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# *Interactive comment on* "Ocean carbon and nitrogen isotopes in CSIRO Mk3L-COAL version 1.0: A tool for palaeoceanographic research" *by* Pearse J. Buchanan et al.

**Anonymous Referee #1**

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This paper describes the implementation of13C and 15N isotopes into the ocean model of the CSIRO model, shows the performance of the model to simulate pre-industrial conditions compared to data and other models, as well as explores the sensitivity of the simulated isotopes to different representations of the marine biological system. This paper is very well written, shows novel results and documents important model features (isotope capability), references the required literature, and has extremely nice figures. I have never had the pleasure to review such a nice a first submission.

This isn't the first time 13C and 15N have been added to an ocean model, but it is still worthwhile to publish this, to document the implementation and performance of



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Discussion paper

these isotopes for the CSIRO model. Furthermore, since the new model is compared to previous model results, this paper is useful beyond just a technical reference, but actually shows how different isotope-enabled models compare, which is of interest to many scientists. This comparison, which is great, is also related to the only real question I have: why is the Community Earth System Model (CESM), which also includes 13C (Jahn et al. 2015) and 15N (Yang and Gruber, 2016) isotopes, not included in the comparison with previous models? It would be great to see how the new developments in CSIRO compare to that model as well. But maybe those runs were not available for the same time period? If it's not possible to easily include results from the CESM in the paper, that's okay, but I would recommend to at least cite those two papers in the list of previous models that have these isotopes, in addition to the models currently listed (UVic, LOVECLIM, PICES).

Based on my reading of the manuscript, it clearly fits the criteria for publication in GMD.

References: Yang, S., and N. Gruber (2016), The anthropogenic perturbation of the marine nitrogen cycle by atmospheric deposition: Nitrogen cycle feedbacks and the 15N HaberâĂŘBosch effect, Global Biogeochem. Cycles, 30, 1418–1440, doi:10.1002/2016GB005421. Jahn, A., Lindsay, K., Giraud, X., Gruber, N., Otto-Bliesner, B. L., Liu, Z., and Brady, E. C.: Carbon isotopes in the ocean model of the Community Earth System Model (CESM1), Geosci. Model Dev., 8, 2419-2434, https://doi.org/10.5194/gmd-8-2419-2015, 2015.

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