Model Data quality description

This section provides supplementary details concerning the validation of model simulations through *in-situ* observations.

The ocean bottom temperature data from the models available here have undergone extensive validation against available *in-situ* observations. The CIOPS-E bottom temperature data have been interpolated onto mooring stations (Figure 1), including northern and southern legs. Similarly, the GLORYS bottom temperature data were acquired from the closest grid points to the mooring stations, as depicted by the circles in Figure 2.

The time series of averaged bottom temperature derived from CIOPS-E and GLORYS along northern and southern legs have been compared with *in-situ* observations at St. Anns Bank Marine Protected Area (MPA; Figure 3). The correlation coefficient (*r*), Root Mean Square Error (*RMSE*) and *bias* between models outputs and observations are also shown in Figure 3. In general, both CIOPS-E and GLORYS bottom temperature exhibit good agreement with observations ($r > 0.82$). Positive *bias* is noted in the both models' bottom temperatures. CIOPS-E performed slightly better than GLORYS, with higher *r* and lower *RMSE* and *bias*. CIOPS-E captures certain sudden drops in temperature, notably in March 2019 and 2021. GLORYS similarly detects these occurrences but with lesser intensity, which might be attributed to the lower spatial resolution of GLORYS (1/12 degree) compared to CIOPS-E (~ 1/36 degree).

The left panel of Figure 4 shows the bathymetry of GLORYS in the region of St. Ann Bank MPA, and the right panel the thickness of the model bottom layer at each grid point.

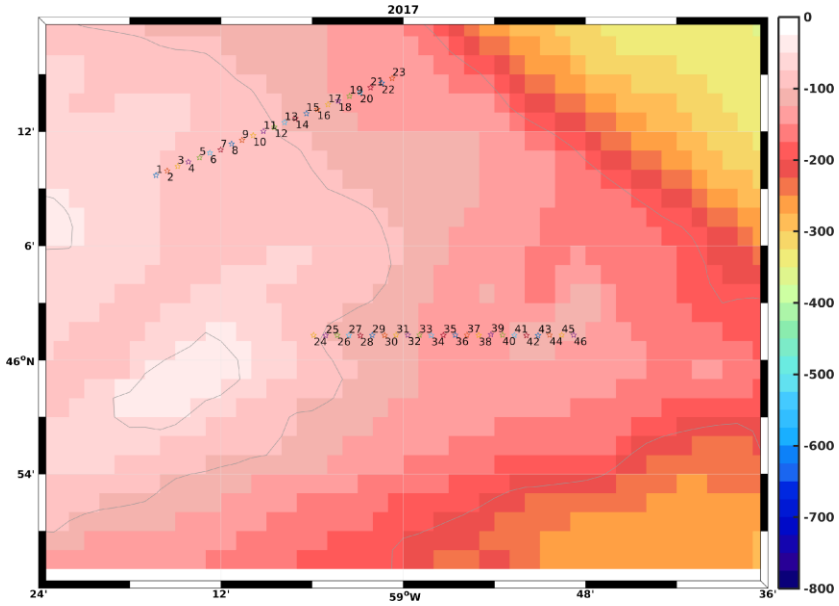
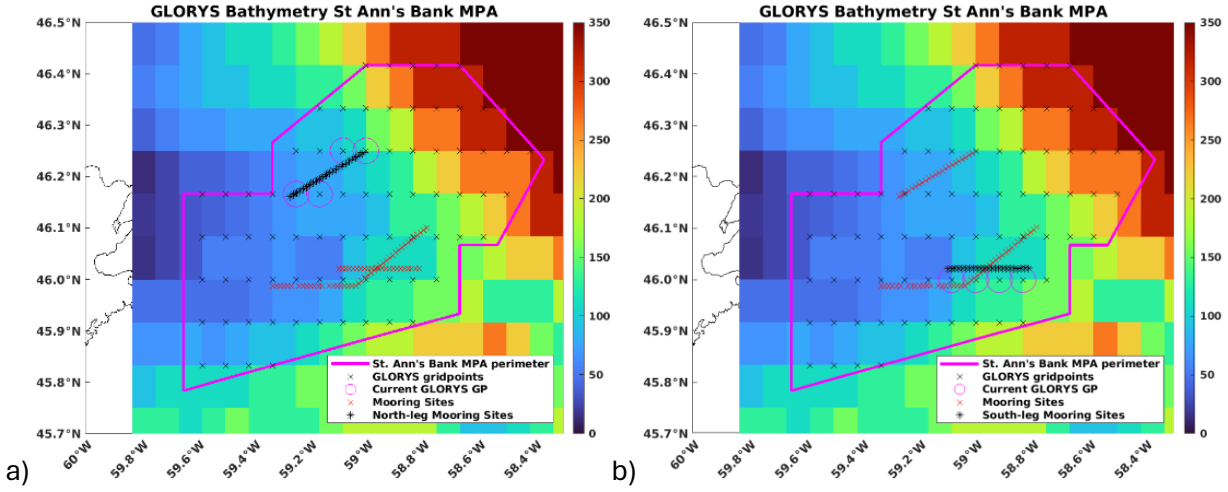


Figure 1. The positions of *in-situ* mooring stations are shown as number labeled symbols within the St. Anns Bank Marine Protected Areas, along with bathymetry data. In-situ observations were gathered along a transect, including northern (1-23) and southern (24-46) legs.



a) b)

Figure 2. Location of GLORYS grid points used for generating the time series of averaged bottom temperature along the (a) northern and (b) southern leg at St. Anns Bank.

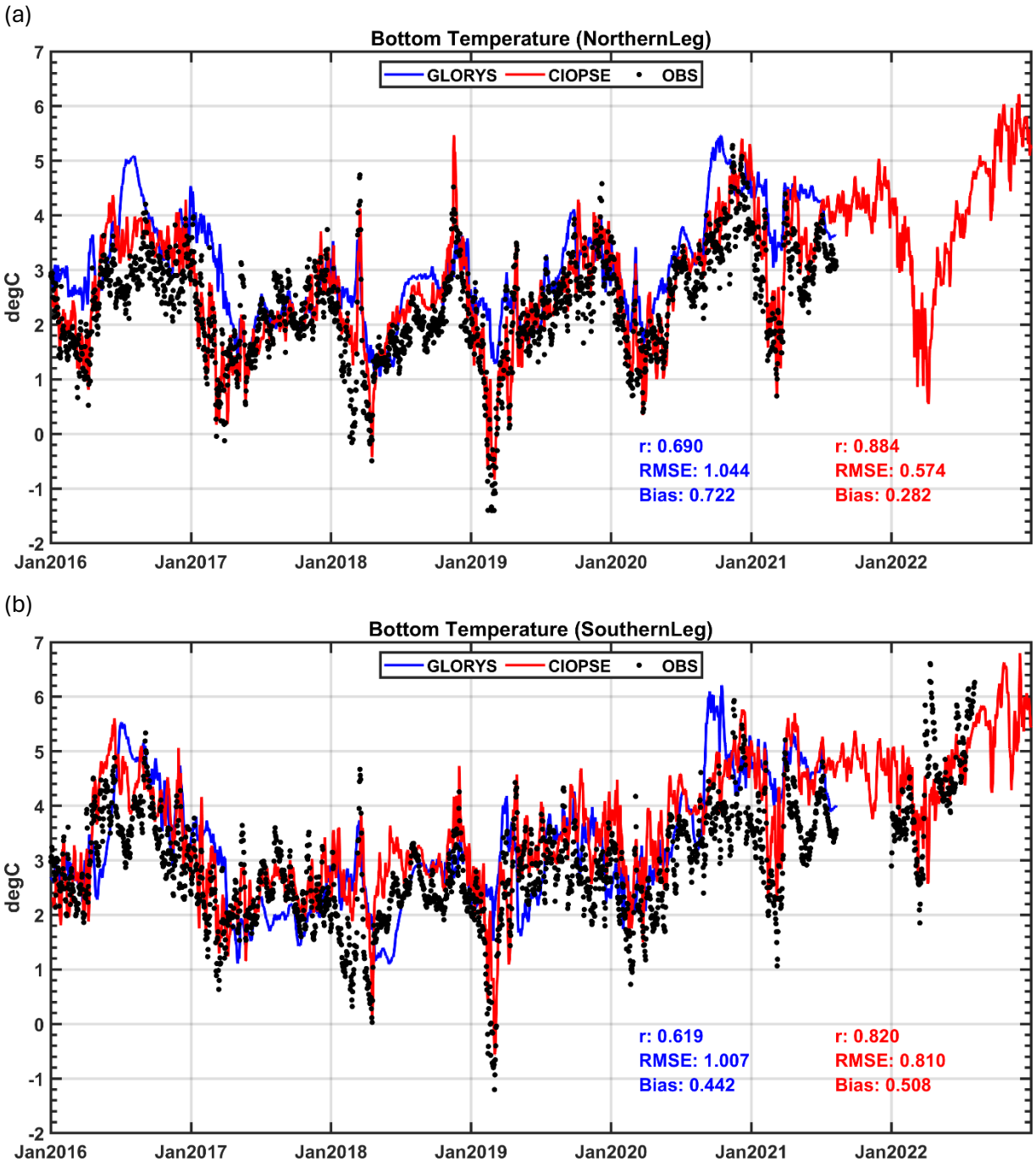


Figure 3. Time series of averaged bottom temperature derived from GLORYS (blue line) and CIOPS-E (red line) along (a) northern leg and (b) southern leg with in-situ observations (black dots) at St. Anns Bank. The correlation coefficient(r), Root Mean Square Error (RMSE) and bias between models and observations are included.

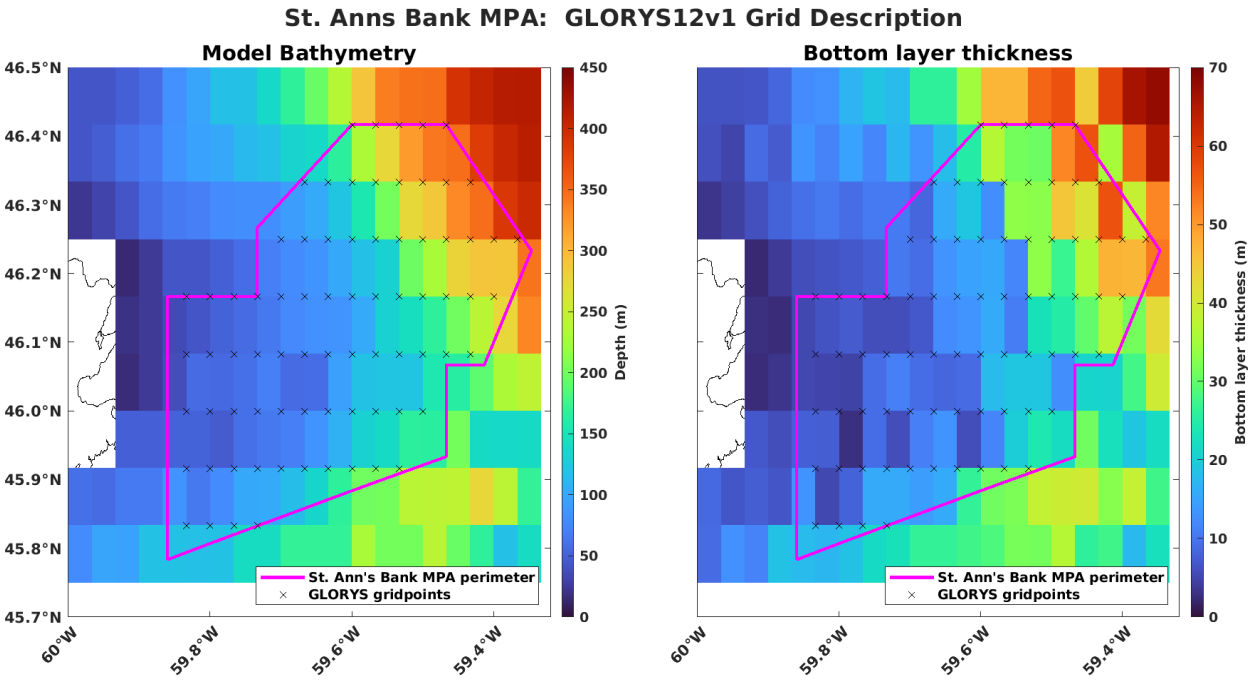


Figure 4: Left panel: GLORYS12v1 model bathymetry. Right panel: thickness of the bottom-most active model layer.