SUMMER REPORT 2026

Global warming impacts in the Mediterranean Sea and Balearic Islands region

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Record-breaking ocean warming in summer 2026 in the western Mediterranean

- In summer 2026, climate change brought new records for the ocean temperatures across the western Mediterranean Sea, triggering unprecedented and widespread marine heatwaves.
- Web-based applications developed by the Balearic Islands Coastal Observing System (SOCIB) enable near real-time monitoring of ocean conditions and the tracking of multi-decadal changes to support climate change adaptation.

Global and European context

After the record-breaking temperatures for the global ocean in the last three years (Cheng et al., 2024, 2025; Pan et al., 2026), global warming continues impacting ocean state and variability. August 2026 ranked as the warmest August and the warmest month ever recorded for the global average surface air temperatures (Copernicus Climate Bulletin for August 2026). For western Europe, August 2026 closed out a record-breaking summer, with anomalous warm weather that persisted into September. In this region, 2026 follows a sequence of unseasonably warm summers. Record-high sea surface temperatures (SSTs) for August were also observed across European seas, particularly along the Atlantic coast and in the western Mediterranean. These were associated with extensive marine heatwave (MHW) conditions ranging from strong to severe.

Record ocean temperatures in the western Mediterranean

- In summer 2026, SST in the western Mediterranean reached its highest seasonal mean on record, surpassing the previous record set in summer 2022.
- The subbasin-averaged mean was 26.87 °C - representing a mean anomaly of 2.85 °C relative to the 1982-2015 baseline - driven by three consecutive record-breaking months.
- From January to September 2026, the western Mediterranean recorded 158 MHW days, with a subbasin-averaged maximum intensity of 5.98 °C, with spatial variations across regions.
- Ocean warming severely affects coastal waters and is also visible propagating downward into subsurface layers.

Sea surface temperatures

Following unusually warm SSTs in winter and spring 2026 - ranking as the fifth and second warmest seasons on record since 1982, respectively - the western Mediterranean experienced a historic, unprecedented summer of high ocean temperatures driven by three consecutive record-breaking months (Figures 1 and 2, https://apps.socib.es/subregmed-indicators/ocean_temperature.htm). Satellite observations for July, August and September 2026 captured the highest monthly SSTs ever registered for these months, with subbasin-averaged values reaching 26.59, 27.79 and 26,23 °C, representing

anomalies of 2.99, 2.95 and 2.59 °C relative to the 1982-2015 baseline (Figure 2), which is a significant rise in temperature over historical levels. Notably, August 2026 became the warmest August and the hottest single month ever recorded for the western Mediterranean SSTs, exceeding the previous monthly regional record in August 2024 by 0.81 °C. In the Balearic Islands region, the spatially-averaged monthly SST peaked at an unprecedented 28.79 °C - a 2.87 °C anomaly as compared to historical mean values - with daily temperatures fluctuating between 27 and 29.83 °C, corresponding to anomalies of 1.05 to 3.75 °C (Figure 3).

Marine heatwaves

These elevated ocean temperatures constitute marine heatwaves (MHWs), which are defined as prolonged periods of extremely warm anomalies. As of late September 2026, the western Mediterranean Sea concluded the 2026 summer having experienced record-breaking MHW intensities, whereas the eastern sub-basin encountered less severe events (Figure 4, https://apps.socib.es/subregmed-marine-heatwaves/). From January to September 2026, the western Mediterranean averaged a MHW mean intensity and maximum intensities (above the mean) of 2.81 and 5.98 °C, a mean duration of 36 days, a frequency of 5 events, and a total of 158 days. Locally, these metrics peaked at 3.38 °C (along the Algerian coast), 8.85 °C (in the center of the Gulf of Lion), 133 days (along the Tunisian coast), 12 events (in the Catalan coast off Barcelona), and 245 days (in the southern Sardinian coast), respectively. Notably, the western Mediterranean sub-basin experienced unprecedented warm SSTs from June to September 2026. During this period, all the western sub-regions experienced highly intense MHWs, reaching Category II for several weeks, with SSTs exceeding 28°C.

Coastal and subsurface ocean temperatures

High-resolution observations from fixed moorings enabled the detection of localized, exceptionally warm temperatures. Specifically, buoys operated by Puertos del Estado and SOCIB observed historic highs in summer 2026 across the Balearic Islands. These hourly time series captured record-breaking temperatures of 33.02°C at the Dragonera on August 5th, 32.36°C off Mahon on August 8th, 30.9 °C in Palma Bay on August 9th, and 32.5°C at Pollença harbour on July 24th. Beyond these extreme peaks, temperatures exceeding 30 °C persisted for multiple days throughout July and August totaling 22 days at Dragonera, off Mahon and in Palma Bay, and reaching up to 42 consecutive days in Pollença. Such extreme values extended into early September on certain days.

Furthermore, as a contribution to the Global Ocean Observing System, SOCIB has deployed ocean gliders and profiling floats. These platforms have enabled the observation of ocean warming not only at surface but also in intermediate and deep waters, down to a depth of 2000 m. In the Balearic Islands region, profiling floats observed the highest values of integrated ocean heat content within the upper 150 and 700 m in summer 2025 (https://apps.socib.es/subregmed-indicators/heat_and_salt_contents.htm); data for 2026 are currently undergoing analysis. Finally, recent studies have demonstrated subsurface warming in the Mediterranean Sea over the last decade (Chevilard et al., 2024; Juza et al., 2025).

Balearic Islands Focus

In summer 2026, the region experienced its warmest season on record for SST, following a series of consecutively unseasonably warm summers, with a regional mean value of 27.76°C. The region suffered severe MHWs that persisted throughout the entire summer (Figure 3). On August 15th, the regionally averaged SST peaked at 29.83°C corresponding to an anomaly of 3.75 °C. Locally, the Dragonera Island buoy recorded the highest ocean temperatures ever registered, reaching 33.02 °C on August 5th, 2026.

What are the impacts?

- Increasing and extreme temperatures have multiple impacts such as modifying ocean systems, threatening marine life and human health, and heightening the vulnerability of coastal communities.

Consequences of ocean temperature changes on ocean system

Through thermal expansion of the water column, warm oceans directly contribute to sea-level rise. Across the western Mediterranean Sea, sea level continued rising with a subbasin-averaged linear trend over the 1999-2025 period of 3.9 cm/decade and reaching its highest anomaly on record in 2025 since 1993; notably, this increase was substantially more pronounced in specific sub-regions (https://apps.socib.es/subregmed-indicators/sea_level.htm). Furthermore, elevated upper-ocean temperatures enhance vertical stratification. This increased stability can alter vertical mixing processes, thereby hindering nutrient supply, reducing the uptake of heat and carbon into the deep ocean, and ultimately depriving deep layers of dissolved oxygen.

Impacts on marine life

Furthermore, increasing ocean temperatures and extreme thermal events threaten marine ecosystems. Devastating consequences for marine organisms and habitats have been documented from the surface down to deep waters during and after previous events; these include the decline of seagrass meadows, mass mortality of marine organisms (including coral and gorgonians), altered reproductive cycles and growth rates of species, and shifts in species abundance and distribution.

In the Mediterranean Sea, marine heatwaves severely affect key species such as the endemic seagrass "*Posidonia Oceanica*", which provides critical habitats, produces oxygen, sequesters a substantial portion of anthropogenic carbon dioxide, and protects coastlines from erosion (Guerrero-Meseguer et al., 2017; Marbà et al., 2014). Additionally, the introduction of invasive species migrating from the eastern to the western subbasin has been observed to contribute to habitat degradation and drive further ecological shifts.

Rising temperatures also contribute to ocean oxygenation, as warmer waters reduce ocean solubility and increase water column stability. This enhanced stratification prevents oxygen-rich surface waters from mixing with deep waters. Consequently, marine biodiversity loss is driven by the compounding effects of ocean warming, deoxygenation, and acidification stemming from anthropogenic carbon uptake (Le Grix

et al., 2025). Furthermore, the decline of phytoplankton and oceanic plants reduces the primary oxygen production via photosynthesis, impacting both marine life and the global atmosphere. Indeed, the global ocean generates approximately half of the atmospheric oxygen essential for terrestrial life.

The impacts of marine heatwaves, which add to the gradual ocean warming, extend beyond isolated events; however, their long-term repercussions remain understudied. Indeed, we are facing an unprecedented scenario with highly intense, prolonged, and recurrent marine heatwaves over several consecutive years - an unprecedented situation of thermal stress for marine ecosystems.

Impacts for communities

The resulting biodiversity loss and ecological degradation directly jeopardize the resources provided by the oceans, severely impacting key sectors of the Blue Economy such as marine living resources and tourism (Smith et al., 2021; Atalah et al., 2024).

In addition, by bringing more heat and moisture to the atmosphere, anomalous warm waters can fuel the intensification of extreme meteorological events; these include severe storms and heavy rainfalls that trigger flooding, beach loss, and infrastructure destruction (Mitchell et al., 2006).

Furthermore, the accelerated sea-level rise recorded in recent decades, driven by global warming, threatens littoral zones and coastlines, carrying profound socio-economic implications for coastal infrastructure, ecosystems, and communities.

Finally, human health faces increasing risks from ocean warming and extreme event intensification which escalate the threat of infectious diseases, harmful algal blooms and food insecurity (UNEP/MAP and Plan Bleu, 2020).

How to mitigate the situation?

- To implement effective measures to reduce greenhouse gas emissions.
- To preserve marine species and habitats.
- To implement sustainable ocean monitoring systems for science-based management.
- To foster scientific and technological knowledge transfer towards all sectors involved.

The increase of ocean temperatures and its multiple impacts are a consequence of global warming. The international scientific consensus states that the only viable solution to limit further warming and mitigate changes, is a sustained and global reduction in greenhouse gas emissions.

Preserving natural marine areas (e.g. seagrass meadows) and protecting ecosystems from additional stressors induced by human activities e.g. pollution, overfishing, maritime traffic, natural resource extraction and coastal urbanization, is also crucial.

Comprehensive ocean monitoring, from physics to biology and ecosystems, is essential to better understand and adapt to the effects of climate change. Sustained observations also contribute to improving ocean forecasts and filling the monitoring gaps, especially in the subsurface ocean. We must

observe, analyse and predict essential ocean variables to effectively anticipate changes and take timely action. What is not observed cannot be managed.

Science plays a key role in collecting and analysing data, and improving our understanding of the ocean. Also, scientific knowledge must be shared facilitating the seamless access to information through open-access monitoring and visualization tools. In this manner, science supports evidence-based decision-making for effective and adaptive management in the context of climate change.

Figures

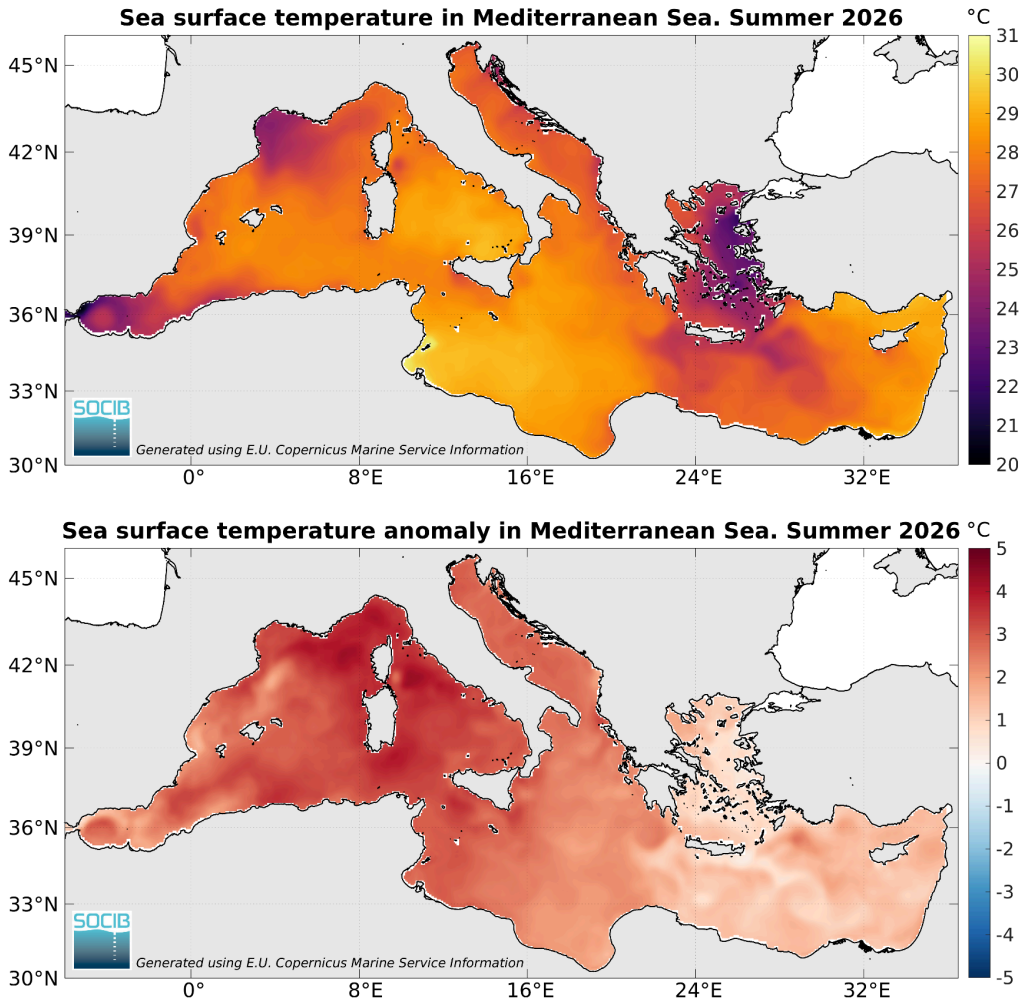


Figure 1. SST (top) and SST anomaly w.r.t. the period 1982-2015 (bottom) in the Mediterranean Sea in summer (July-August-September) 2026. Source: Sub-regional Mediterranean Sea indicators (updated on October 1st, 2026; Juza and Tintoré, 2020, 2021), SOCIB.

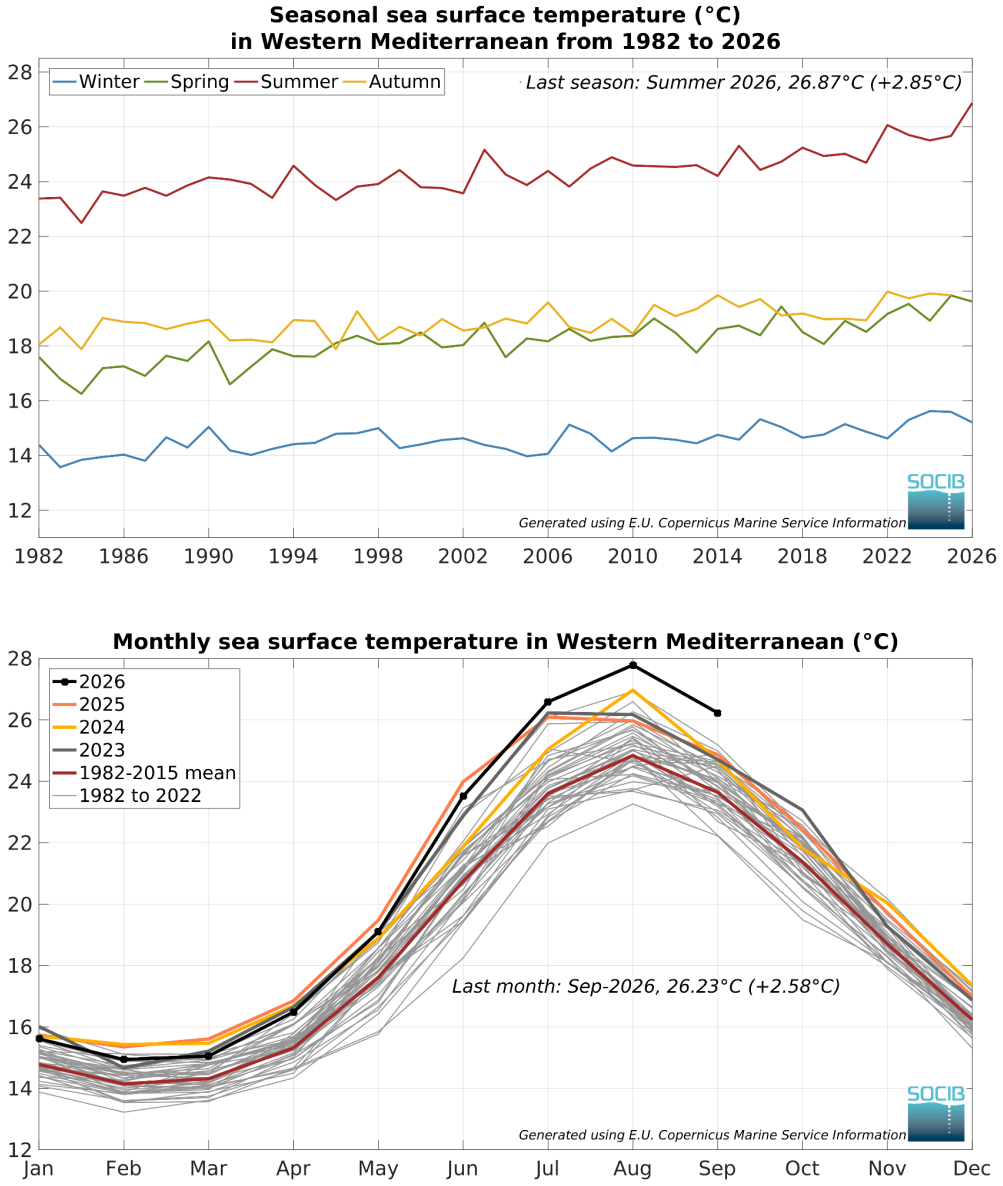


Figure 2. Seasonal (top) and monthly (bottom) SST averaged in the western Mediterranean Sea from 1982 to 2026. Source: Sub-regional Mediterranean Sea indicators (updated on October 1st, 2026; Juza and Tintoré, 2020, 2021b), SOCIB.

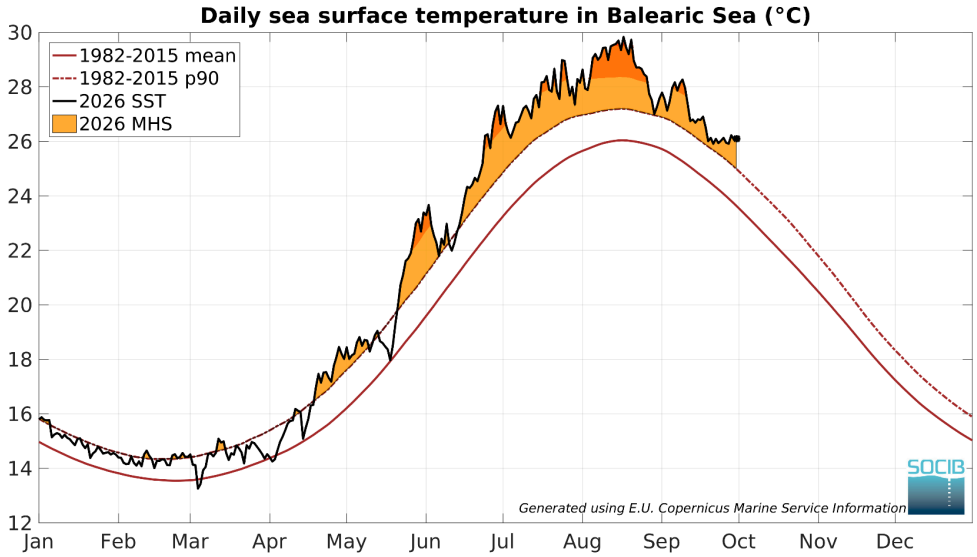


Figure 3. Daily SST averaged in the Balearic Islands region in 2026. MHWs are indicated in orange. Source: Sub-regional Mediterranean Marine Heatwaves (updated on October 1st, 2026; Juza and Tintoré, 2021; Juza et al., 2022), SOCIB.

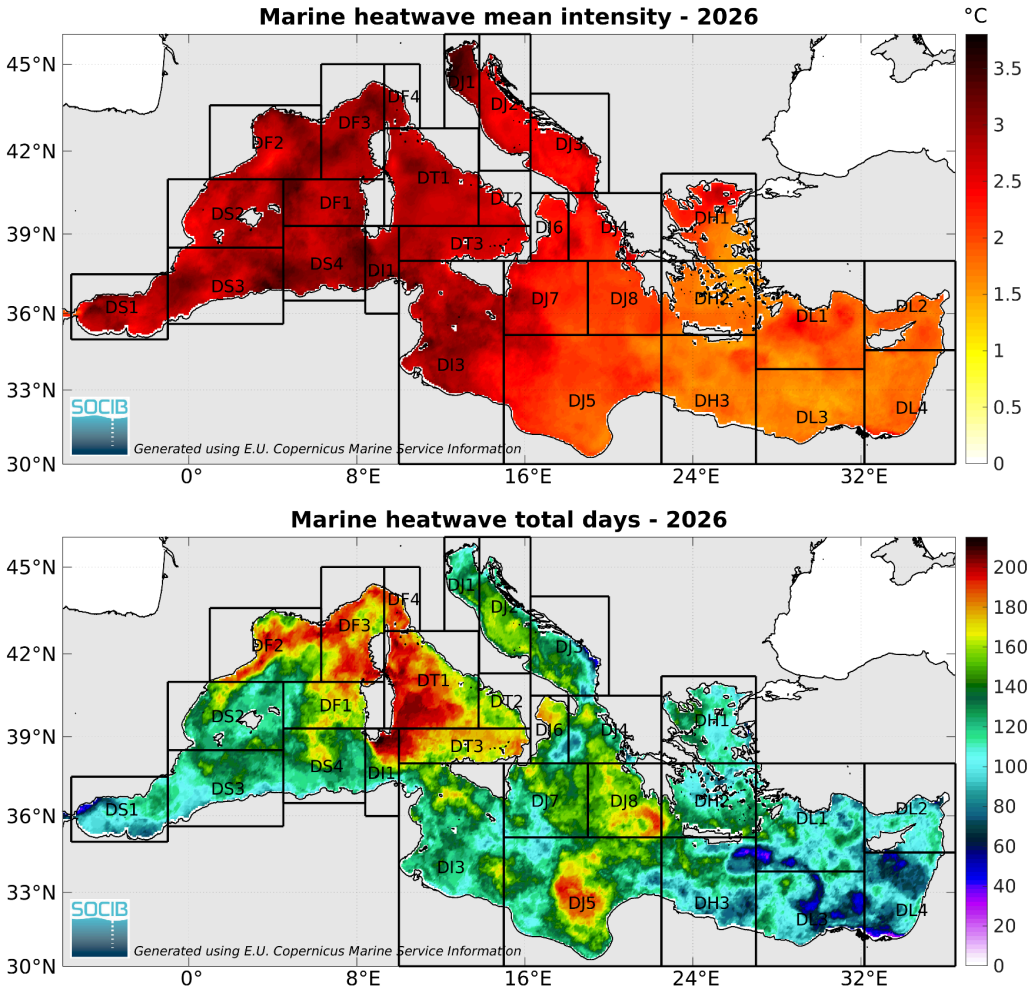


Figure 4. MHW mean intensity (in °C, top) and total days (bottom) over January-September 2026 in the Mediterranean Sea. Source: Sub-regional Mediterranean Marine Heatwaves (updated on October 1st, 2026; Juza and Tintoré, 2021; Juza et al., 2022), SOCIB.

Sources of information

Web-based applications

Open-access web-based applications have been implemented for the Mediterranean Sea to continuously monitor and visualize timely information on the ocean state and variability, from event detection to multi-decadal assessment. See and access the applications below:

- Sub-regional Mediterranean Sea indicators (Juza and Tintoré, 2020)
- Sub-regional Mediterranean Marine heatwaves (Juza and Tintoré, 2021)
- TIAMAT Observatory - Cabrera Archipelago (Juza et al., 2023)

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