

# NORTH-HEAT

## High Resolution Marine Heat Waves in the southern North Sea: history, impact, causes

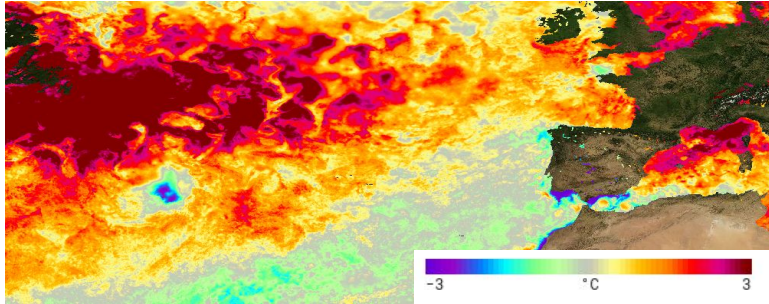
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A STEREO IV project

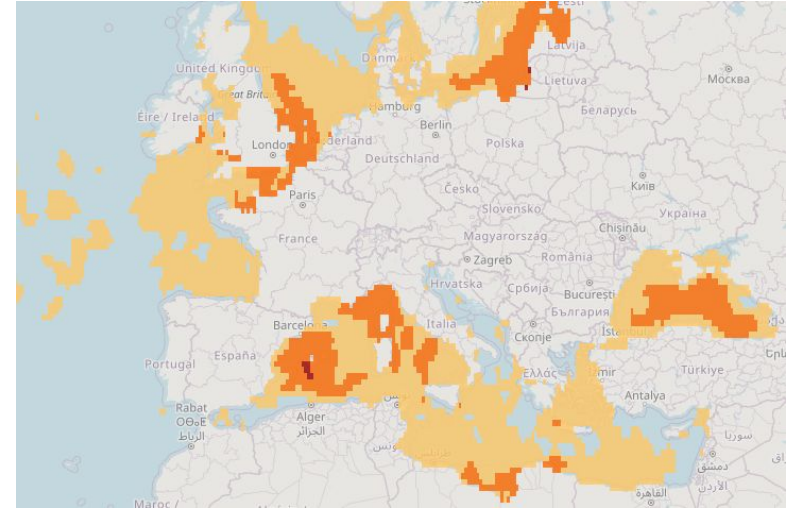


**Marine Heat Waves:** periods of anomalously warm water, caused by atmospheric and/or oceanic processes

- Observed worldwide
- Becoming more intense, long and frequent under climate change
- Large impact on ecosystems
- Can fuel extreme weather events



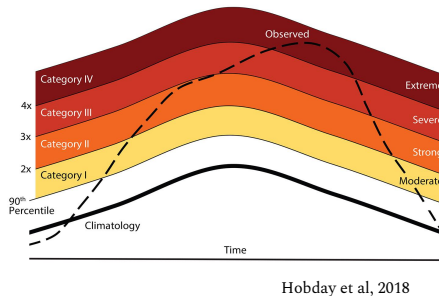
Sea surface temperature anomaly in the Atlantic Ocean and European Sea on 04-09-2022 (<https://podaac-tools.jpl.nasa.gov/soto>)



28 - 08 - 2022

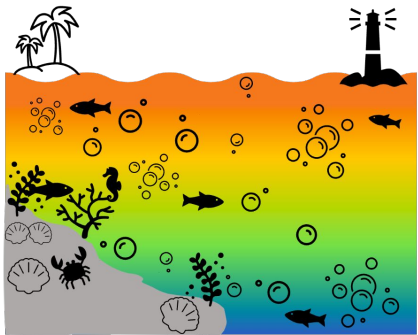
<http://www.marineheatwaves.org>

**Marine Heat Waves definition:** Water temperature warmer than the 90th percentile for at least 5 days, based on a long-term climatology baseline (Hobday et al, 2016)



Cold Spells follow a similar (opposite) definition

Before

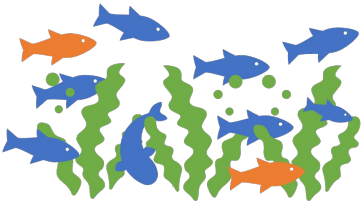


## Impacts of MHWs

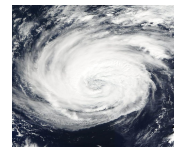
**Water quality**  
stratification, acidification, deoxygenation



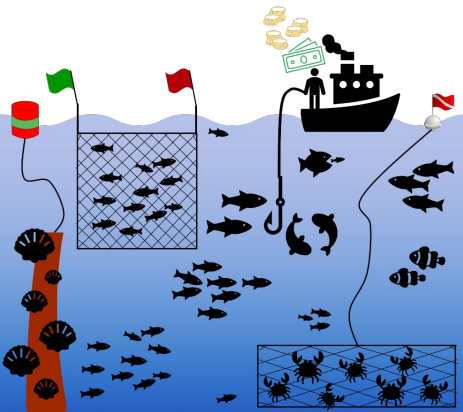
**Ecosystems**  
biodiversity and habitat loss  
exotic/invasive species  
mass mortality events



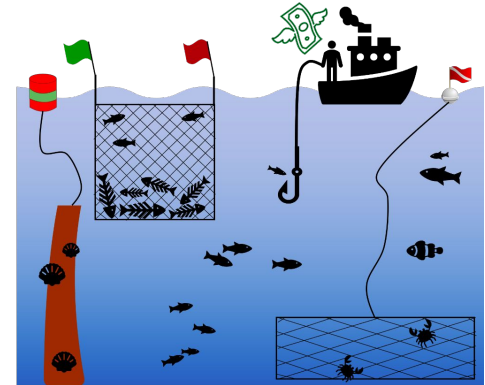
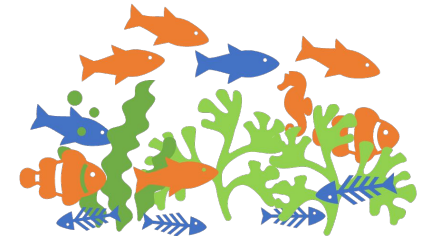
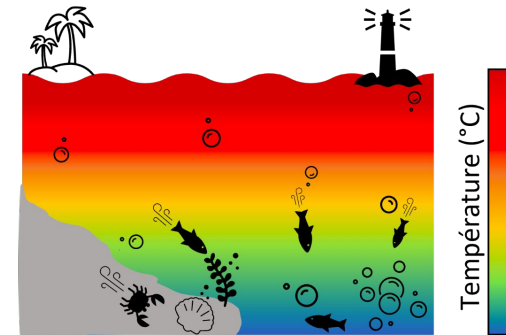
**Extreme weather**




**Economic loss**  
fisheries, aquaculture, tourism, energy

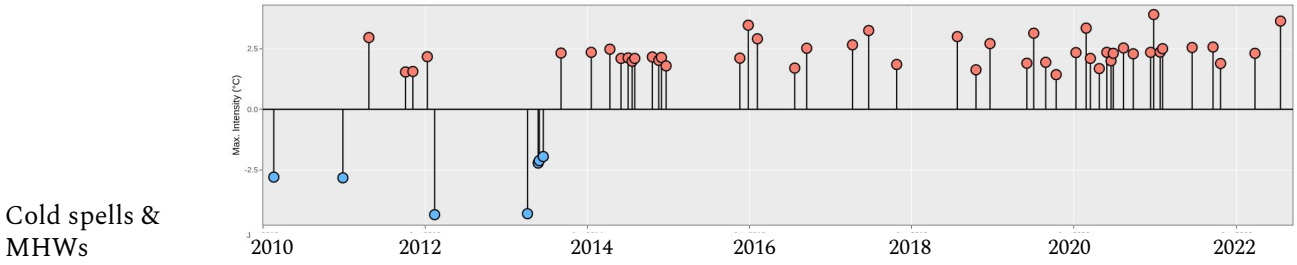



During/After

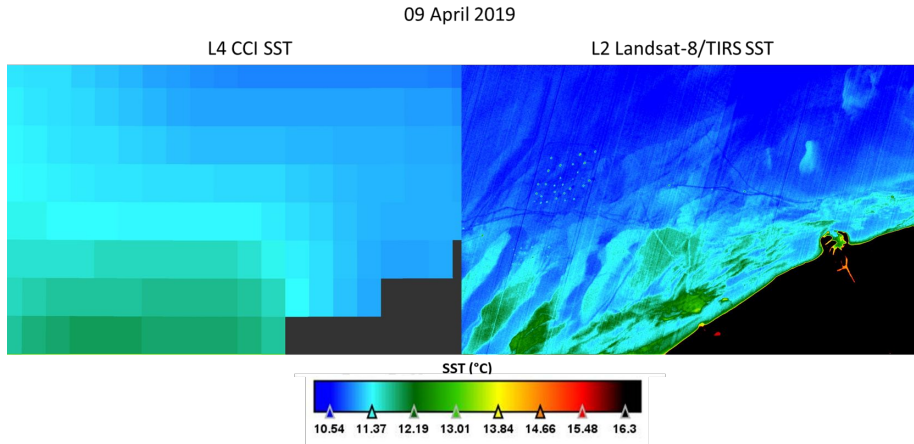
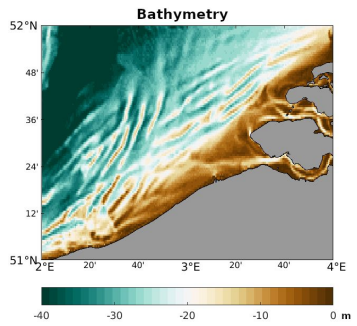


# Objectives of NORTH-HEAT


- 1. Determine the **Marine Heat Waves** and **Cold Spells** in the southern North Sea
  - 4 decades of L3 (gappy) ESA CCI sea surface temperature (5km) and L4 with DINEOF 
  - **Frequency, duration and intensity**, threshold analysis, causes of formation, distribution

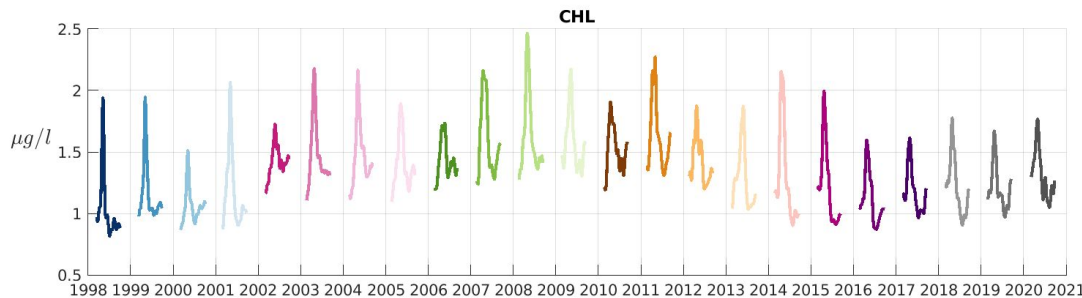


- 2. For specific events: high spatial resolution analysis
  - **Synergy analysis** (Alvera-Azcárate et al, 2021) 
  - Small-scale spatial and temporal variability
  - Potential of **high spatial resolution SST**

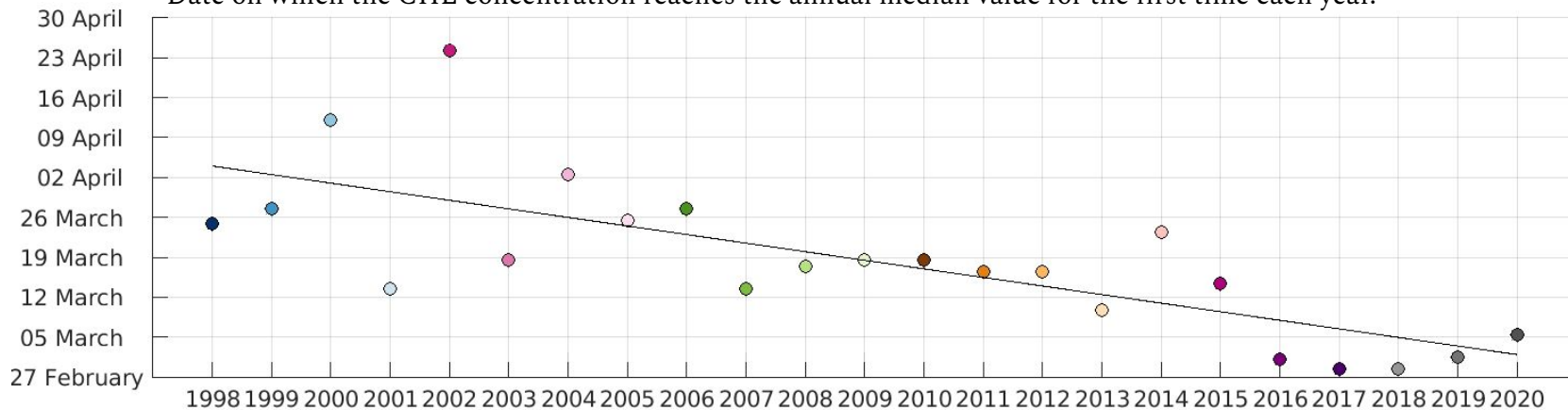


### 3. Study the **influence** of specific MHWs and Cold Spells on the different **habitats** of the southern North Sea

- High spatial resolution sea surface temperature and chlorophyll concentration 
- Impact of **specific events**
- **Long-term changes** in the ecosystem



Date on which the CHL concentration reaches the annual median value for the first time each year.



## Who does what

- Data preparation (satellite SST, CHL, in situ data)



- DINEOF interpolation, detection & characterization of marine heat waves/cold spells



- Influence of marine heat waves/cold spells on ecosystem



<https://www.gher.uliege.be/north-heat>

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