Geosci. Model Dev. Discuss.,
https://doi.org/10.5194/gmd-2018-187-RC1, 2018

Geoscientific Model Development Discussions

Interactive comment on "A High-resolution Biogeochemical Model (ROMS 3.4 + bio_Fennel) of the East Australian Current System" *by* Carlos Rocha et al.

L. Laiolo (Referee)

leonardolaiolo@gmail.com

Received and published: 10 September 2018

General comment

The authors presented a new high-resolution biogeochemical (BGC) model for the East Australian Current (EAC) system. The challenge of this work relies on providing a tool able to:

(1) explore the BGC dynamics in the selected region

(2) understand the EAC system dynamics as a whole

To address these objectives, the authors coupled ROMS and bio_Fennel, obtaining a

model able to explore the complex BGC dynamics of the selected area at a regional and finer scale. The simulated surface chlorophyll-a dynamics were compared with a 10-years dataset of remotely sensed chlorophyll-a product observations (i.e., Copernicus-GlobColour). To assess the model performance several statistical metrics were used. Furthermore, the simulated vertical distribution of the nitrate was assessed against the CARS dataset. The high-resolution model presented here represents a powerful tool to explore the impacts of oceanic features and associated biological responses in the off shore East Australian waters. As stated by the authors in the manuscript text, this would not be possible simply analysing climatological fields by their own. Overall, aims and results of the work are well presented, as well as the different statistical analyses used to assess the simulations. In my opinion, only few sections require clarifications, as detailed below.

Specific comments:

Page 2, line 14: I do not think there is a need to start a new paragraph here.

Page 2, line 27: Same as above, I believe the topic is still the EAC.

Page 3, line 6: Insert the Internet link for CARS

Page 3, line 11- 13: here would be useful to insert the phytoplankton response to these physical factors in both cyclonic and anticyclonic eddies

Page 5, line 25: the link of GlobColour would be helpful for the reader.

Section 2.4: moving the description of the quantitative metrics below every equation can help to better understand the analyses performed and how to read the different panels in Fig. 5 and 6.

Page 8, line 21: EAC nutrient-poor water affect the phytoplankton growth and, as a consequence, the chlorophyll fields.

Page 9, line 8-9: I think the sentence should be reworded. Indeed, rather than 'aggra-

vate the model misfit to observations', the remote sensing biases described earlier can explain the satellite observations vs simulations inconsistencies.

Page 9, line 19-20: I do not understand the meaning of the sentence. The inconsistencies do not derive uniquely from the physic processes, to which corresponds biological responses?

Page 10, line 5-26: the authors here accurately describe the features of figure 7. Therefore, would be helpful to insert mode 1, 2, etc. . . on the top of Fig. 7, to help the reader to quickly refer to the panels while reading the text.

Figure 1a: It would be useful to shows the EAC and the separation zone and possibly the formation/occurrence of CE and ACE eddies off East Australia. At least a schematic image would be important as I think these information are more relevant for this study rather than the depth.

Figure 8: I imagine the top row is from ROMS and bottom row from CARS. Please double check that, as the figure and caption are not consistent.

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