

Interactive comment on “Human-induced influence on eggs and larval fish transport in a subtropical estuary” by Maria Helena P. António et al.

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Dear Referee 1,

Thank you for your comments and the opportunity of revising our paper on “Human-induced influence on eggs and larval fish transport in a subtropical estuary” for publication in Biogeosciences. We are also grateful for your insightful comments, and the sug-

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gestions and comments offered resulted in valuable improvements to our manuscript. Most of the suggestions made were incorporated in the manuscript text. Also, I have included each comment and concern with their respective responses (in bold). We hope this revised version will bring the manuscript to the Biogeosciences standard. We thank you for your valuable contributions.

1. You should clearly state what is new about your work. You cite several past studies that looked at the effect of artificial structures on the marine environment (page 15, lines 654-658); how is your study different and new?

Response: The novelty of this study is to demonstrate that even small alterations in coastal structures can result in circulation changes that have an impact on the transport of planktonic organisms. As discussed in the paper, small changes in fish eggs and larvae transport to nursery areas can lead to recruitment variability. Text inserted in line 137 addresses this issue. (Inserted from line 137).

2. There should be some connection established between the results of your numerical experiments and the real world. The output of the hydrodynamic model has been compared with simulations, but what about the output of the particle-tracking experiments? For example, have there been observations of eggs/larvae or dye experiments anywhere in the world that are consistent with the results of some of your experiments? If so, the results of your other experiments can be seen as something built upon the foundation established by that simulation-observation comparison. Otherwise, this manuscript will be not much more than a report on exercises in running a model.

Response: Thank you for your comment. Our study is the first Lagrangian 3D model with an emphasis on the dispersion of organisms (eggs and larvae), and builds on previous work conducted with 2D models of particle dispersion in the region (Silva et al. 2019, doi: 10.1007/s12665-019-8162-y, Franzen et al. 2019, doi: 10.3856/vol47-issue3-fulltext-15, and Martins et al., 2007, doi: 10.1016/j.jmarsys.2007.02.004). Our

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study and previous studies have been used to try to overcome the lack of observational data on the transport of eggs and larvae in the study region. Our literature search did no reveal studies to acquire and to deploy trackable particles with this model that would be suitable for comparison. (Text inserted from line 739 to 767).

3. The description of the hydrodynamic model should be expanded. I realize there is another manuscript that focuses on the hydrodynamic model, but the description here seems to be too brief. For example, which datasets from HYCOM or ECMWF are you using? What are the initial conditions, and how long is the model run to ensure that the model state is produced by the model itself and not just a remnant of the initial conditions? What are the numerical schemes used for the lateral open boundaries, surface momentum flux, advection, mixing, or freshwater flux from rivers? How are the sigma layers distributed vertically?

Response: We have made several changes in the text to address these suggestions (caption 2.1. Hydrodynamic Numerical Model - text below), and a figure with the boundary conditions application scheme has also been included in the manuscript. The model ran for a minimum of 6 months before producing the presented results. "The open boundaries of the domain were forced with results from regional and global models and field data. To be comparable, simulations for both scenarios had the same set-up. Time series of daily averaged river discharge of the main tributaries (Guaíba river and Camaquã river, Figure 1) were obtained from the National Water Agency (www.ana.gov.br) and prescribed at the northern and central continental boundaries. The mean discharge data for the São Gonçalo Channel was considered constant as 700 m³/s (Vaz et al., 2006), as there were no time series of discharge for the studied periods. Temperature and salinity fields obtained from the HYCOM model (Hybrid Model Coordinate Oceanic, <https://hycom.org/>), with a temporal resolution of 3h and spatial resolution of 1/12.5°, were prescribed tridimensionally in all grid points. Wind time series, with a spatial and temporal resolution of 0.75° and 6h, respectively, were obtained from the ECMWF (European Center for Medium-Range Weather Forecasts,

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www.ecmwf.int). Eleven (11) sigma levels were considered in the vertical and distributed from the bottom to the sea surface." (Inserted on line 212).

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4. It seems that you are using the Euler scheme to calculate the movement of the particles (page 5, line 230). Is there are reason you are not using a higher-order scheme that are generally known to be more accurate?

Response: The Lagrangian model used is already included in the TELEMAC-3D model and works coupled with the hydrodynamic model. We have opted to use the scheme available in the most updated version of TELEMAC-3D.

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5. The quality of the writing needs significant improvement. There are numerous problems, such as vague statements (e.g., "the most important aquatic resources in the world", page 2, lines 47-48), grammatical errors (e.g., "the shallow estuary channel" instead of "a shallow estuary channel", page 2, line 66), misspellings (e.g., "Kjerfev" instead of "Kjerfve", page 4, line 145). The word "salinity" is used when you seem to mean a salinity front (e.g., page 4, line 162; page 8, line 335). The distance traveled by the particles does not seem to be defined in section 3.2 – is it the center of mass or the leading edge of the patch of particles?

Response: The text was corrected and modifications were made accordingly. Your comments and suggestions improved the quality of the paper. Section 3.2 deals with the most advanced edge of the particles. The center of mass is covered in section 3.3.

6. For submitted manuscripts, the convention is for each figure to have its own page, so that readers do not have to flip back and forth between the page with the figure and the page with the caption

Response: Thank you for your comment. A review was made and figures and captions fit to the same page.

7. The list of references has many errors, such as inconsistent formatting, misspellings, and entries out of order. The language in which a source was written should be indi-

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cated if other than English. For both the list of references and the authors' information on the first page, please check the journal's policy on whether country names should be in English or can be in the language of that country.

Response: Thank you for your observations. A review was made taking into account the journal's policy to correct these errors.

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