Modeled Seasonality of the Biogeochemistry of Pre-*Dreissena* Mussel Lake Michigan

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The MIT General Circulation Model was configured to the bathymetry of Lake Michigan at 1-minute resolution to model the physical and biological characteristics of the lake. This eddy-resolving computational model is forced by atmospheric data from the North American Regional Reanalysis Program. The purpose of this model is to provide an effective tool towards assessing the spatial impacts invasive *Dreissena* mussels have had on lake productivity and biogeochemistry. The first step, detailed here, was the creation of a pre-*Dreissena* model state based on lake observations collected prior to the arrival of invasive mussels. Comparisons with observational data show that the model sufficiently captures the timing and magnitude of late winter/early spring primary production. This timeframe is critical towards incorporating invasive mussels, since the recently established quagga (*Dreissena rostriformis bugensis*) mussel is able to colonize offshore regions inaccessible to the once dominant zebra (*Dreissena polymorpha*) mussel. Stratification effectively blocks quagga mussel interaction with the euphotic layer during the summer and fall, however, the mussels are able to directly interact with the entire water column during late winter/early spring isothermal mixing. This study provides the pre-*Dreissena* model that is verified with physical and biological observational data, providing confidence that it is reasonable representation of pre-*Dreissena* Lake Michigan biogeochemistry.