2023 Temperature Report

University of Portsmouth & GB Row

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OCEAN TEMPERATURE

"GIVEN THE GREAT IMPLICATIONS OF A WARMING OCEAN TO A COUNTRY'S ENVIRONMENTAL, SOCIAL AND ECONOMIC SUCCESS, MONITORING SEA SURFACE TEMPERATURE IS OF UTMOST IMPORTANCE TO ANTICIPATE WHERE AND HOW WARMING OCCURS", Laura Fantuzzi.

The long-term increase on sea surface temperature (SST) has already shown a global impact on ecosystems. Scientists have observed the spread of warm water species poleward, where waters have warmed enough to become habitable. A consequence of this is migrating commercial fish stocks, with impacts on local fisheries. Warming oceans also increase the rate of sea level rise, worsening coastal flooding and coastal erosion.

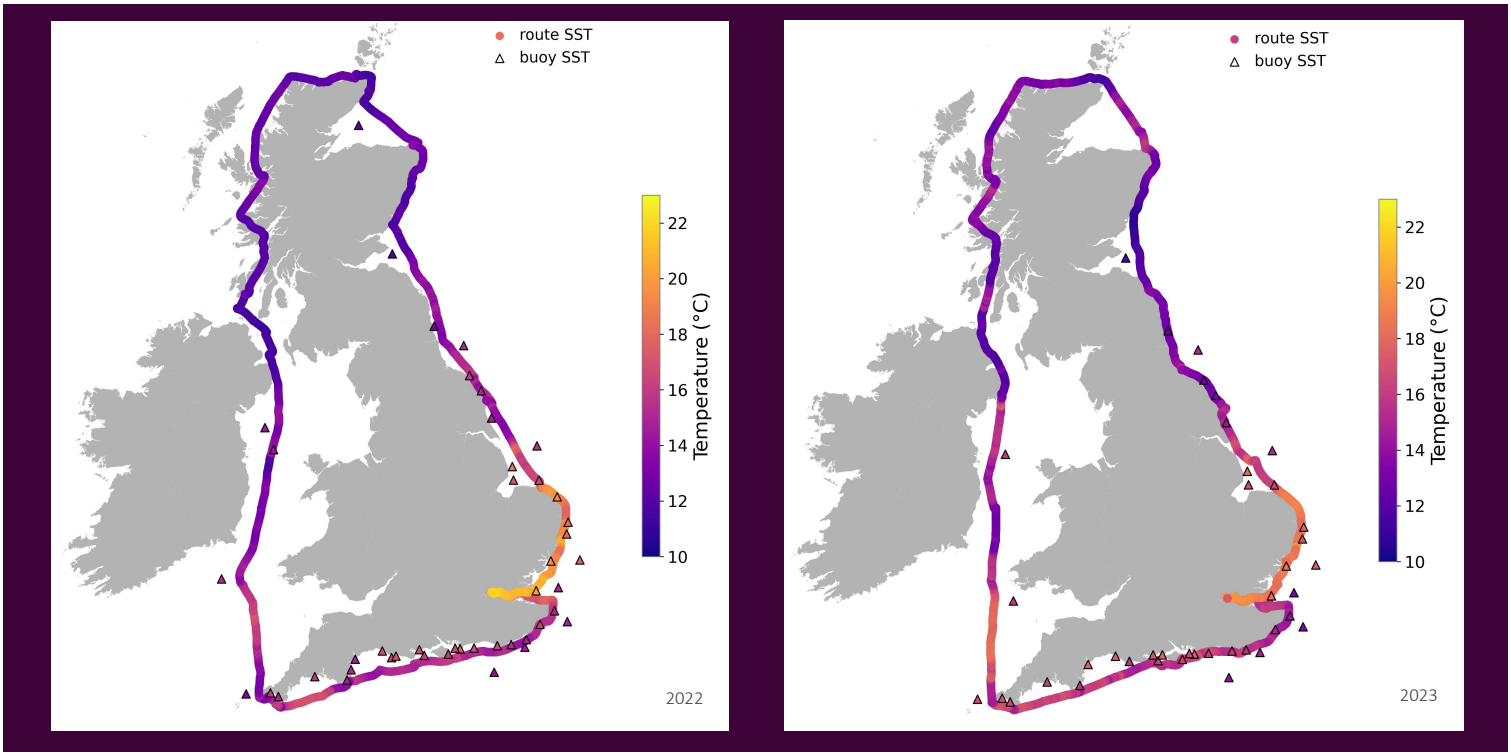
Laura Fantuzzi, University of Portsmouth PhD student working on the GB Row project

GB ROW & TEMPERATURE

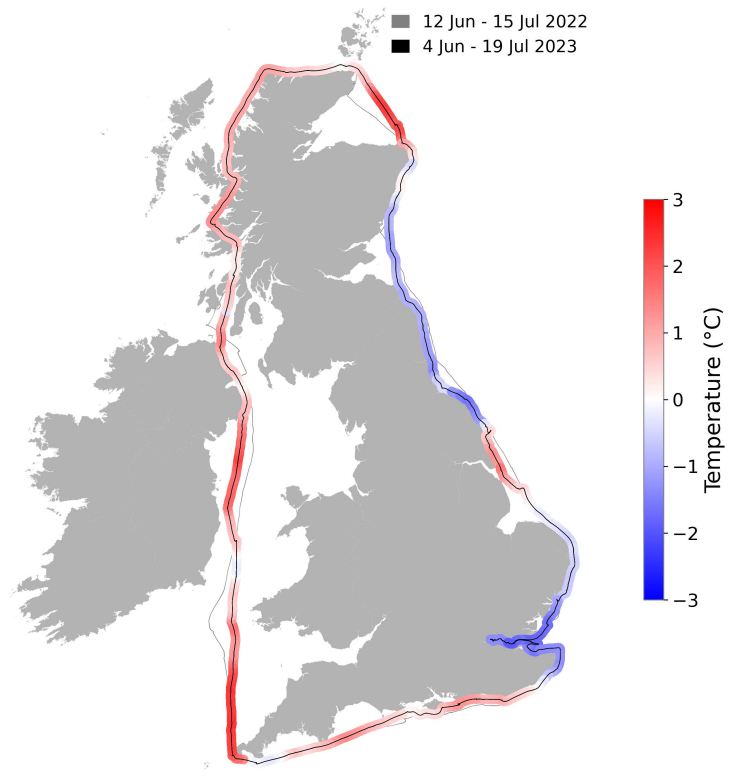
GB ROW DATA FILLS GEOGRAPHICAL GAPS IN TEMPERATURE MONITORING

In areas not covered by oceanographic buoy monitoring, GB Row temperature data is the only *in situ* collected publicly available data for UK seas. In the figure below, triangles show the location of active temperature recording buoys in 2022 and 2023. GB Row routes intersect with some of these buoys, particularly along the south coast, however, there are many locations where monitoring is lacking and GB Row data is providing much needed coverage.

Having an *in-situ* reference dataset from static monitoring oceanographic buoys allows validation of GB Row data. For both 2002 and 2023, data from buoys <40 km away from the respective route are statistically well correlated and not significantly different from the corresponding GB Row data. This validation is important in ensuring that the GB Row data is accurate when looking at areas not regularly monitored such as north and west coasts of Great Britain.



Temperature data collected by GB Row Challenge boats circumnavigating Great Britain in June/July 2022 and 2023, and temperature data from static oceanographic buoys.



Temperature differences between 2022 and 2023 GB Row Challenges. Red indicates warming and blue cooling.

Inter-annual comparisons

SUMMER UK COASTAL SEAS WERE, ON AVERAGE, 0.39ºC WARMER IN 2023 THAN IN 2022. LOCALLY THIS REACHED OVER 2ºC WARMER IN AREAS SUCH AS THE CELTIC AND IRISH SEAS, THE NORTHERN NORTH SEA AND AN AREA OFFSHORE OF THE HUMBER ESTUARY.

The magnitude of this warming is **highly significant**. A recent study calculated the decadal warming for the English Channel, finding a 0.35ºC per decade increase in sea surface temperature, based on satellite and buoy data. GB Row data shows that this level of warming was achieved in just one year when comparing summer 2022 and 2023 temperatures. Two years of data is not enough to make long term predictions, therefore continued monitoring is essential, especially as the greatest temperature rises observed were in areas with little coverage by oceanographic buoys.

Alongside this warming in most of Great Britain's coastal waters, it is important to note that a few locations experienced a decline in summer sea surface temperature from 2022 to 2023, such as in the Thames Estuary both at the start and end of the monitoring, and around Kent in early June. The latter area had the most intense cooling, with surface waters in 2023 up to 1.9ºC cooler than in 2022.

What does this mean?

These localised temperature changes alongside generalised warming, are likely to impact ecosystems in the long term. The GB Row Challenge data collection project includes collection of eDNA samples, which will allow us to analyse temperature variations with biodiversity, a key factor in controlling species distribution. The eDNA report is to be released shortly.

Data collection, Partners and Supporters

HUGE CONGRATULATIONS TO TEAM ITHACA WHO COLLECTED THE 2023 TEMPERATURE DATA WHILE ALSO BREAKING THE WORLD RECORD FOR FASTEST FEMALE TEAM!

Also a sincere thank you to all our partners, sponsors and donors who allow this important work to occur and continue.

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