

## ***Interactive comment on “The role of ecosystem function and emergent relationships in the assessment of global marine ecosystem models: a case study with ERSEM” by L. de Mora et al.***

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This is an excellent paper, representing, in my view, an important advance in assessment and evaluation of biogeochemical models. The authors have made a strong case for the utility of emergent properties and have provided carefully considered guidelines around how emergent should be considered in model assessment (some other examples that I have seen have fallen into the trap of calibrating the model to the properties being assessed, which can then no longer be considered "emergent" properties in the model). I am impressed also by the size of the datasets used to derive expected patterns in emergent properties: this has been achieved by drawing widely on the lit-

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erature for the (very well studied) Atlantic ocean and beyond, and may provide a good starting point for those of us working in less intensively monitored parts of the world.

The structure of the paper departs from the traditional Intro-Methods-Results-Discussion-Conclusion format and it is not clear that there was a need for this departure, however the present format is clear enough and given the major effort that would be required to restructure the paper, I am not recommending that this be done. The text is fairly dense, however, and could perhaps be made easier to read by including more subheadings. Also, while I know ERSEM is a well published model, it would save readers time if a diagram showing the conceptual structure of the model was included as an early figure.

For future work, it would be good to see this sort of evaluation conducted in the context of testing hypotheses around bgc model structure. For instance, "X has suggested that bgc models need to include process Y to properly capture nutrient dynamics. If this is true, we would expect a model that did not include process Y to exhibit behaviour Z (e.g. systemically underestimating POC/DIN ratios)..."

Comments: p 6101, li 13-17: Is it appropriate to use the same parameters when presumably the models have slightly different structures, and hence the true biophysical meanings of even nominally identical parameters will be slightly different in the different models? (i.e. a parameter set that gives the best calibration for one model may not be the best for another, equally valid, model).

p 6102, first paragraph: This is a very important point and should be highlighted, perhaps in conclusions or earlier in the introduction.

Minor technical edits: p 6101, li 16 (and elsewhere): "parametrisations" -> "parameterisations"

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