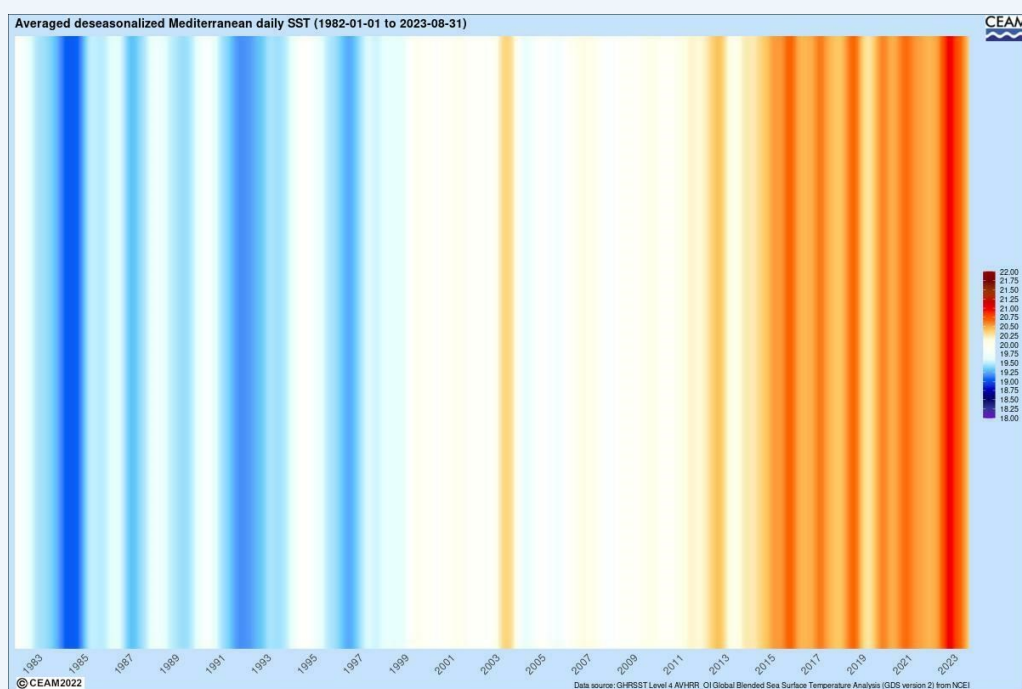


Mediterranean SST report

Summer 2023

The Mediterranean area has been defined as a *hot-spot* for climate change. From a climatic point of view, the Mediterranean Sea and its interactions with the atmosphere play a fundamental role in its environmental conditions. It is, therefore, crucial to study the behaviour of the Mediterranean Sea in the past and to monitor its current situation to understand possible future scenarios in the region.

Mediterranean SST report is an initiative of the Mediterranean Center for Environmental Studies ([CEAM](http://www.ceam.es)) Meteorology and Climatology area to periodically review and update sea surface temperature (SST) climatology and trend in the Mediterranean basin. This newsletter will be issued on a seasonal basis and is intended to disseminate the state of the art about Mediterranean SST but also as information for stakeholders and



media interested in climate change. It is also our intention to offer this newsletter as a meeting point for the scientific community involved in the study of Mediterranean SST. SST daily updated information can be found in our web SST-CEAMed at <http://www.ceam.es/SST>.

All graphics and analysis are based on daily SST data from GHRSSST Level 4 AVHRR_OI Global Blended Sea Surface Temperature Analysis (GDS version 2) from NOAA National Centers for Environmental Information available at PODAAC site (https://podaac.jpl.nasa.gov/dataset/AVHRR_OI-NCEI-L4-GLOB-v2.1).

Mediterranean SST report will be issued in a seasonal basis (4 times a year). If you are interested in receiving upcoming issues please contact Francisco Pastor at paco@ceam.es. Please, feel free to distribute to anyone who might be interested.

Mediterranean SST report - Summer 2023

SUMMARY

The mean Mediterranean temperature started a rapid rise from the beginning of June to reach its highest daily value of the historical series (28.1°C) in mid-July. Subsequently, a pronounced decrease was recorded until the beginning of August before rising sharply again towards the end of the month. The highest SST anomalies, around 3°C, were recorded at the end of July. The long-term trend of seasonally unseasonalised Mediterranean SST persisted with a cumulative warming (1982-2023) of 1.5°C on average.

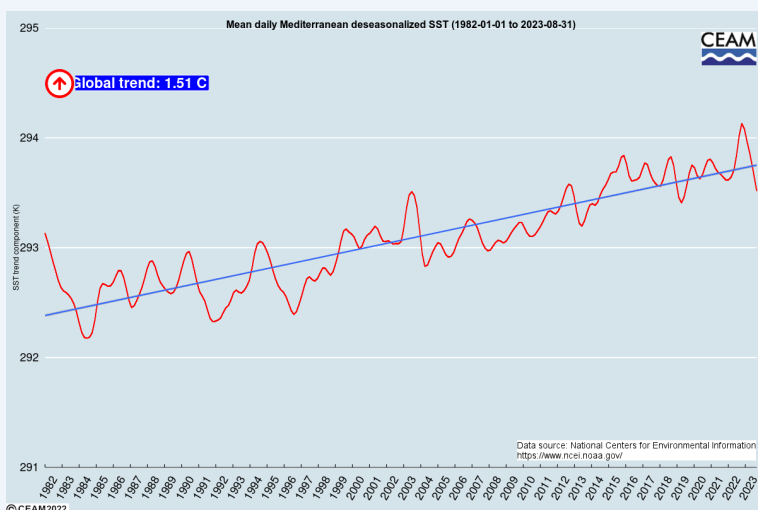


Figure 1. Time evolution for deseasonalized mean Mediterranean SST

The mean SST in the Mediterranean started June at normal values and rose rapidly from the last decade of the month and especially in July, reaching the highest anomaly of the historical series with 3.0°C in the second half of the month. After a steep decline to only slightly above normal values at the beginning of August, there was a further rise with another very pronounced anomalous peak at the end of the month which declined rapidly. The long-term cumulative increase in SST is 1.5°C for the period of analysis (1982-2023) for the seasonally adjusted SST.

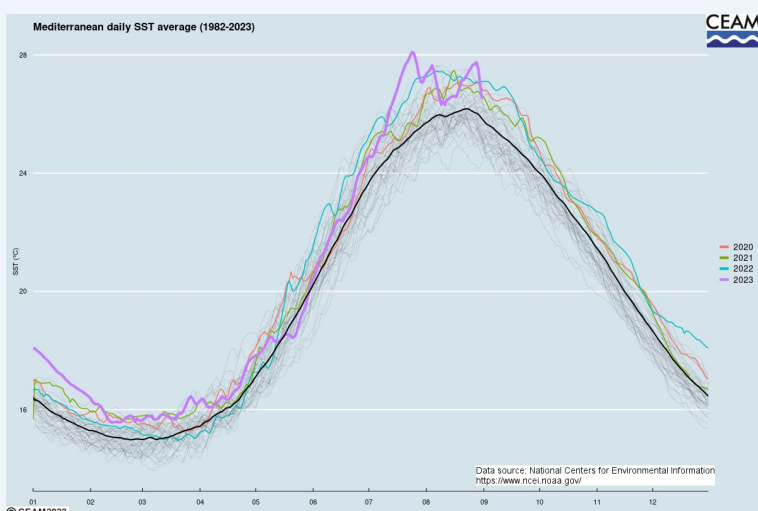


Figure 2. Yearly time series for mean Mediterranean SST

Figure 2 shows the annual series of daily mean SST (black line for the mean 1982-2023). The raw SST anomaly values were 0.8°C in June, 1.9°C in July and 1.3°C in August. For the unseasonalised SST the values ranged between 0.7°C and 0.8°C during the summer.

Trend summary (1982-2023)	
Global trend	1.51°C
Global daily trend	$9.0 \cdot 10^{-5} \text{°C/day}$
Monthly anomalies	June 0.8°C
	July 0.8°C
	August 0.7°C

Global trends and monthly anomalies for deseasonalized SST

Mediterranean SST report - Summer 2023

Global SST anomalies

Throughout the summer, the mean SST in the Mediterranean remained clearly above the climatic values, especially in July, which was the warmest month in the historical series since 1982. During the month of June the monthly anomaly remained slightly above the climatic values with a value of 0.6°C while July and August clearly exceeded 1°C. The trend towards higher positive SST anomalies since 1982 was maintained and slightly reinforced, with values almost always positive since 2000.

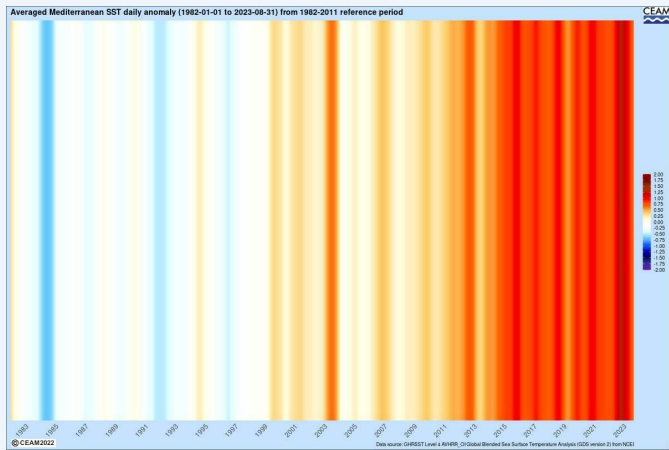


Figure 3. Mean SST daily anomaly

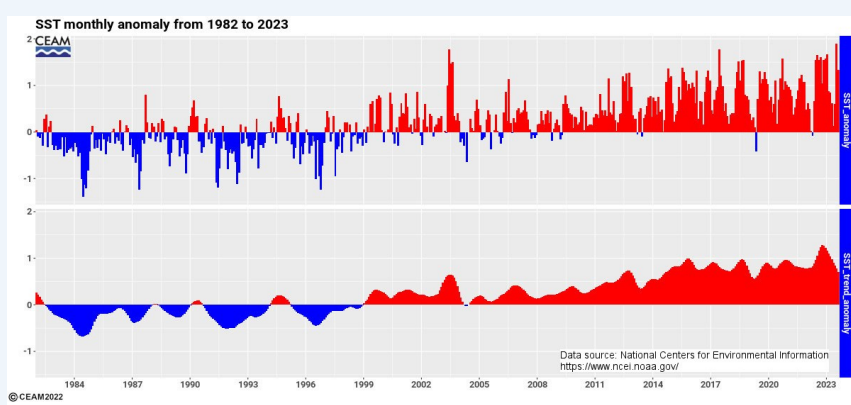


Figure 4. Mean SST monthly anomaly since 1982

SST monthly analysis June 2023

During the month of June, the spatial patterns typical of summer SST were already detected, with the most notable values in the Balearic and Tyrrhenian Seas and the area between Turkey, Cyprus and Egypt. During this month the temperature remained at normal values in the centre and east of the Mediterranean basin, even with negative values in the Aegean Sea. In contrast, in the western Mediterranean basin, a positive anomaly with very high values was recorded in the area between Sardinia-Corsica, the Balearic Islands and southern France, with values above 3°C in the Gulf of Lions. The monthly mean SST anomaly in June was the twelfth in the historical series (1982-2023) for this month, but in the case of seasonally adjusted SST it was the fourth highest in history.

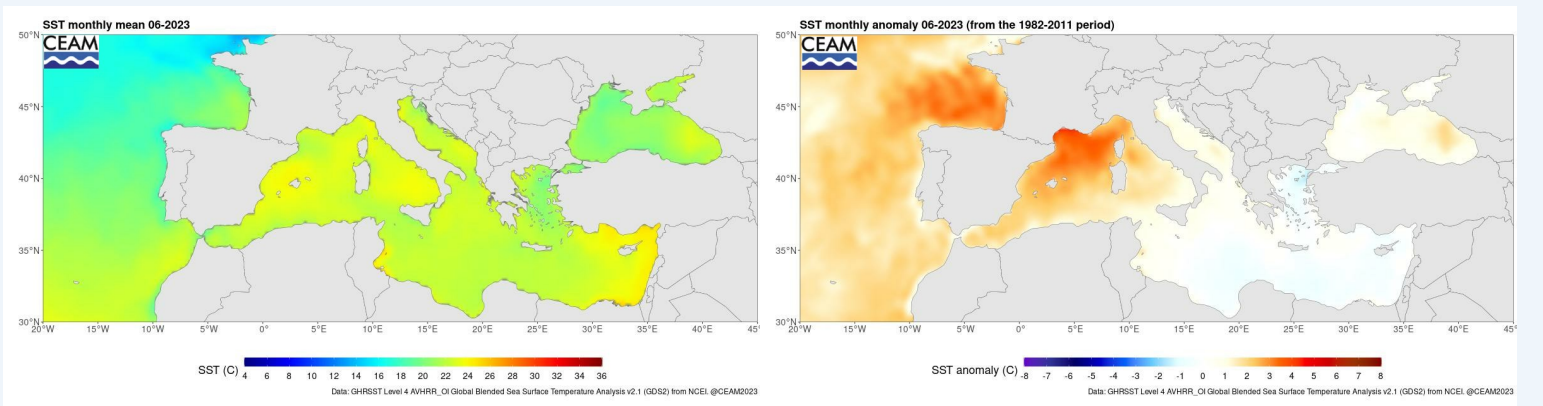


Figure 5. Mean monthly SST (left) and mean monthly SST anomaly (right) on June 2023

June SST	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
SST anomaly	-0.1	0.5	0.5	0.7	1.8	1.5	0.7	0.2	0.7	1.5	0.6
SST trend comp. anom.	0.3	0.6	0.8	0.8	0.8	0.9	0.6	0.8	0.8	1.0	0.8

Minimum values in blue/maximum values in red

Mediterranean SST report - Summer 2023

SST monthly analysis July 2023

High SST values were recorded throughout the Mediterranean basin during the month of July, exceeding 24°C in practically the entire Mediterranean. Only in areas such as the Gulf of Lions and part of the Alboran Sea did it remain below 22°C on average. SST anomalies were positive throughout the basin, but particularly in the western half. In this case, the highest values were recorded in the Alboran Sea, southeast of the Iberian Peninsula and the coast of Morocco and Algeria. The monthly mean SST anomaly was the highest recorded since 1982, while the seasonally adjusted SST anomaly was the seventh highest.

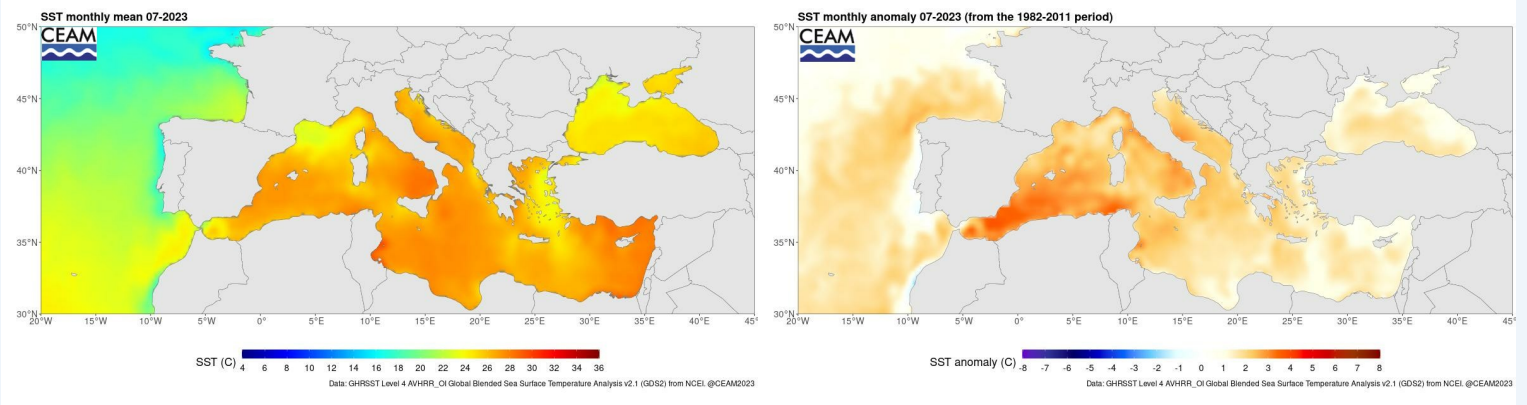


Figure 6. Mean monthly SST (left) and mean monthly SST anomaly (right) on July 2023

July SST	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
SST anomaly	0.3	0.0	1.4	0.6	1.2	1.1	1.3	0.7	0.9	1.7	1.9
SST trend comp. anom.	0.4	0.6	0.9	0.8	0.8	1.0	0.7	0.8	0.8	1.1	0.8

Minimum values in blue/maximum values in red

SST monthly analysis August 2023

During the month of August, the situation remained very similar to that of July. Average values exceeded 24°C throughout the Mediterranean basin, with the exception of the Gulf of Lions, and were generally above typical August values. The most prominent SST anomaly remained in the western Mediterranean basin and in the Aegean Sea, to a lesser extent in the rest of the Levantine basin. In the central Mediterranean the anomaly was still positive but weak. Thus, the monthly mean SST anomaly values ranked fourth in the historical series, while in the seasonally adjusted SST they ranked tenth.

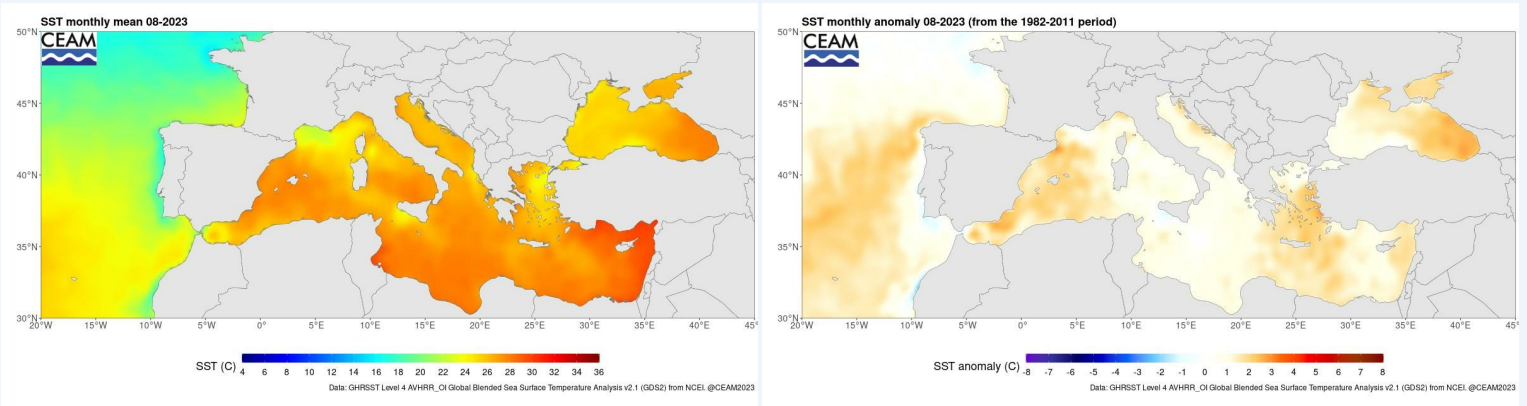


Figure 7. Mean monthly SST (left) and mean monthly SST anomaly (right) on August 2023

August SST	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
SST anomaly	0.4	0.3	1.3	0.2	1.0	1.5	1.0	1.2	1.2	1.5	1.3
SST trend comp. anom.	0.4	0.7	0.9	0.8	0.8	1.0	0.8	0.9	0.8	1.2	0.7

Minimum values in blue/maximum values in red

Mediterranean SST report - Summer 2023

Mean Mediterranean SST temporal trend heatmaps

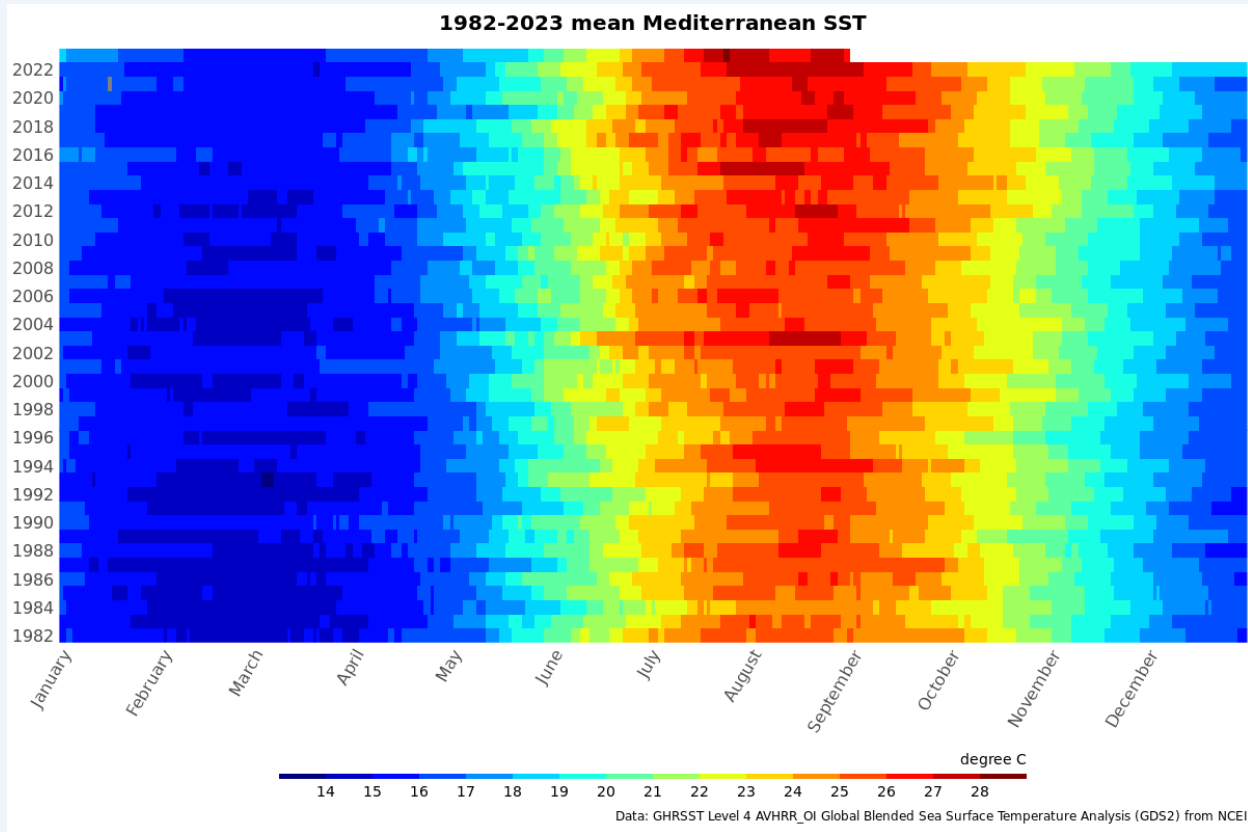


Figure 8. Yearly heatmap for daily mean SST in the Mediterranean (1982-2023)

Figure 8 shows the mean Mediterranean SST evolution in the 1982-2023 period and figure 9 shows its anomaly, with reference period 1982-2011. It can be seen how warm values have been progressively broadening their annual time range, especially warmer SST in summer season.

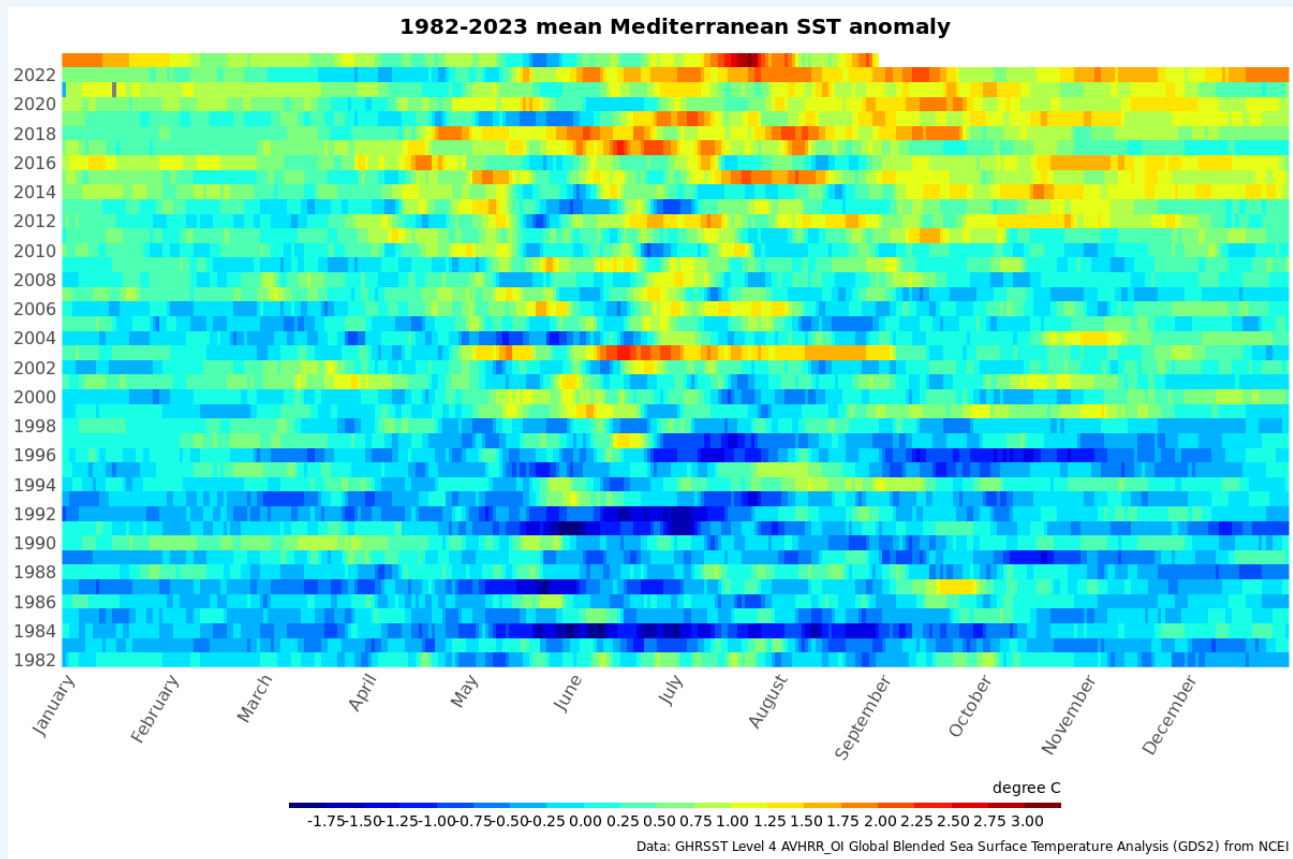


Figure 9. Yearly heatmap for daily mean SST anomaly in the Mediterranean (1982-2023)



Mediterranean SST report is an initiative of the Mediterranean Center for Environmental Studies (CEAM) Meteorology and Climatology area, funded by the Generalitat Valenciana.

More information about Mediterranean sea surface temperature (daily updates) at our SST CEAMed web portal www.ceam.es/SST

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Data source: National Centers for Environmental Information. 2021. Daily L4 Optimally Interpolated SST (OISST) In situ and AVHRR Analysis. Ver. 2.1. PO.DAAC, CA, USA. Dataset accessed 2021-06-05 <https://doi.org/10.5067/GHAAO-4BC21>.

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