Supporting Information for "An evaluation of eight global ocean reanalysis for the Northeast U.S. continental shelf"

Alma Carolina Castillo-Trujillo[1], Young-Oh Kwon [1], Paula Fratantoni[2], Ke Chen[1], Hyodae Seo[1], Michael A. Alexander[3], Vincent S. Saba[4]

[1]Department of Physical Oceanography, Woods Hole Oceanographic Institution

[2]NOAA Fisheries, Northeast Fisheries Science Center, National Marine Fisheries Service

[3]National Oceanic and Atmospheric Administration, Physical Sciences Laboratory

[4]National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Geophysical Fluid Dynamics Laboratory, Princeton University

[1]Woods Hole, MA, United States

[2]Woods Hole, MA, United States

[3]Boulder, Colorado, United States

[4]Princeton, New Jersey, USA

Contents of this file

1. Figures S1 to S8

Introduction

This supporting information provides the monthly time series of surface temperature from the National Data Buoy Center (NDBC) buoys and reanalysis interpolated into the observation's location in Fig. S1. Observations and reanalyses have been detrended

and their seasonal cycle removed before producing the comparisons. The Taylor diagram from Fig. S1 is shown in Fig. S2. The time series of subsurface temperature from the Gulf of Maine Ocean Observing System (GoMOOS) mooring at 1 m, 20m and 50 m are found in Figs. S3, S4 and S5. Fig. S6 shows the temperature trends calculated from the Oleander XBT temperature profiles and the GoMOOS subsurface temperature moorings. Figs. S7 and S8 show the time series of yearly averaged surface and bottom temperature and salinity from the NOAA Northeast Fisheries Science Center (NEFSC) Ecosystem Monitoring (ECOMON) averaged over the Eastern Gulf of Maine (EGOM), Western Gulf of Maine (WGOM), Grand Banks (GB), Northern Mid Atlantic Bight (NMAB) and Southern Mid Atlantic Bight (SMAB). The time series of monthly sea surface height from tide gauges in the Northeast U.S. Shelf (NES) are found in Fig. S9. The seasonal cycle has been removed and detrended before producing the time series. The location of all observations shown here is shown in the primary manuscript in Fig. 1b.

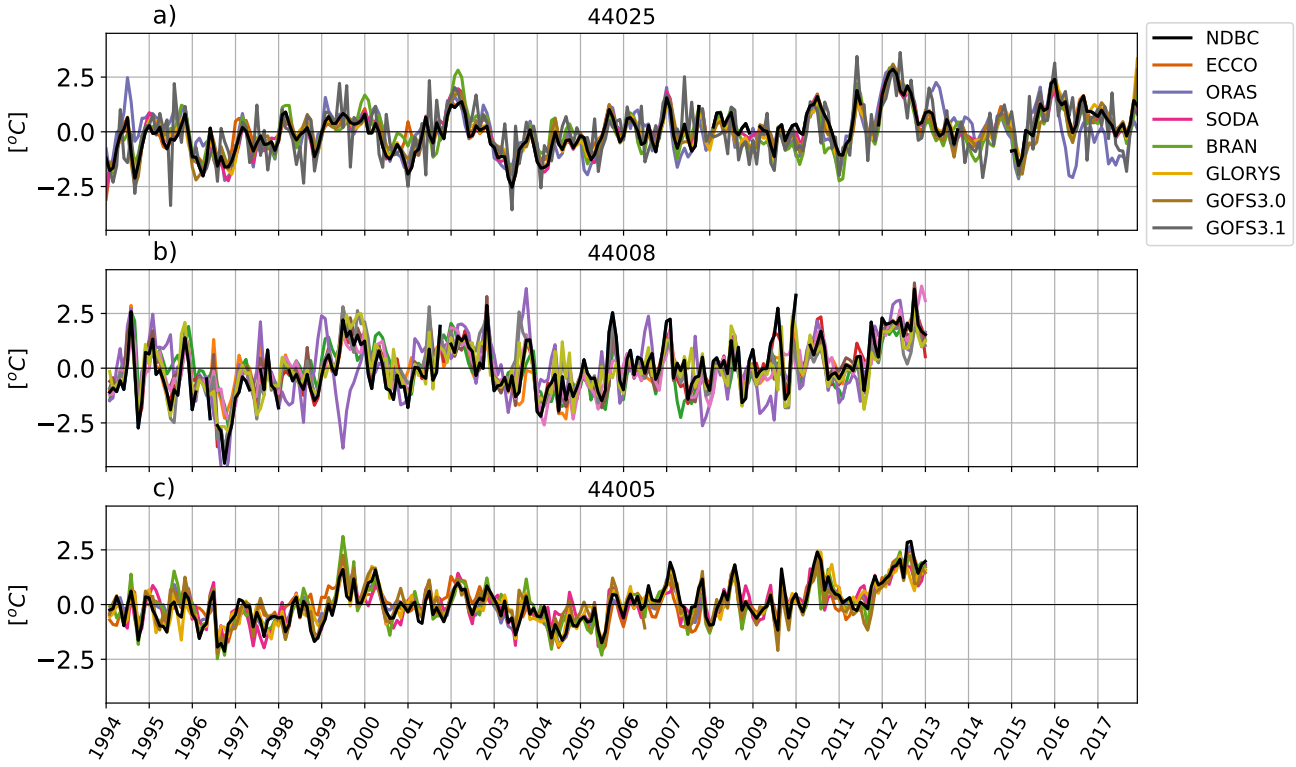

Figure S1. Time series of monthly surface temperature anomalies from the National Data Buoy Center (NDBC) at three buoy locations in the Northeast U.S. Shelf (NES) and the reanalysis interpolated into the observations for buoys 44005 in the Gulf of Maine (a), 44008 in Nantucket (b), and 44025 in Long Island (c). Locations shown in Fig. 1b, main text.

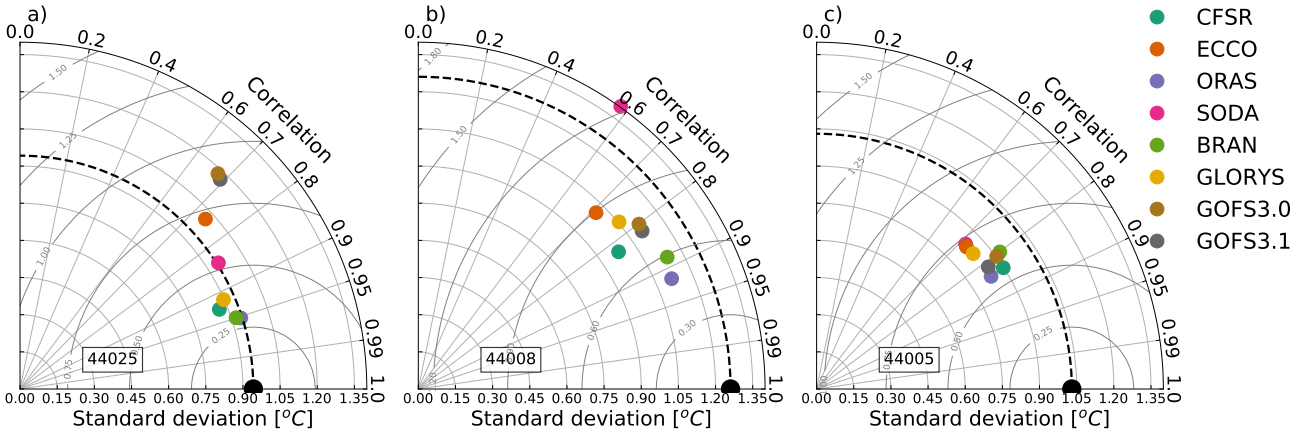

Figure S2. Taylor diagrams for the comparisons of reanalyses and observed surface temperature from the time series shown in Figure S1 for buoys 44005 in the Gulf of Maine (a), 44008 in Nantucket (b), and 44025 in Long Island (c). Locations shown in Fig. 1b, main text. The radial coordinate of the Taylor diagrams is the standard deviation, the angular coordinate is the correlation (r), and the RMSE is proportional to the distance from observations and it is shown as grey contours.

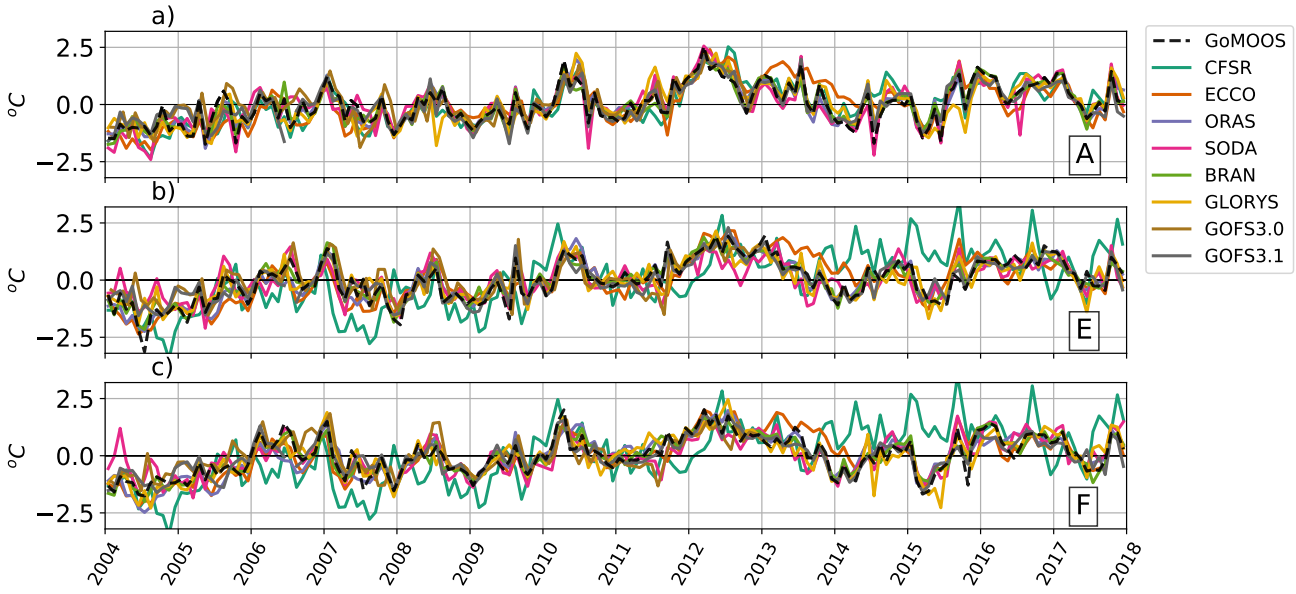

Figure S3. Time series of monthly temperature anomalies at 1 m depth from the Gulf of Maine Ocean Observing System (GoMOOS) moorings at three locations (locations shown in Fig. 1b, main text) and the reanalysis interpolated into the observations for mooring A (a), mooring E (b), and mooring F (c).

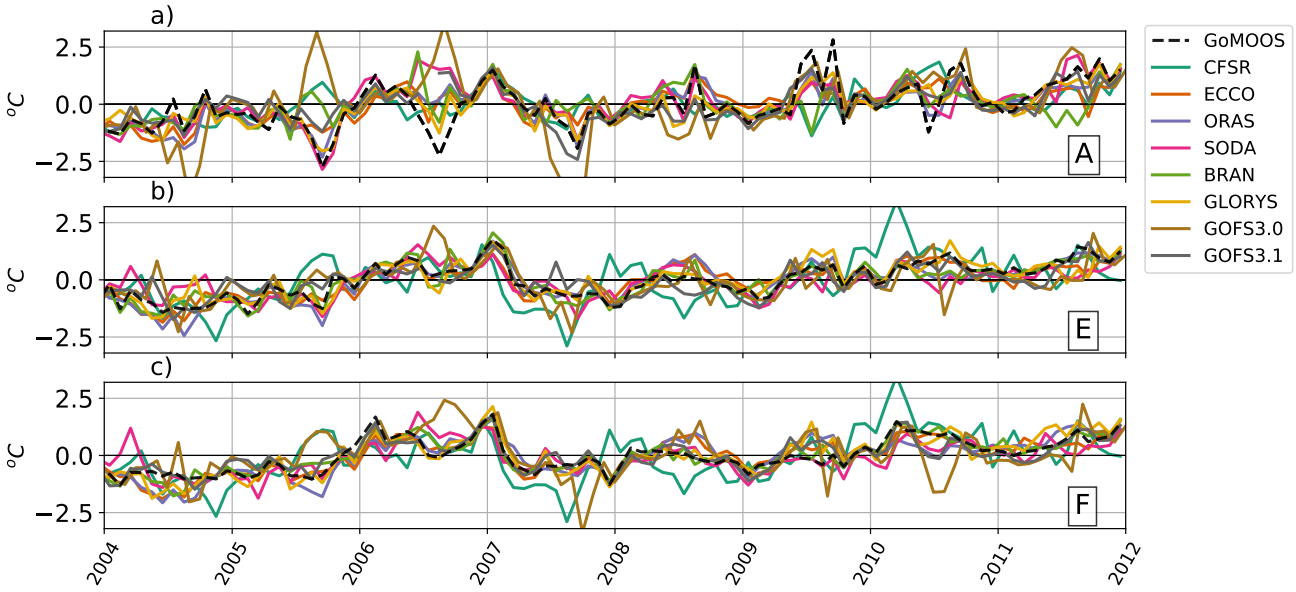

Figure S4. As in Figure S3, but for the 20 m.

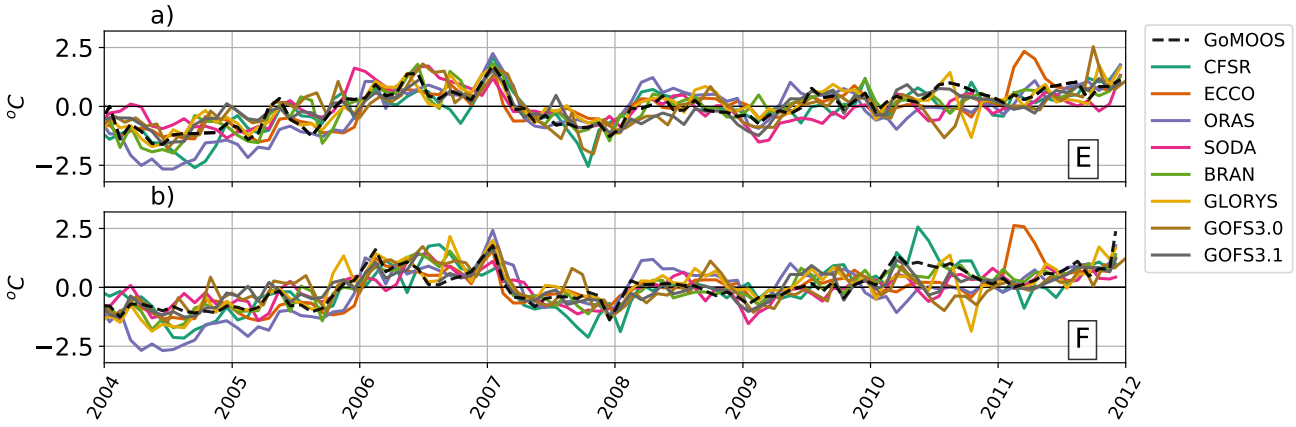

Figure S5. As in Figure S3, but for 50 m from mooring E (a) and mooring F (b).

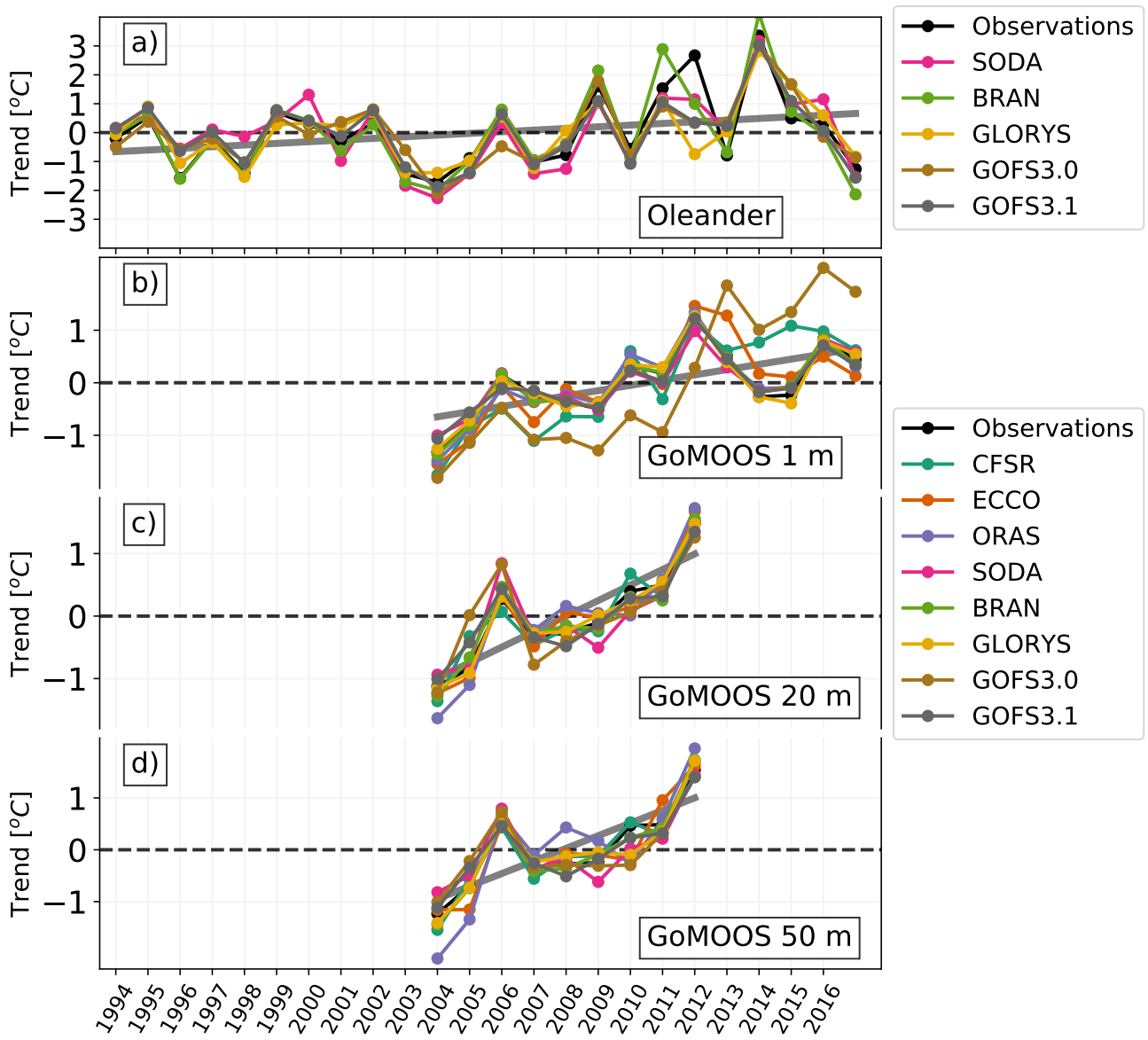

Figure S6. Time series of temperature trends calculated by removing the (a) mean of 1994 to 2017 from the Oleander XBT temperature profiles shoreward of the 200-m isobath, (b) the mean of 2004 to 2017 from the GoMOOS temperature moorings at 1 m depth, and the mean of 2004 to 2012 from the GoMOOS temperature moorings at 20 m (c) and 50 m (d) depths. Observations are shown in black and reanalyses are shown in color. The solid thick lines denote the linear trend computed from the temperature observations shown in each panel.

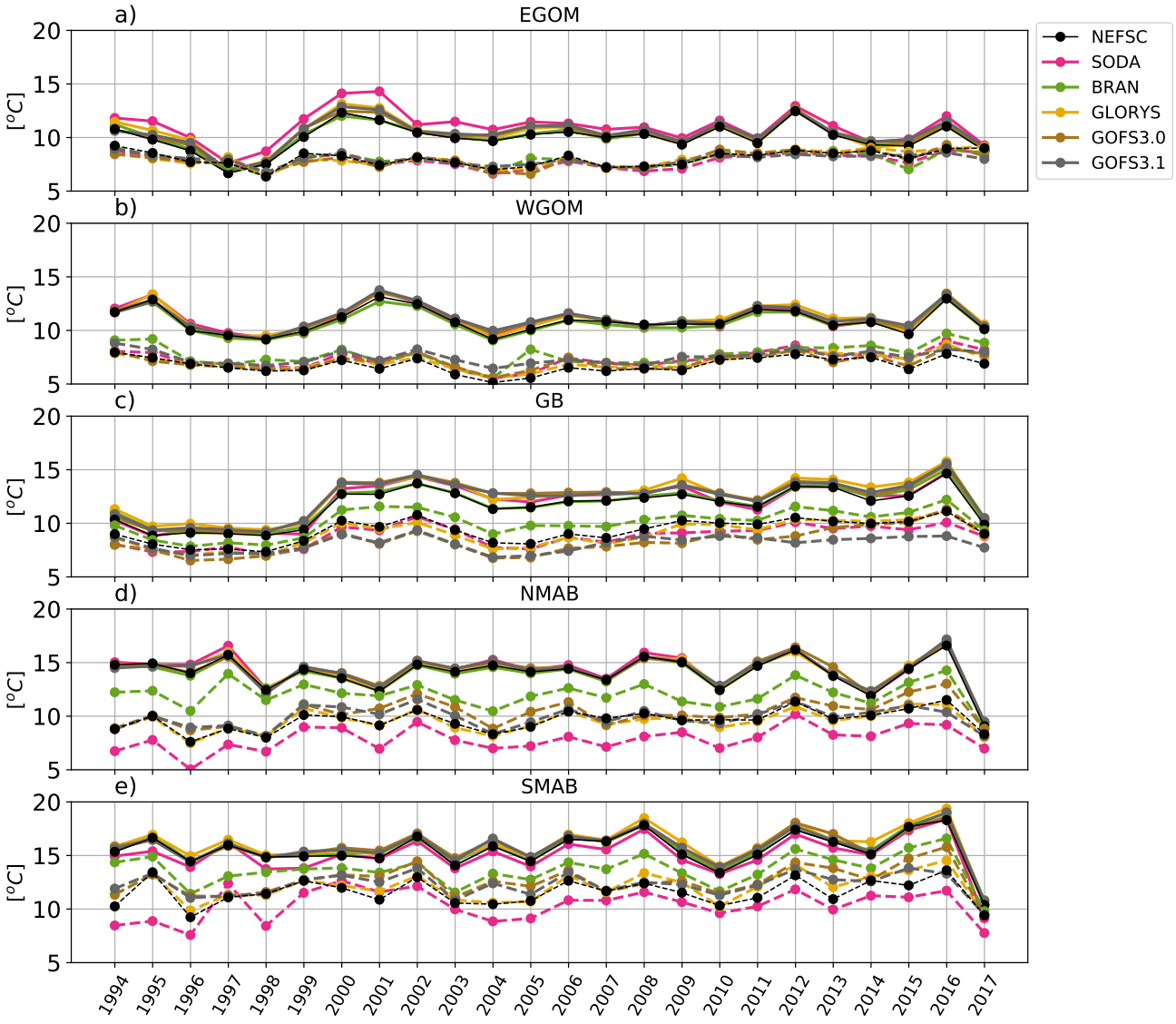

Figure S7. Time series of yearly averaged surface (solid line) and bottom (dashed line) temperature from the NOAA Northeast Fisheries Science Center (NEFSC) Ecosystem Monitoring (ECOMON) programand reanalysis for the 5 regions within the Northeast U.S. Shelf (NES) shown in Fig. 1b (main text); a) EGOM (Eastern Gulf of Maine), b) WGOM (Western Gulf of Maine), c) GB (Grand Banks), d) NMAB (Northern Mid Atlantic Bight) and e) SMAB (Southern Mid Atlantic Bight).

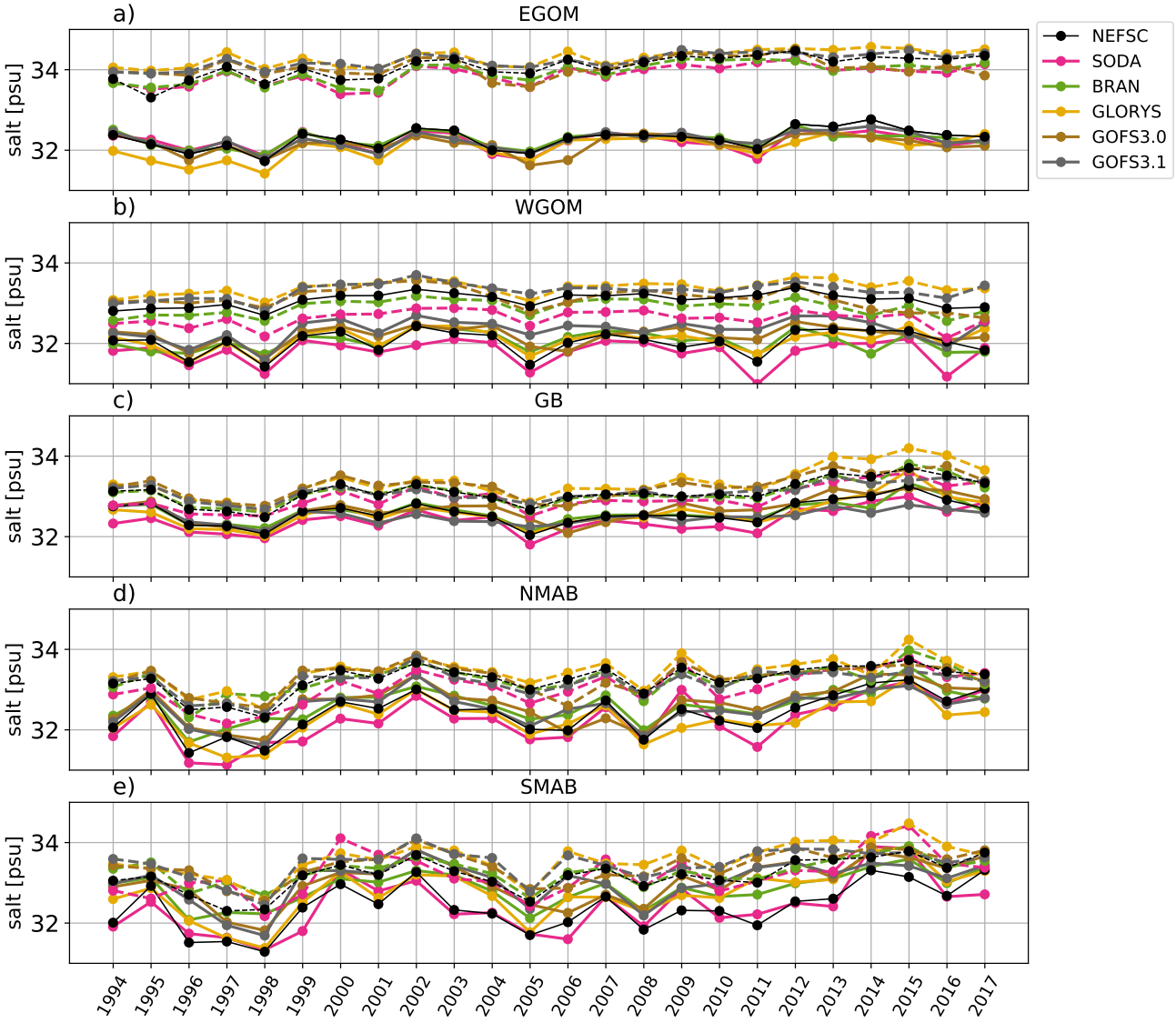

Figure S8. As Fig. S6 but for surface and bottom salinity.

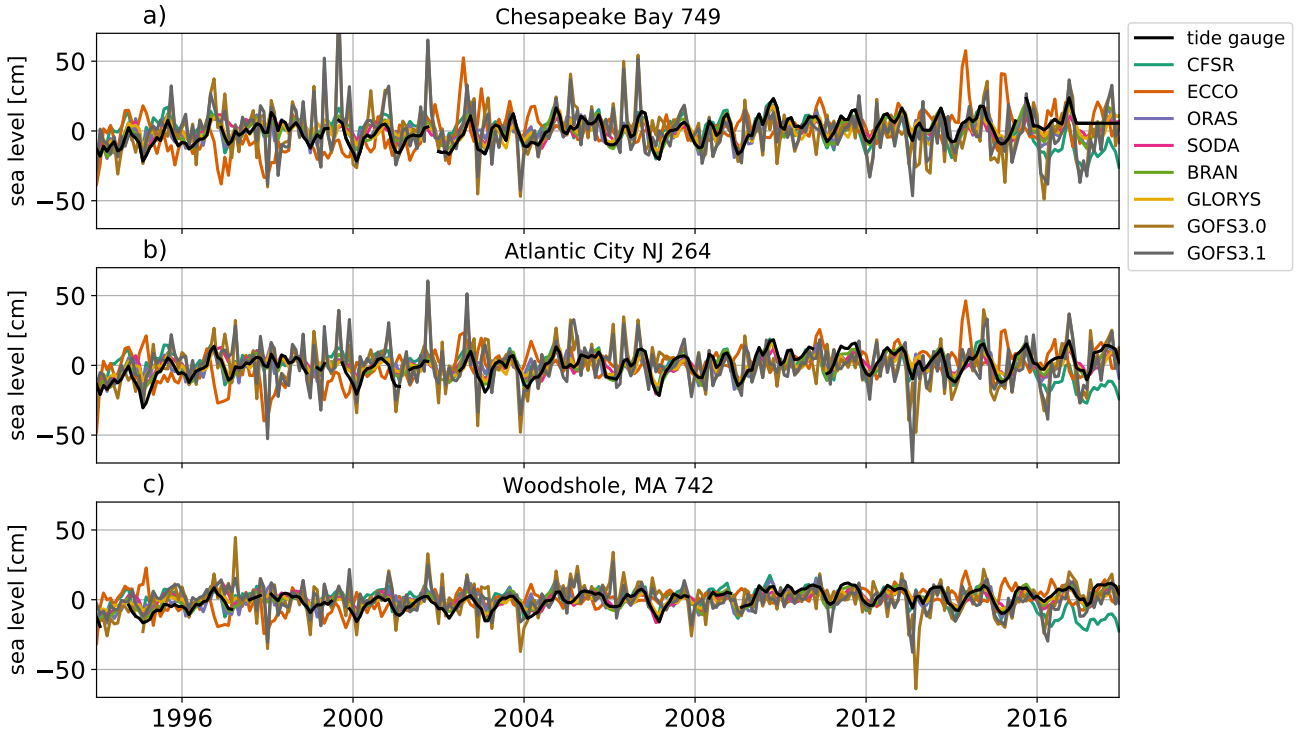

Figure S9. Time series of monthly sea surface height anomalies from tide gauge stations and reanalysis from Woods Hole, Ma (Fig. S8a), Atlantic City, NJ (Fig. S8b) and Chesapeake Bay (Fig. S8c). Locations shown in Fig 1b (main text).