

Interactive comment on “Doppio – A ROMS-based Circulation Model for the Mid-Atlantic Bight and Gulf of Maine: Configuration and comparison to integrated coastal observing network observations” by Alexander Gordon Lopez et al.

Anonymous Referee #2

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General Comments

The authors clearly present the details of a new regional ocean model configuration, for the coastal, shelf and slope waters of the Mid-Atlantic Bight and Gulf of Maine – of broad interest to biological and biogeochemical applications in particular. With this in mind, the authors could refer a little more to the importance of the physics and dynamics – painstakingly evaluated – for these applications. For example, water depth shoals to just a few metres across part of Georges Bank, and a large expanse of the outer shelf here (around 200 x 100 km) is no deeper than 60 m. These shallow waters

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remain tidally mixed all year around, while the deeper surrounding waters thermally stratify during summer. The consequence is enclosure of mixed waters by a tidal mixing front, which supports a clockwise residual gyre (Chen et al. 2003). I return to this in Specific Comments below.

Reference: Chen, C., Beardsley, R.C., Franks, P.J.S., and J. Van Keuren (2003). Influence of diurnal heating on stratification and residual circulation of Georges Bank, J. Geophys. Res., 108, 8008, doi:10.1029/2001JC001245, C11.

The manuscript should nevertheless be suitable for publication in GMD, subject to minor and technical revisions in response to the following comments.

Specific Comments

1. p.3, lines 100-103: Relate the horizontal resolution (& km) to the 1st baroclinic Rossby radius in shallow stratified water at mid-latitudes, and discuss how much of the shallow dynamics is unresolved
2. p.9, lines 320-321: The water column must be stabilized in winter by salinity stratification, as noted below (p.10, lines 338-339) – this should be introduced here to avoid an impression of static instability.
3. p.10, line 352: As outlined above, water columns on Georges Bank remain fully mixed during summer. Surrounded by stratified water, horizontal density gradients across the front between mixed and stratified water support a baroclinic jet (Chen et al. 2003), presumably of consequence for pelagic and benthic fauna. How well is this simulated in Doppio?
4. Fig. 10: the indication is of seasonal stratification across Georges Bank, presumably due to area-averaging? In general, averaging across the large areas in Fig. 6 (left) will “hide” considerable spatial structure in seasonal stratification – can you justify this averaging?
5. Figs. 15, 16: Seasonal jets will not be clearly seen in long-term averages – can you

contrast winter and summer circulation, zooming in on Georges Bank? (an additional figure)

Technical Corrections

1. p.7, line 223: “reference datum”
2. p.13, line 441: “in the face of”
3. Figure 6: explain the dashed contours (labelled 0.5, 1.0)

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2019-359>, 2020.

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