Responses to referee comments

egusphere-2025-2180

BORIS-2 – a benthic ecosystem model based on allometry

Martin et al.

We thank both referees for their constructive comments and respond to each of them in turn.

All line numbers refer to lines in the version with tracked changes.

User manual supplement and Zenodo code have both been updated to match revised manuscript and a new Zenodo doi created and used throughout.

Referee 1

The manuscript describes the BORIS-2 model, a benthic ecosystem model based on class size that builds on a previous version that simulated ecosystems with a smaller size range and different representation of physiological processes. It describes a steady state solution used to test and evaluate the model and compare it to data from five different sites with a range of depths and overlying pelagic environments.

The authors did an excellent job organizing the manuscript; the explanation on the model itself, the validation and choice of coefficients, and the differences between the current version and BORIS-1 are well written and well linked when necessary. The arguments justifying the choices that need to be made to choose general coefficients and forcings to represent the different sites are well argued and informative for users that may want to run a transient version.

The figures and tables are clear and contain all the necessary information.

We thank the referee for their comments

In my view the paper is suitable for publication, although I do have a few of suggestions on the text:

Line 289-291: It seems reasonable to me to use the sediment traps at 3000 m, but out of curiosity, how much to they diverge? Thinking of future exercises linking ecosystem to sediment diagenetic processes, information of resuspension/sedimentation is always useful

This is a good question. We should have been more specific. At PAP (the only one of our study sites with a sediment trap time series) the flux near-bottom is often found to be in excess of that at 3000m because of re-suspension. Using the deep trap data therefore risks counting the same POC arriving on the seafloor twice. We have now added this information and supporting references to the text - lines 331-333.

Line 304-307: these sentences could be linked better

Agreed. We have tried to make this point more clearly. Lines 350-356

Line 519-521: The global estimate of carbon burial also shows spatial variation, thought to be much higher in shelf environments. I would assume there could be differences between the shallower and deeper sites chosen for model validation that could be mentioned or briefly discussed here.

An excellent point that we had missed, thank you. We have modified the text to clarify that the fraction buried does vary with water depth and that our decision to leave it out of the model is based on the deep-sea values. We have also given an indication of how this geographical variation could be added in future if needed. Lines 643-647