Åbo Akademi University

Impacts of marine heatwaves on the functioning of Baltic Sea coastal ecosystems under the influence of non-indigenous species

Background

Upscaling from single to **multiple drivers of global change** and from single-species responses to **community effects**

Marine heatwaves (**MHWs**) → Abiotic driver

Non-indigenous species (**NIS**) → Biotic driver

- Both drivers are **potential threats** to biodiversity, as they may **modify ecosystem structure and function**
- How **energy fluxes** are likely to change in marine food webs in response to future climate conditions remains unclear

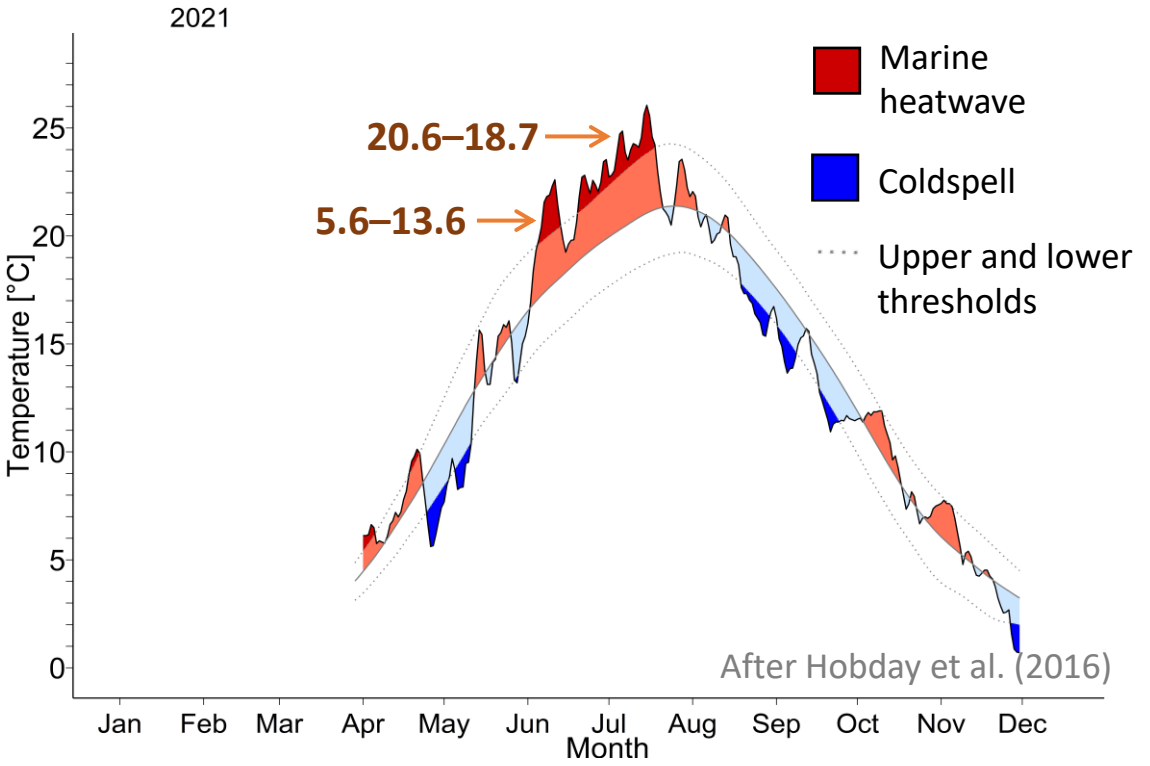


Figure 1. *MHWs (red spikes) registered in the Åland Sea in 2021. Climatology and thresholds are based on 17 years (2005–2021) of local temperature data.* *Figure: L. Kraufvelin, data provided by Husö Biological Station, ÅAU.*

Aims

1. Assess how MHWs of present and future intensities may modify trophic interactions, affect structure and alter functioning of key coastal ecosystems

2. Assess how NIS and native species differ in their sensitivities to MHWs

3. Assess how the inclusion of a NIS in a food web may alter the community response, resistance and resilience to MHWs

Materials and Methods

Mesocosm experiments

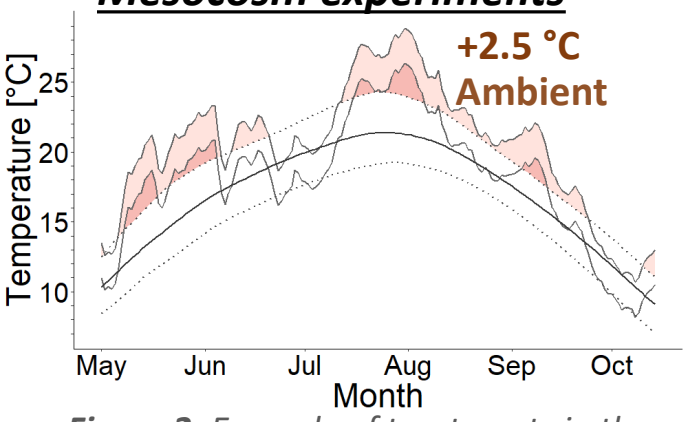
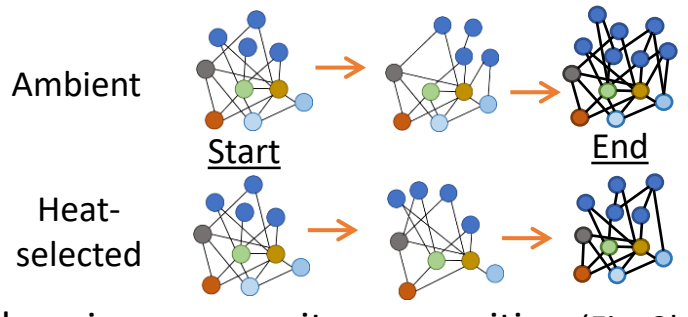


Figure 2. *Example of treatments in the mesocosms, showing ambient and simulated future conditions.* *Figure: L. Kraufvelin, data provided by Husö Biological Station, ÅAU.*

Community analysis



Changing community composition (Fig. 3b)

Food web assembly + shifts in structure

Approach

During 2022, community mesocosm experiments exposing Baltic Sea communities to future and present-day intensities of MHWs (Fig. 2) will be conducted in **Kiel** and **Korpoström** (Fig. 3a).

Figure 3. a) *The mesocosm system (20 experimental units) at Korpoström Archipelago Research Centre.* *Picture: S. Rühmkorff.*
b) *Benthos recruited to an experimental unit in 2021.* *Picture C. Pansch*

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