

Developing synergies between BGC-Argo and Earth Observation to assess the impact of ocean extremes on marine ecosystems

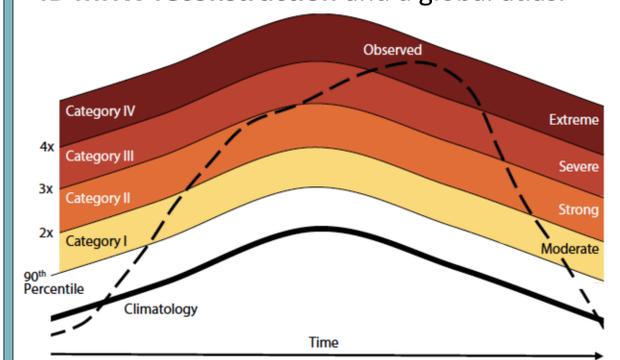
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THE CAREHEAT PROJECT

As global ocean temperatures continue to rise, Marine Heat Waves (MHW) have become more widespread, threatening marine ecosystems and their services for food-provision, livelihoods and recreation. Predicting the occurrence, intensity and duration of MHW, and **understanding MHW impacts on marine ecosystems is essential for management planning of ecosystems services**, a key step towards developing science-based solutions for sustainable development. CAREHeat will develop novel strategies to identify MHWs, assess their status and trends, and determine their effect on marine ecosystems. This will be achieved following a multidisciplinary approach capitalizing on the large potential offered by satellite Earth observations, complemented with large-scale autonomous Biogeochemical-Argo field measurements, physical and biogeochemical ocean reanalyses, biogeochemical modelling and emerging machine learning technologies. This poster will present how **Biogeochemical-Argo float and space-based observations will be used synergistically to investigate the impact of MHWs on marine ecosystems with a focus on marine biodiversity and carbon fluxes**. CAREHeat is funded by ESA under the OCEAN HEALTH –EXPRO+ actions and kicked-off on March 3rd 2022.

CAREHeat will first improve MHW detection algorithms from space-based Sea Surface Temperature (SST) measurements, and provide **4D MHW reconstruction** and a global atlas.

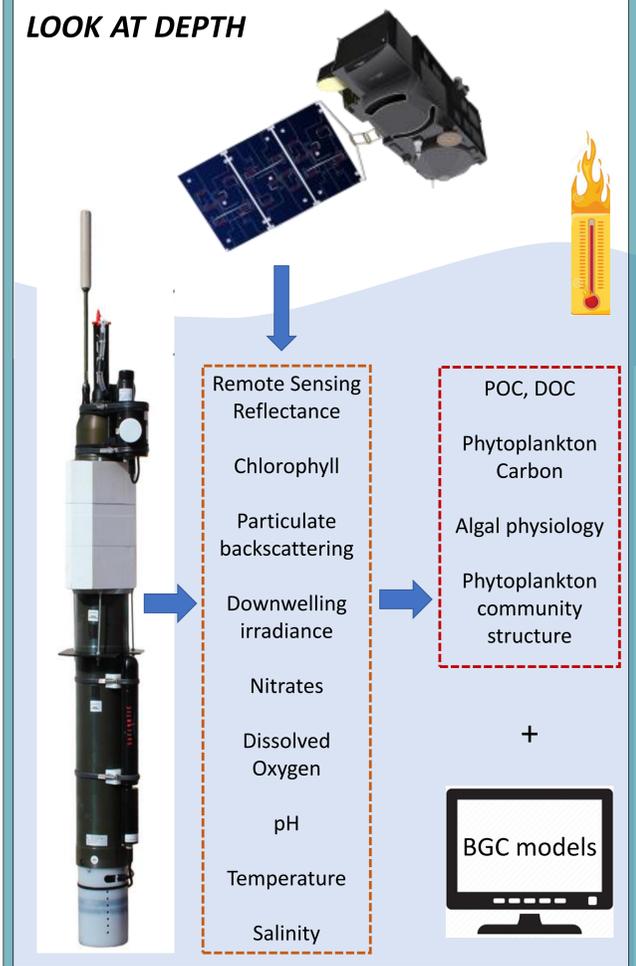


from Hobday et al. (2018)
 doi:10.5670/oceanog.2018.205

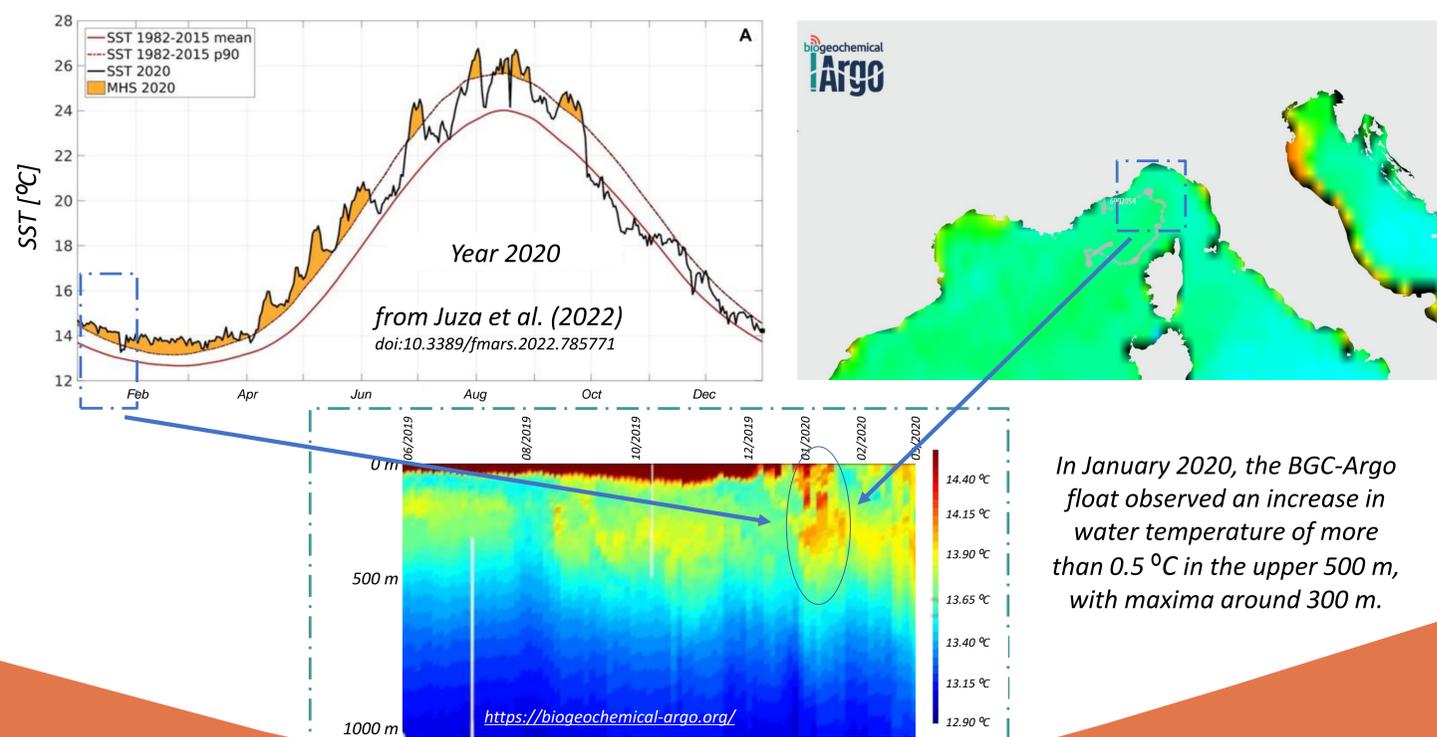
THE FOLLOWING IMPACTS OF MHWs ON MARINE ECOSYSTEMS WILL BE ANALYSED:

1. What is the effect of MHWs on phytoplankton chlorophyll concentration at the ocean surface and along the water column?
2. Are phytoplankton chlorophyll changes related to modifications in phytoplankton biomass or physiology?
3. How is the phytoplankton community structure affected by MHWs?
4. How do community structure changes impact on ocean biogeochemistry and propagate over the water column affecting nutrient profiles and oxygen levels?
5. How do changes at lowest trophic levels impact on carbon fluxes in support of higher trophic levels (micro-nekton, apex predators)?
6. Is there a biogeochemical signature in the pH and air-sea CO₂ fluxes during all MHW events, and to what degree of MHW severity is such signature becoming significant?

BGC-ARGO & OCEAN COLOUR TO ALSO LOOK AT DEPTH



AN EXAMPLE: THE MHW IDENTIFIED IN THE NW MEDITERRANEAN SEA DURING WINTER 2020



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