

Review of Legrand et al. Species interactions can shift the response of a maerl bed community to ocean acidification and warming

General Comments

The paper by Legrand et al. describes an elegant mesocosm experiment testing the effects of ocean warming and acidification upon the community-scale responses of maerl bed assemblages. This work is timely, and provides an interesting insight into how the communities associated with coralline algae will respond to the impacts of anthropogenic climate change. Given the importance of coralline algae as a habitat architect, and the role of these communities in carbon fixation, I believe this work will make an important contribution to our understanding of coastal sea biogeochemistry. The statistical analysis, however, leaves a lot to be desired and as such, I cannot confidently review the authors' interpretation of their results or discussion. I am baffled as to why the authors have chosen to use permutational multivariate analysis of variance (perMANOVA) of similarity matrices (Euclidean distance) as a statistical test to test for differences in univariate response variable (e.g. respiration). Firstly, the authors make the erroneous assumption that perMANOVA does not make any assumptions about normality and homoscedacity of the data. However, Anderson (2001) point out in their papers describing these methods that the method makes the assumption of multivariate normality as measured by a homogenous dispersion of the similarity matrix data. Secondly, I simply cannot understand why perMANOVA was selected as a statistical test. There are more appropriate univariate tests such as analysis of variance (ANOVA) [with appropriate transformations applied], or if appropriate the use of Generalised Linear Models or Generalised Least Squares techniques which would allow the author to account for non-Gaussian data distributions (GLM) or heterogeneous variances between the treatments (GLS) (see Zuur et al., 2009). This represents a major issue with the handling of the experimental data, and so I cannot recommend the paper be accepted for publication in its current form. I strongly encourage the authors to revise the paper and resubmit. I think this has the potential to be an excellent paper and I will happily review a suitably revised manuscript.

Specific Comments

Abstract

Pg. 1 L 11: "However, little information is available on the response of marine communities..." I do not believe this is true. There has been considerable work of community scale responses to OA – see Ulf Riebesell's work on planktonic communities and benthic-pelagic coupling as an example.

Introduction

Pg. 2 L 34-35: Please specify examples of how species interactions are modified by climate change.

Pg. 2 L 37: There are actually quite a number of studies examining the effects of climate change on marine communities. I recommend the authors carry out a thorough literature search.

Pg. 3 L 61-63: "Because the responses of species..." This sentence seems rather poorly structured consider revising to clarify.

Materials and Methods

Pg. 4 L 90 – 97: This should be a single paragraph.

Pg. 5 L 100-109: This information would be better displayed as a table.

Pg. 9 L 190 – 201: Please revise around appropriate statistical tests.

Discussion

Pg. 11 L 251-253: “Results show... underlying maerl.” This sentence is not clear, please specify the community responses to climate change more clearly.

Pg. 16 L 358-359: The final line of the paper is vague, what specific pieces of further work would be useful?

Figures

In the figures it would helpful to see which treatment effects are statistically significant, can you please find a way to highlight these effects in the graphs.

References

Anderson, M.J. 2001. A new method for non-parametric multivariate analysis of variance. *Austral Ecology*, 26: 32–46.

Zuur, A. et al., 2009. *Mixed Effects Models and Extensions in Ecology with R*. Springer-Verlag. 574pp. DOI: 10.1007/978-0-387-87458-6.