

Geosci. Model Dev. Discuss., author comment AC2
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Reply on RC2

Jeff Polton et al.

Author comment on "Reproducible and relocatable regional ocean modelling:
fundamentals and practices" by Jeff Polton et al., Geosci. Model Dev. Discuss.,
<https://doi.org/10.5194/gmd-2022-217-AC2>, 2023

We thank the reviewer for taking the time to review this manuscript and are pleased that they saw it as valuable, especially for new modellers.

The reviewer raises an issue about availability of example files. This is a fair criticism and we have made associated edits. Though we are not aiming to present a "black box" solution that is machine independent, we are trying to make it easier for people to follow along. Having critical files unnecessarily unobtainable rather defeats this aspiration! We have carefully gone through the Severn Estuary configuration documentation, in particular, and identified the fundamental files required to independently produce the workflow. There are two types of file: 1) files we "own" e.g. the AMM15 coordinates file, and 2) files we do not own. E.g. ERA5 met forcing, FES2014 tidal files, open boundary conditions from the CMEMS catalogue, GEBCO bathymetry and river forcing data. For the former (coordinates file) we attach the binary file to the updated Zenodo repository: <https://zenodo.org/record/7473198>. For the latter we have updated the wiki, where previously it only had links to internal storage with urls for the download sites. Documentation for the Indian subcontinent and SE Asia domains already had links to the external file locations and the coordinates file was similarly already hyperlinked.

The reviewer raised a specific query about river forcing in the SEVERN SWOT example being incomplete. Since the worked examples presented in the paper are not necessarily static (though the DOIs point to specific releases), we have been able to update the documentation with recent development in the SEVERN-SWOT case study which includes modifications to run with wetting & drying and river forcing. In order to include river forcing as a worked example, we have followed and linked the methodology used in the SEAsia example. Although, this might not be the best river forcing for the Severn, it shows the methodology to be used, and the data can easily be switched if a user has a preferred source.

Minor edits:

- Line 257 xarray repeated

Done

- Line 248 workflows.... that abstract (no s on abstract)

Done

- Line 405 important to ensure that straits are not connected on the diagonal only (no flow that way) and that important islands have not been remove. Using (and keeping) a script (even a complicated one) to manipulate your bathymetry means that it is reproducible.

Agreed. There is an example in the SEVERN-SWOT documentation. So this is pointed to.

- Line 562 such as biogeochemistry (s missing on as)

Done

- Line 605 spell out MJO

Done

- Line 633 10 m is very deep for mixing freshwater in my coastal experience. Plumes (Rhine, Columbia etc) are not 10 m thick

Agreed. Using a 10m mixing depth was a pragmatic response to stability issues when using biogeochemical and physical river variables. We confess to never getting to the bottom of this issue and are cautious about interpretation of simulation near the coastline. We have amended the text to make this clearer:

“In all our mid latitude and tropical applications with biogeochemistry we mixed the freshwater over the top 10m, for numerical stability.”

- Line 704 input files (no s on input)

Done

- Line 730 in strong tidal mixing areas, with good vertical resolution, the vertical CFL number can also be a problem

Agreed. This is easily overlooked. A caution about vertical CFL criteria is added for shallow tidal regimes.

- Line 916 this scheme exists (no s on scheme)

Done

- Line 957 and on: this level of detail, mentioning specific variables, is much higher than other sections of the paper, I suggest abstracting it to match the rest of the paper.

Agreed. Removed lines making specific mention of parameter names. These are introduced more thoroughly in the linked WED025 Demonstrator.

- Line 970 source needs (s on need)

Done

- Line 998 and on: Lagrangian (with a capital as Lagrange was a person)

Done

- General quibble: The paper stresses consistent boundary conditions, river forcing, atmospheric forcing. I agree that consistent helps avoid some bizarre errors. However, the coastal ocean is very much a receiver of forcings and accurate forcing can be really key for some processes in any given region.

We press the point about consistency only in the river section. However, the point that data quality may trump data consistency for some processes is more generally true. For example if biogeochemical data boundary conditions are required then physics plus biogeochemistry boundary data will almost certainly come only be available at a lower resolution compared to sourcing physics-only boundary conditions.

Because this advice is more generally true, and in agreement with the reviewer, we have revised the text accordingly line 629:

“However, while consistent forcing is desirable, a dataset with a range of consistent variables may be lower accuracy than e.g. a region specific flow only dataset. In some strongly forced applications, forcing accuracy in specific variables maybe more important than consistency across all forcing variables. See SANH for an example that generates river forcing from different sources, and section 4.1.3 for specific guidance on constructing riverine biogeochemical fluxes.”