• The following slides are basically a set of talking points to illustrate the qualitative circulation and dynamical balance of the MAB and Slope Sea
• Several of these features complicate modeling, data assimilation, and altimetric observations efforts
• Mesoscale and subsurface structures are illustrated
• The extensive observing systems in operation are highlighted so we can potentially discuss how best to use these complimentary data to evaluate how to best reprocess coastal altimetry, or use in concert with altimetry to constrain data assimilative analyses
• Slides show:
  – Qualitative mean circulation pathways
  – Climatological T,S and shelf/slope front
  – Mesoscale variability in the slope sea
  – Submesoscale coastal T/S from gliders
  – CODAR, repeat ADCP Oleander, VOS XBT/CTD Argo
  – IOOS networks
  – Tides
Geography and schematic circulation in the GoM-MAB. Lines on the shelf (blue) indicate the generally southwestward flow from Scotian Shelf to the MAB. Other lines (red) depict the currents that define the Slope Sea gyre, and the dashed line is the mean position of the Gulf Stream.
Lozier and Gawarkiewicz, 2001
Figure 1: Map of the Middle Atlantic Bight showing selected mean wind stress (gray) and mean depth-averaged current vectors (black). The 50-m, 100-m, and 1000-m isobaths, and the approximate location of the Oleander line are also shown.

Figure 2: Schematic of the two-dimensional model setup. The model assumes a geostrophic interior and vertically mixed surface and bottom boundary layers of constant thickness $\delta^s$ and $\delta^b$ respectively. The thin lines are isopycnals and the bottom slope is $h_b$. The inferred mean cross-shelf circulation is also shown with offshore flow $u^s$ in the surface boundary layer, onshore flow $u^b$ in the interior, and divergent flow $u^d$ in the bottom boundary layer with onshore flow near the coast increasing to offshore flow as the water depth increases. Vertical velocities suggested by convergences and divergences in cross-shelf flow are also shown.

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Figure 2. A climatological plan view of a) temperature and b) salinity in the depth range 40-55 m during summer. The shelfbreak front is the boundary between fresher (<34 PSU) shelf water and more saline slope water (between the light blue and yellow salinities in (b)).

Figure 3. A cross-shelf section from the climatology of the shelfbreak front. The front is between the solid vertical lines in (b). This is a summer average.
Surface currents from Maximum Cross-Correlation analysis of AVHRR and ocean color image pairs

7-day composite MCC (black vectors)
Altimetry (white vectors)
RU Endurance Line glider transect May 18-24, 2006
CODAR Daily Average Currents
- NWS WFOs
- Std Radar Sites
- Mesonet Stations
- LR HF Radar Sites
- Glider AUV Tracks
- USCG SLDMB Tracks
- NDBC Offshore Platforms
Eulerian mean alongshore velocity from de-ringed Oleander ADCP measurements from 1993 through 2002.