MEDMOS
MEDITERRANEAN MONITORING SYSTEM



Mediterranean State Report

Winter 2025

Report N°23

CEAM

SUMMARY

Med SST in Numbers

Mean	17.3°C
Maximum	19.7°C
Mean anomaly	1.0°C
Maximum anomaly	1.2°C

KEY MESSAGES

- **Winter Mediterranean SST** has been **clearly over the climatological reference** (1991-2020) **for the whole season.** Mean Mediterranean SST reached 17.3°C with a maximum of 19.7°C. The maximum anomaly was of 1.2°C.
- **February 2025 mean SST (16.3°C) has been the highest in the historical record,** since 1982.
- Persistent **MHW** events extended over the Mediterranean with **mean intensity of 1.5°C, affecting 87% of the basin.**

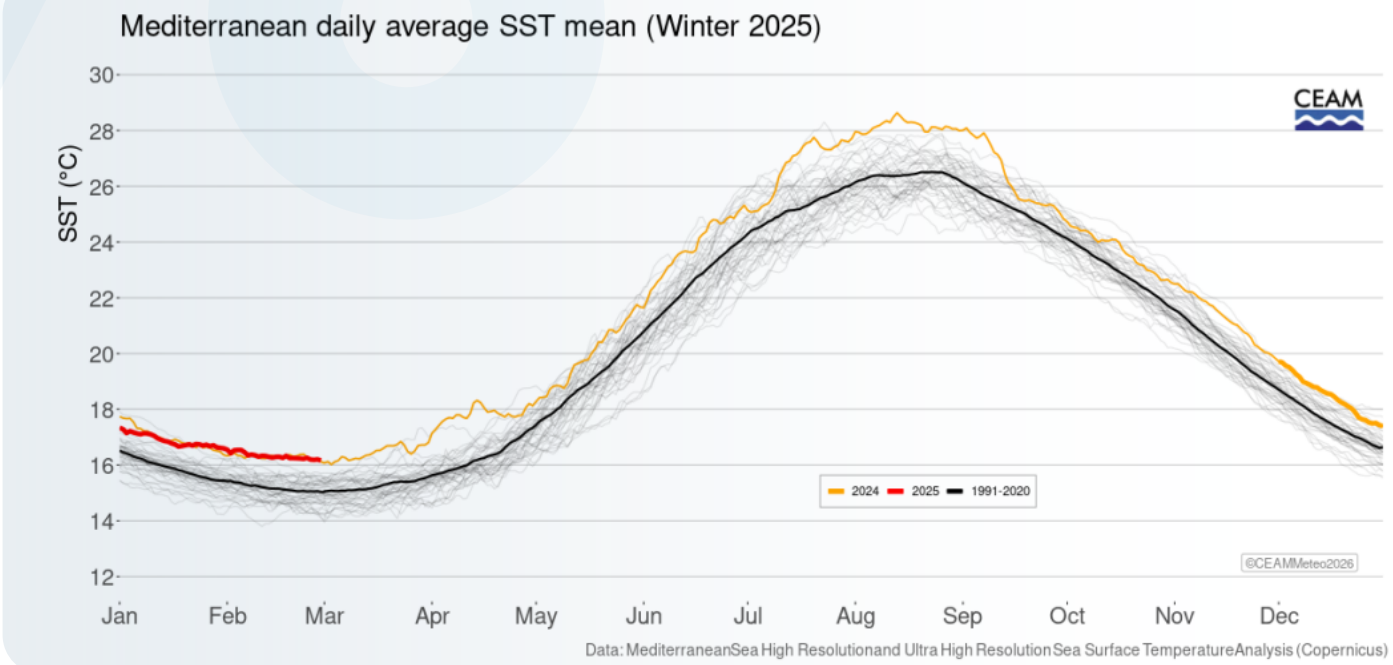
MHW in Numbers

Intensity

Mean intensity	1.5°C
Maximum intensity	2.1°C
Area Affected	87%

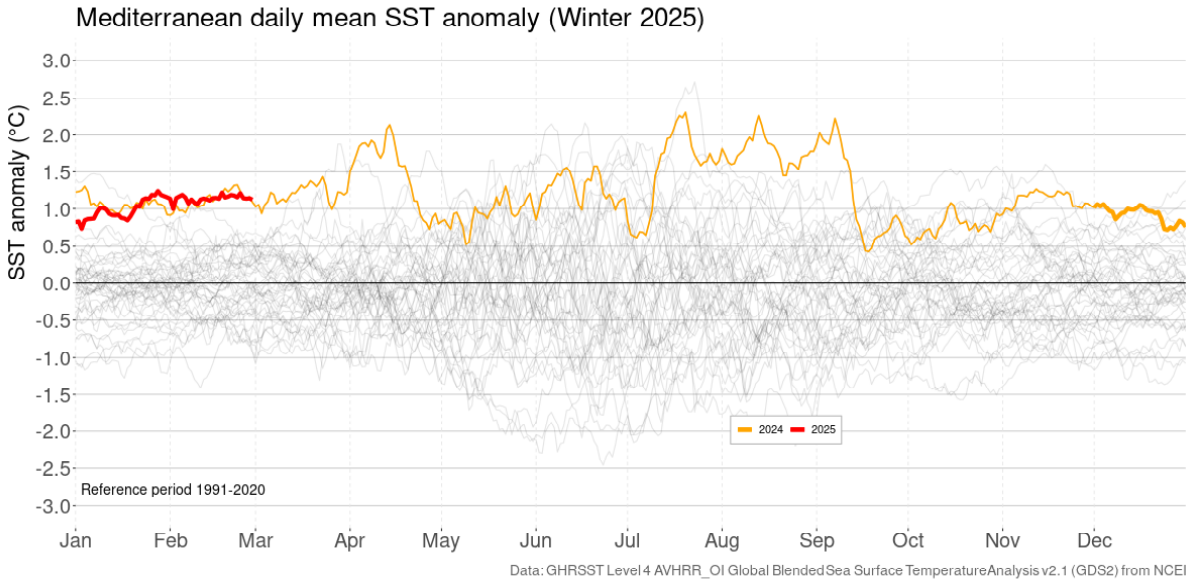
Categories

Moderate	47%
Strong	30%
Severe	8%
Extreme	2%



1. *The percentage of affected area shows the total area of the Mediterranean affected by at least one MHW event.*
2. *The percentage of MHW categories shows the percentange of the Mediterranean affected by each MHW category.*

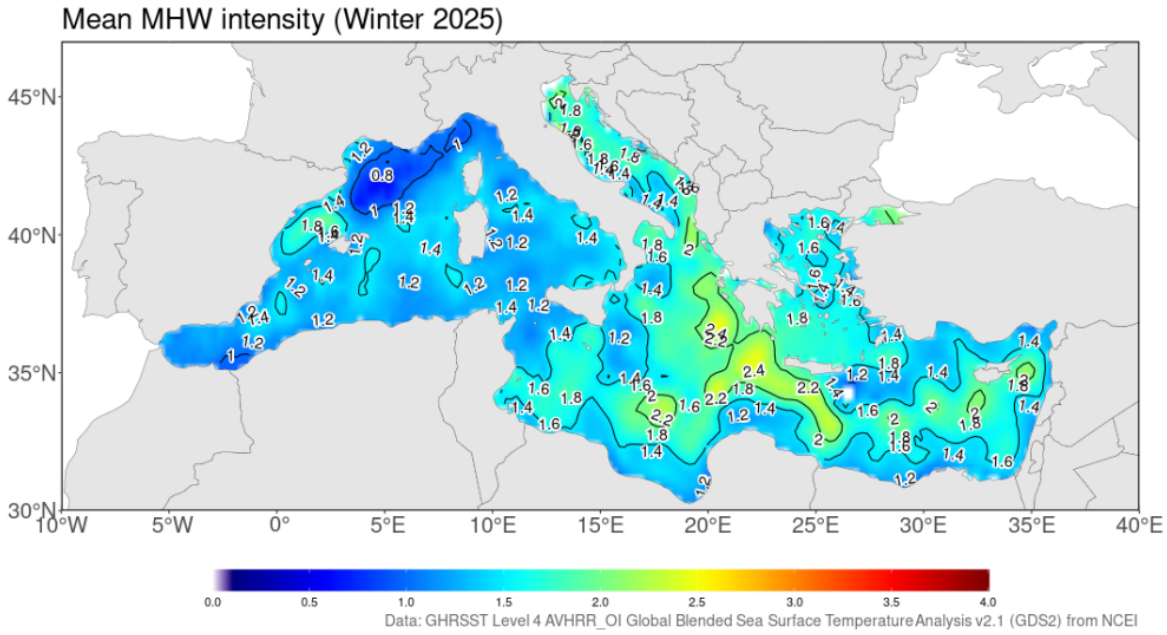
Winter 2025



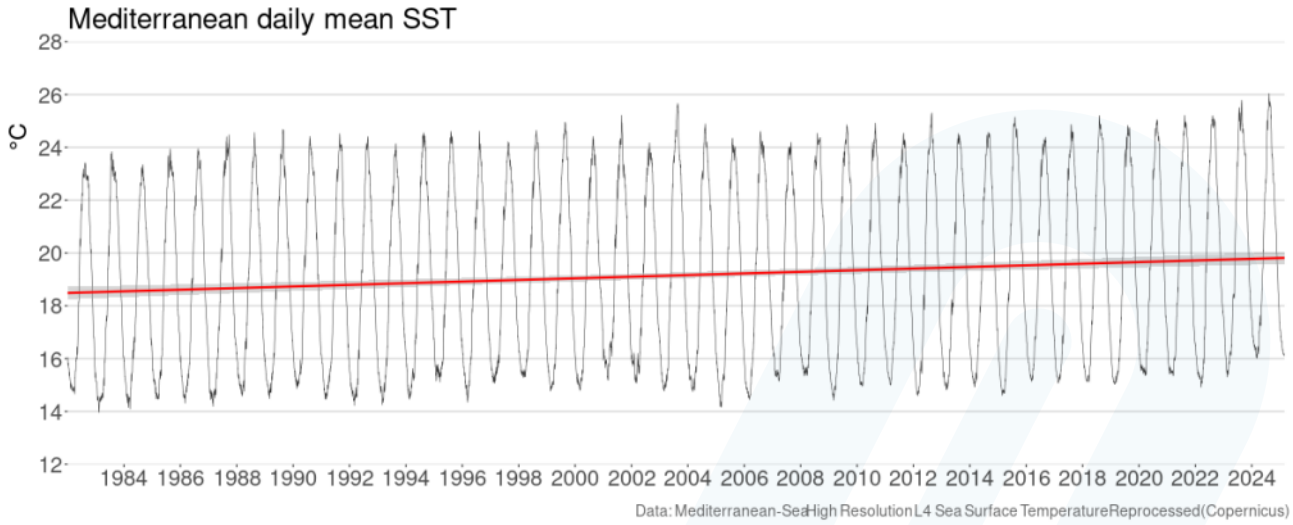
Throughout the winter season, the mean Mediterranean SST remained well above the values for the climate reference period, with a mean value of 17.3°C. Maximum observed mean SST was of 19.7°C at the start of December and a minimum of 16.2°C was recorded on late February. The mean SST anomaly was 1°C, falling within the range between 0.7 and 1.2°C.

Widespread and persistent MHW conditions affected most of the Mediterranean basin. On average, 87% of the basin suffered MHW events that were predominantly moderate (47% mean Mediterranean area) and strong (30% of the basin). Mean Mediterranean MHW intensity was of 1.5°C with a mean maximum of 2.1°C.

Winter 2025 runs from December 2024 to February 2025

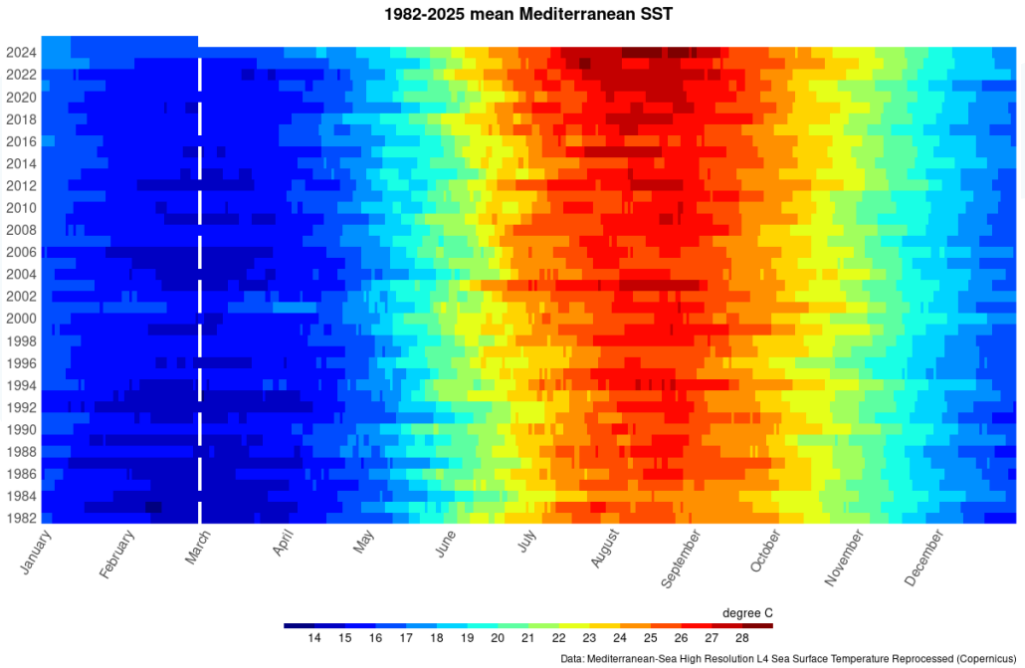


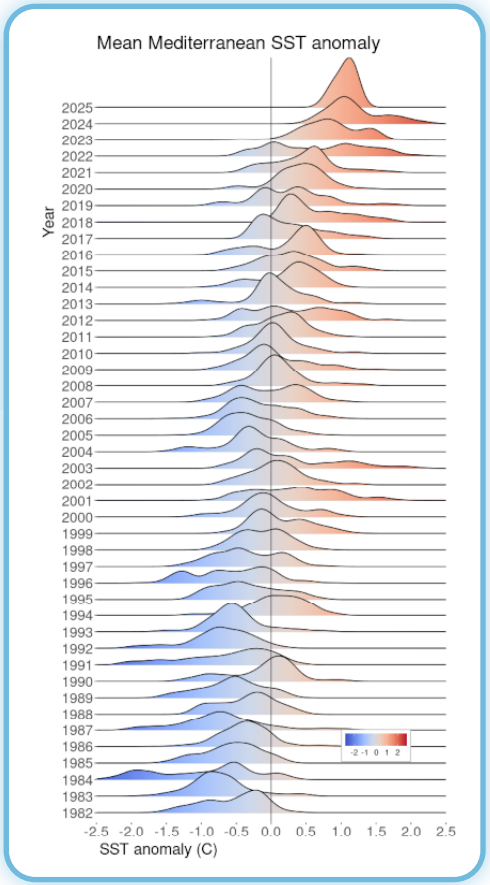
SST - Long term trend



Mean Mediterranean SST long term trend shows a consistent warming trend since 1982. After removing the seasonal contribution to the SST series, the desesasonalized trend accounts for an increase of 0.3°C per decade.

Mediterranean SST shows a progressive increase since the start of the study period in the 1980s with a clear shift towards greater values. This has derived in an increase in the duration of summer SST values but also in higher winter SST records. Regarding SST anomalies, a progressive shift from negative to positive SST values has been observed from the reference period (1991-2020), especially in the last decade and including winter 2025.



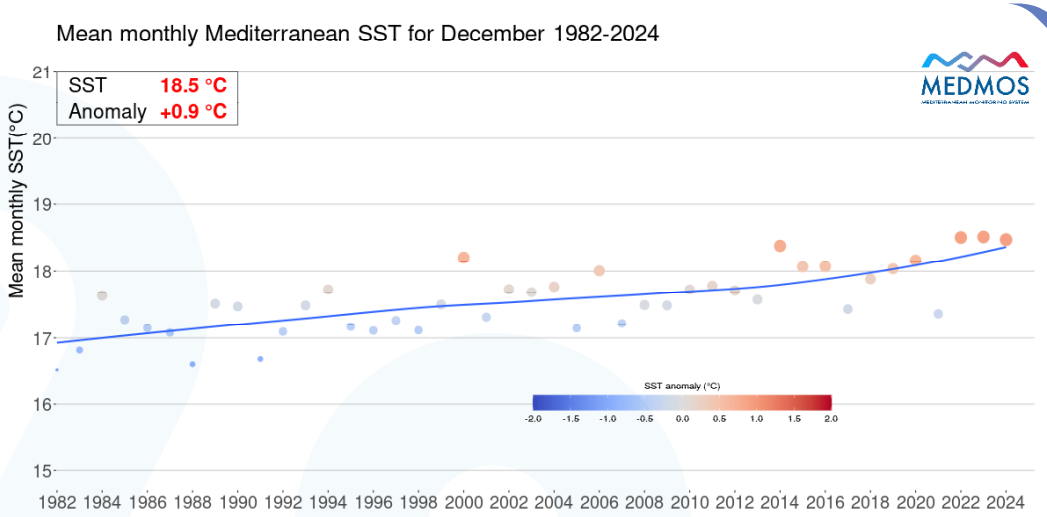


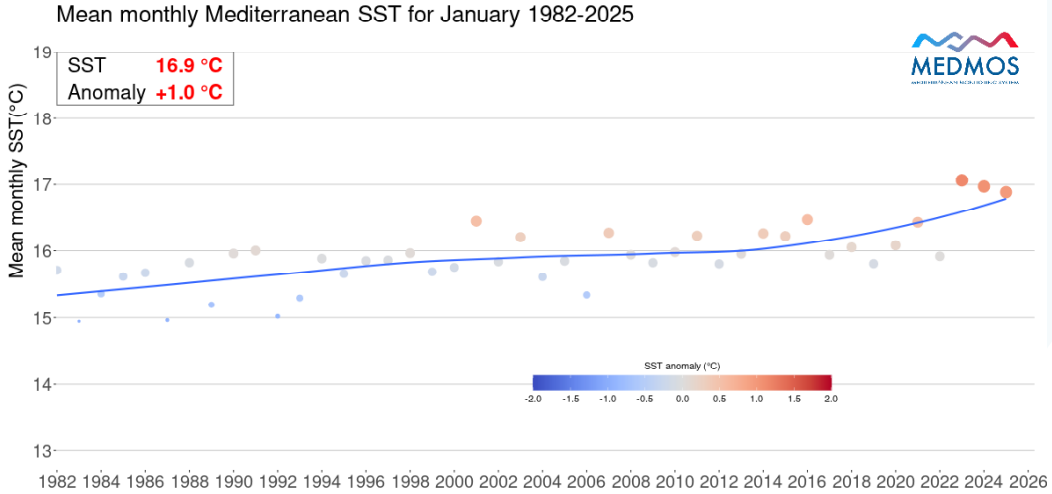
SST - Monthly trend

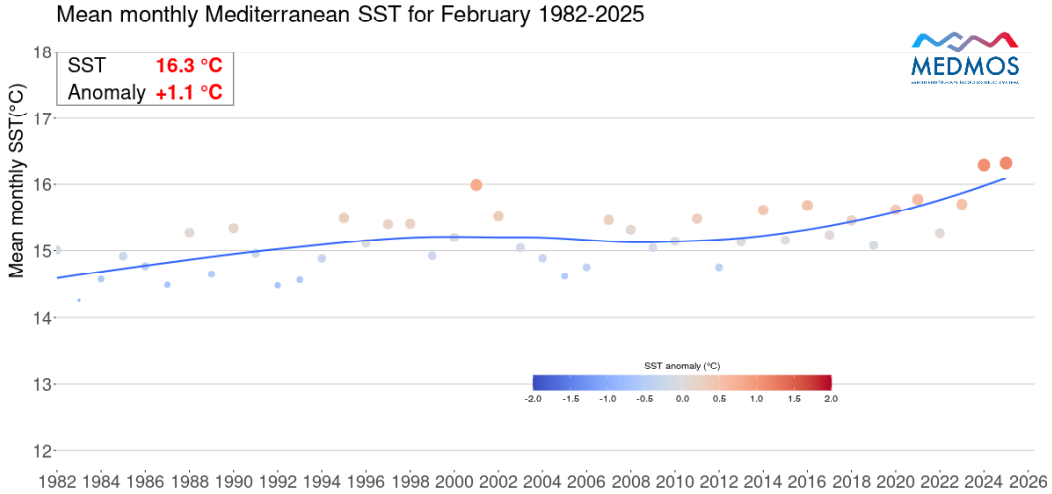
All three months in winter 2025 are on the upper tail of monthly mean SST value and anomaly.

December 2024 ranks third, tied with 2022, whilst January 2025 also ranks third in the historical record.

February 2025 saw its highest mean monthly SST on record since 1982, almost tied with February 2024.



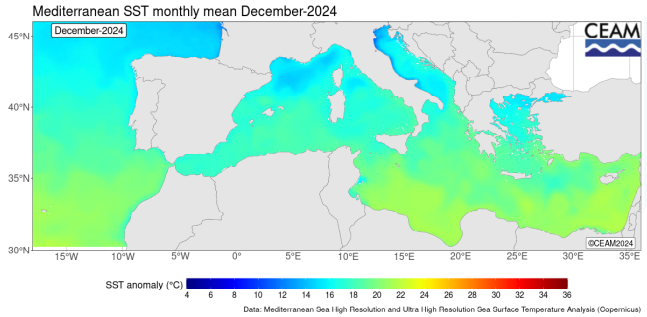


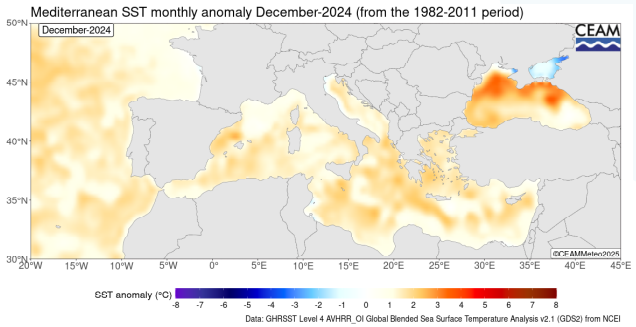


SST - Winter 2025 Summary

December '24

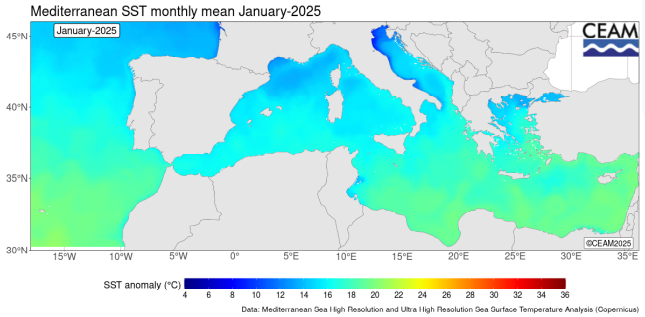
Coldest mean SST values are observed at the northernmost part of the western Mediterranean, especially in the coastal aras of France and the Adriatic Sea. The highest values were recorded in the eastern Mediterranean. Positive anomalies predominated in the whole Mediteranean, with values mostly on the 0.7-1°C range. The Mediterranean mean SST value ranked third in the long-term data series, tied with 2022 and 2023, with a value of 18.5°C while the mean December SST anomaly was the warmest since 1982 with a value of 0.9°C.

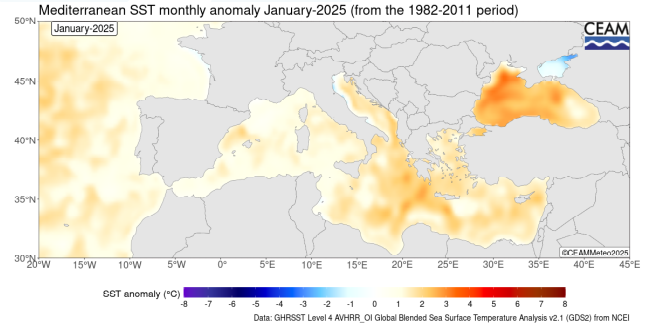




January '25

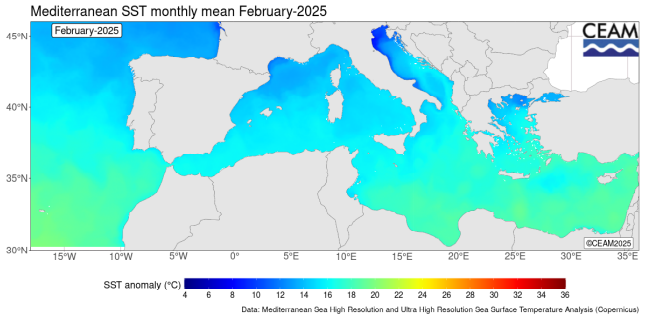
Mediterranean SST field showed a typical winter spatial gradient with a clear north to south gradient. The lowest SST values were observed in the Adriatic Sea, followed by the Gulfs of Lyon and Genoa. SST values above 20°C were still present in parts of the eastern Mediterranean. The most noticeable positive SST anomalies were found in the eastern basin, while weak positive anomalies were present in the western basin. January '25 mean SST (16.9°C) was the third warmest month since 1982 while the mean anomaly ranked third, only following 2023 and 2024.

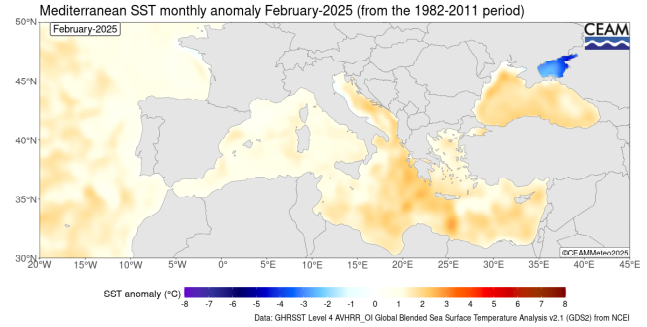




February '25

February '25 mean SST showed the same spatial pattern as in January, maintaining the north-south gradient and with the highest values in the south-east of the Eastern basin. The anomaly values were positive in the Adriatic and throughout the central-eastern Mediterranean basin. SST anomalies were weaker in the western Mediterranean, although generally positive. Mean SST for February (16.3°C) was the highest for this month in the historical record, closely followed by 2024. The mean anomaly was also the highest for February, almost tied with 2024.





MHW - Winter 2025

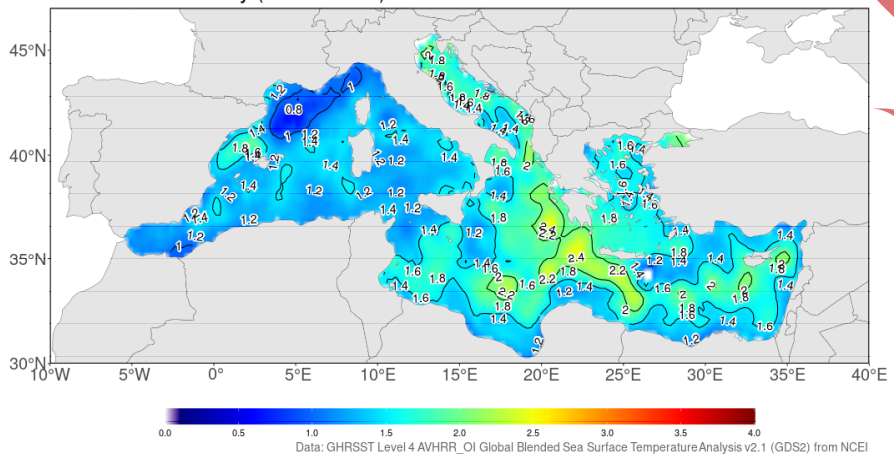
MHW Highlights

- Widespread MHW conditions persisted throughout the season.
- **87% of the Mediterranean experienced MHW conditions during winter.**
- Mean MHW intensity was of 1.5°C while the maximum mean intensity climbed to 2.1°C

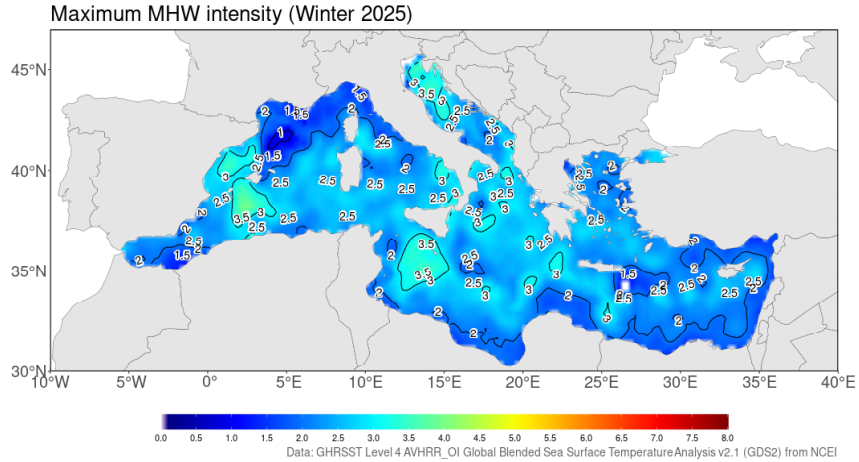
December began with an MHW affecting the western and central basins, with areas classified as ‘extreme’ in the latter. This event gradually lost intensity; only the central basin remained classified as ‘strong’, with some areas classified as ‘severe’ by mid-December. No significant changes were observed for the rest of the month. From the start of January, an extensive but weak MHW spread across the entire Mediterranean basin. From 9 January, the MHW intensified markedly in the central basin, the Adriatic Sea and the Tyrrhenian Sea.

By around the 17th, the MHW had moved to southern Greece, gradually intensifying and spreading to the Adriatic Sea and the central Mediterranean towards the end of January. This spatial pattern remained largely unchanged throughout most of February, with ‘strong’ to ‘severe’ categories in parts of the central and eastern basins and some localised ‘extreme’ areas. In most of the western Mediterranean, the prevailing intensity was ‘moderate’, with some areas of ‘strong’ and ‘severe’ intensity observed locally and temporarily throughout February.

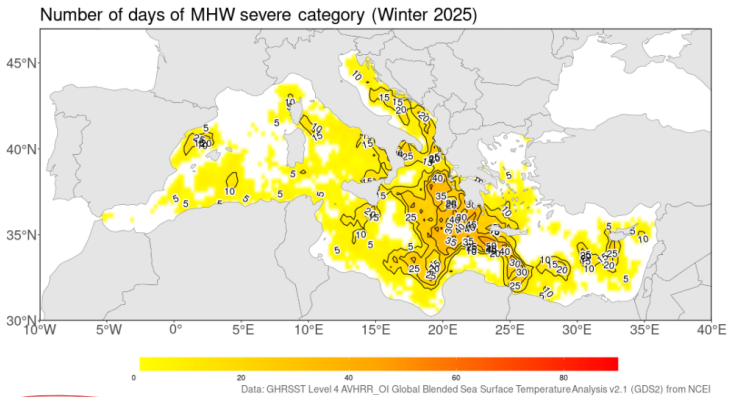
Mean MHW intensity (Winter 2025)



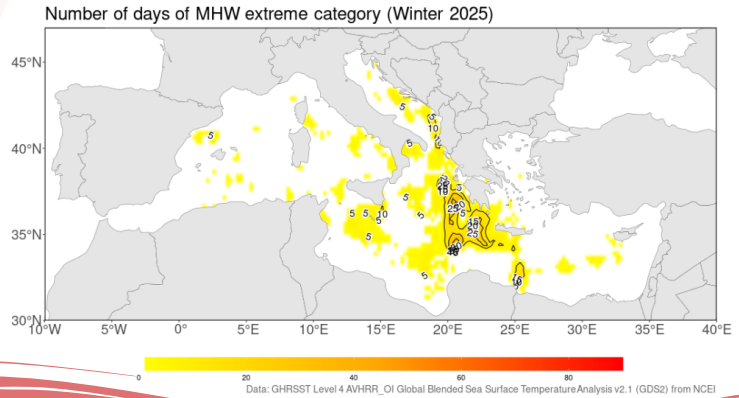
Maximum MHW intensity (Winter 2025)



Number of days of MHW severe category (Winter 2025)



Number of days of MHW extreme category (Winter 2025)



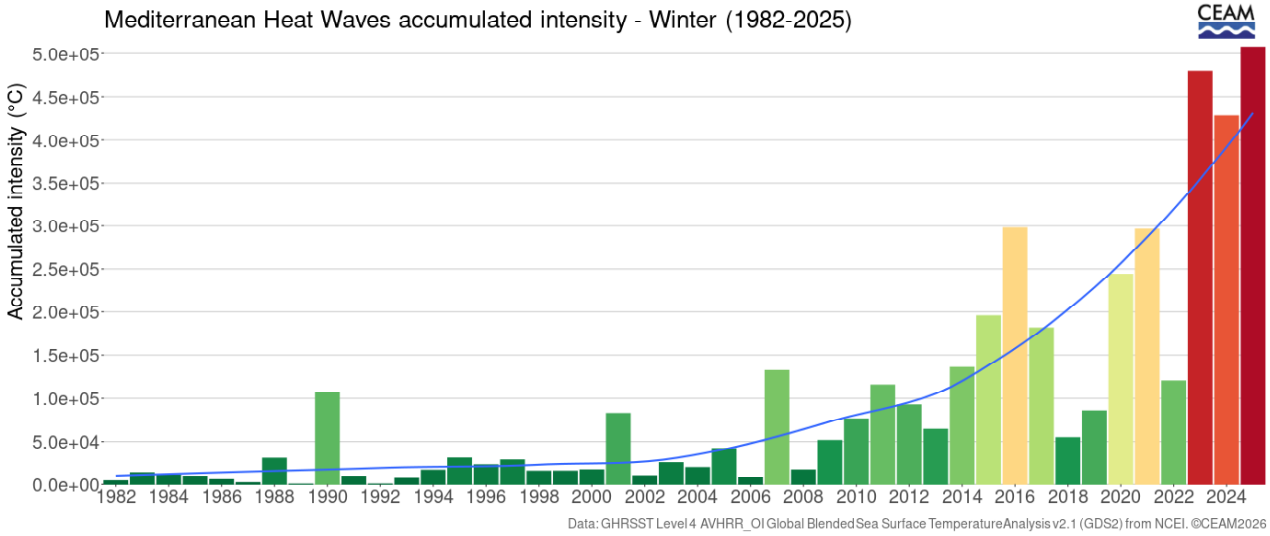
MHW - Long term trend

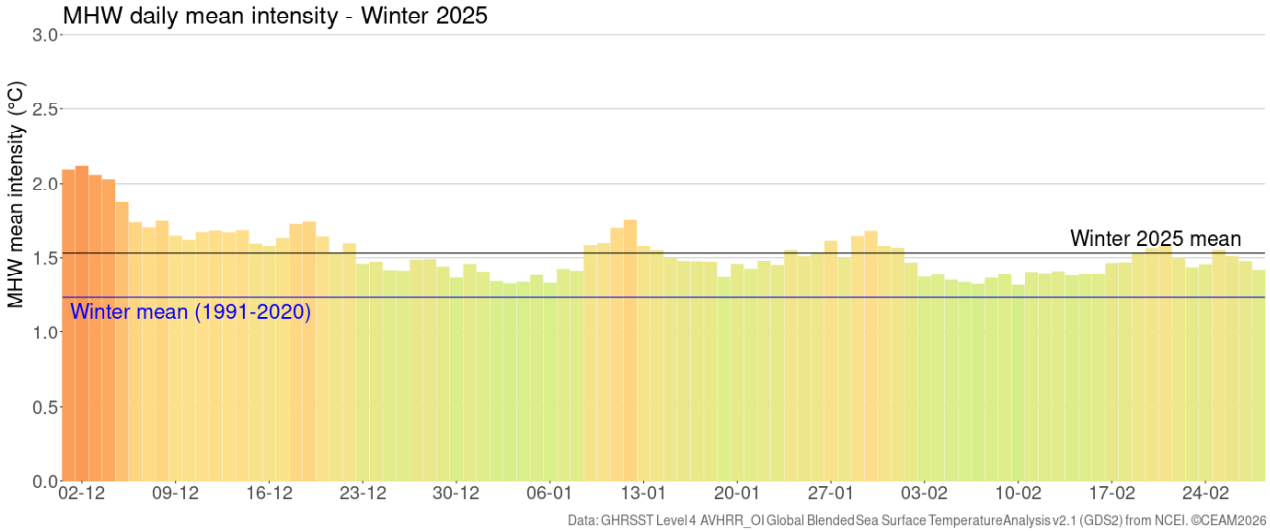
Highlights

- **Accumulated MHW intensity** during the winter of 2025 is **the highest recorded for winter** time since 1982.
- **February 2025** presented the **highest area affected for this month** since the start of the satellite era.

A clear growing trend for MHW accumulated intensity has been found for the winter season, especially since around 2010. The last three years (2023–2025) have been particularly notable, with values significantly higher than in previous years.

The mean MHW intensity for the Mediterranean was of 1.5ºC, on winter 2025, exceeding the winter climatological value (1991-2020) by 0.3ºC.





MHW - Evolution over previous 12 months

Mediterranean

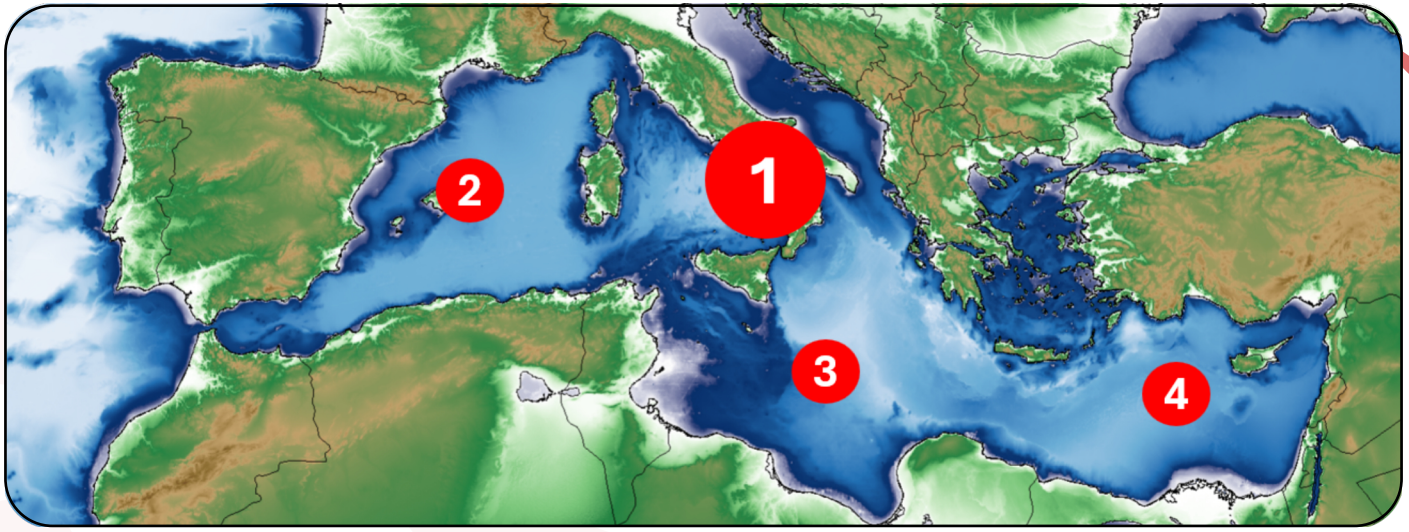
During the last year, the Mediterranean showed **the most noticeable MHW situation from mid-July until mid-September**, especially in the central Mediterranean.

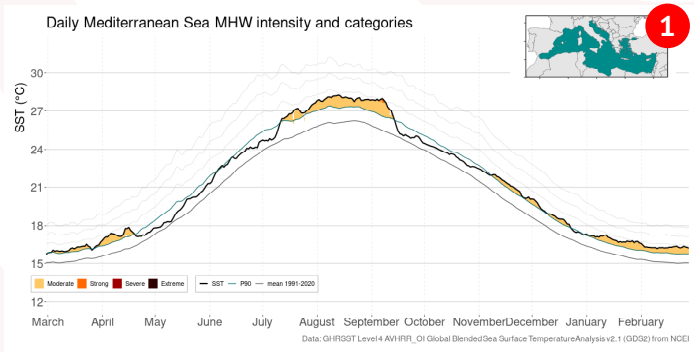
On average, the latest winter months were characterised by moderate MHW conditions.

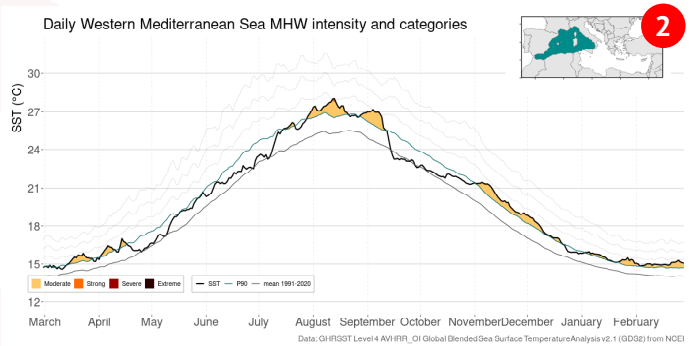
The highest MHW category (strong) recorded was observed in the eastern Mediterranean from late August to the first part of September.

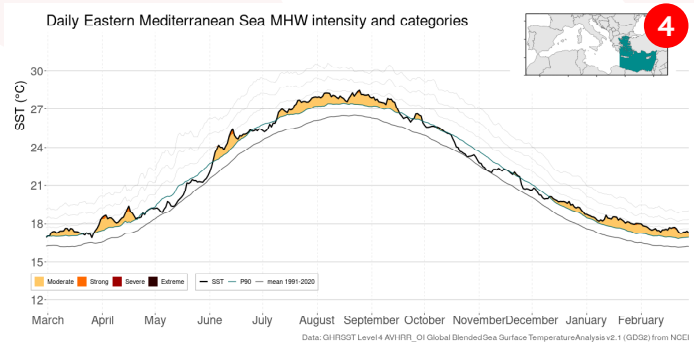
For the winter months, the prevailing category was moderate throughout the whole Mediterranean basin, with some short temporal spots of strong category during January and February in the central Mediterranean.

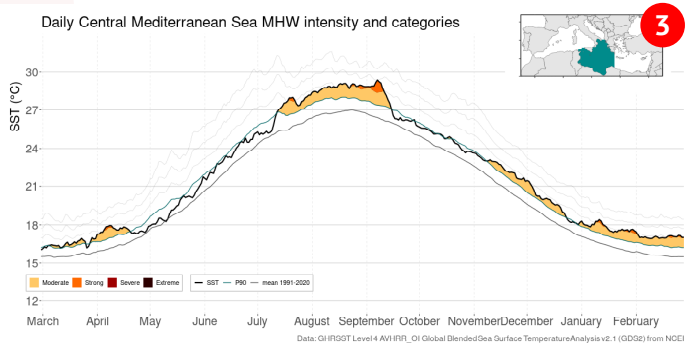
Moderate basin mean MHWs were recorded in the central and eastern Mediterranean in January and February, with periods of strong category, particularly in the eastern basin.











Mediterranean State report is an initiative of the Mediterranean Center for EnvironmentalStudies (CEAM) Meteorology and Climatology area to periodically review and update sea surface temperature and marine heat waves climatology and trend in the Mediterranean basin for both the scientific community, stakeholders and the general public.

Methodology

Data sources

All maps and plots in this report have been created from free, open-access datasets provided by international scientific organizations.

- Mediterranean Sea – High Resolution L4 Sea Surface Temperature Reprocessed from Copernicus (https://doi.org/10.48670/moi-00173)
- GHRSST Level 4 AVHRR_ OI Global Blended Sea Surface Temperature Analysis (GDS2) from NCEI (https://doi.org/10.5067/GHAAO-4BC21)

Methodology

Winter 2025 comprises form December 2024 to February 2025

- To calculate the mean SST, all daily values from all points across the entire Mediterranean basin are averaged. From the daily mean SST series monthly values are calculated.
- The reference period (1991-2020) for the anomaly calculation follows the WMO recommendation for recent climate analysis.
- MHW events are obtained using the definition in Hobday et al. (2016), considering an MHW event when SST exceeds the 90th percentile for at least five days in an extense area.

Hobday, A. J. et al. A hierarchical approach to defining marine heatwaves. Prog Oceanogr 141, 227–238 (2016).

About

How to cite this report

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Contact

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