

Thank you for your comments. We have drafted some substantial revisions to the paper based on them – as explained below.

[It is a daunting task to summarize ocean numerical model physics in a few pages.](#)

We can only agree with you. Our original draft was aimed at people who are responsible for implementing ocean models in operational systems. So it included only the technical section. We were asked to provide some more introductory material and we wrote that in section 2 at an elementary level.

[My comments are as follows:](#)

- [1. Contrast between Sections 2 and 3: Section 2 is written at an elementary level with no references while Section 3 is technical with many references. While this is announced in the abstract, the transition is too abrupt. It is almost as if it was written by two different contributors. I suggest that the authors slightly rewrite both sections for a better flow/continuity.](#)

We can see that there is a problem with the lack of continuity. We have considered various options to address that and have made two types of changes. The main change is that we have introduced a new section (3.5 pages long) that describes the models at an intermediate level. This outlines their governing equations, some approximations used to improve their efficiency and the grids they typically employ. We felt that there was still quite a jump between the elementary and intermediate levels so we have also written a 2-page appendix that explains the vector calculus underlying fluid dynamics for people who are familiar only with the calculus of a single independent variable, i.e.  $y(x)$ . We don't remember seeing explanations (rather than summaries) of this sort and think it may be useful for people who would otherwise be unable to understand the equations in section 3. It may also be a useful reminder for people who last covered this material many years ago. This is quite a difficult thing to do well so we are running it past some people to see if it works for them. The second (relatively minor) change is that we have added suitable references in subsection 2.2. This makes that subsection more informative and slightly less elementary.

- [2. The paper is lacking a summary section. I suggest discussing the current state of the art and where numerical models might be 20 years from now. An example can be found in the introductory encyclopedia paper of Chassignet et al. \(2019\) \(\[https://www.coaps.fsu.edu/pub/eric/papers\\\_html/Chassignet\\\_et\\\_al\\\_19.pdf\]\(https://www.coaps.fsu.edu/pub/eric/papers\_html/Chassignet\_et\_al\_19.pdf\)\) which also aims at reaching a broad audience.](#)

We have included a new final section (new section 5). At present it is titled "Wider and future perspectives" and contains just two paragraphs. The first outlines the role of ocean models as one component within a complex network of activities aiming to support public safety and protection of the environment. It also provides some historical context. The second paragraph discusses prospects for ocean models over the next 10-20 years within this wider context.

- [3. As in Chassignet et al. \(2019\), I suggest adding a "Further Reading" section for the readers that interested in more details.](#)

After re-reading Chassignet et al (2019), we decided to end the introduction with a paragraph drawing the readers' attention to alternative introductions to ocean modelling. This paragraph begins "Chassignet et al. (2019) provides an alternative non-technical introduction to ocean modelling. McWilliams (1996) and Fox-Kemper et al. (2019) provide more detailed reviews and Griffies (2004) is still a helpful primer on the basic techniques." We think this is the most helpful short-list of introductions we can provide. We cite many books and papers in the main text.

4. Minor comment: In the Introduction, on line 20, you introduce Section 4 of Wan et al. It is a bit awkward as it follows the description of Section 3 of your paper and you do not have a Section 4. I assume Wan et al. is part of the same issue - I suggest rephrasing the sentence to make it clear that it is complementary to this paper.

Yes Wan et al. is part of the same issue and we can see the sentence needed re-phrasing. The introduction now concludes by saying "Aspects of the design, testing, documentation and support for an ocean model code that are crucial for it to be suitable for use in operational predictions or climate simulations are covered in Wan et al. (2024). Porter et al. (2024) discuss the adaptations of ocean models required for them to perform efficiently on modern high-performance computers (HPCs)." These points explain why those topics are not otherwise mentioned in our review.