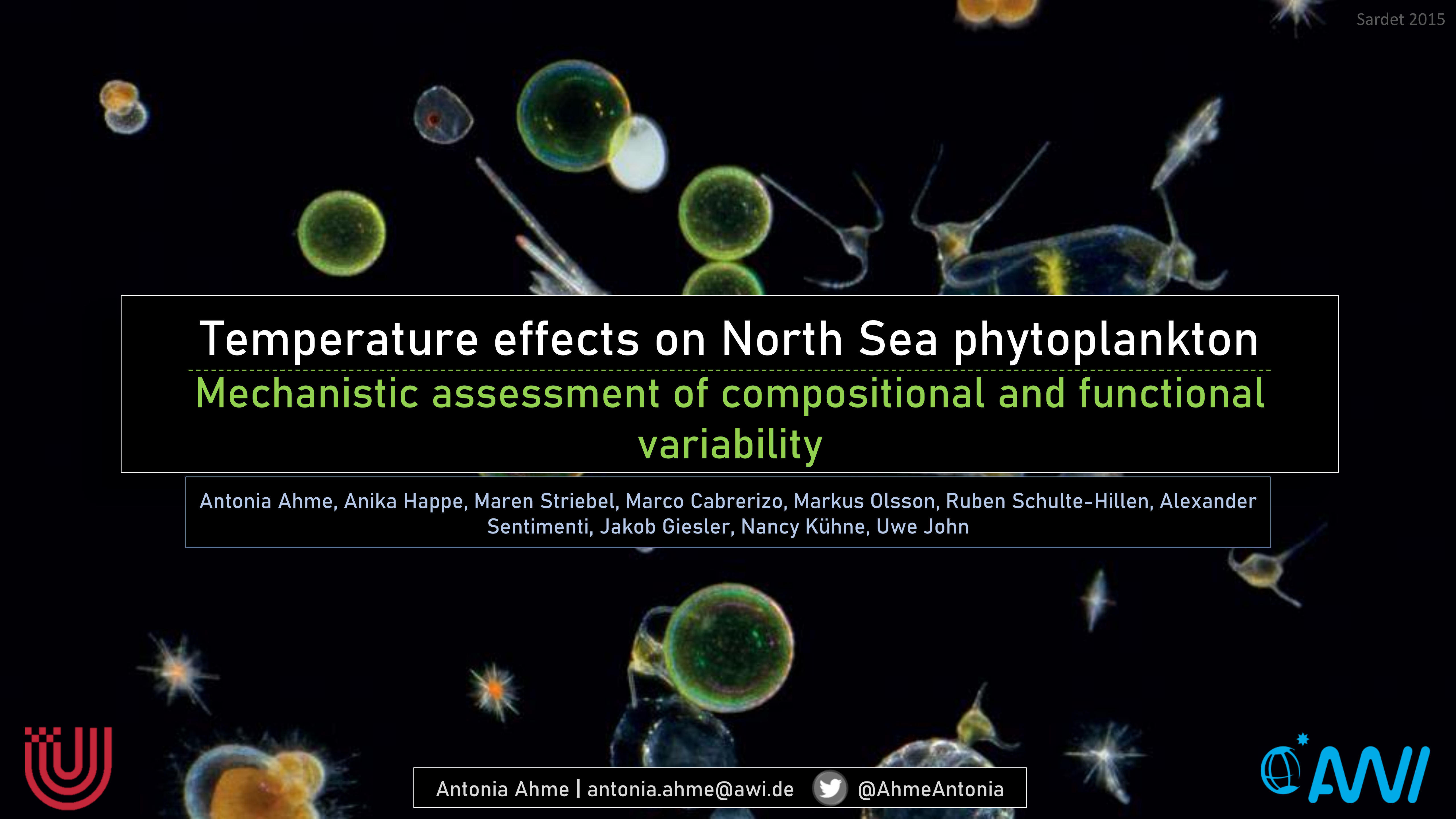

Sardet 2015

Temperature effects on North Sea phytoplankton

Mechanistic assessment of compositional and functional variability

Antonia Ahme, Anika Happe, Maren Striebel, Marco Cabrerizo, Markus Olsson, Ruben Schulte-Hillen, Alexander Sentimenti, Jakob Giesler, Nancy Kühne, Uwe John

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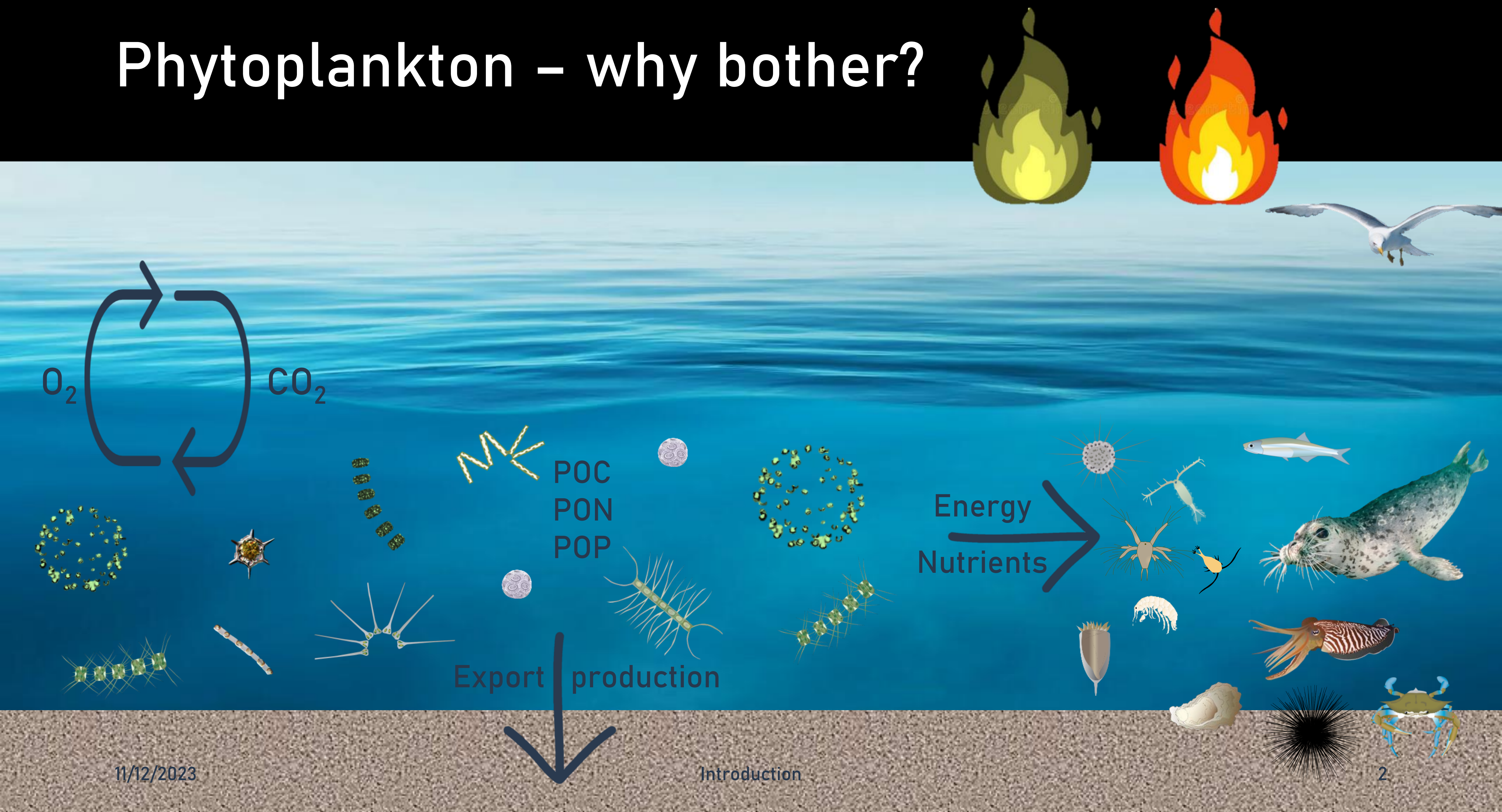
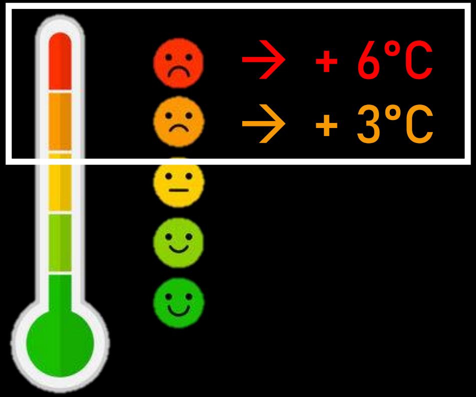
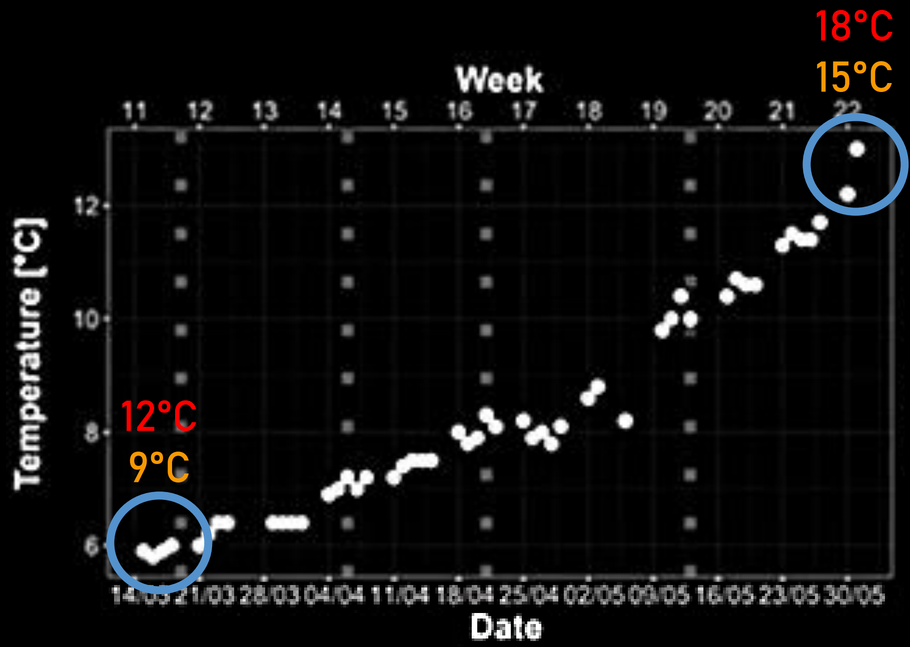
Phytoplankton – why bother?



Are we looking at the right temperatures?





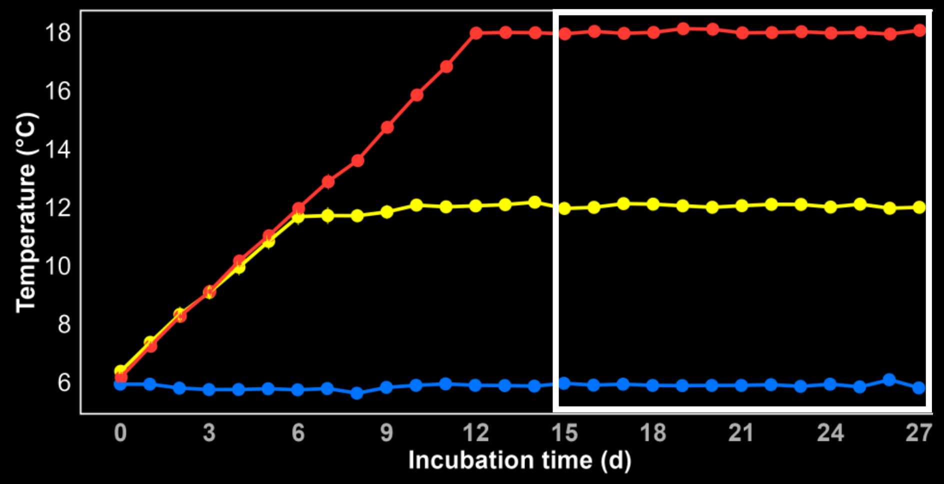
Käse et al. (2020), *Journal of Plankton Research*

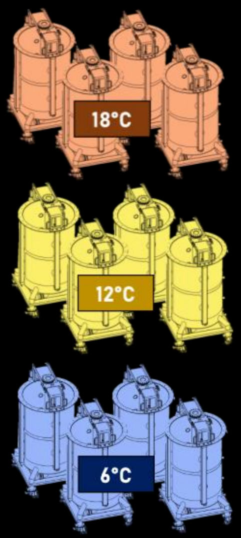
OBJECTIVE:

To experimentally determine the mechanistic effect of warming on the compositional and functional variability of a North Sea spring bloom community, spanning the maximum potential temperature range.

Experimental design

07.03.2022
North Sea





Sampling Parameters

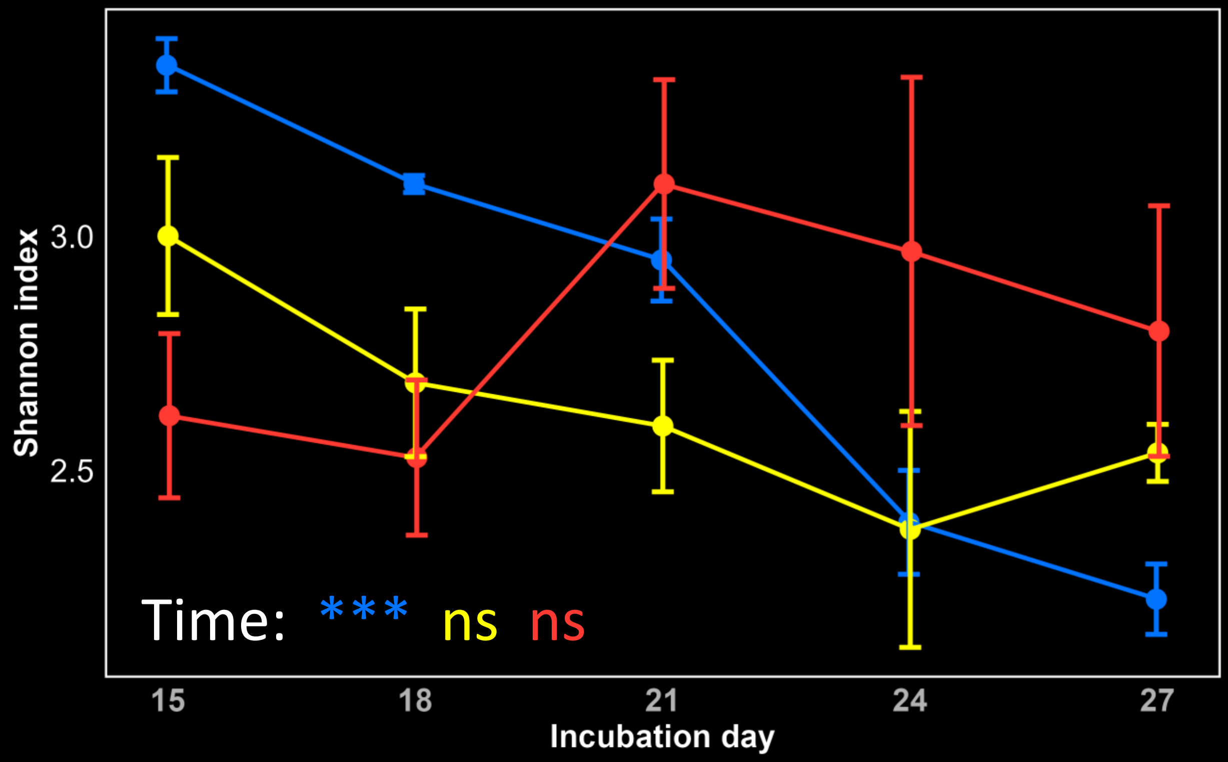
- **Community Composition**: 18S rRNA metabarcoding, flow cytometry
- **Ecosystem Functions**: Biomass (POC), gross primary productivity (µmol O_2 mg POC^{-1} d^{-1}), nutritional quality (POC:PON, POC:POP)
- **Metadata**: chlorophyll a, dissolved nutrients, pH, total alkalinity, salinity, light intensity, micro-grazing, mesozooplankton

Analyses

- **Compositional variability:**
  beta-dispersion
- **Mean differences:**
  repeated measures ANOVA

https://uol.de/en/icbm/planktology/research/current-projects-08

Results: Diversity

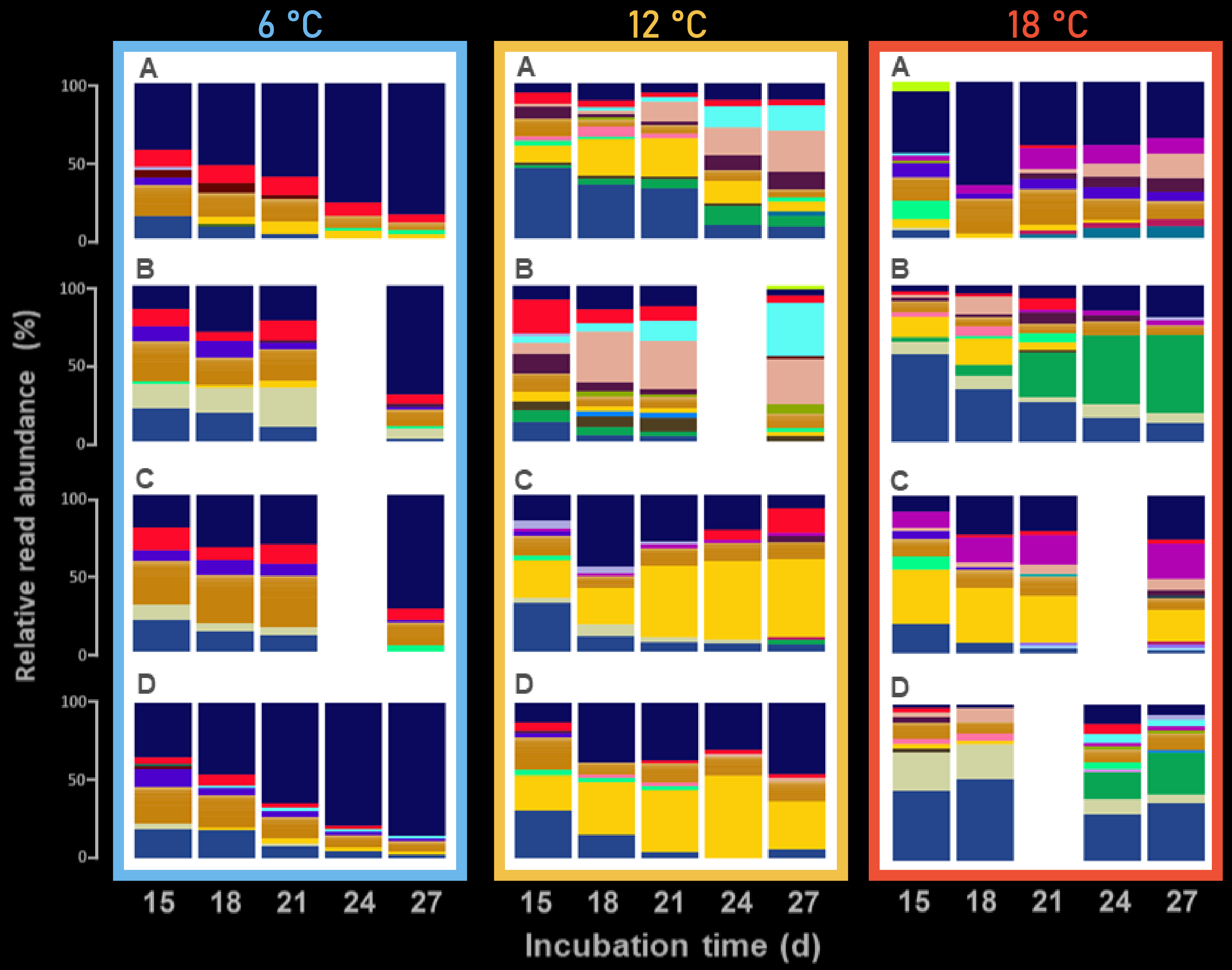


Shift from higher diversity at 6 °C to higher diversity under warming

→ Many species able to tolerate temperatures of up to 18 °C

→ 6 °C stronger selective pressure

Results: Community composition



Chaetoceros debilis

Gephyrocapsa oceanica

Phaeocystis globosa

Thalassiosira punctigera

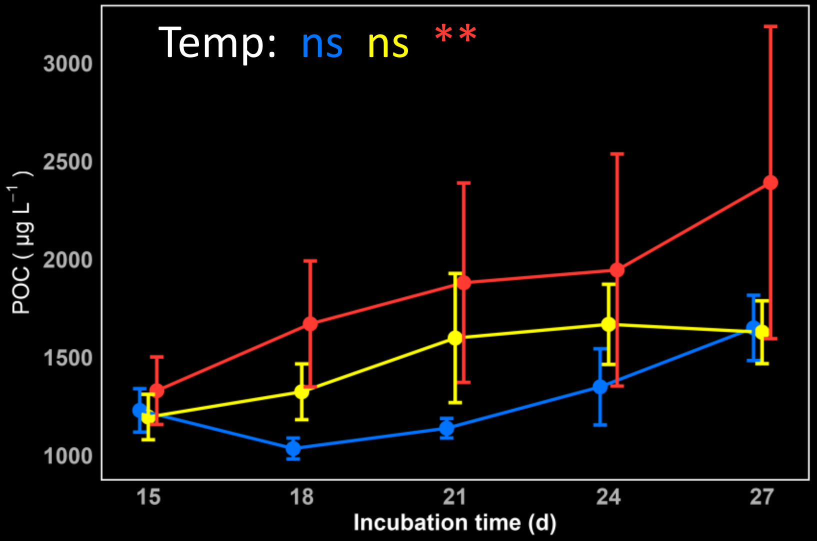
Dytilum sp.

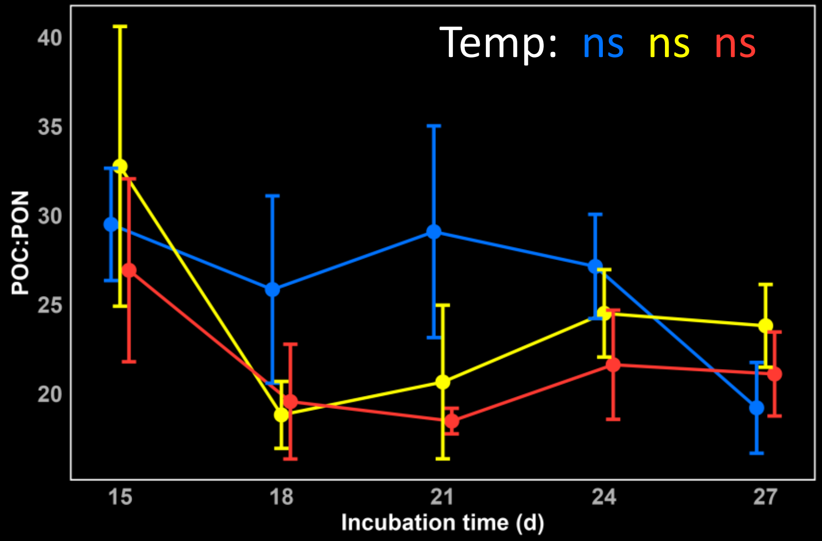
Pyramimonas sp.

→ Increasing compositional variability with warming

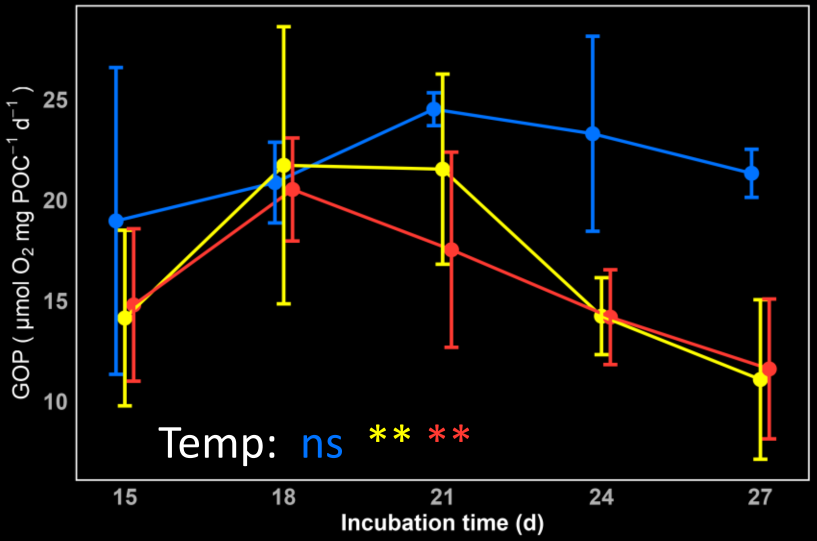
Results: Ecosystem output

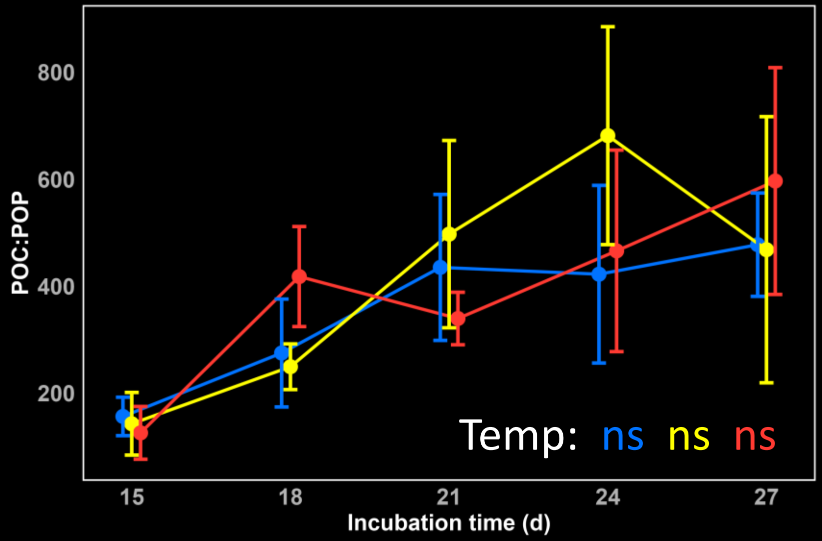
Biomass





Gross oxygen productivity





Nutritional quality

Results: Role of *Phaeocystis globosa*?

DIC ↑

Biomass ↑

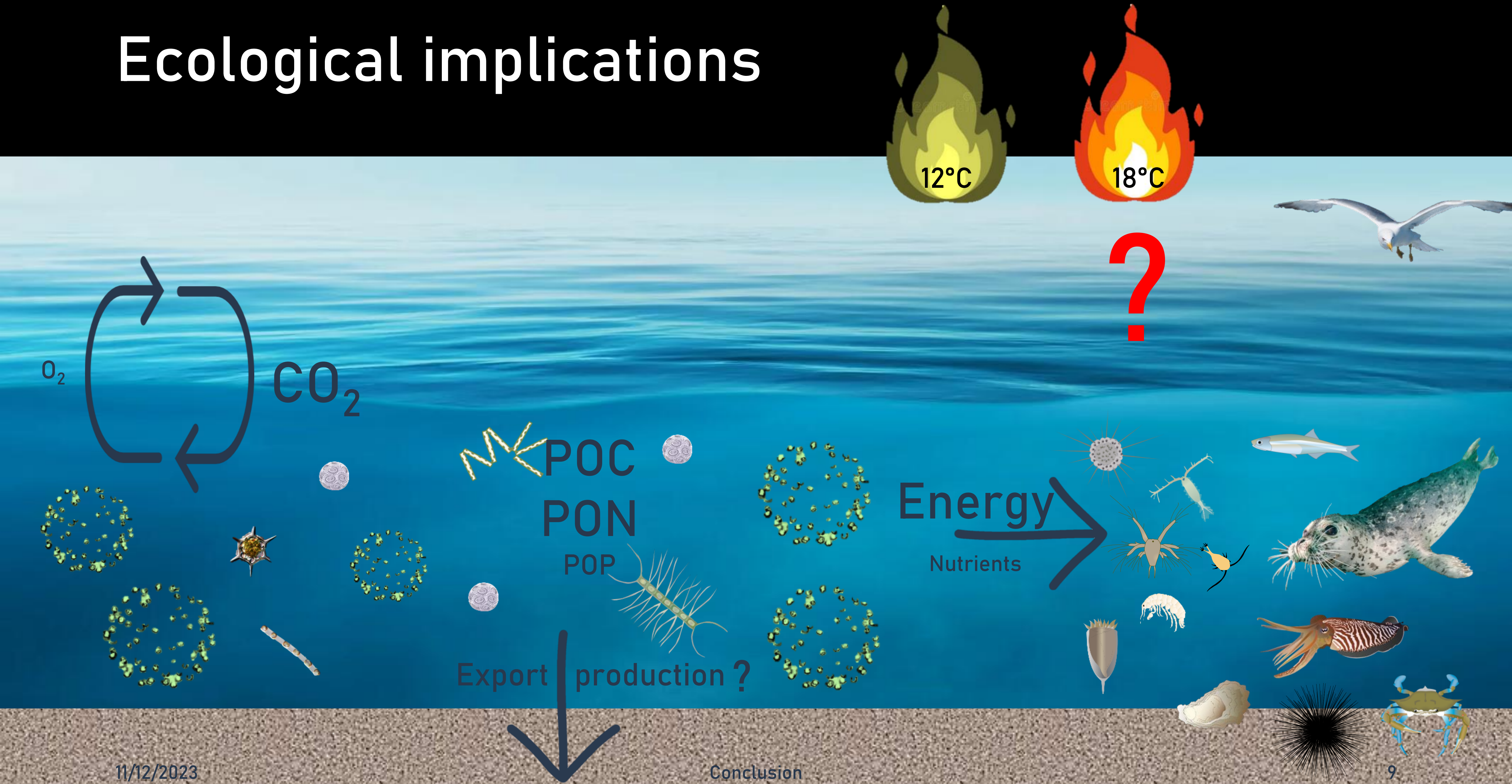
C:N =

Nitrate ↑

Oxygen =

C:P ↑

Ecological implications



Take-home messages

- Many species can cope with warming → high diversity @18°C
- Higher temperatures = more variable compositional output
- C:N ratio & C:P ratio remain stable, while biomass & oxygen productivity sensitive to warming
- *Phaeocystis globosa* drives functional dissimilarity in terms of C:P & biomass

→ Buffering the compositional variability with functional similarity depends on the ecosystem function and the degree of warming

Make a search alert for the paper to read the full story 😉

Sardet 2015

Thank you!
Questions?

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