

## ***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**

Received and published: 27 May 2020

### 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

C1

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

C2

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.