Earth Syst. Dynam. Discuss.,
https://doi.org/10.5194/esd-2020-41-SC1, 2020


Earth System Dynamics
Discussions

# *Interactive comment on* "Resolving ecological feedbacks on the ocean carbon sink in Earth system models" *by* David I. Armstrong McKay et al.

**Karin Kvale**

kkvale@geomar.de

Received and published: 20 September 2020

We appreciate this submission of a sensitivity study exploring the isolated and combined effects of temperature dependent remineralization and ecological dynamics on the ocean's changing biological pump in the recently updated EcoGENIE EMIC. We agree with the authors that the topic of ecological model complexity and its relevance for biogeochemistry and eventually climate represents an important, and as yet unresolved, scientific challenge. We also appreciate the careful design and analysis of the numerical experiments. The analysis, however, over-emphasizes the role of the biological processes for model-model differences in the oceanic CO2 uptake



while neglecting the importance of model-model differences in the buffer factor due to differences in the surface carbon chemistry at the end of the spin-up of the different versions. The manuscript makes a number of strong statements that are not justified by the material presented and, we feel, need a careful scientific reassessment. These statements, as well as identified conceptual problems, are described and discussed in the attached PDF document.

Please also note the supplement to this comment:
https://esd.copernicus.org/preprints/esd-2020-41/esd-2020-41-SC1-supplement.pdf

Interactive comment on Earth Syst. Dynam. Discuss., https://doi.org/10.5194/esd-2020-41, 2020.