

Effects of ocean acidification on North Sea microzooplankton communities

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Introduction

Microzooplankton (MZP) is an important **competitor** for food and a **food source** for larger mesozooplankton at the same time. Its ability to act as **trophic upgrader** for mesozooplankton by buffering nutritional imbalances of algae might gain importance given the expected decrease in algal food quality with ocean acidification.

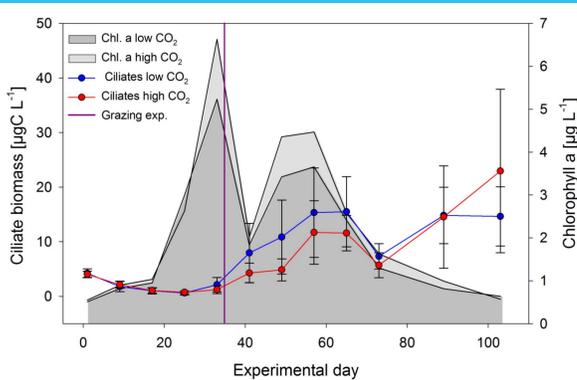
With phytoplankton growth being enhanced at high CO₂ conditions, we expect an **enhanced MZP growth** as well.

Methods

- 10 outdoor mesocosms, 55,000 L each
- 400 and 1000 ppm target CO₂, 5 replicates
- Runtime 107 days (March – June 2013)
- Weekly MZP sampling
- Determination of abundance, biomass, size classes and species or genus by microscopic counts
- 24h dilution experiments to determine the MZP grazing impact

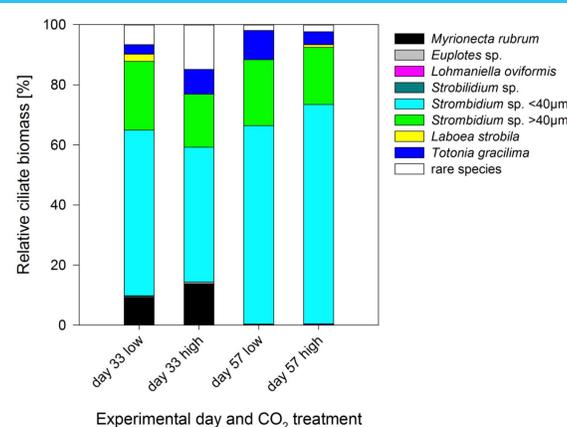


Plankton succession

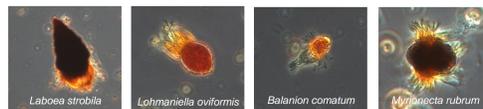


- No significant differences in MZP biomass between CO₂ treatments
- No reaction of MZP to 1st bloom
- Slight increase in MZP biomass at 2nd bloom but no response to CO₂ treatments
- Large variation between mesocosms

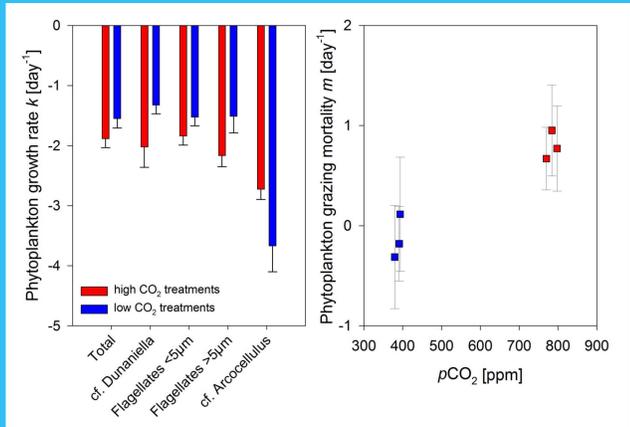
Species composition



- Community dominated by small *Strombidium* sp. during 1st and 2nd bloom (day 33 and day 57)
- Density of *Myrionecta rubrum* higher during the 1st bloom
- Species >40µm increased after 2nd bloom, especially *Laboea strobila*



Grazing experiment



- Conducted on day 35 at 1st phytoplankton bloom peak
- Phytoplankton growth rates (left) were lower for high CO₂ treatments except for *Arco-cellulus*
- Phytoplankton grazing mortality (right) indicates higher MZP grazing at high pCO₂ values

Summary

- No significant effect of elevated pCO₂ values on MZP biomass
- No response of MZP biomass to 1st phytoplankton bloom but slight increase in MZP biomass in response to 2nd bloom
- No effect of pCO₂ on MZP species composition

Conclusions

MZP densities stayed low throughout the experiment. As it was also shown by studies conducted with plankton communities from the Atlantic¹, MZP is probably more temperature dependent than sensitive to acidification.

The results of this experiment point at **complex responses** of MZP to ocean acidification in temperate oceans.