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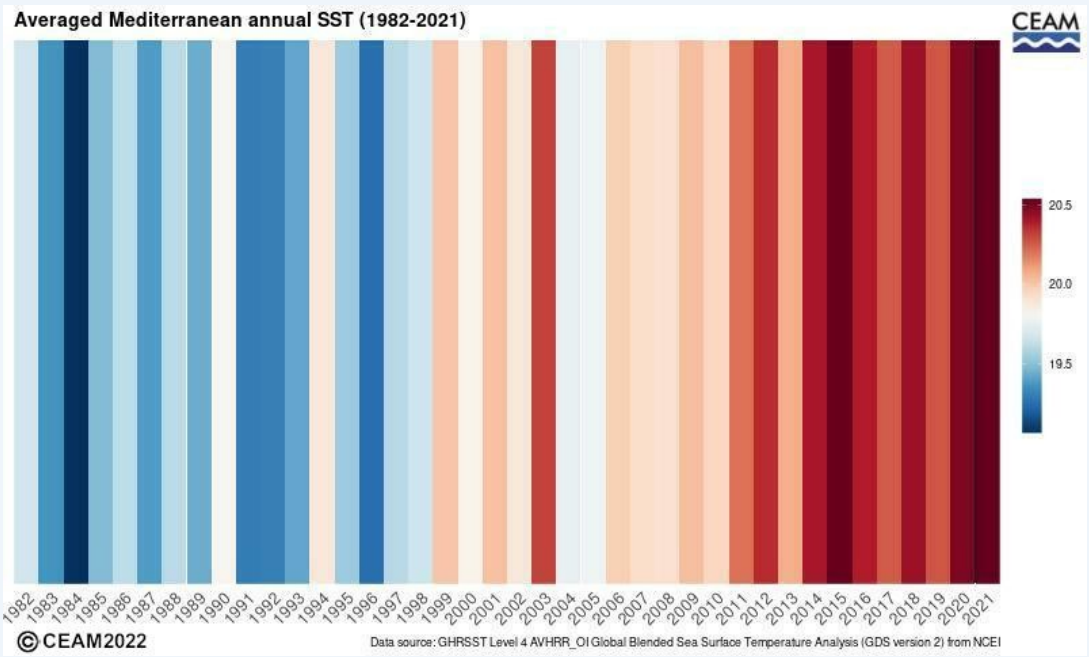
Mediterranean SST report

Spring 2022

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) Meteorology and Pollutant Dynamics department 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.



This newsletter is partially funded by the research project the IMAGINA-PROMETEO (PROMETEU/2019/110) financed by the Generalitat Valenciana. 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 GHRSST Level 4 AVHRR_OI Global Blended Sea Surface Temperature Analysis (GDS version 2) from NOAA National Centers for Environmental Information available at PO-DAAC 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.*

CEAM
FUNDACIÓN CENTRO DE ESTUDIOS AMBIENTALES DEL MEDITERRÁNEO

Mediterranean SST report - Spring 2022

SUMMARY

Spring season has shown mean sea surface temperature (SST) in the Mediterranean below the climatic values in March and April. At the start of May it reached climate normals while during the second half of the month peaked up to high values.

Although the long-term trend for seasonally adjusted SST continues to be positive, the relatively cold values in spring slightly lowered the cumulative warming over the study period was 1.15˚C, averaged over the entire Mediterranean basin.

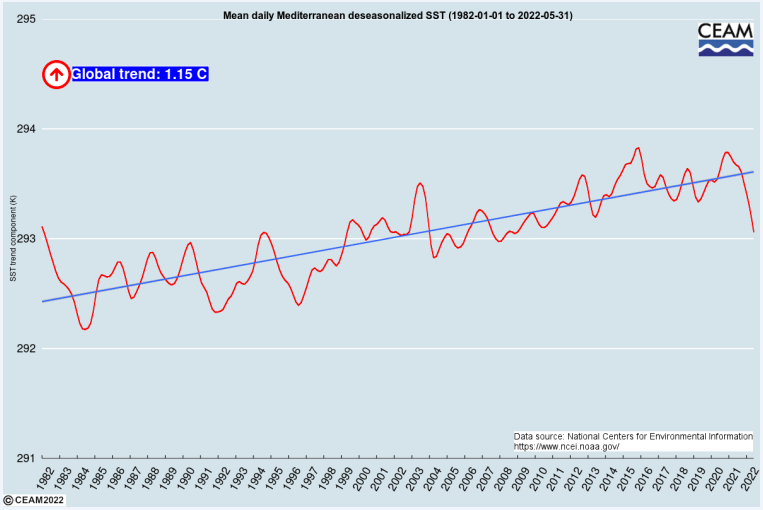


Figure 1. Time evolution for deseasonalized mean Mediterranean SST

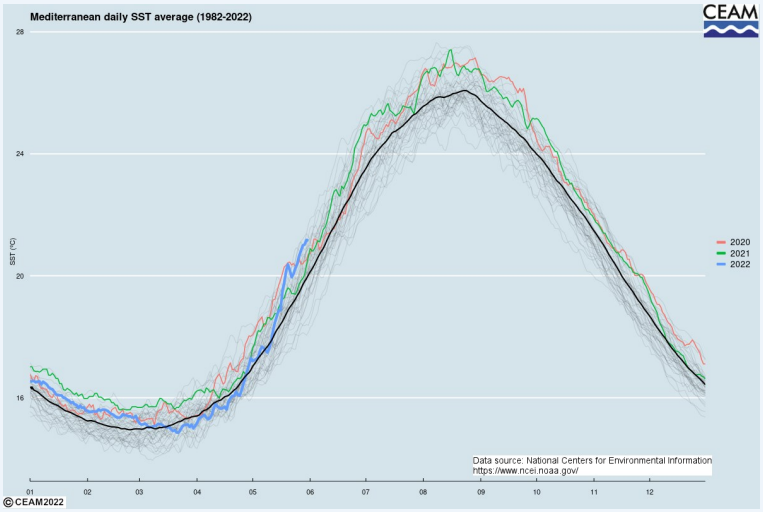


Figure 2. Yearly time series for mean Mediterranean SST

Spring season showed relatively low mean SST values through most of it. This slightly weakened the mean SST long-term trend, which still remained positive with a cumulative increase of 1.15°C for the analysis period (January 1982—May 2022). The positive trend was also found for the raw SST data, not seasonally adjusted, also exhibits a positive value for the same study period.

Figure 2 shows the annual series of the daily averaged SST (black line for the 1982-2022 average). March and April mean SST were very close to climatic values, but with positive anomaly for deseasonalized SST (0.4 and 0.3°C respectively). May mean SST ended with a 0.7°C anomaly (0.2 °C for the deseasonalized SST) for raw mean SST as it began to rise sharply during the second half of the month.

Trend summary (1982-2022)	
Global trend	1.15˚C
Global daily trend	$8.7 \cdot 10^{-5}$ ˚C/day
Monthly anomalies	March 0.4˚C
	April 0.3˚C
	May 0.2˚C

Global trends and monthly anomalies for deseasonalized SST

Data source: GHRSST Level 4 AVHRR_OI Global Blended Sea Surface Temperature Analysis (GDS version 2) from NCEI available at PODAAC site https://podaac.jpl.nasa.gov/dataset/AVHRR_OI-NCEI-L4-GLOB-v2.1

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Global SST anomalies

Although neutral values for mean SST anomalies were recorded in March and April, May presented positive values. In the case of desesasonalized SST the anomalies in the spring season were positive for the three cases. Both, daily (figure 3) and monthly anomalies (figure 4) present a clear trend towards higher positive anomalies for the period 1982-2022. Negative SST anomalies have been very rare in the XXI century for the full data while they are not observed in the seasonally adjusted SST.

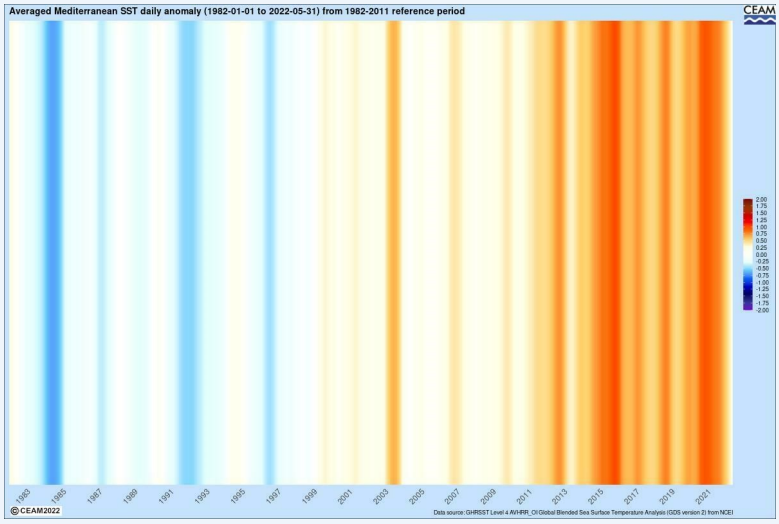

Figure 3. Mean SST daily anomaly

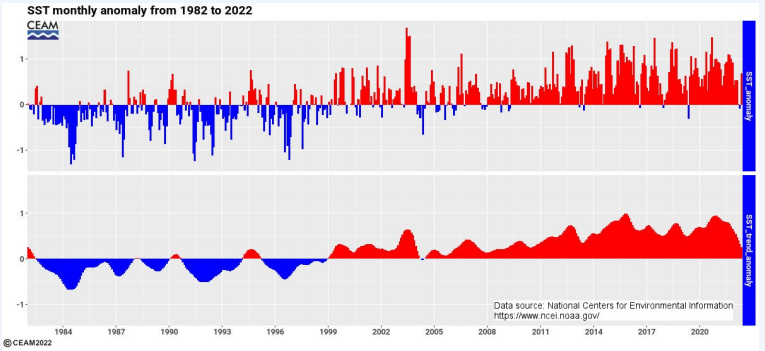

Figure 4. Mean SST monthly anomaly since 1982

SST monthly analysis March 2022

March spatial SST distribution retains typical winter characteristics with a North to South increasing gradient and higher values to the East of the Mediterranean basin. Highest SST values were found in the Levantine basin from Turkey to the Egyptian coast. Colder values for SST were recorded in the Northern Adriatic.

No significant anomalies were found in March across the Mediterranean basin. Almost all anomalies recorded were below 1 degree. Only the Aegean Sea and parts of the Western Mediterranean showed noticeable positive values while the northern Adriatic showed the stronger negative ones. Mean SST anomalies are in the 24th position of the time series while deseasonalized mean SST anomaly was the twelfth value recorded since 1982.

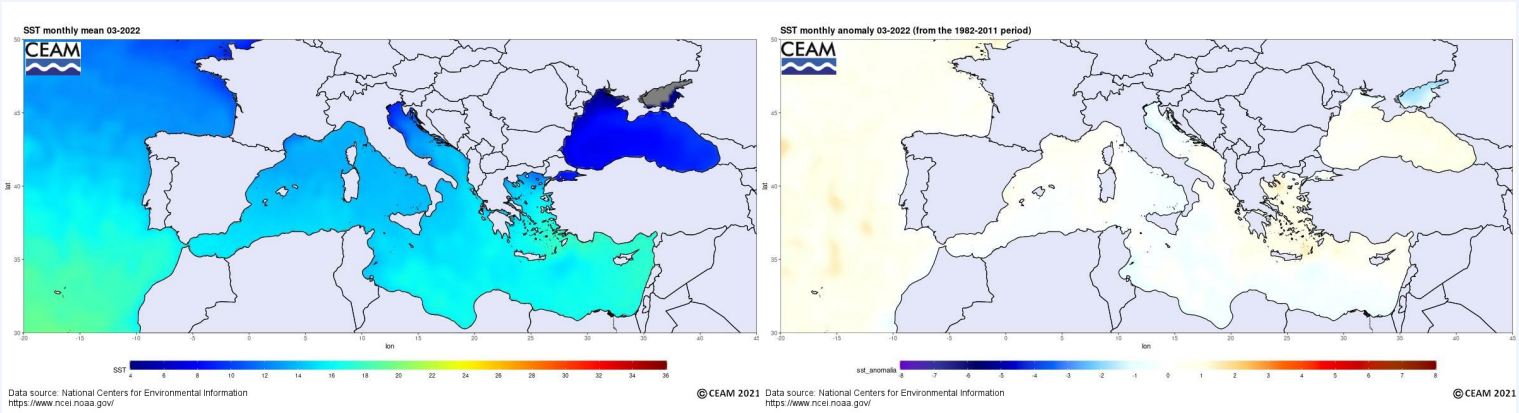

Figure 5. Mean monthly SST (left) and mean monthly SST anomaly (right) on March 2022

March SST	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
SST anomaly	0.1	-0.1	0.4	0.4	0.6	0.6	0.3	0.6	0.4	0.8	0.0
SST trend comp. anom.	0.5	0.4	0.5	0.8	0.7	0.7	0.6	0.5	0.7	0.9	0.4

Minimum values in blue/maximum values in red

Data source: GHRSST Level 4 AVHRR_OI Global Blended Sea Surface Temperature Analysis (GDS version 2) from NCEI available at PODAAC site https://podaac.jpl.nasa.gov/dataset/AVHRR_OI-NCEI-L4-GLOB-v2.1

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SST monthly analysis April 2022

Northwest to Southeast SST weak gradient was found for April, with the highest values again in the Levantine basin. The colder SST was found in the Adriatic sea, especially in its northern and western coasts. As in March, monthly anomalies were almost neutral in most of the basin. The only remarkable anomalies were the negative ones in the Adriatic. Regarding mean SST anomalies, April presented a negative values of –0.09°C, that were in the 28th position of the historical time series. Seasonally adjusted mean SST anomaly was the 13th in the study period (1982-2022) for April.

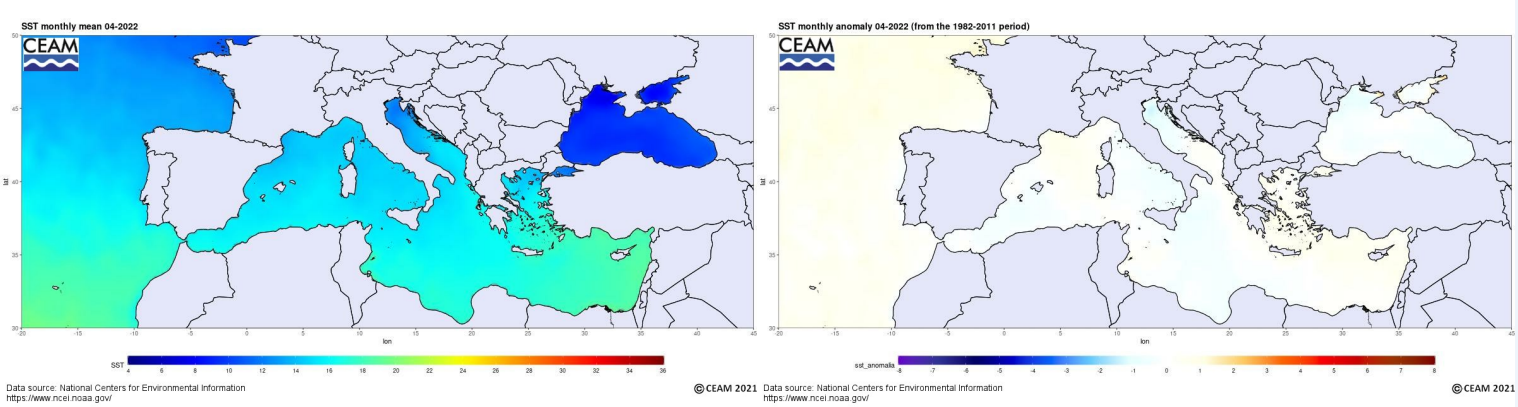

Figure 6. Mean monthly SST (left) and mean monthly SST anomaly (right) on April 2022

April SST	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
SST anomaly	0.4	0.4	0.7	0.4	**1.3**	0.8	0.7	0.3	0.6	0.4	**-0.1**
SST trend comp. anom.	0.6	0.4	0.5	**0.8**	0.7	0.7	0.6	0.5	0.7	**0.8**	**0.3**

Minimum values in blue/maximum values in red

SST monthly analysis May 2022

Monthly mean SST in May showed typical spring spatial distribution, roughly without clear gradients but with the higher values (reaching 22°C) in the easternmost Levantine basin. The coldest values were registered again in the Adriatic Sea. Monthly anomalies were weak but positive in most of the western basin. Strong cold anomalies were found in the Adriatic sea while lower but significant negative values were found in the Tyrrhenian and central Mediterranean. In the historical series, May 2022 ranks 8th, while the seasonally adjusted SST holds the 18th position since 1982.

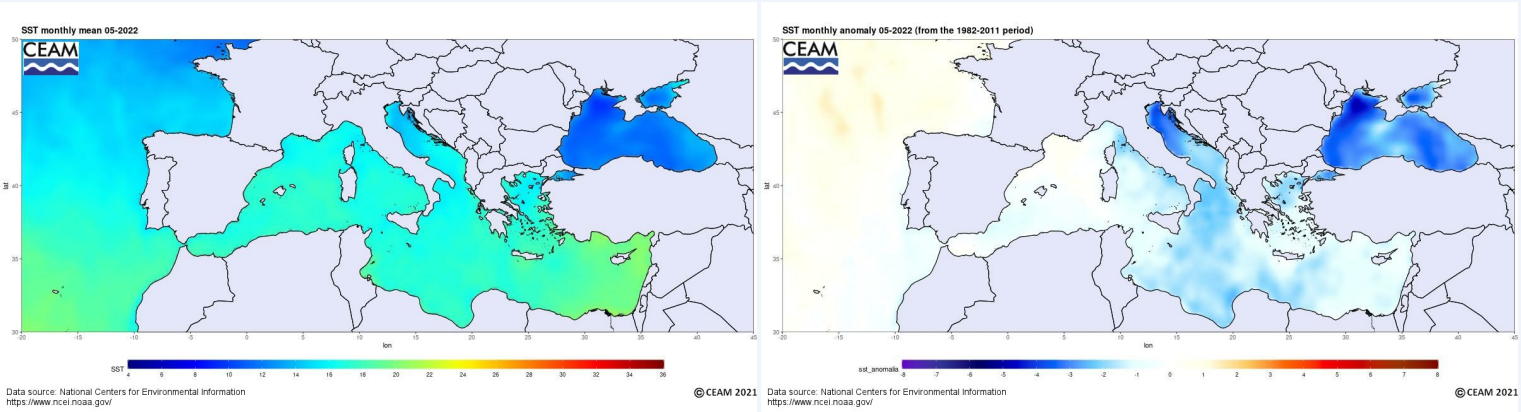

Figure 7. Mean monthly SST (left) and mean monthly SST anomaly (right) on May 2022

May SST	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
SST anomaly	0.4	0.5	0.4	1.0	0.2	0.8	**1.2**	**-0.3**	**1.2**	0.6	0.7
SST trend comp. anom.	0.6	0.3	0.6	**0.8**	0.6	0.6	0.7	0.5	0.7	**0.8**	**0.2**

Minimum values in blue/maximum values in red

Data source: GHRSST Level 4 AVHRR_OI Global Blended Sea Surface Temperature Analysis (GDS version 2) from NCEI available at PODAAC site https://podaac.jpl.nasa.gov/dataset/AVHRR_OI-NCEI-L4-GLOB-v2.1

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Mean Mediterranean SST temporal trend heatmaps

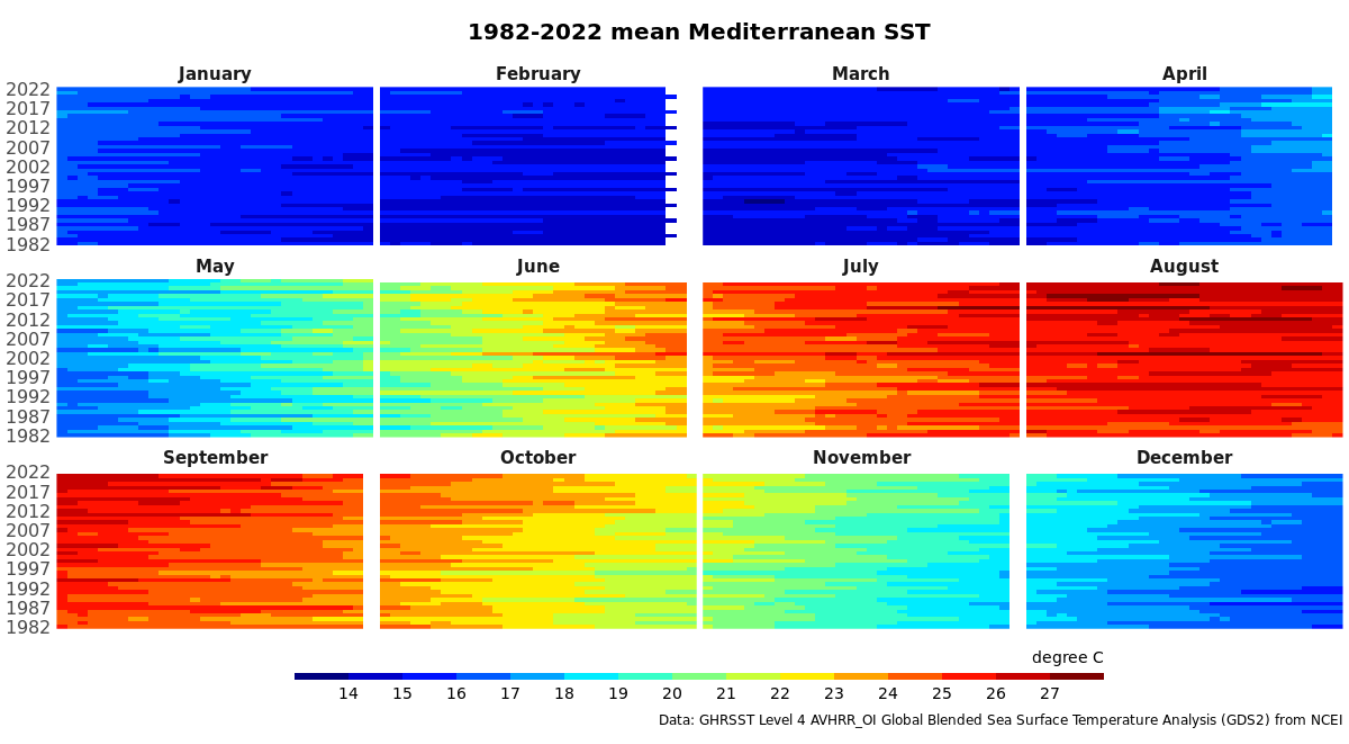

Figure 8. Monthly heatmap for daily mean SST in the Mediterranean (1982-2022)

Figures 8 and 9 show the mean Mediterreanean SST evolution in the 1982-2021 period. It can be seen how warm values have been progressively broadening their annual time range, especially warmer SST in summer season (July-September). Changes in colder months are not so significant, except in December where lower SST values have progressively delayed their onset.

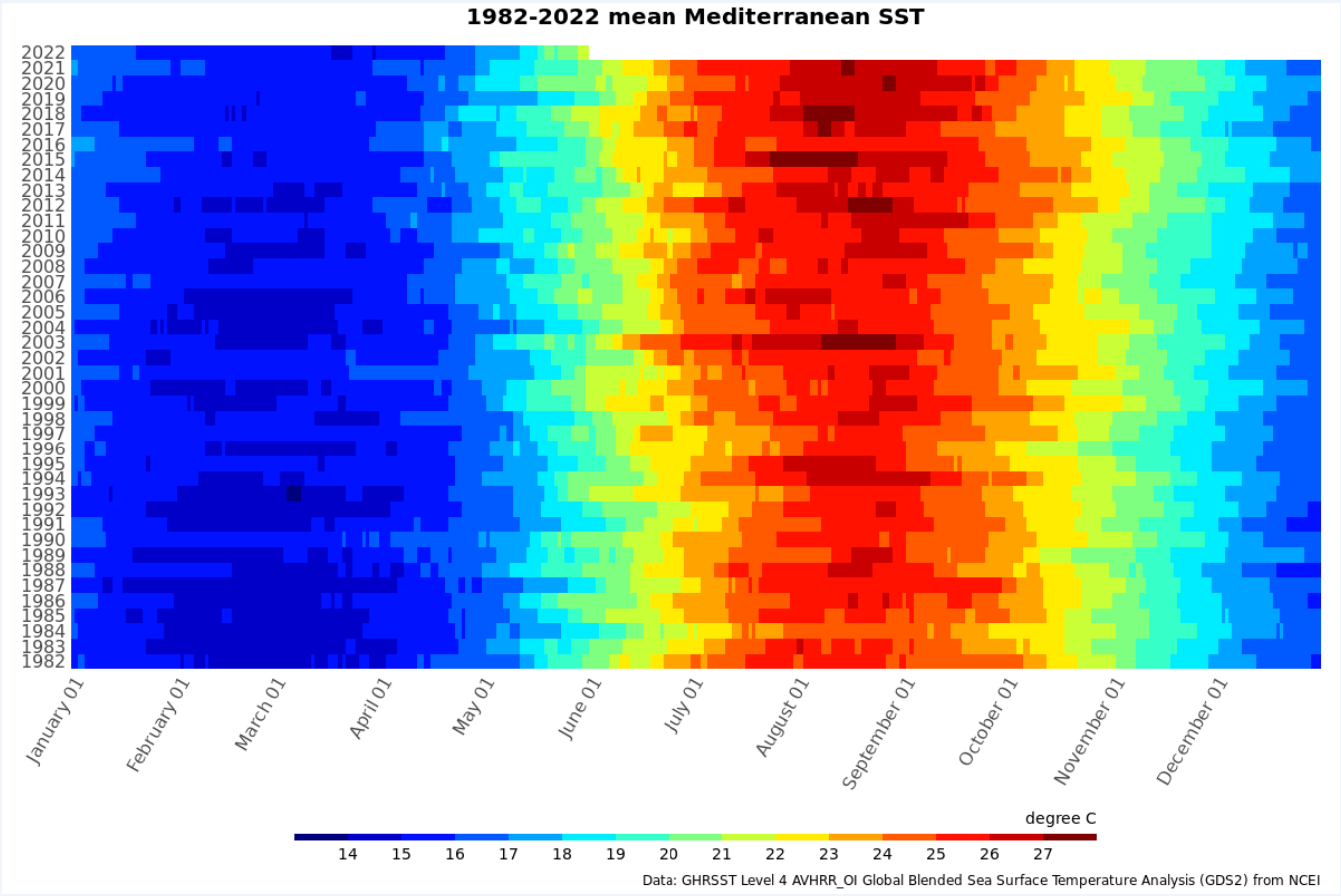

Figure 9. Yearly heatmap for daily mean SST in the Mediterranean (1982-2022)

Data source: GHRSST Level 4 AVHRR_OI Global Blended Sea Surface Temperature Analysis (GDS version 2) from NCEI available at PODAAC site https://podaac.jpl.nasa.gov/dataset/AVHRR_OI-NCEI-L4-GLOB-v2.1

Mediterranean SST report is an initiative of the Mediterranean Center for Environmental Studies (CEAM) Meteorology and Pollutant Dynamics department as part of the research project IMAGINA-PROMETEO (PROMETEU/2019/110) funded by the Generalitat Valenciana.

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

Citation: Mediterranean Sea Surface Temperature report (Spring 2022). Meteorology and Pollutant Dynamics Area. Fundación CEAM. 2022.

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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