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Brian D. Fath

Editor-In-Chief

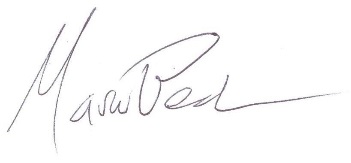
Ecological Modelling

I am pleased to submit our manuscript, “Parameter sensitivity and identifiability for a biogeochemical model of hypoxia in the northern Gulf of Mexico,” to be considered as an original research article for publication in Ecological Modelling.

The Coastal General Ecosystem Model was developed to describe and predict the spatial extent of hypoxia on the Louisiana Continental Shelf of the northern Gulf of Mexico. This area experiences seasonal hypoxia in late summer to early fall and is one of the largest marine hypoxic zones in the world. The model includes over 100 biogeochemical equations and 251 associated parameter values that describe ecological processes relevant for hypoxia. Parameter sensitivity has never been evaluated for this model, and more importantly, we demonstrate that significant redundancies in the effects of parameter subsets on state variables lead to challenges in parameter identifiability. As such, we propose explicit parameter selection heuristics for model calibration that balance the tradeoff between sensitivity and numerical certainty. We also make a case for considering statistical limitations of over-parameterized models as an approach for more efficient and careful use of models in practice. Both the questions that we address and our methods should be of broad interest in ecological modelling and to those interested in managing environmental systems.

Please feel free to contact me with any questions or concerns about our submission. We appreciate the opportunity to publish our work with Ecological Modelling

Sincerely,



Marcus W. Beck, PhD

Post-Doctoral Research Fellow

U.S. Environmental Protection Agency

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