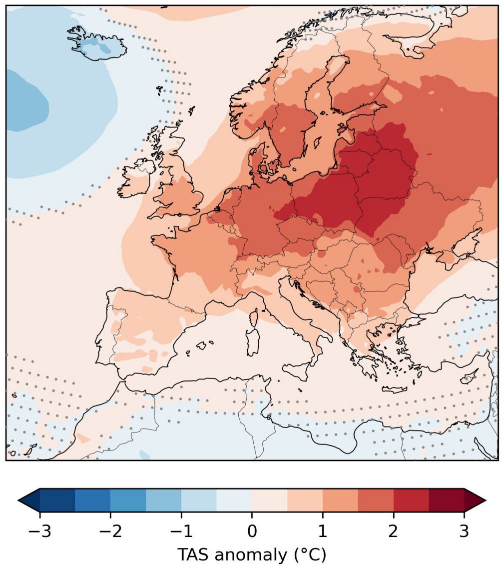
Source: https://charts.ecmwf.int/products/extended-regime-probabilities?forecast_from=latest

II. Subseasonal forecasts

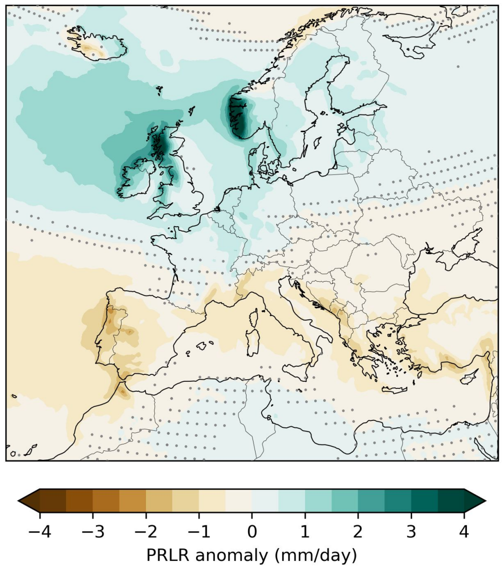
Composite of positive NAO and surface climate



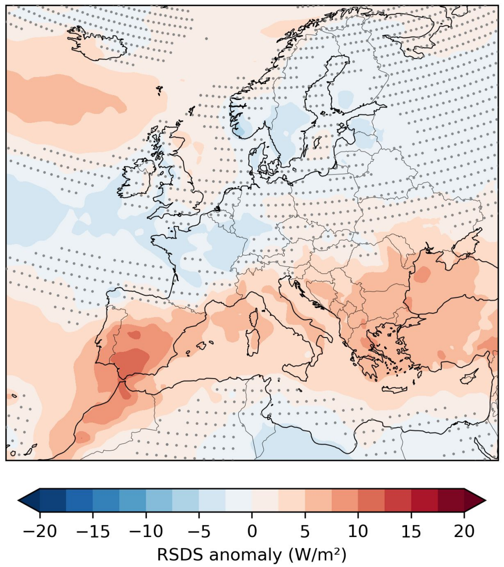
ΔTAS composite — NAO +
ERA5 (1980–2008)



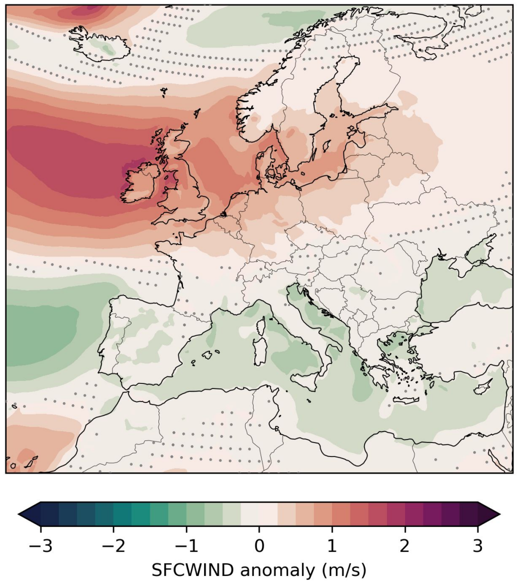
ΔPRLR composite — NAO +
ERA5 (1980–2008)



ΔRSDS composite — NAO +
ERA5 (1980–2008)



ΔSFCWIND composite — NAO +
ERA5 (1980–2008)



Temperature

Precipitation

Solar radiation

Surface wind

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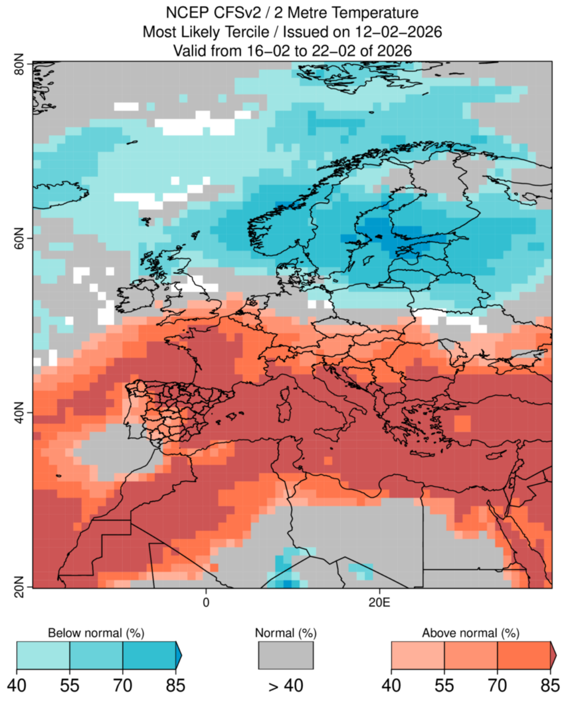
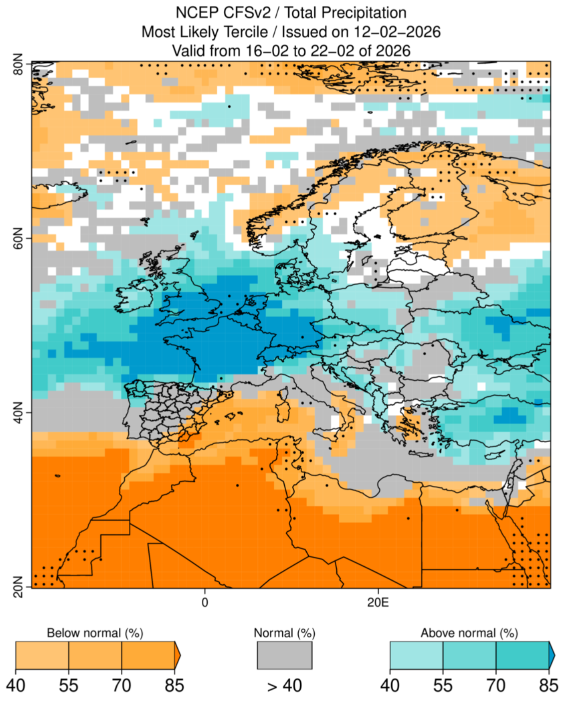
Centro Nacional de Supercomputación

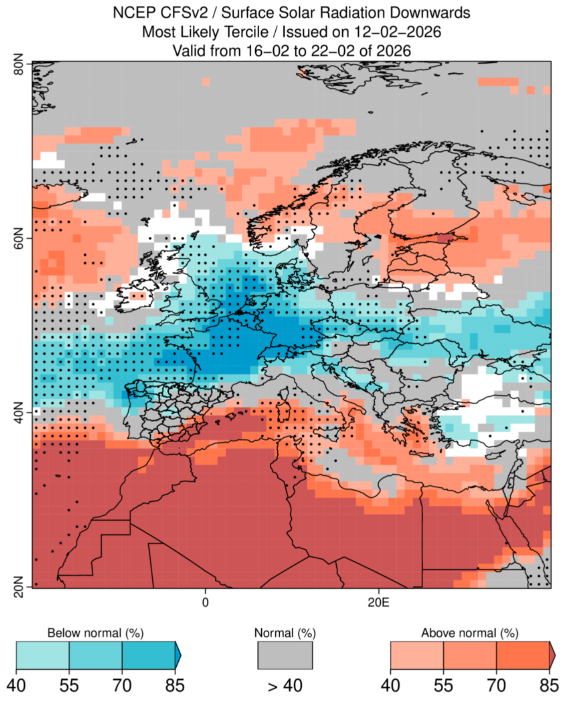
II. Subseasonal forecasts

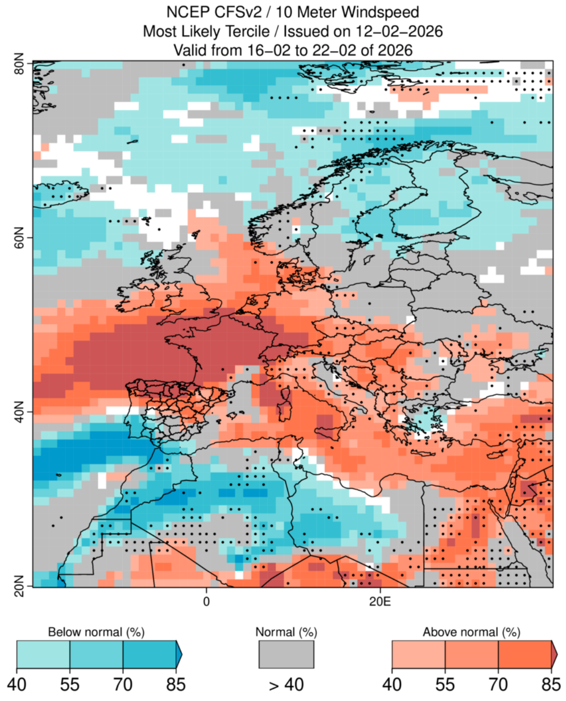
Valid on 16 - 22 Feb [Init. 12 Feb]

Hindcast period: 1999 - 2016









Temperature

Precipitation

Solar radiation

Surface wind

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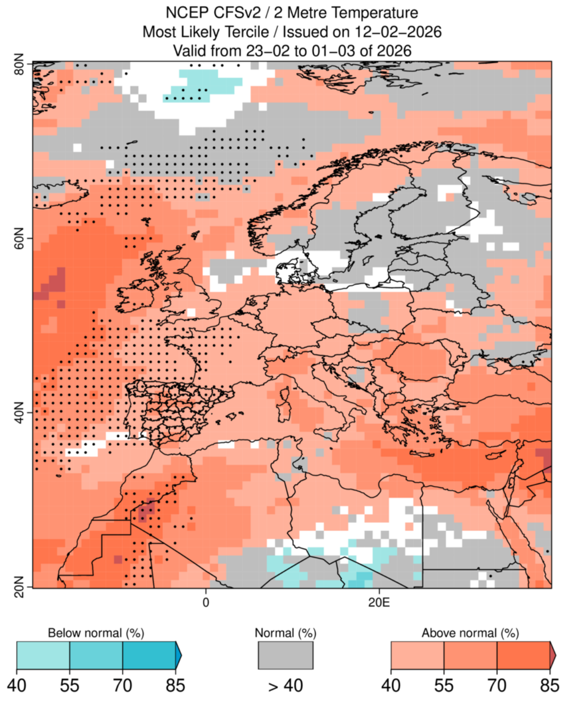
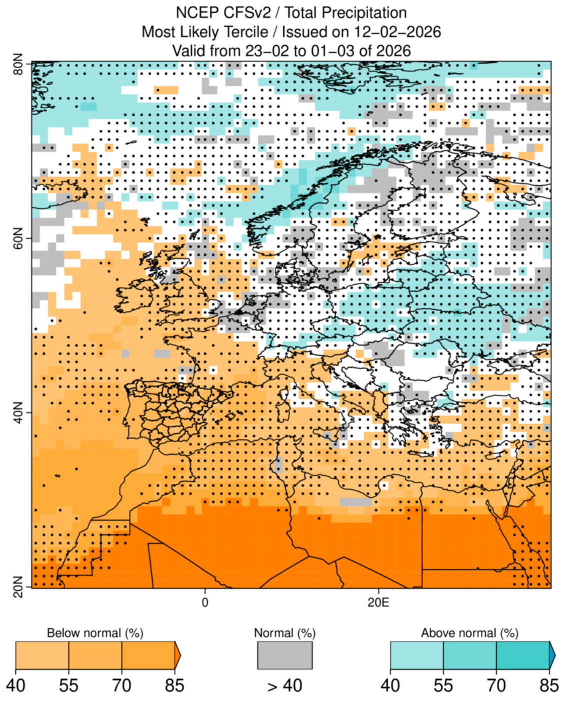
Centro Nacional de Supercomputación

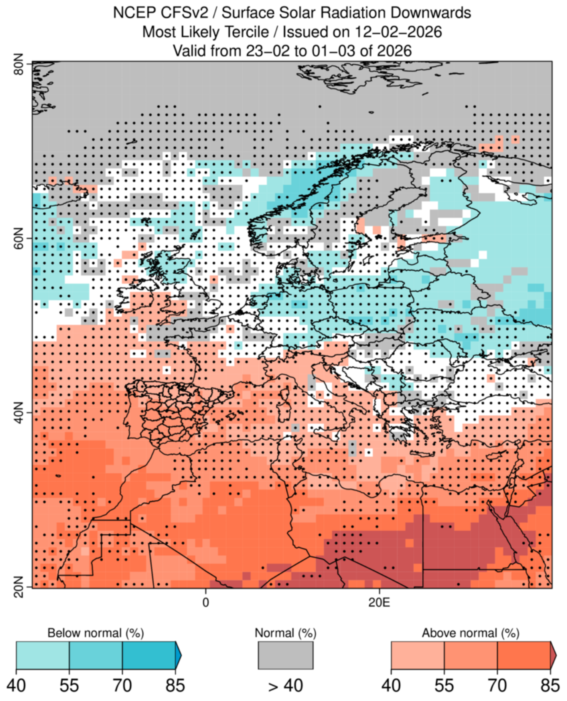
II. Subseasonal forecasts

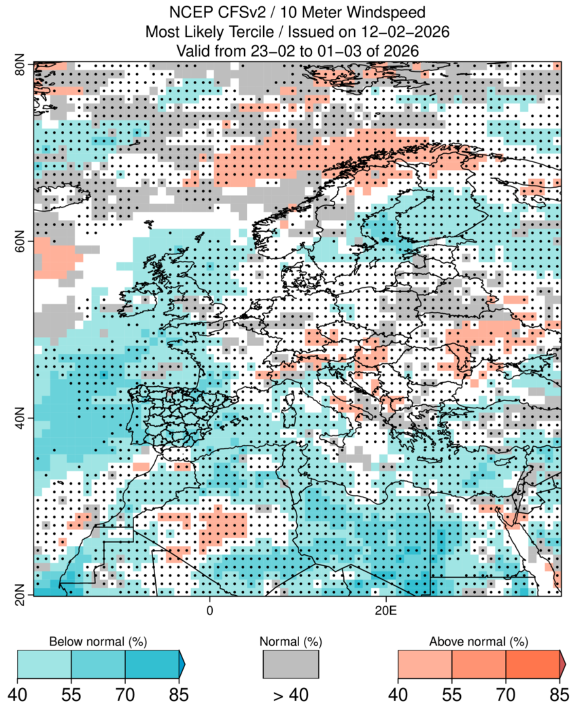
Valid on 23 Feb - 1 Mar [Init. 12 Feb]

Hindcast period: 1999 - 2016









Temperature

Precipitation

Solar radiation

Surface wind

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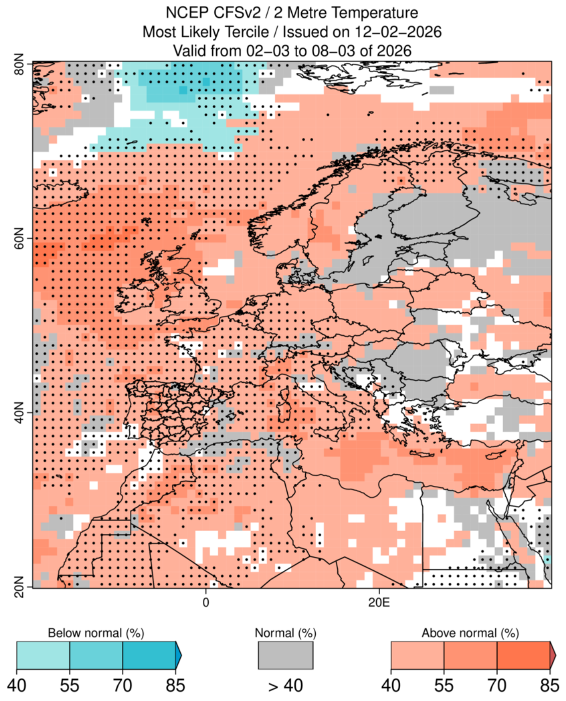
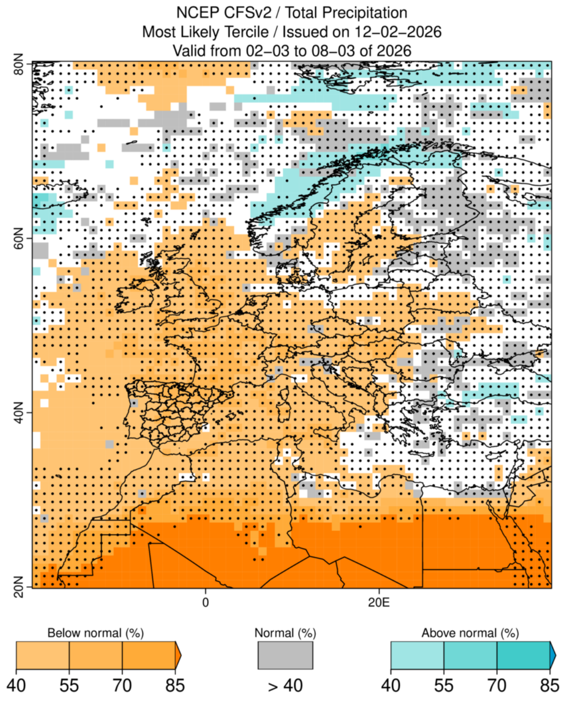
Centro Nacional de Supercomputación

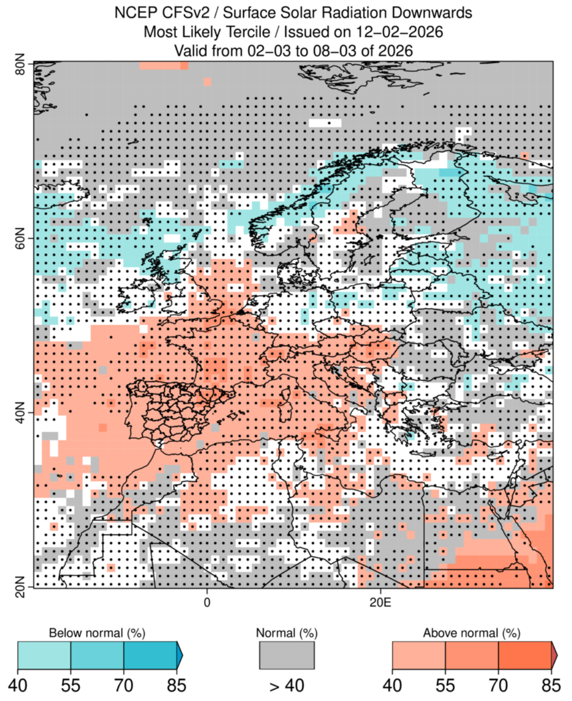
II. Subseasonal forecasts

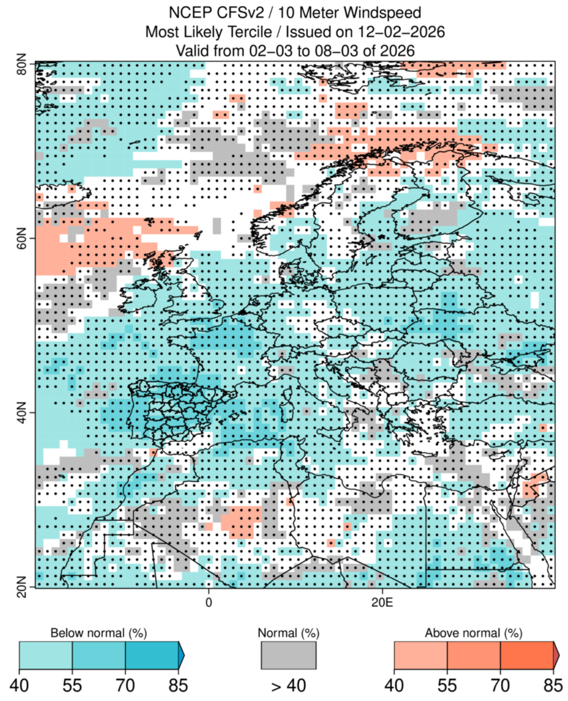
Valid on 2 - 8 Mar [Init. 12 Feb]

Hindcast period: 1999 - 2016









Temperature

Precipitation

Solar radiation

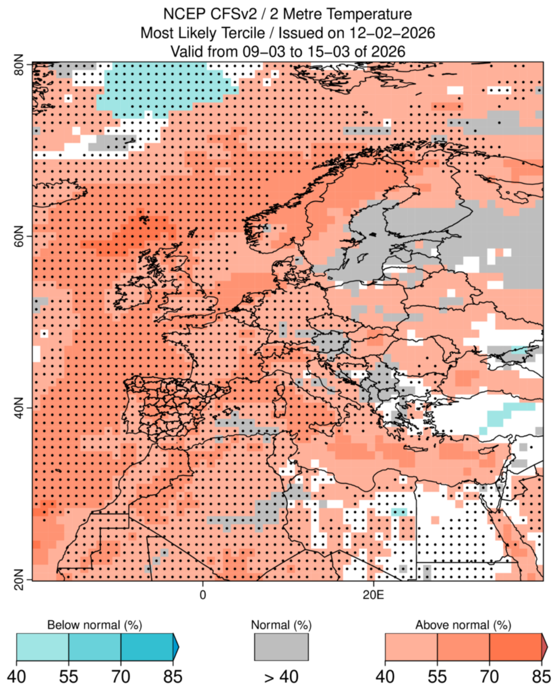
Surface wind

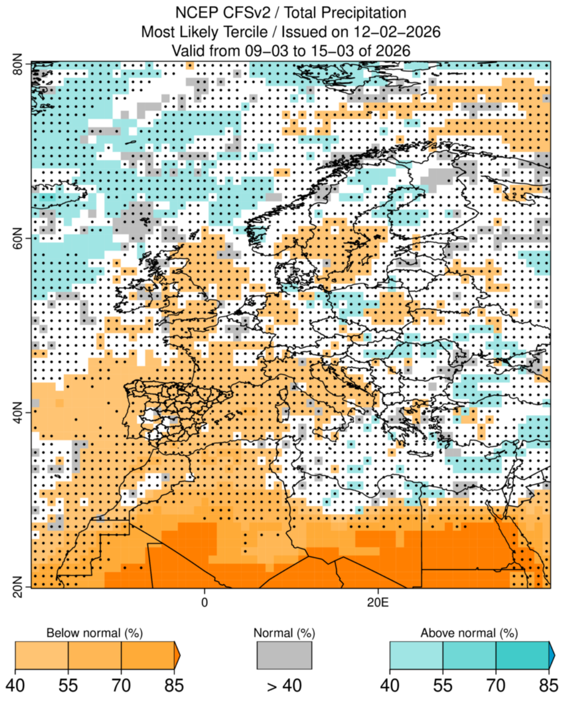
Barcelona Supercomputing Center
Centro Nacional de Supercomputación

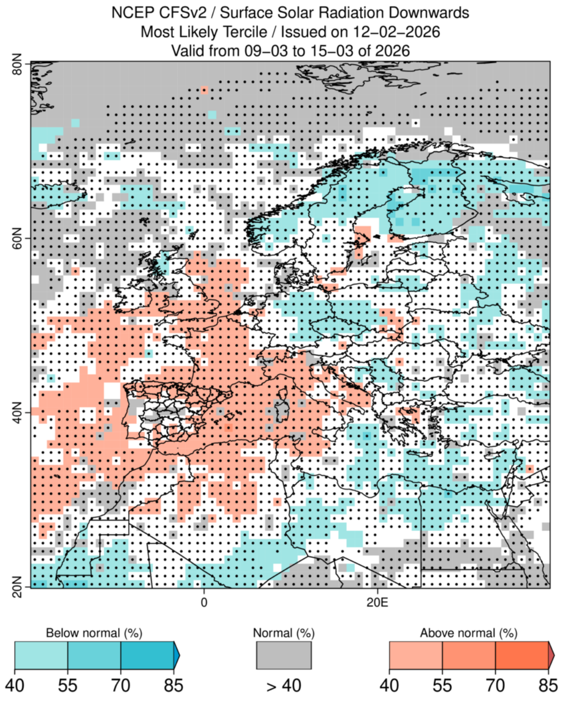
II. Subseasonal forecasts

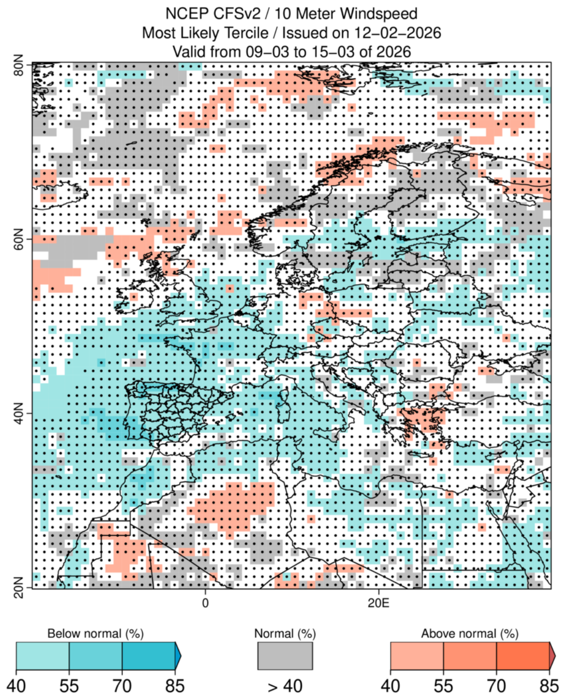
Valid on 9 - 15 Mar [Init. 12 Feb]

Hindcast period: 1999 - 2016









Temperature

Precipitation

Solar radiation

Surface wind

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

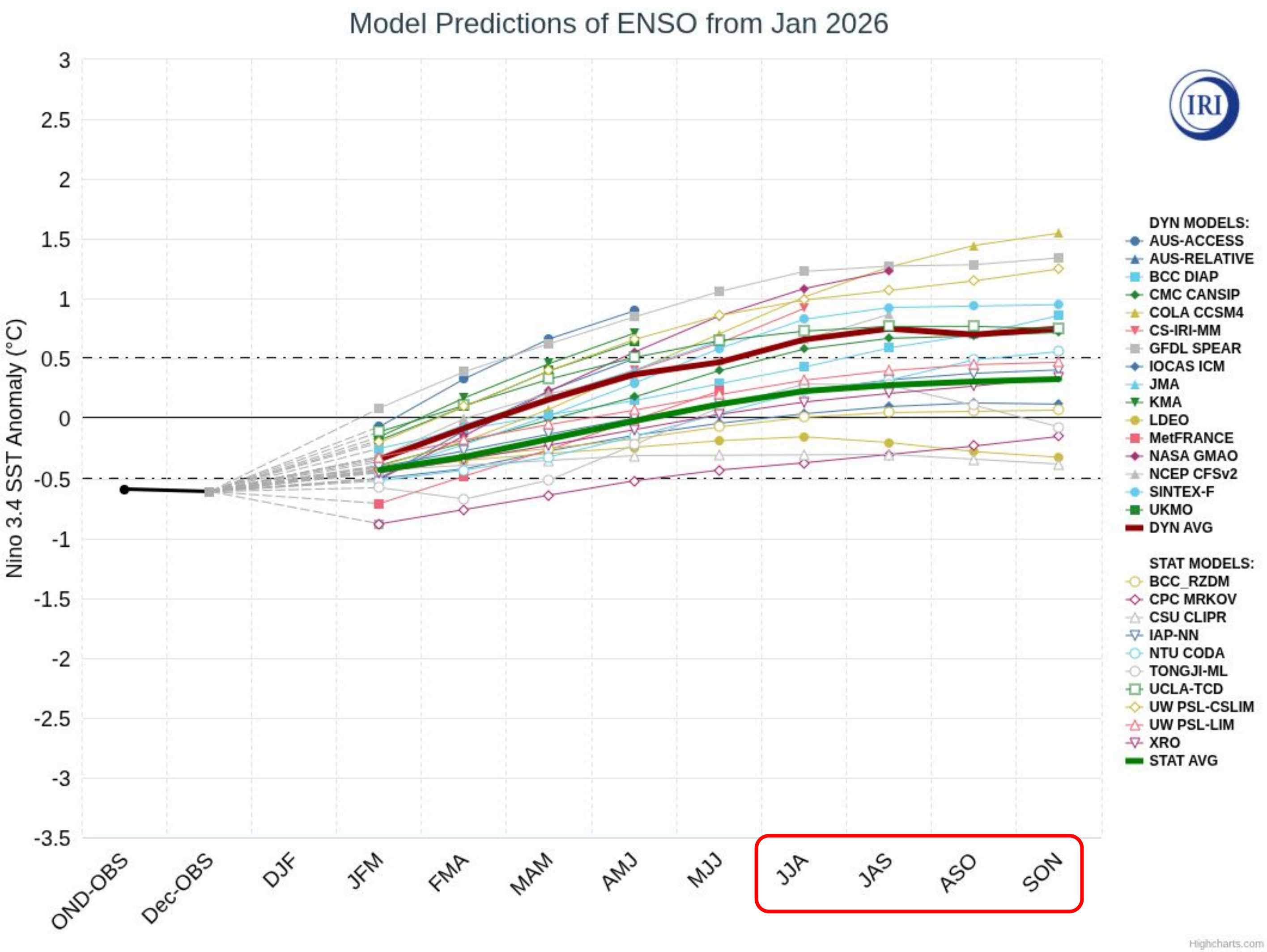
I. Recent state of the climate

II. Subseasonal forecasts

III. Seasonal forecasts

III. Seasonal forecasts

ENSO forecasts



- ➢ Transition towards **ENSO-neutral** conditions in the next months, especially pronounced in the **dynamical** models, that predict a transition towards **El Niño** as early as in JJA.

- ➢ The statistical models predict ENSO-neutral conditions at least until early autumn

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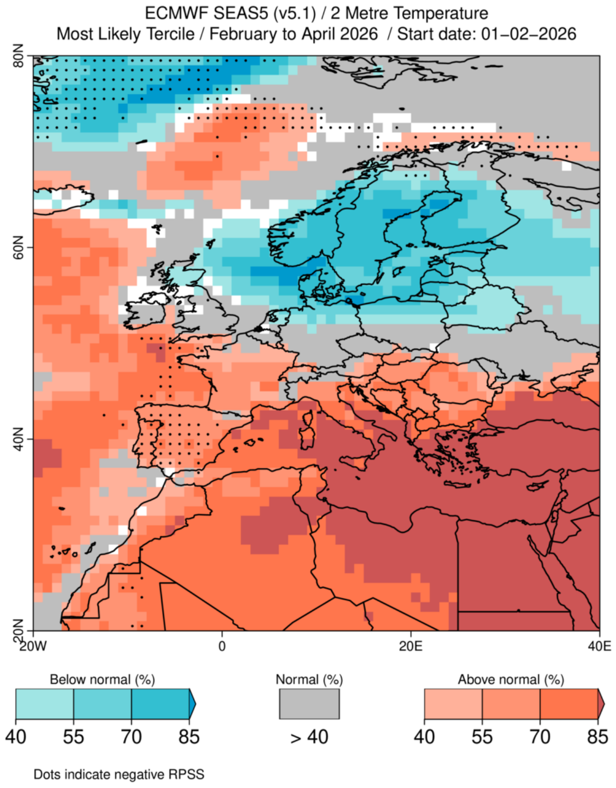
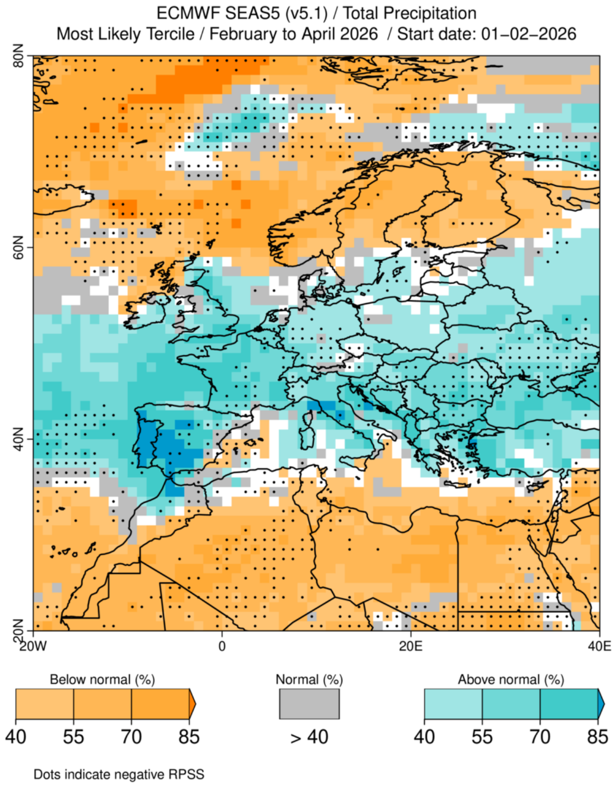
Source: https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-sst_table /

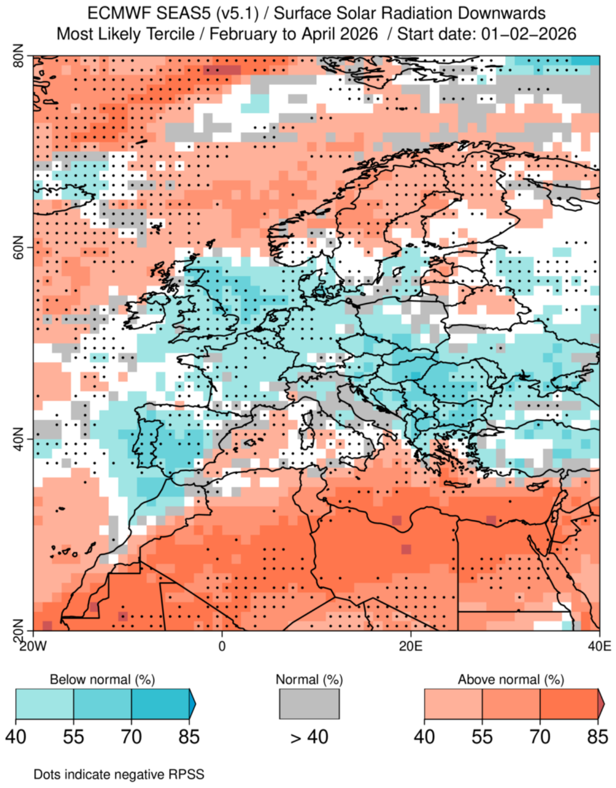
Seasonal forecasts

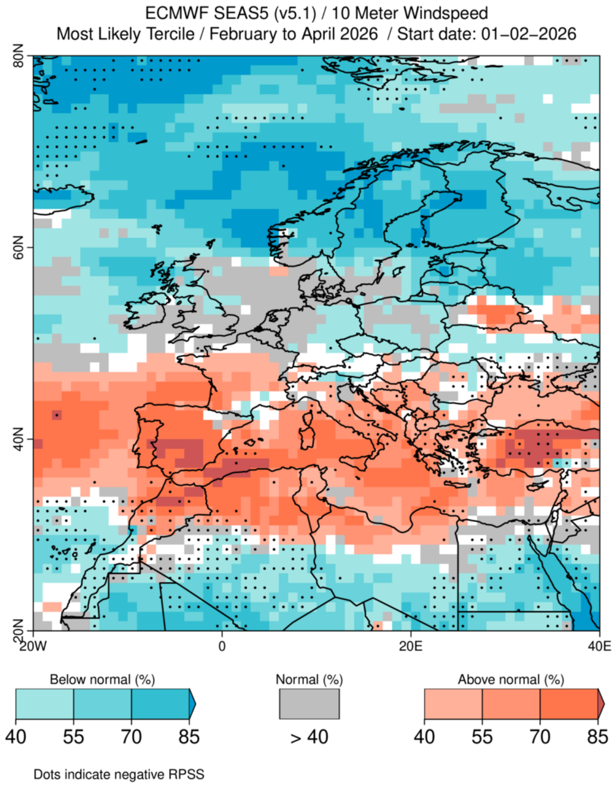
Ft1-3 (Feb to April 2026)

Hindcast period: 1993 - 2016









Temperature

Precipitation

Solar radiation

Surface wind

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

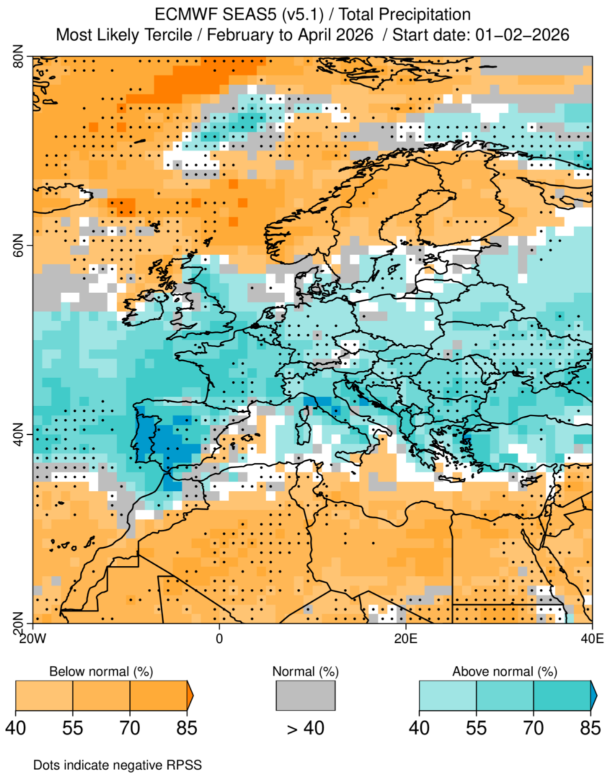
Dots = negative Ranked Probability Skill Score

Where does this precipitation signal come from?

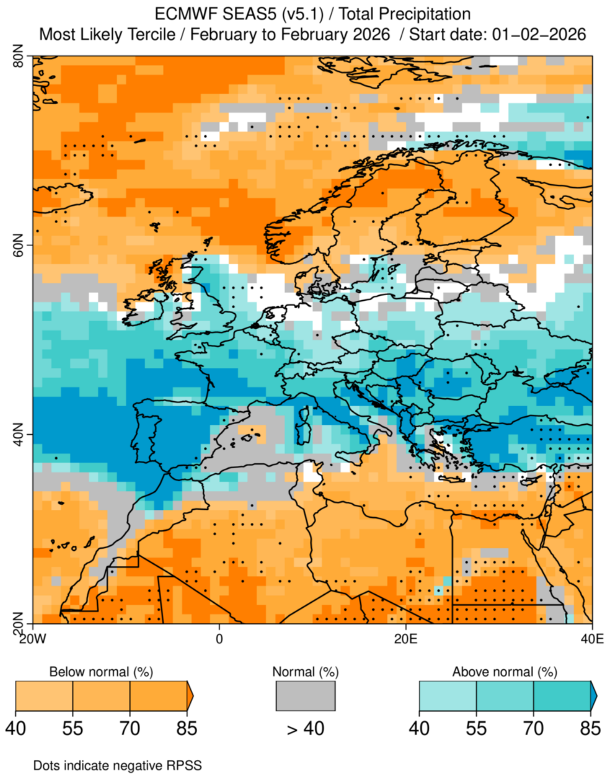
BOREAS

Hindcast period: 1993 - 2016

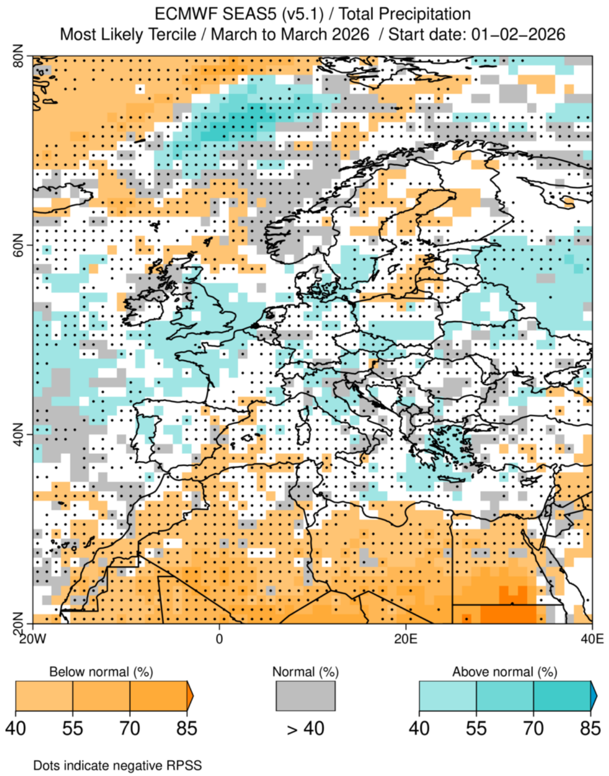
Ft1-3 (Feb to April 2026)



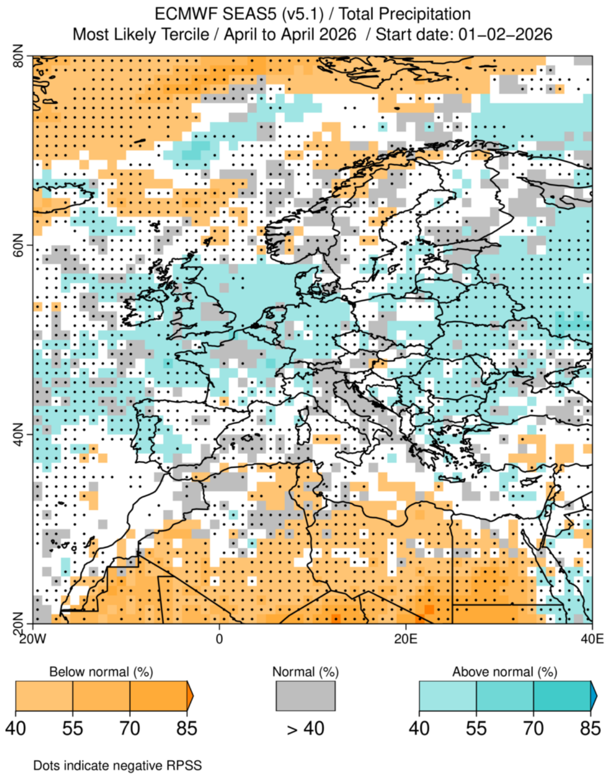
February



March



April



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Precipitation

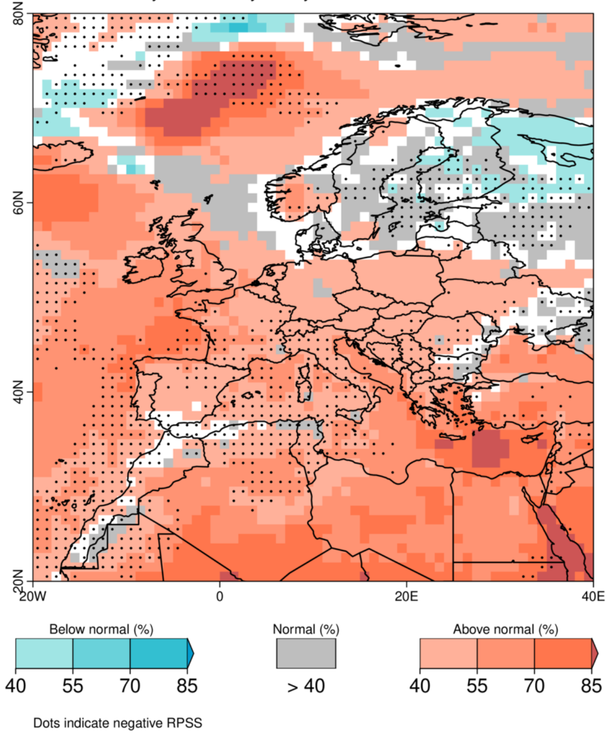
Dots = negative Ranked Probability Skill Score

Seasonal forecasts

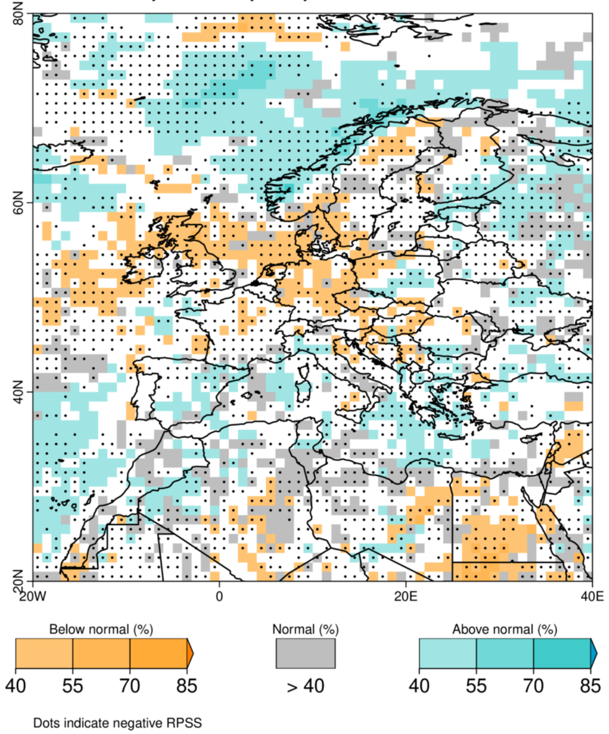
Ft4-6 (May to July 2026)

Hindcast period: 1993 - 2016

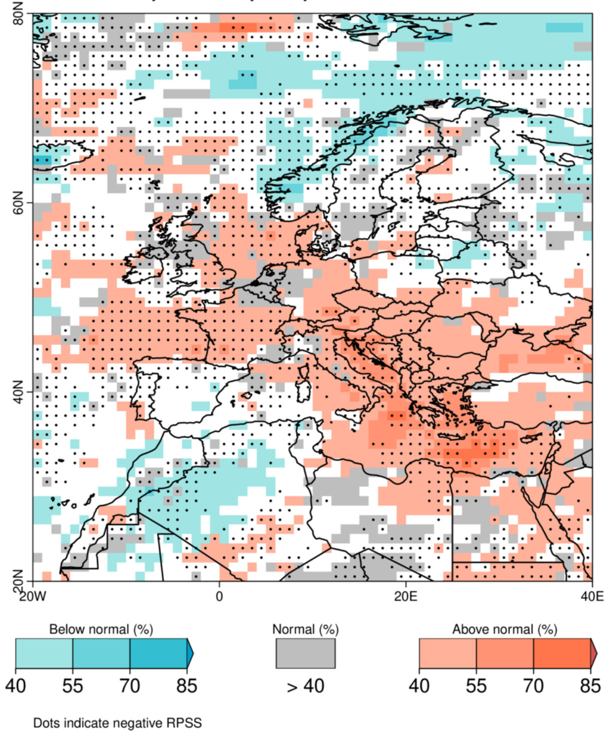
ECMWF SEAS5 (v5.1) / 2 Metre Temperature
Most Likely Tercile / May to July 2026 / Start date: 01–02–2026



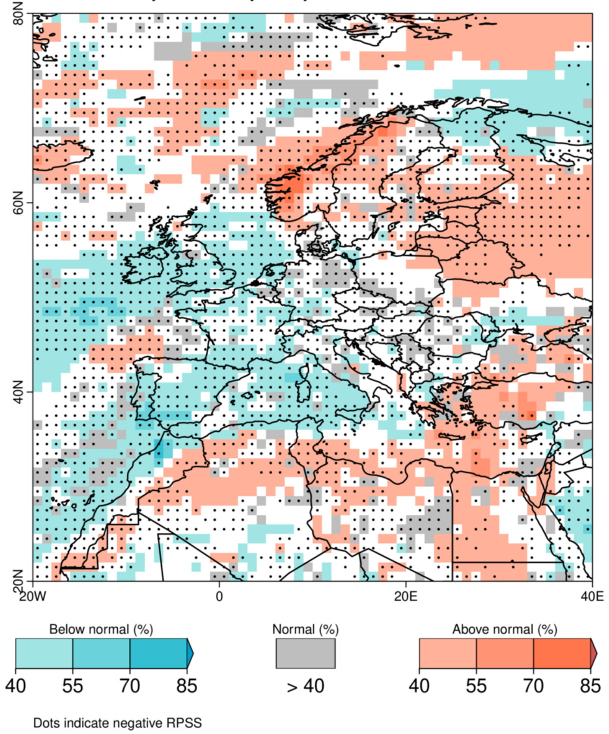
ECMWF SEAS5 (v5.1) / Total Precipitation
Most Likely Tercile / May to July 2026 / Start date: 01–02–2026



ECMWF SEAS5 (v5.1) / Surface Solar Radiation Downwards
Most Likely Tercile / May to July 2026 / Start date: 01–02–2026



ECMWF SEAS5 (v5.1) / 10 Meter Windspeed
Most Likely Tercile / May to July 2026 / Start date: 01–02–2026



Temperature

Precipitation

Solar radiation

Surface wind

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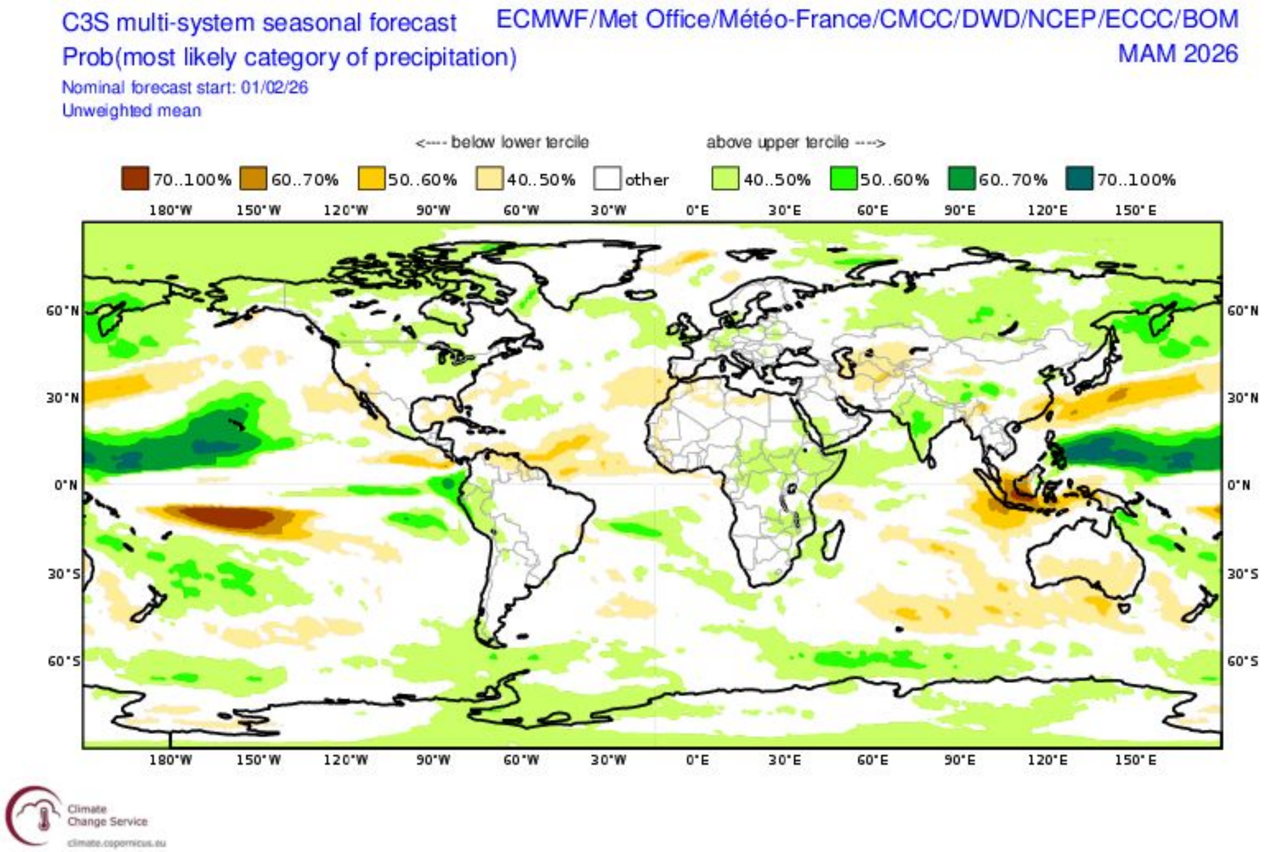
Centro Nacional de Supercomputación

Dots = negative Ranked Probability Skill Score

Precipitation



- ➢ Positive anomalies in parts of the Pacific, Central America, Siberia, Central Africa, northern North America, Fennoscandia, Philippines.
- ➢ Negative anomalies in Indonesia, eastern China, parts of the Pacific and Indian oceans, california, S. Australia and S. Iberian peninsula and N-W of Morroco.

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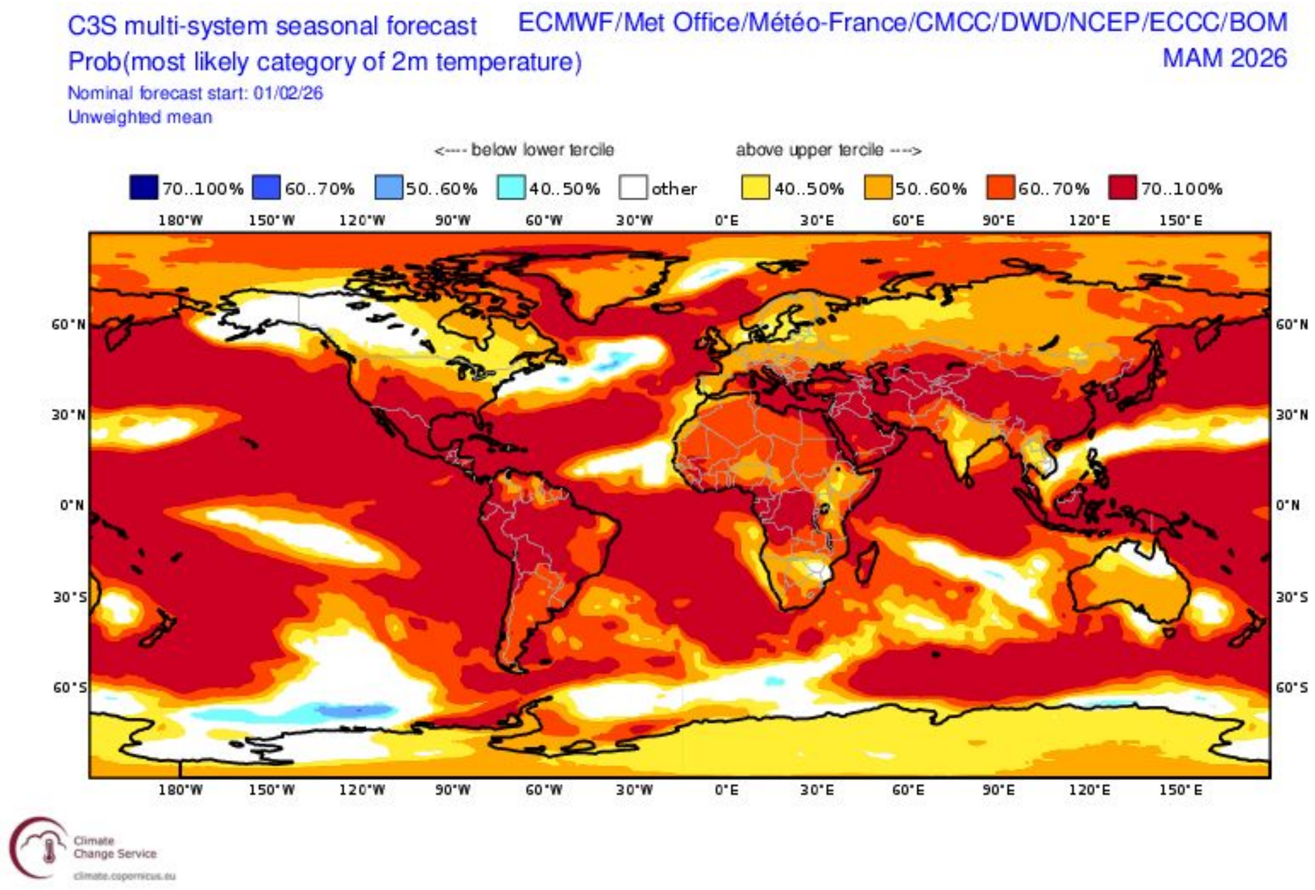
Source: https://climate.copernicus.eu/charts/packages/c3s_seasonal/ / https://iri.columbia.edu/our-expertise/climate/forecasts/seasonal-climate-forecasts/

III. Seasonal forecasts

Temperature



➢ Typical global warming signal.

➢ Parts of North Atlantic and Southern Ocean with normal/cooler anomalies.

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Source: https://climate.copernicus.eu/charts/packages/c3s_seasonal/ / https://iri.columbia.edu/our-expertise/climate/forecasts/seasonal-climate-forecasts/

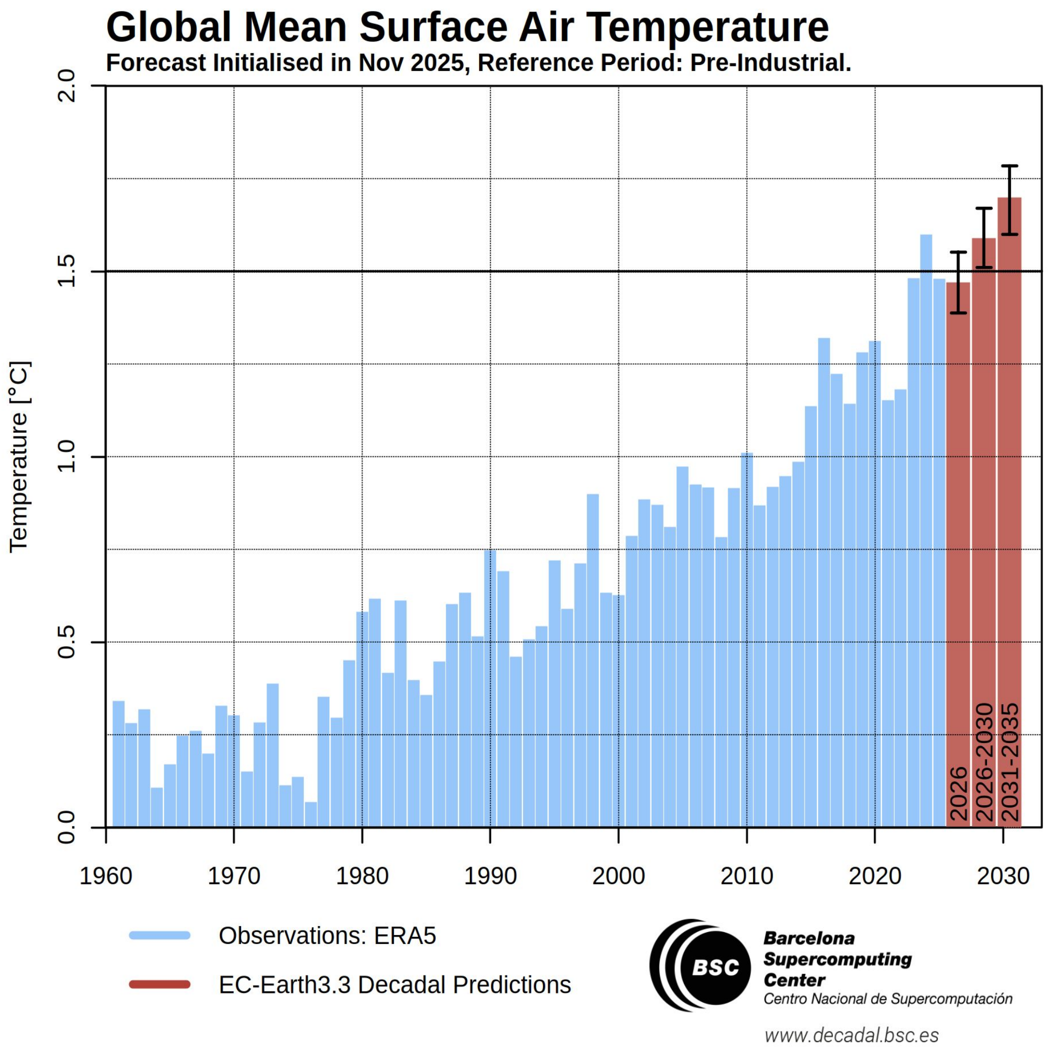
I. Recent state of the climate

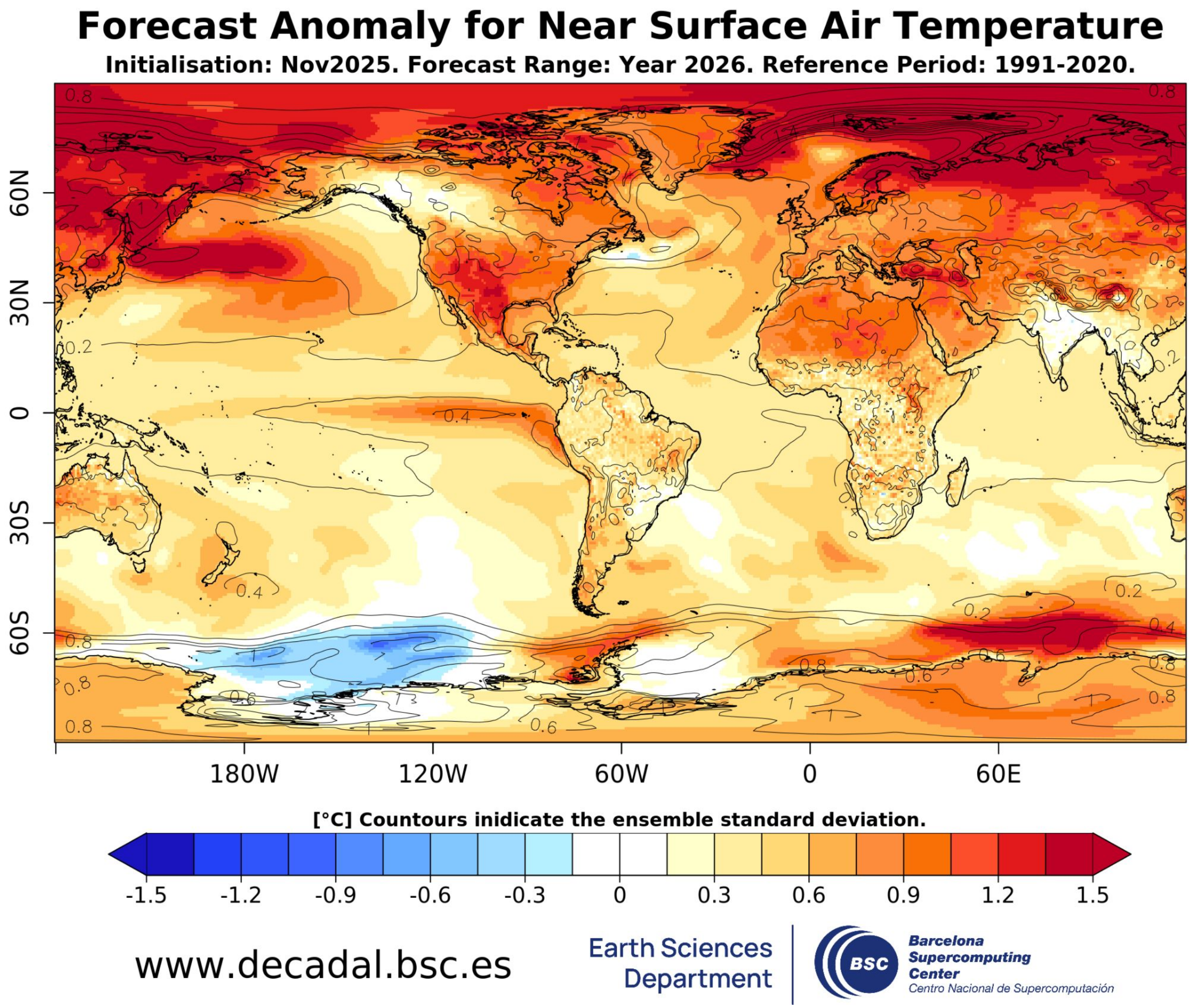
II. Subseasonal forecasts

III. Seasonal forecasts

IV. Decadal forecasts

Decadal forecasts





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Courtesy of Roberto Bilbao

Earth Sciences Department

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

Forecast Briefing

February 2026

Climate Services Team (CST)

Earth System Services (ESS)

Barcelona Supercomputing Center (BSC)

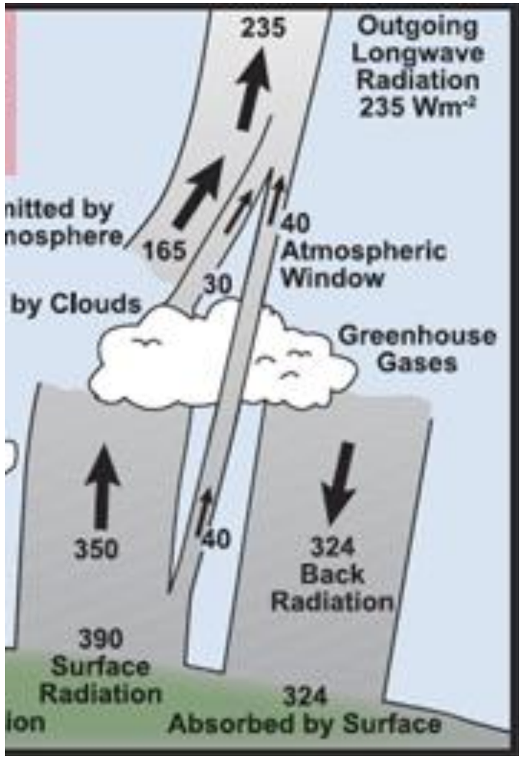
Thursday 19th Feb 2026

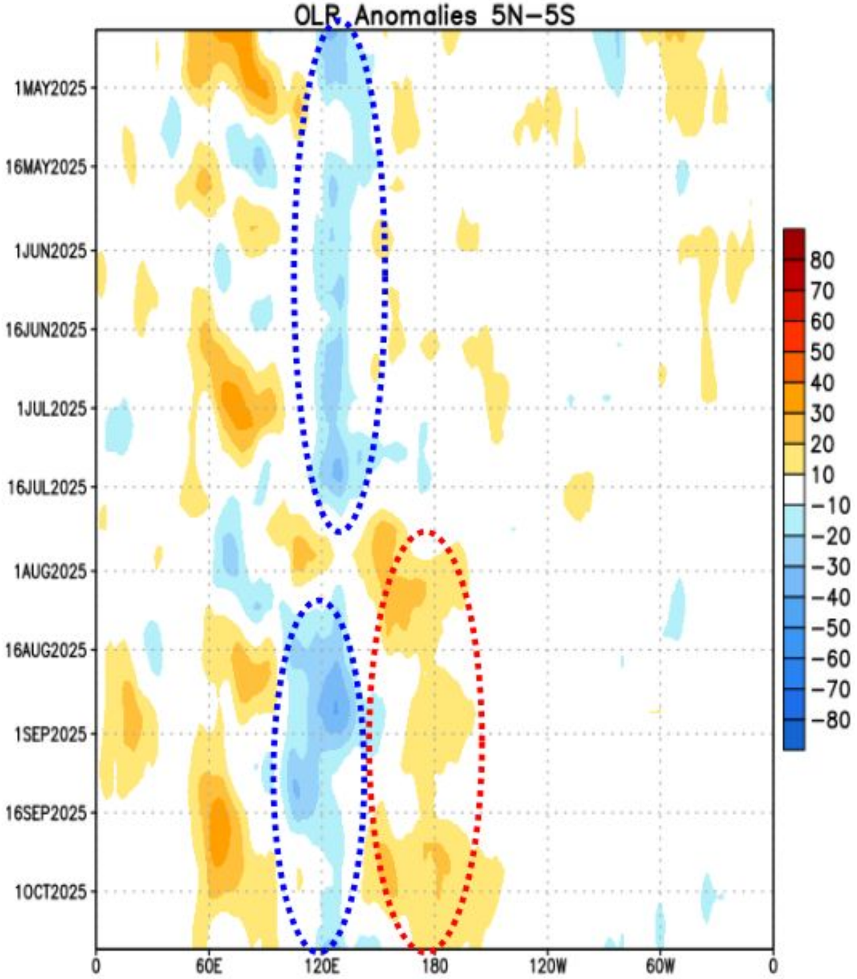
- Negative OLR anomalies:

  Enhanced convection =

  High and deep clouds =

  Their top is cold and emits less emission of longwave radiation back to space.





- Positive OLR anomalies:

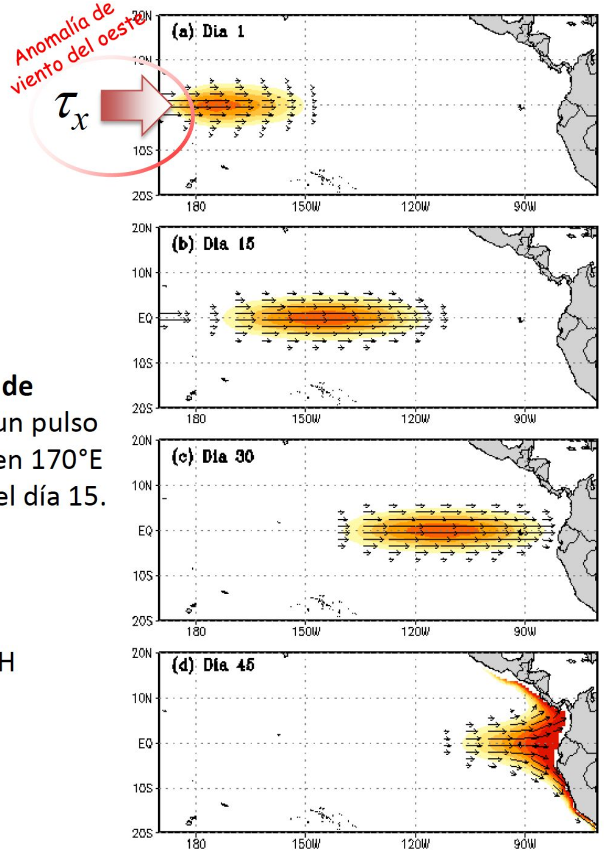
  Suppressed convection over the central Pacific is associated with La Niña.

Subsidence (orange/red shading)

Enhanced convection (blue shading)

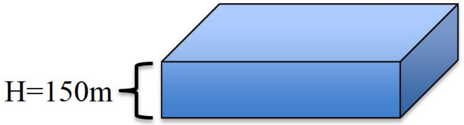
Source: https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf

¿Cómo se forma una onda Kelvin cálida?



Simulación numérica de la propagación de una onda Kelvin Ecuatorial forzada por un pulso de viento del oeste ecuatorial centrado en 170°E durante 30 días con un pico máximo en el día 15.

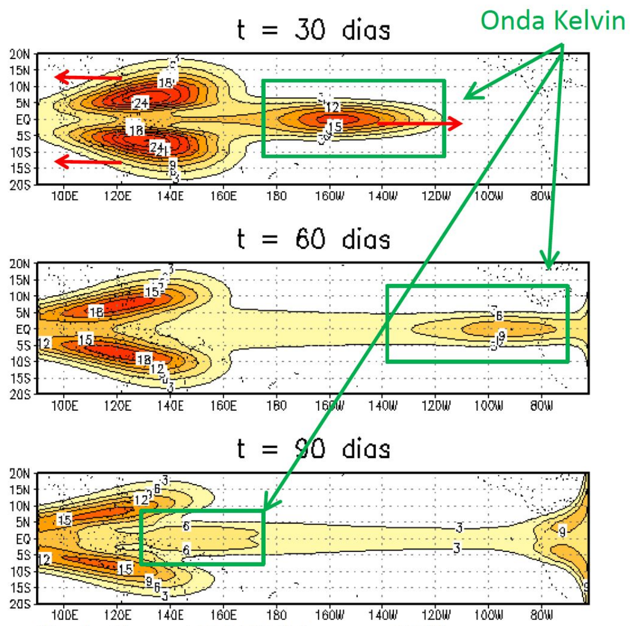
Océano de profundidad H



Mosquera (2014)

¿Cómo se forma una onda Kelvin cálida?

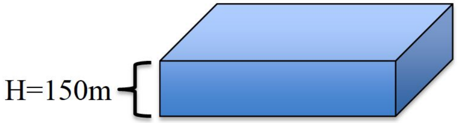
Nivel del mar

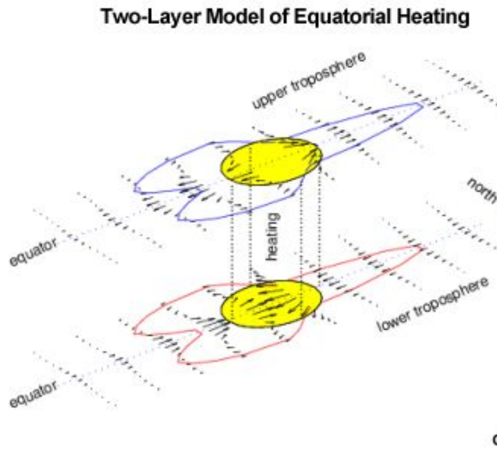


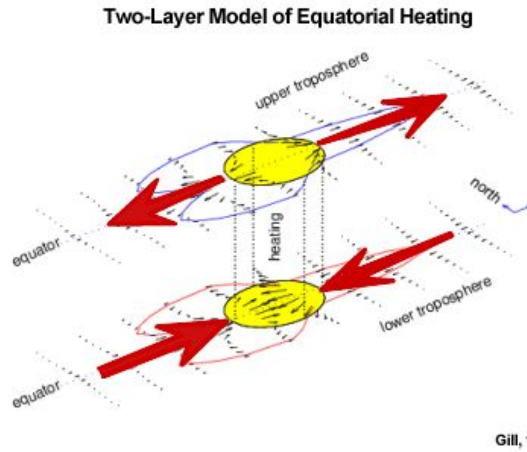
Como consecuencia de la reflexión de la onda Rossby en la frontera occidental

Simulación con LOM-IGP (Mosquera, 2009)

Océano de profundidad H







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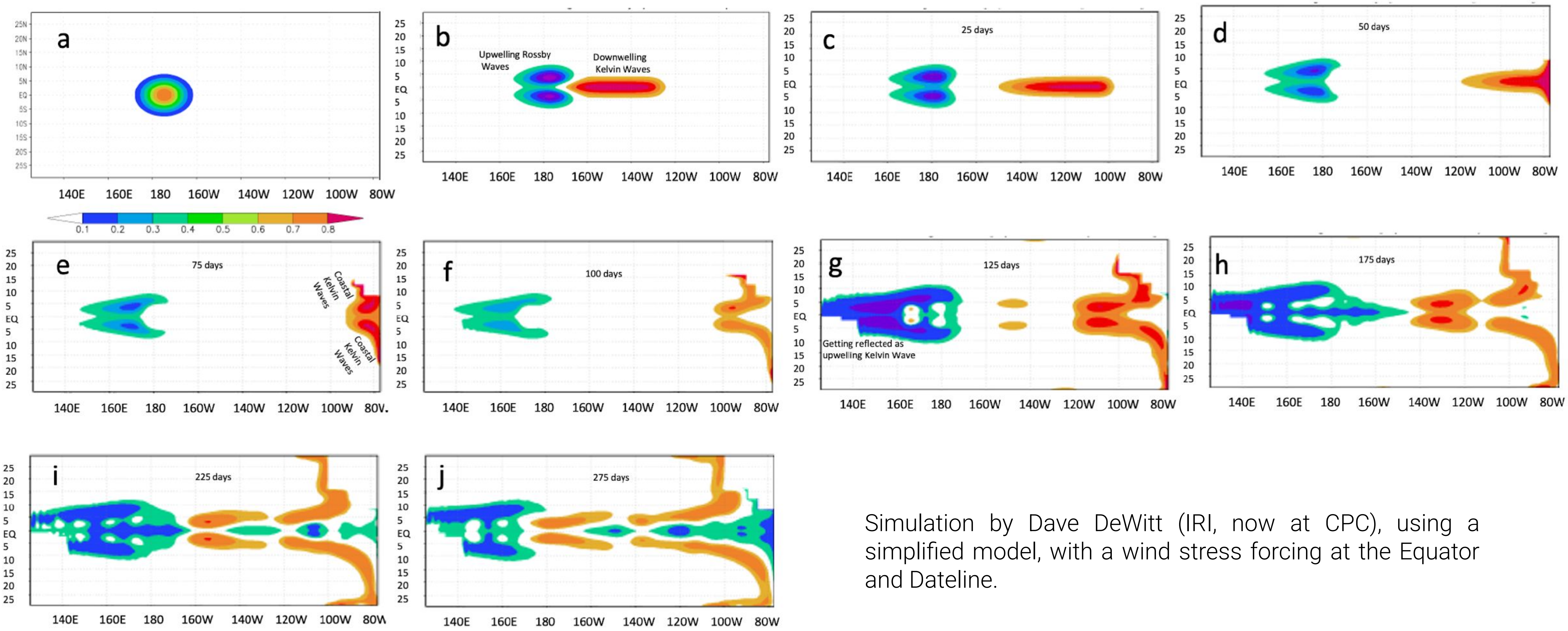

Simulation by Dave DeWitt (IRI, now at CPC), using a simplified model, with a wind stress forcing at the Equator and Dateline.

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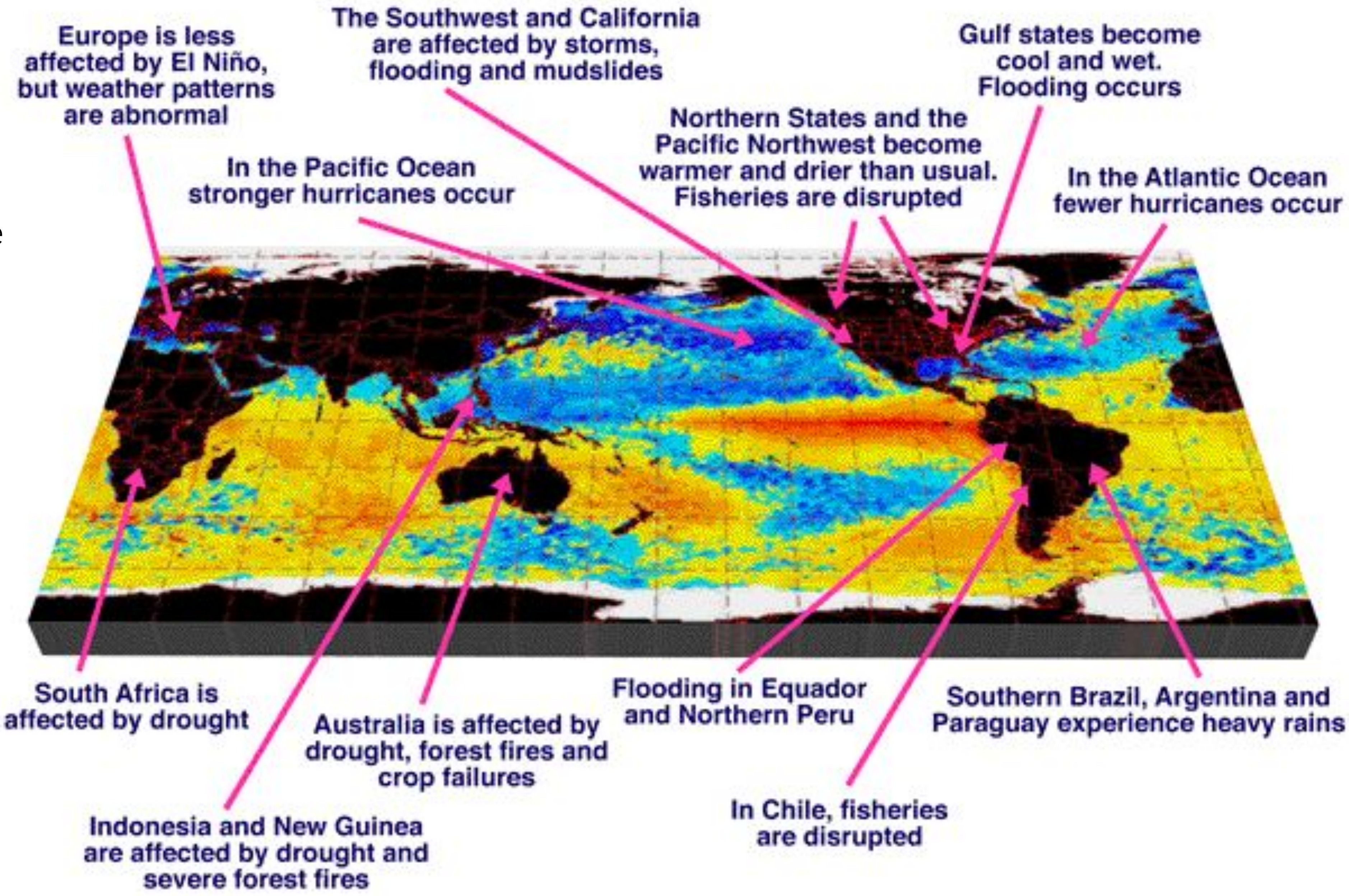
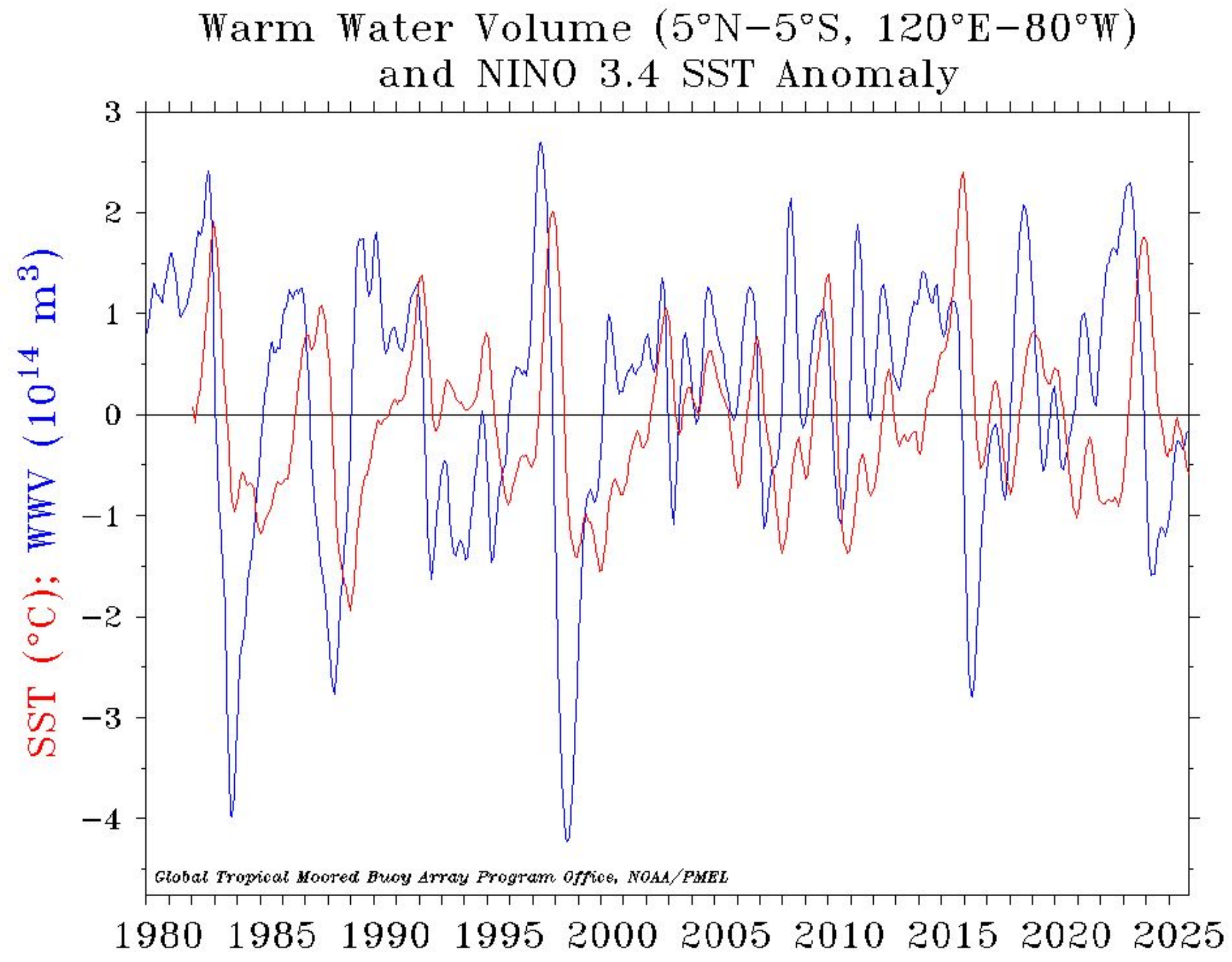
➢ Canonical El Niño impacts across the globe.



Heat content in the upper ocean as ENSO precursor

- ENSO-related SST anomalies usually follow anomalies in warm water volume a few months later.

- **Key for predicting ENSO conditions**



Source: https://www.pmel.noaa.gov/elnino/upper-ocean-heat-content-and-enso

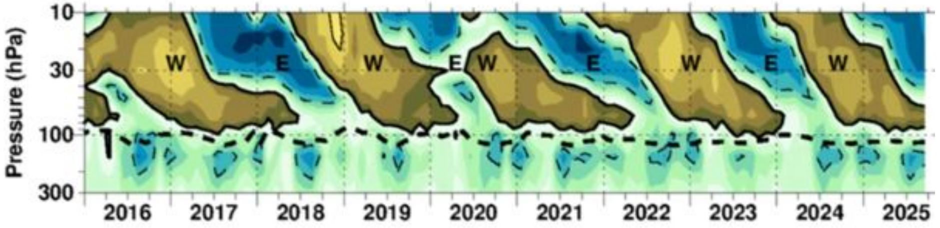
Met Office
Hadley Centre

Summary of teleconnections

- **Positive NAO**
  - La Niña conditions
    → Increases the likelihood of westerly winds in late winter
  - MJO (sub-seasonal, early-mid November)

- **Negative NAO**
  - La Niña conditions
    → Decreases the likelihood of westerly winds in early winter
  - Quasi-biennial Oscillation (QBO) in easterly phase
    → Increased chance of a weaker stratospheric polar vortex
    → Increases the likelihood of sudden stratospheric warmings

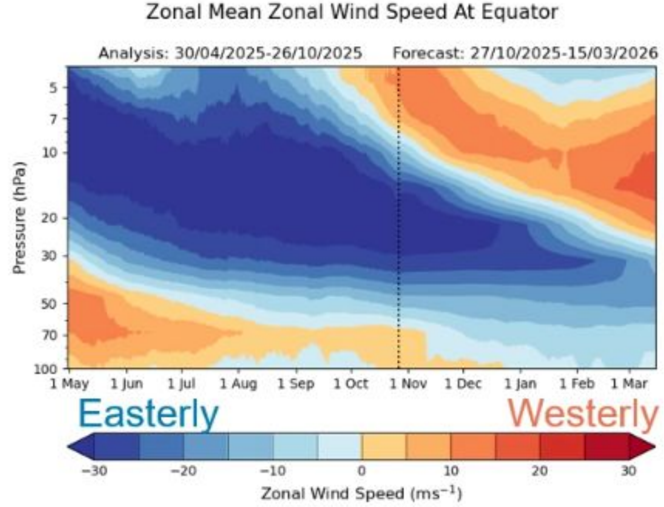
QBO Observations



Paul A. Newman, Larry Coy, Leslie R. Lait (NASA/GSFC) Thu Oct 2 16:20:52 2025

https://acd-ext.gsfc.nasa.gov/Data_services/met/qbo/qbo.html#uwind

QBO Predictions



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Centro Nacional de Supercomputación

Take control Chat People Raise React View More

Met Office
Hadley Centre

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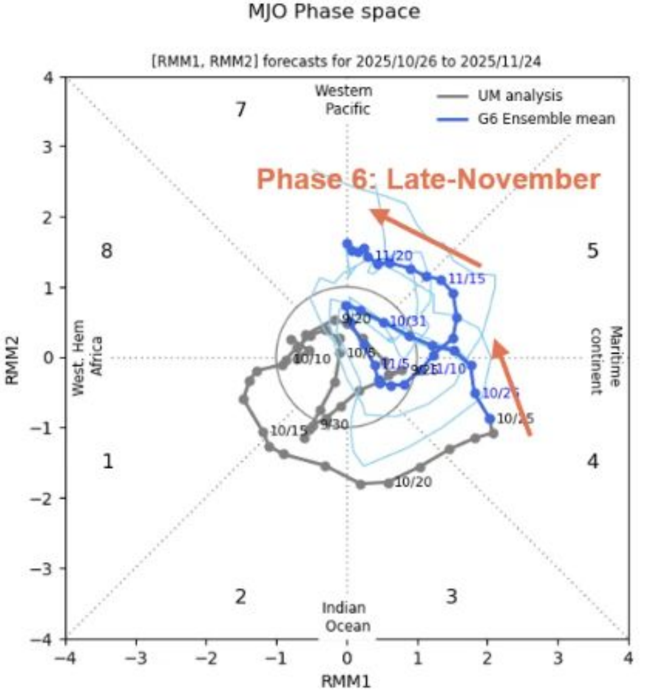

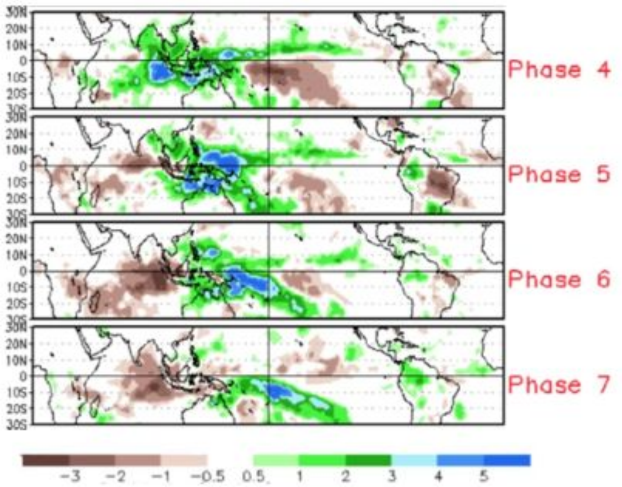

Supercomputing Center
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Met Office
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