Understanding copepod distributions with a trait database

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Goal

Establishing a **trait database** for marine copepods that contains rich data for the key traits and **all available contextual information**.

Approach

Creating a relational database based on **established concepts** from the plant trait community that is **flexible** and **extensive** in the amount of information it can store and **compatible** with other efforts in trait ecology.

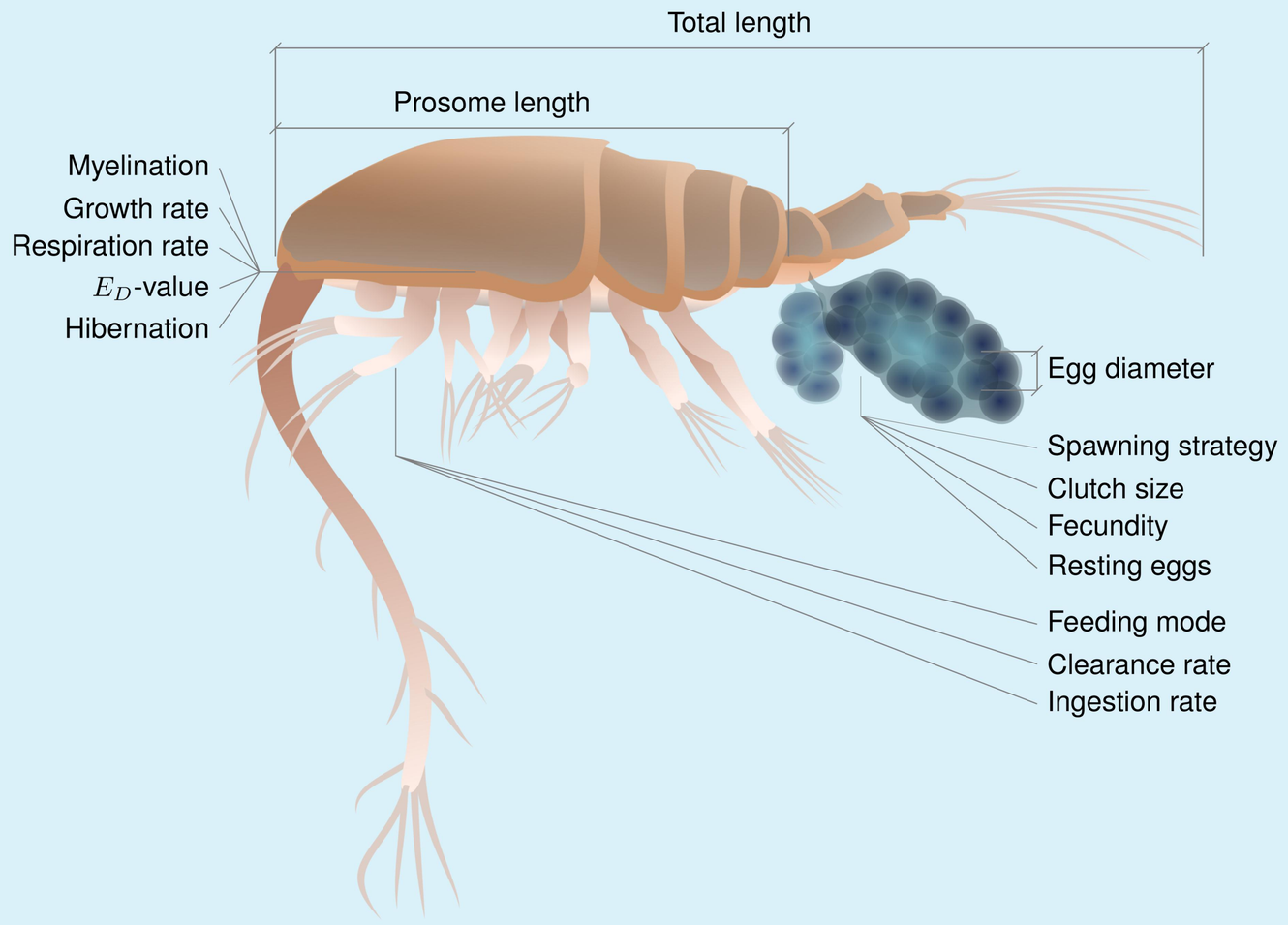
Current extent

- 18 traits or groups of traits
- 5743 records
- 1104 taxa

Outlook

Producing an **online platform** to easily extend the database and query information (a prototype can be found on www.pgbr.square7.ch). Potentially continue the project in a **collaborative** way.

Copepod traits



Most important copepod traits for which data has been collected

Trait distributions of copepod assemblages in the North Atlantic

Data

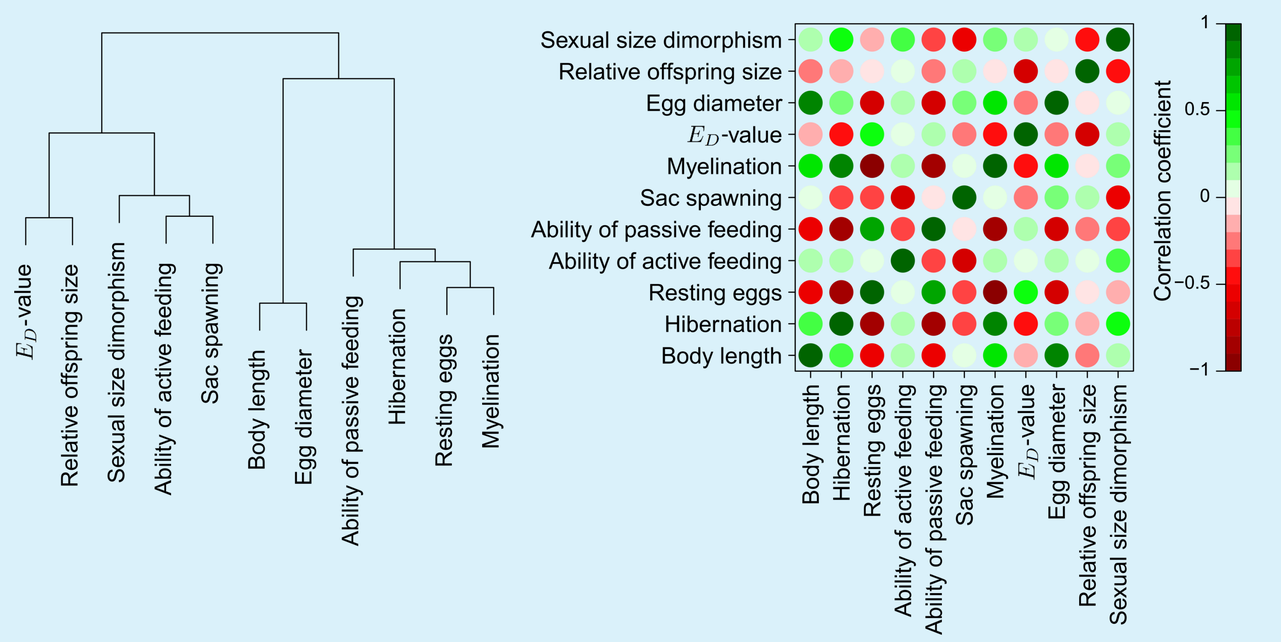
- **Continuous Plankton Recorder** observations from 1998 - 2008
- Over 49000 abundance class observations for 69 taxa from surface waters of the North Atlantic
- Trait database mentioned above

Method

- Calculation of **mass-weighted trait means** of the community at each sampling point
- Inverse squared distance weighted **spatial interpolations**

Results

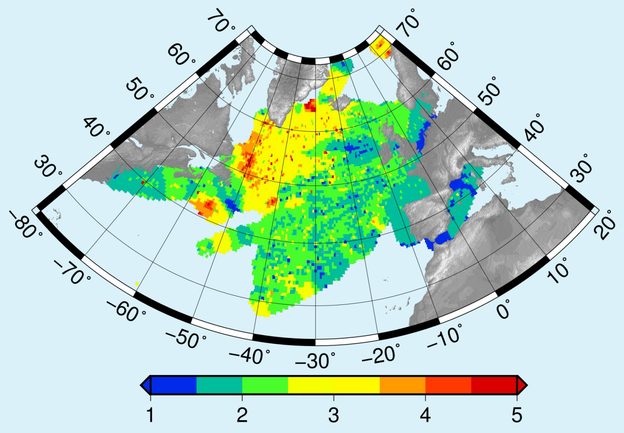
Strong correlations occur between some of the estimated mean trait values and most traits show **distinct spatial patterns**. Mean body length of the copepod community varies in space and through the seasons and is correlated with sea surface temperature (SST). Copepods in the southern central North Atlantic produce relatively large offspring. Copepod hibernation is linked to SST, and occurs mainly in areas with an annual mean temperature of less than 10°C. Resting egg producing taxa, on the other hand, are common in areas rich in chlorophyll *a* and with low water depth.



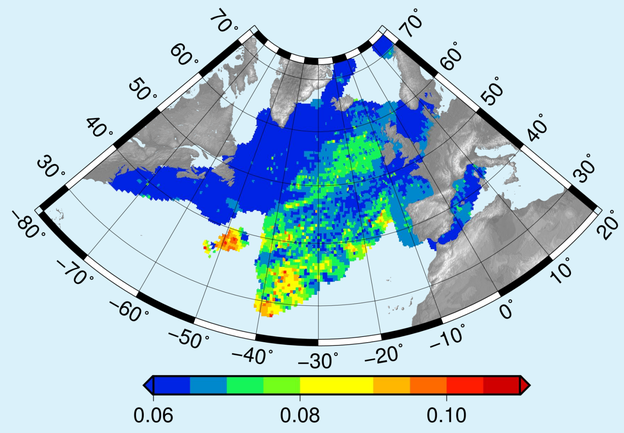
Dendrogram and matrix illustration of pair-wise correlation coefficients between mean trait values at sampling points

Discussion

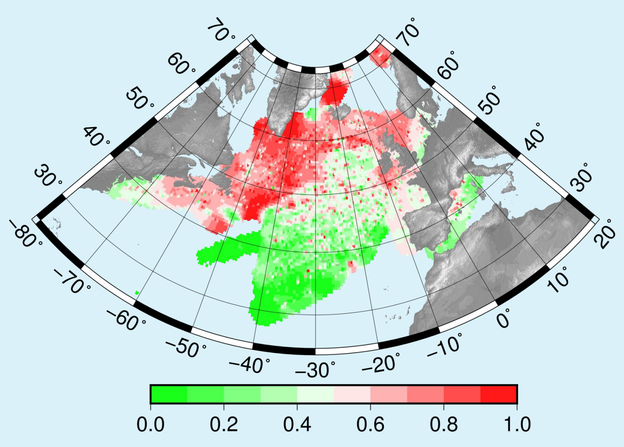
The fundamental traits of copepods determine their fitness in the environment. Our analysis provides new insight into how this constraint shapes copepod communities across the North Atlantic. For instance, resting eggs, durable investments in the next generation, seem to be a suitable strategy for copepods in shallow, coastal areas where food availability is seasonally high. Instead, copepods of the southern central North Atlantic produce larger offspring that can cope with this dynamic and nutrient poor environment.



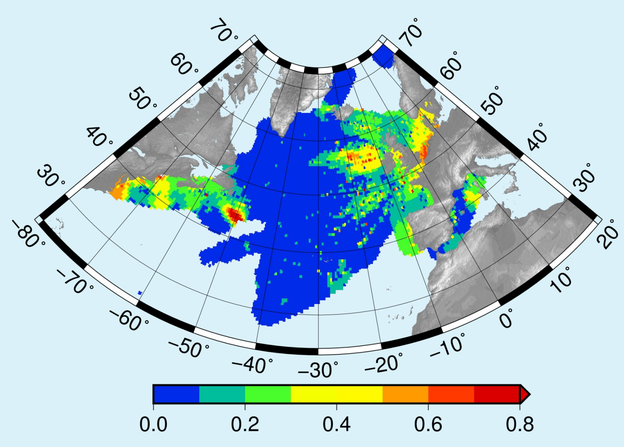
Mean body length (mm)



Mean relative offspring size



Weight fraction of hibernating copepods



Weight fraction of resting egg producing copepods

Conclusion

Distinct patterns in the trait biogeography of copepods underpin the **relevance of the trait-based approach** on large scales. **Extensive data-driven** investigations provide an opportunity to **uncover trait-environment relationships** beyond the most obvious and well-understood trade-offs.