Press release

According to the data collected by the Spanish Port Authority buoy network

The temperature in the Mediterranean exceeded 31 ºC this summer

- The Dragonera buoy (Balearic Islands) recorded a historic high for the entire Port Authority buoy network this summer.
- And while the Atlantic did not reach a record high, it did exceed the highest temperatures recorded over July and August in the Cantabrian Sea and the Canary Islands.

19-09-2022 (Spanish Port Authority). After the months of July and August, where persistently high temperatures were experienced in the seas around Spain, record values were logged by various buoys in the Port Authority's measurement networks. These records have been reviewed and have showed that the buoys of Ceuta, Cabo de Gata, Cabo de Palos, Valencia, Tarragona Exterior and Dragonera have exceeded the maximum temperatures recorded since they went into operation, with the temperature of 31.36 ºC, recorded by the Dragonera buoy in August, being the highest seen by the Port Authority networks since records began.

Although this warming episode was most pronounced in the Mediterranean Sea, where several record temperatures have been logged, it was also notable in the Cantabrian Sea and the Canary Islands. While these areas did not reach record highs, the maximum values associated with the months of July and August were exceeded at several stations.

MEDITERRANEAN SEA

As expected, this episode of persistent high water temperatures over the months of June, July and August was more pronounced in the Mediterranean, where measuring stations recorded the highest values.

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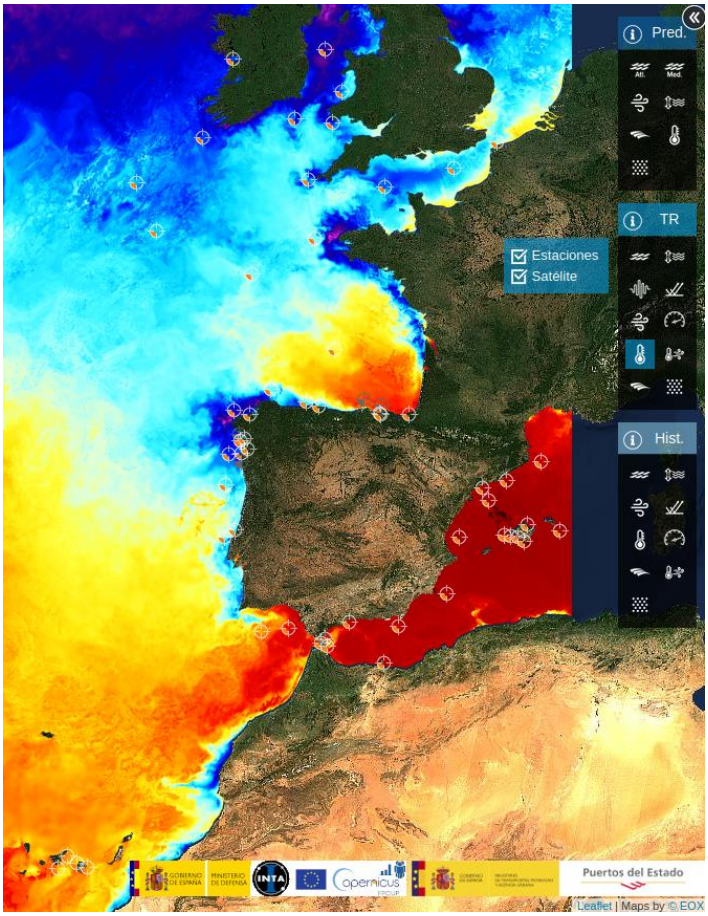

Figure 1. Image from the Port Authorities website for 10 August 2022. The map shows the daily average water surface temperature from Sentinel-3 satellite data and the position of temperature sensor buoys. Satellite water temperature information is a product developed by the Remote Sensing Systems Area of INTA within the framework of the Copernicus programme's STERNA.

The Dragonera buoy, which has been in operation since the summer of 2009 and already held the highest water temperature on record since 2018, when it registered 31.27 ºC, has beaten this record twice: it measured 31.34 ºC on 11 August at 15h UTC, and subsequently 31.36 ºC on 24 August at 15h UTC, which is the highest water temperature value recorded by the Port Authority's measurement networks.

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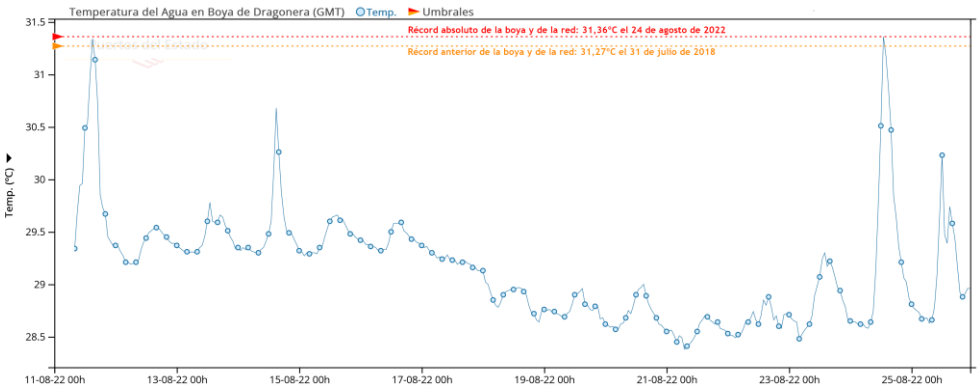

Figure 2. Graph showing water temperatures measured at the Dragonera buoy at various times between 11 and 25 August 2022. The value of the buoy's record temperature, which is also the record held by the Port Authority's networks, is highlighted with a red line. The orange line highlights the network's previous record, which was also logged by this buoy.

The high temperatures in the Mediterranean Sea have also set records at the individual series of several buoys. The Valencia buoy (operational since 2005) logged 29.94 ºC on 11 August at 18 h UTC, surpassing its previous record of 28.65 ºC, logged in August 2015. Nearby, the outer Tarragona buoy (in operation since 2004) recorded 29.77 ºC on 11 August at 18h UTC, up from its previous maximum of 29.56 ºC in August 2018. Further south, at both the Cabo de Palos and Cabo de Gata buoys, which have been recording water temperature data since 2006 and 2001 respectively, also logged record temperatures in July: 29.37 ºC on 28 July at 15 h UTC for the former, and 27.93 ºC on 25 July at 17 h UTC for the latter.

Among the buoys located closer to the coast, the Ceuta buoy, which has been recording temperature data since 2014, also recorded an all-time high on 6 August at 17 h UTC, measuring 24.6 ºC, two degrees higher than its previous record of 22.6 ºC, recorded in August 2016.

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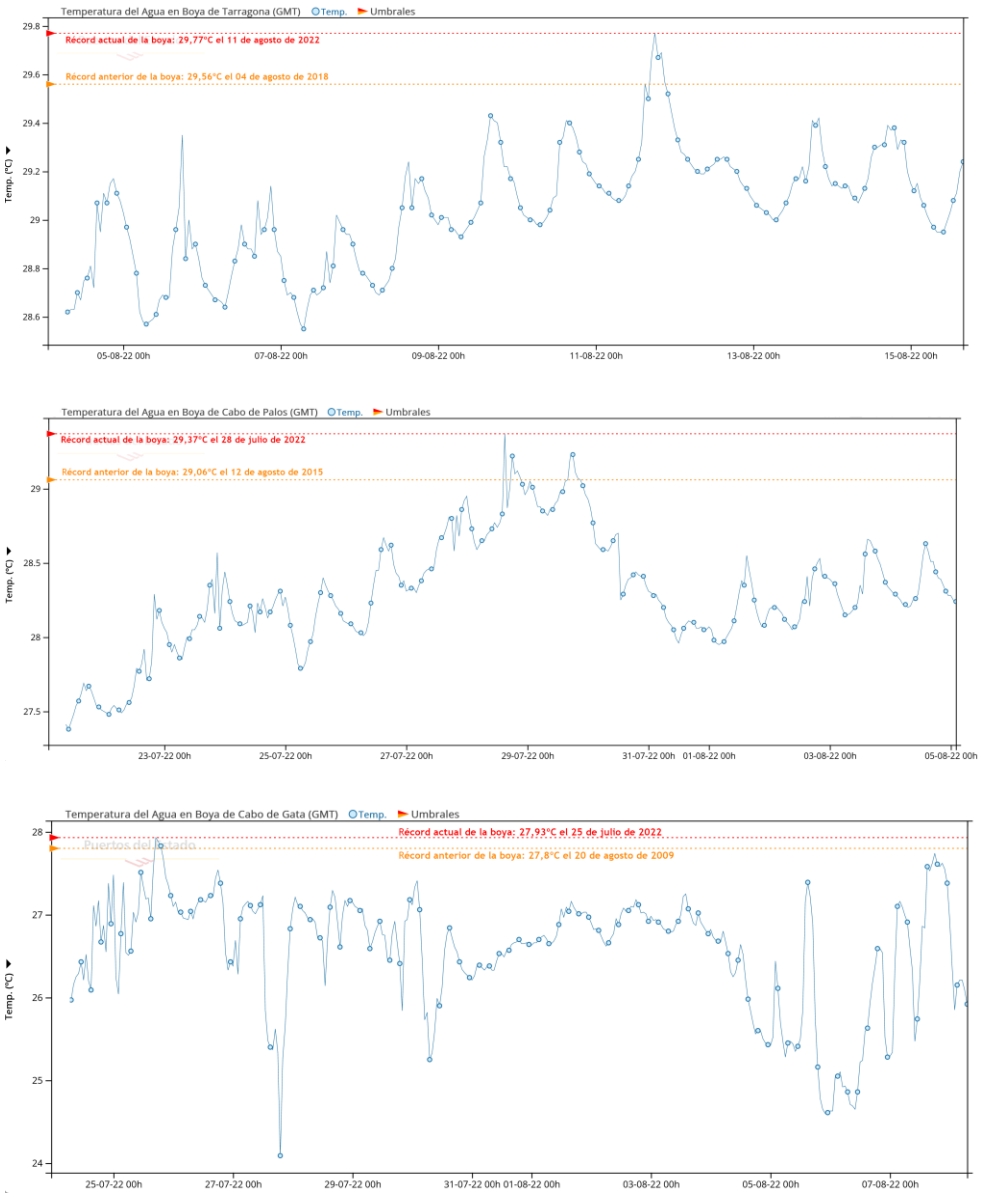

Figure 3. Graphs showing the water temperature data recorded at various times by the Tarragona (top), Cabo de Palos (middle), Cabo de Gata (bottom) buoys this summer during the days where historic records were achieved in their respective data series. The value recorded this summer is highlighted with a red line and the previous record in its series is highlighted in orange.

ATLANTIC COAST

Water temperature values were not as high on the Atlantic coast, nor have global historic records been reached at the Port Authority buoys, although historical values associated with the month of July were

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exceeded at several of them, located both in the Cantabrian Sea and around the Canary Islands.

At the Bay of Biscay, the Bilbao coastal buoy (in operation since 2004) recorded its highest temperature associated with the month of July on the 14th, measuring 25.6 ºC at 14:00 UTC. On the same day, the Bilbao-Vizcaya buoy, which has been recording data since 2006 and is anchored in open water, measured 24.68 ºC at 17 h UTC. In this case, the value reached is the highest temperature recorded by this buoy in the month of July, and also its second highest temperature on record, only surpassed by the record of 24.95 ºC measured in August 2018.

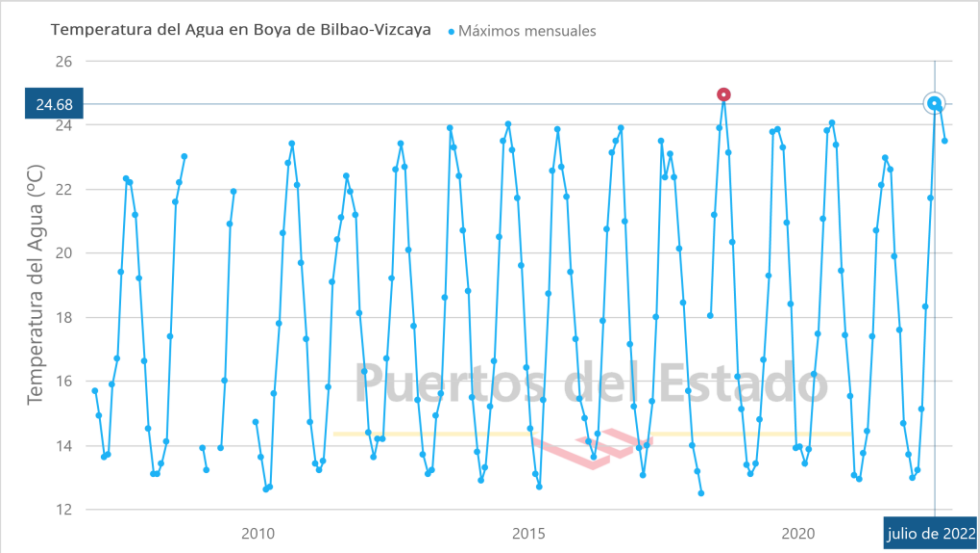

Figure 4. Time series graph showing the maximum monthly water temperatures recorded by the Bilbao-Vizcaya buoy since it started measuring in 2006. The value recorded on 14 July 2022 is highlighted in blue, and the record temperature obtained by this buoy in August 2018 (24.95ºC) is highlighted in red.

The Pasaia II coastal buoy, anchored at the beginning of 2022, has not been recording temperatures long enough for us to discuss record temperatures, but it is worth mentioning that on 18 July at 14 h UTC it logged 28 ºC.

Around the Canary Islands, three of the four buoys operated by the Port Authority exceeded their values associated with the month of July. The Tenerife South and Gran Canaria buoys, both fitted with water

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temperature sensors since 2001, measured 24.66 ºC on the 13th and 23.32 ºC on the 27th, respectively. For its part, the coastal buoy at Las Palmas East, which has been recording water temperature data since 2014, reached 23.5 ºC on 26 and 27 July. In no case have the values reached the respective historical highs, which in this area usually occur in the month of September.

SPANISH PORT AUTHORITY MEASUREMENT NETWORKS

The Port Authority has an Outer Buoy Network (or deep water buoys) with 15 measuring positions, a Coastal Buoy Network with 12 measuring positions, a network of 46 tide gauges along the Spanish coast, and a network of high-frequency radars with 9 stations. All the information is received in real time by the Port Authority, which is responsible for its management.

The Port Authority records water temperature on the Spanish coasts via the two buoy networks: the Coastal Network and the Outer Network. The Outer Network buoys are anchored far from the coastline at great depths, between 200 and 1,800 metres. They are usually large in size—up to 3 metres in diameter and 7 metres in length—and are equipped with satellite transmission. The Coastal network buoys are located near to ports, at depths of less than 100 metres, and transmit the measurements to shore via radio and GPRS.

Although the measurement rate of the buoys is one data point per hour, this does not mean that the parameters provided are being measured over the whole hour. In the case of water temperature, the measurement is instantaneous, and it is assumed that this value represents the temperature for that hour.

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