

November 20, 2023

Dr. Paul F. Kemp, Editor-in-Chief
Limnology and Oceanography: Methods

Dear Dr. Kemp,

Enclosed please find our manuscript, titled 'Fitting metabolic models to dissolved oxygen data: The Estuarine BAYesian Single-station Estimation method (EBASE)', to be considered as a description of new methods in Limnology and Oceanography: Methods.

This work advances the study of metabolic rates in estuaries by presenting a new Bayesian framework, EBASE, for fitting metabolic models to dissolved oxygen data. We are unaware of any existing methods that provide similar functionality in estuarine settings. We develop our approach by building and improving upon a similar Bayesian model developed for freshwater streams. Several parameters of the core metabolic model were modified to better represent the dynamics of estuaries. EBASE was also benchmarked against the conventional Odum open-water method for estimating metabolism using a synthetic time series with known parameters. Our results demonstrated that EBASE can reproduce the known metabolic rates with reasonable certainty. Lastly, the methods are available in an R package that includes options to vary the prior distributions for the metabolic parameters and the amount of data used in their estimation.

Each author has contributed substantially to this work. All authors have contributed to the writing and review of the original draft. Further, Dr. Ray Najjar was instrumental in conceptualization of the method and Dr. Maria Herrmann greatly assisted in the methods assessment portion of the manuscript. Dr. Arriola was responsible for discussing and testing earlier versions of EBASE. All authors have approved the final draft.

We greatly appreciate the opportunity to publish this work in Limnology and Oceanography: Methods and are confident readers will consider it a valuable contribution. Please feel free to contact us directly should additional information be needed.

Regards,

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