

Multi-stressors and multi-community approaches in order to better predict future climate changes

Andreas Pansch¹, Stefanie Sokol², Harald Asmus¹, Ragnhild Asmus¹, Martin Wahl²

¹Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung - Wadden Sea Station List, Germany

²GEOMAR Helmholtz Zentrum for Ocean Research, Kiel, Germany

Relevance

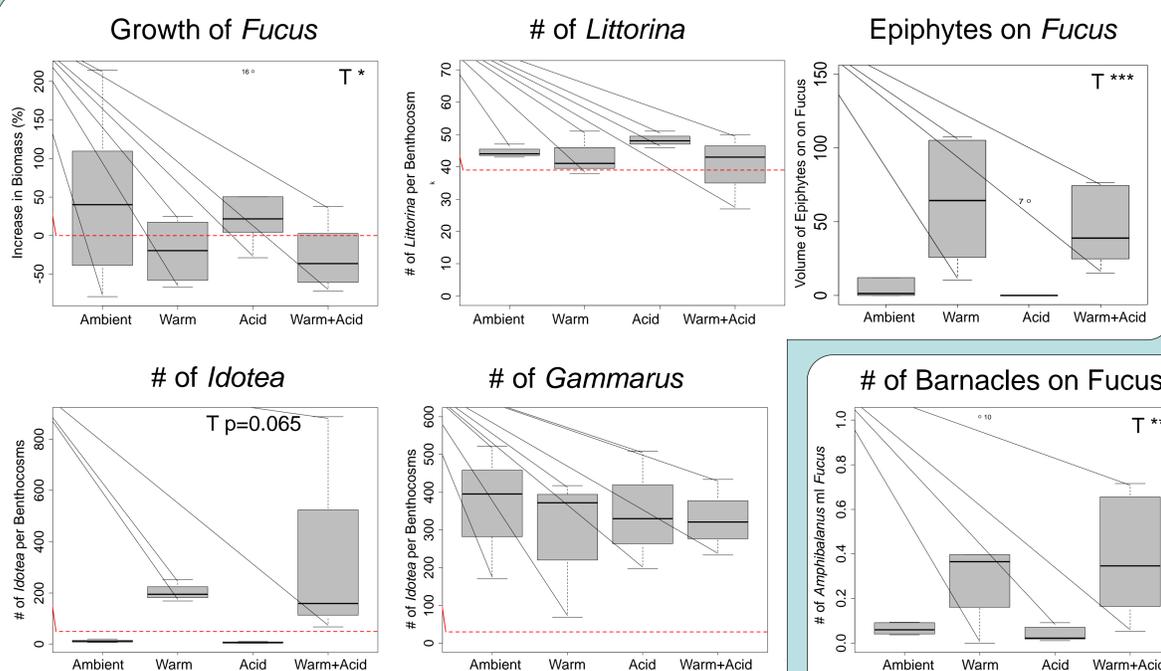
- Increasing human activities and CO₂ release to the atmosphere cause global ocean warming and acidification, as well as local oxygen depletion and eutrophication.
- Laboratory experiments with single species and single stressors show variable responses between and within species and different stress combinations can have synergistic, additive or antagonistic effects on species.
- Thus, only near natural multi-species and multi-stressor experiments can predict future community responses.

Kiel Benthocosms - Baltic Sea

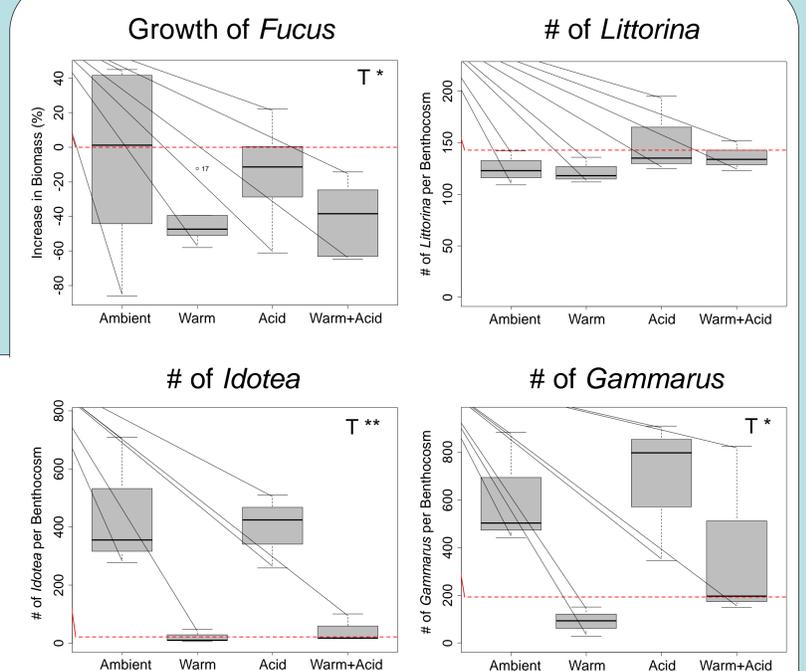


- *Fucus vesiculosus* + it's associated community (*Idotea sp.*, *Littorina sp.*, *Gammarus sp.*, *Mytilus edulis* and *Asterias rubens*)
- Incubated for 3-months at future warming (ambient +5 ° C) & ocean acidification (ambient +600 ppm) in 12 2000 l benthocosms
- Red lines indicate the biomass or the number of specimens at the beginning of the experiments

Spring 2013



Summer 2013



First Results

- Warming inhibited *Fucus* growth in both experiments and supported growth of epiphytes
 - Warming increased the abundance of *Idotea* in spring while it largely decreased it's abundance in summer
 - Warming did not effect *Gammarus* abundance in spring but reduced it's abundance in summer, and increased the amount of settled barnacles
 - *Littorina* seemed to be less impacted by warming and acidification
- **Warming had a much higher impact than acidification**

Outlook

- Further experiments will be conducted with *Fucus vesiculosus* and *Zostera marina/noltii* at the AWI-Sylt for comparisons of North- and Baltic Sea communities
- Organisms will be exposed to new combinations of stress regimes, including eutrophication, hypoxia, desiccation and sedimentation
- Analysis of the data with ecological network analysis

Sylt Benthocosms - North Sea



Andreas Pansch
andreas.pansch@awi.de



ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR-
UND MEERESFORSCHUNG