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Evaluating the Arabian Sea as a regional source of atmospheric CO_2: seasonal variability and drivers

Alain de Verneil et al.

Correspondence to: Alain de Verneil (ajd11@nyu.edu)

References

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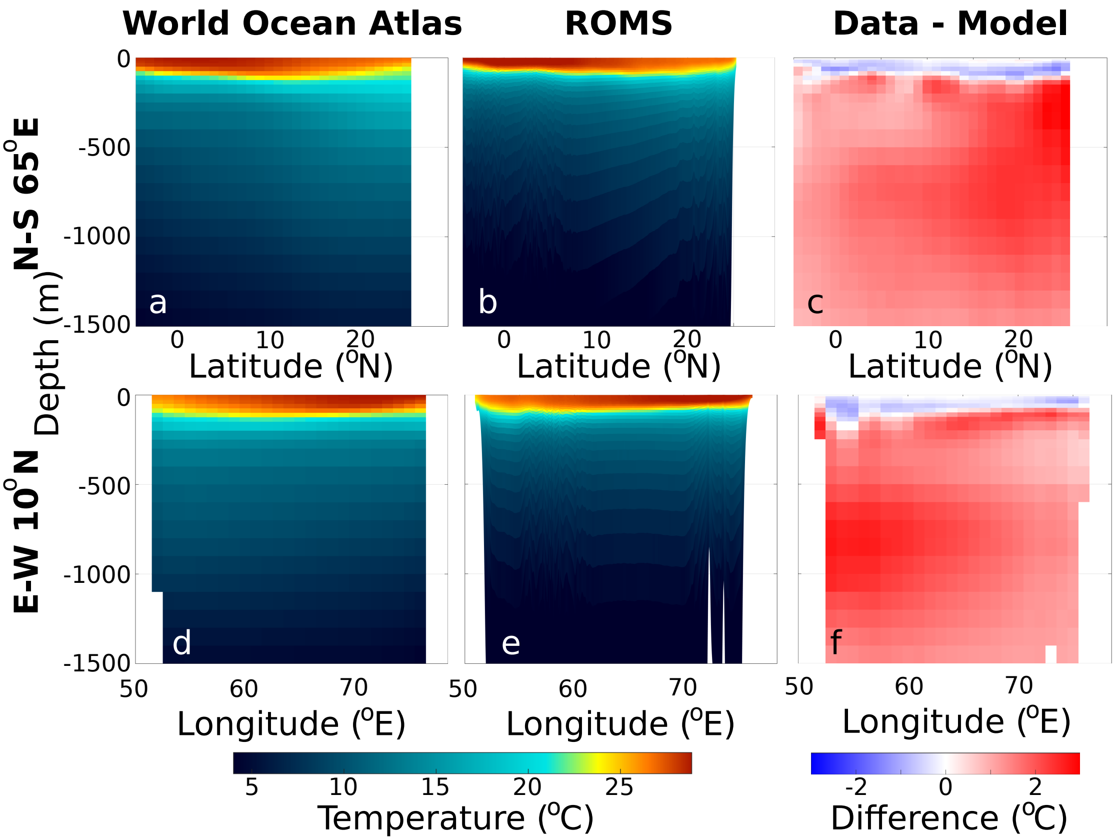
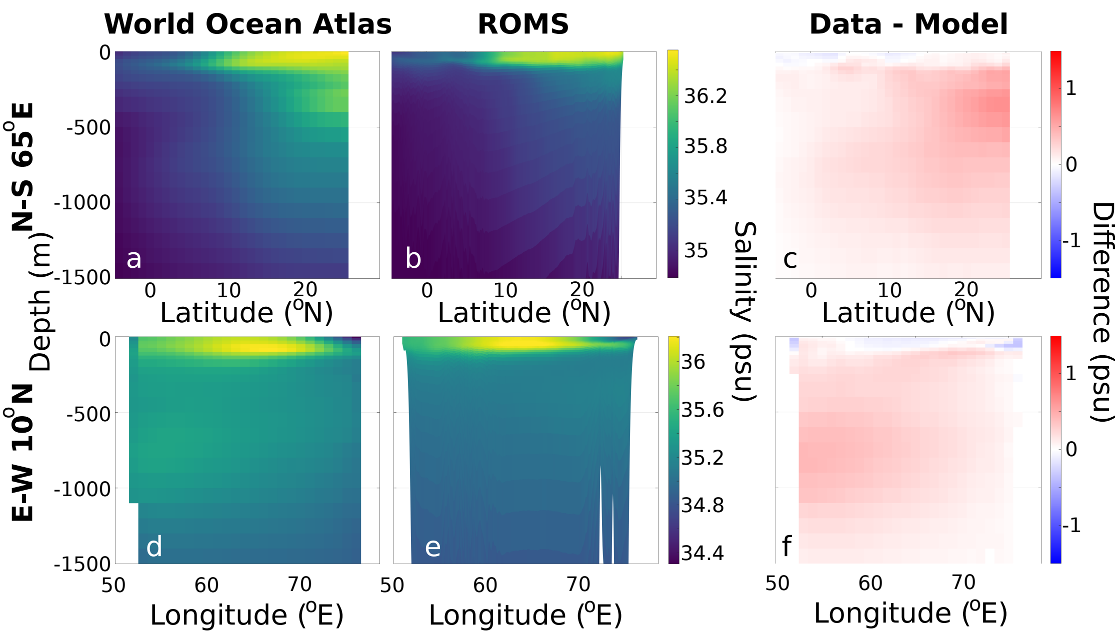
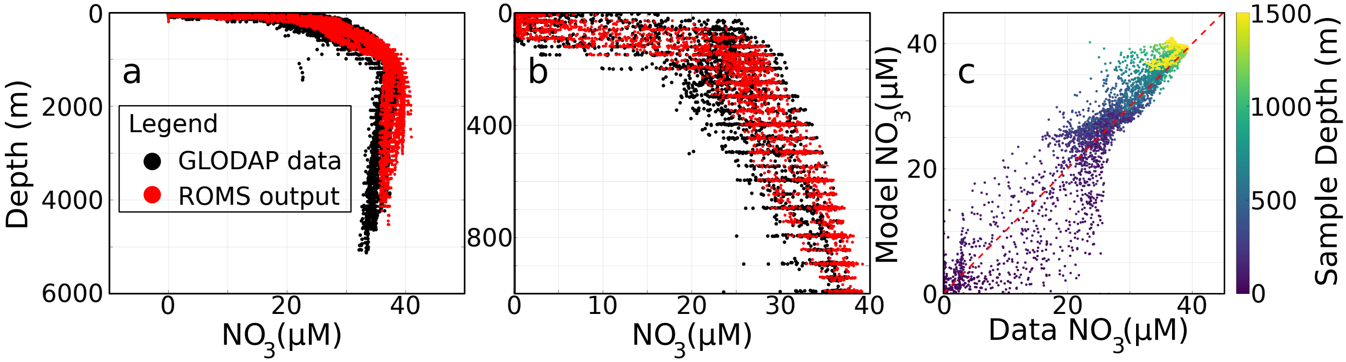
Takahashi, T., Sutherland, S. C., Sweeney, C., Poisson, A., Metzl, N., Tilbrook, B., Bates, N., Wanninkhof, R., Feely, R. A., Sabine, C., et al.: Global sea–air CO2 flux based on climatological surface ocean pCO2, and seasonal biological and temperature effects, Deep Sea Research Part II: Topical Studies in Oceanography, 49, 1601–1622, 2002.



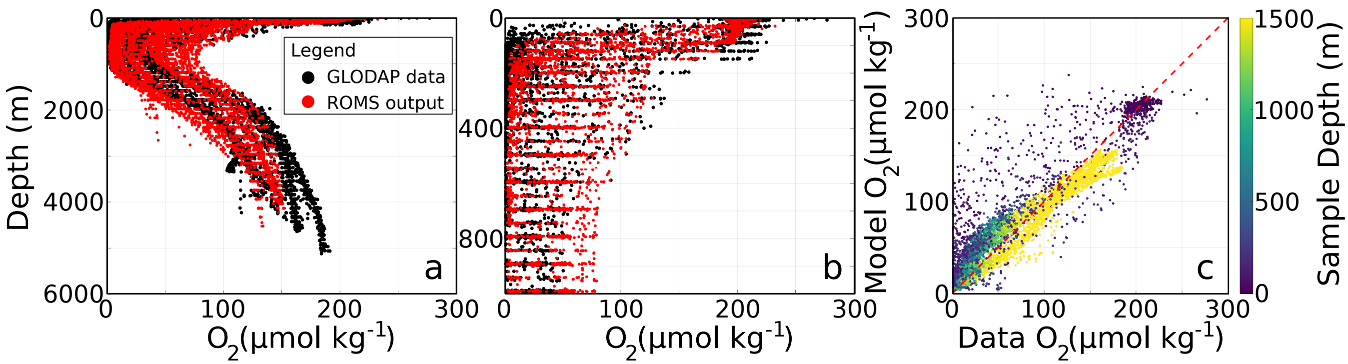
Supp Fig 1. Transects of annual mean temperature (°C in (left) WOA 2009, (middle) ROMS, and (right) their differences. First transect (a-c) is north to south, centered at 65^{o}E, with second transect (d-f) going east-west centered at 10^{o}N.



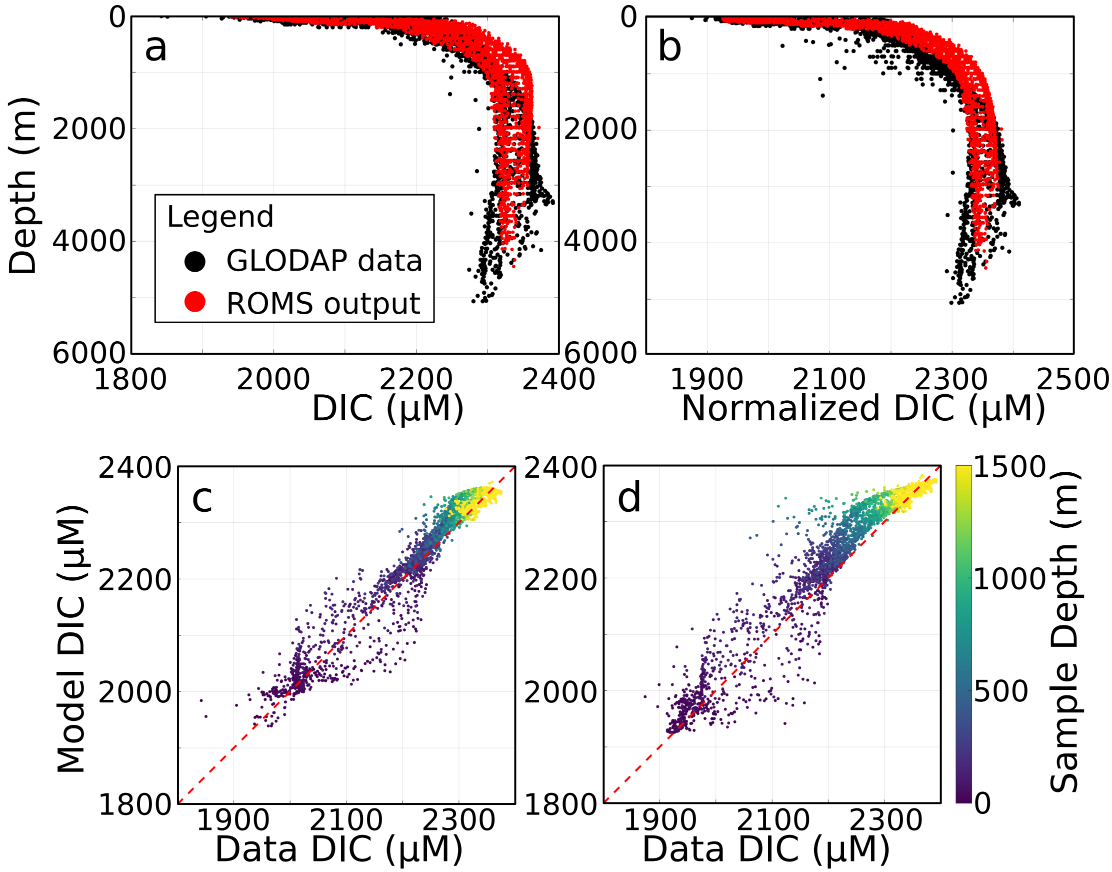
Supp Fig 2. Transects of annual mean salinity (psu), arranged similarly to Supp Fig. S1.



Supp Fig 3. (left) Scatterplot of NO_3 (μM) concentration data from GLODAP (black), and model output (red) in the model domain . (middle) Scatterplot similar to (left) zooming in to the top 1000 m. (right) Plot of model vs data NO_3, with points colored by sample depth. 1:1 line shown by dashed red line.



Supp Fig 4. Scatterplots of O_2 (μmolkg^{-1}) GLODAP data and model output, similar to Supp Fig. 3.



Supp Fig 5. Scatterplots of GLODAP and model DIC (µM, top-left) and normalized DIC (top-right). Model vs data plots (bottom) of DIC and normalized DIC, colored by sample depth similar to Supp Figs. 2-3.

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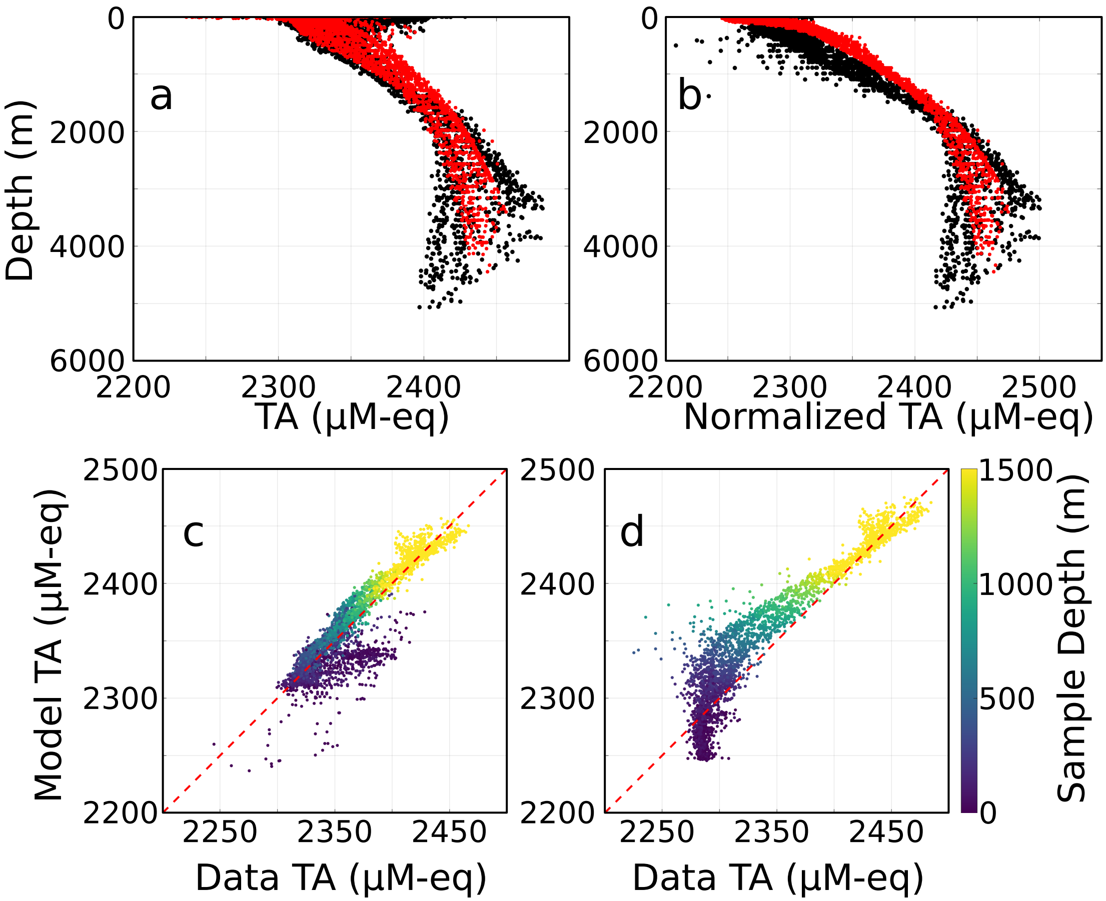
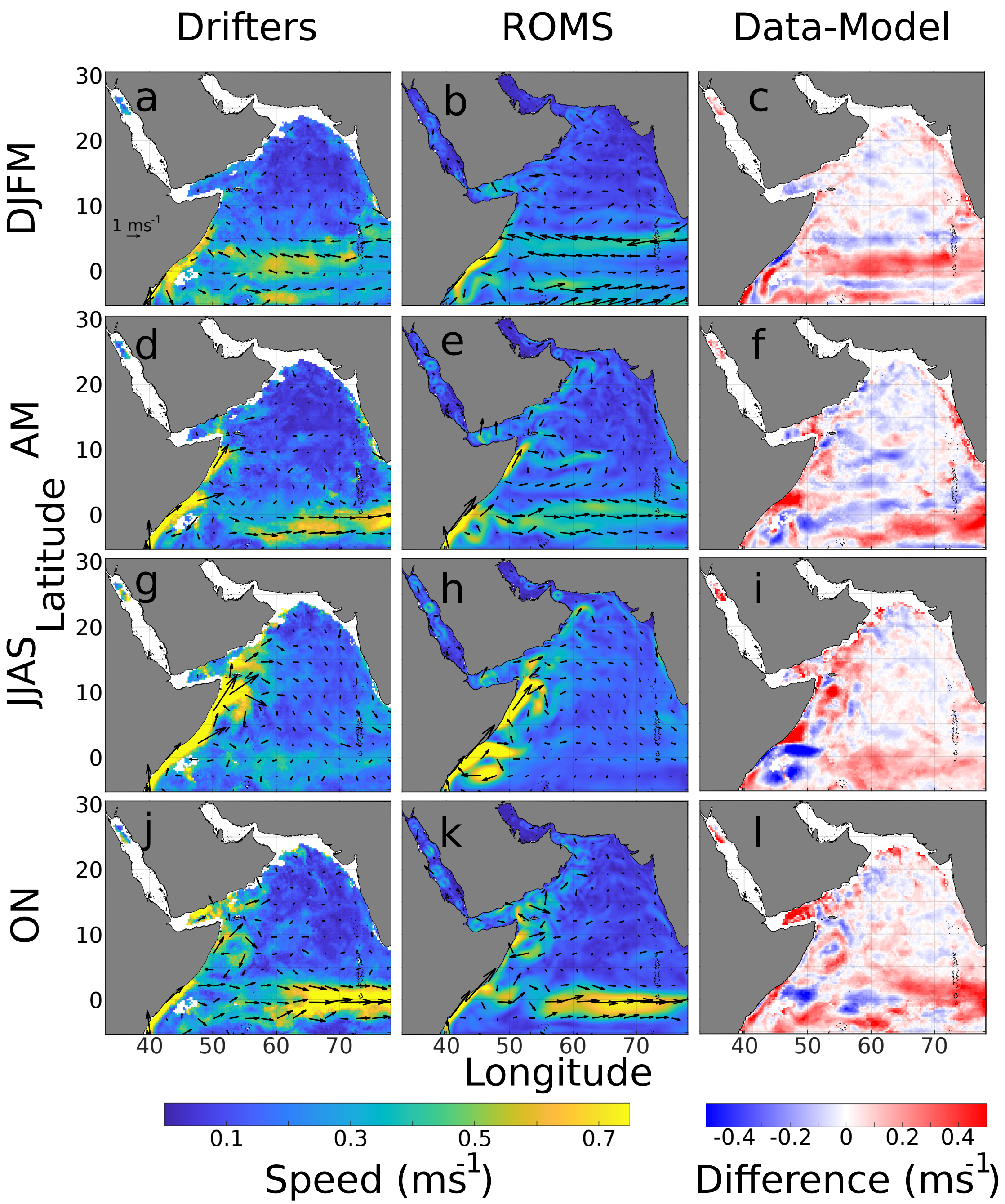
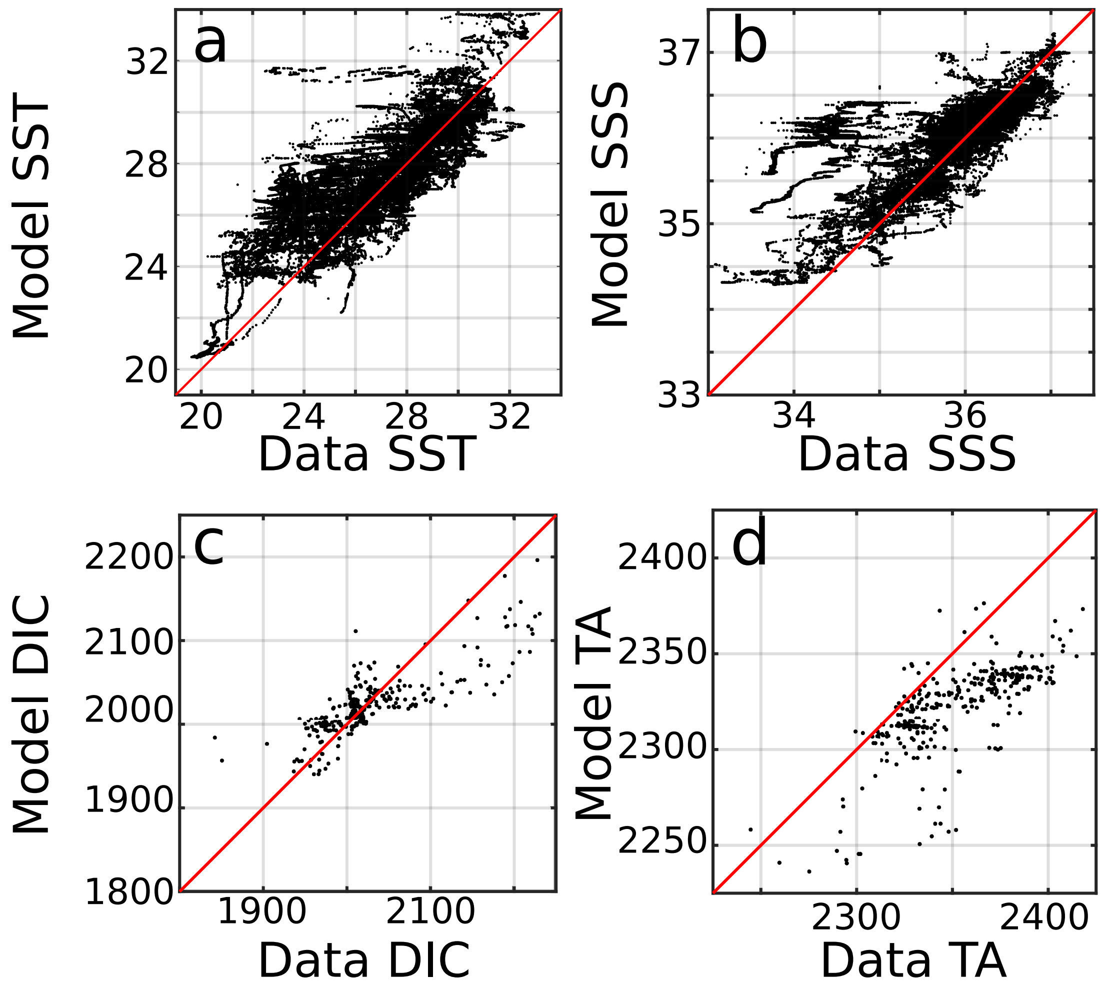


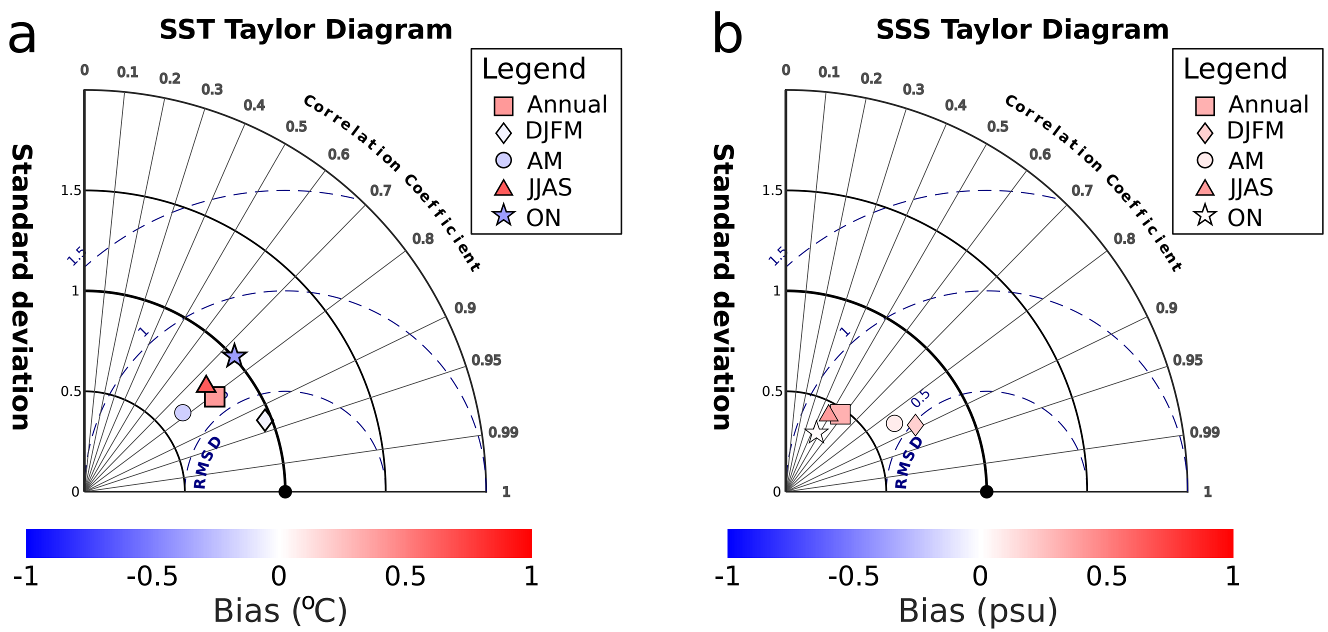
Supp Fig 6. Similar to Supp Fig. 5, but for TA and normalized TA (μM − eq).



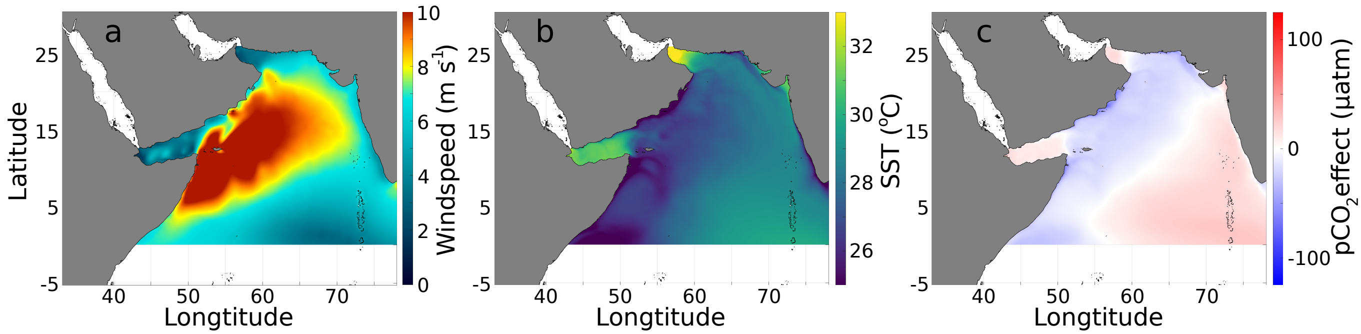
Supp Fig 7. Current speed (ms^{-1}), of (left,a,d,g,j) 15-m drogued SVP drifter climatology from Laurindo et al. (2017), and (middle, b,e,h,k) ROMS model, and their difference (right,c,f,i,l) separated into seasons starting with (a-c) winter monsoon DJFM, (d-f) spring inter-monsoon AM, (g-i) summer monson JJAS, and (j-l) fall inter-monsoon ON.



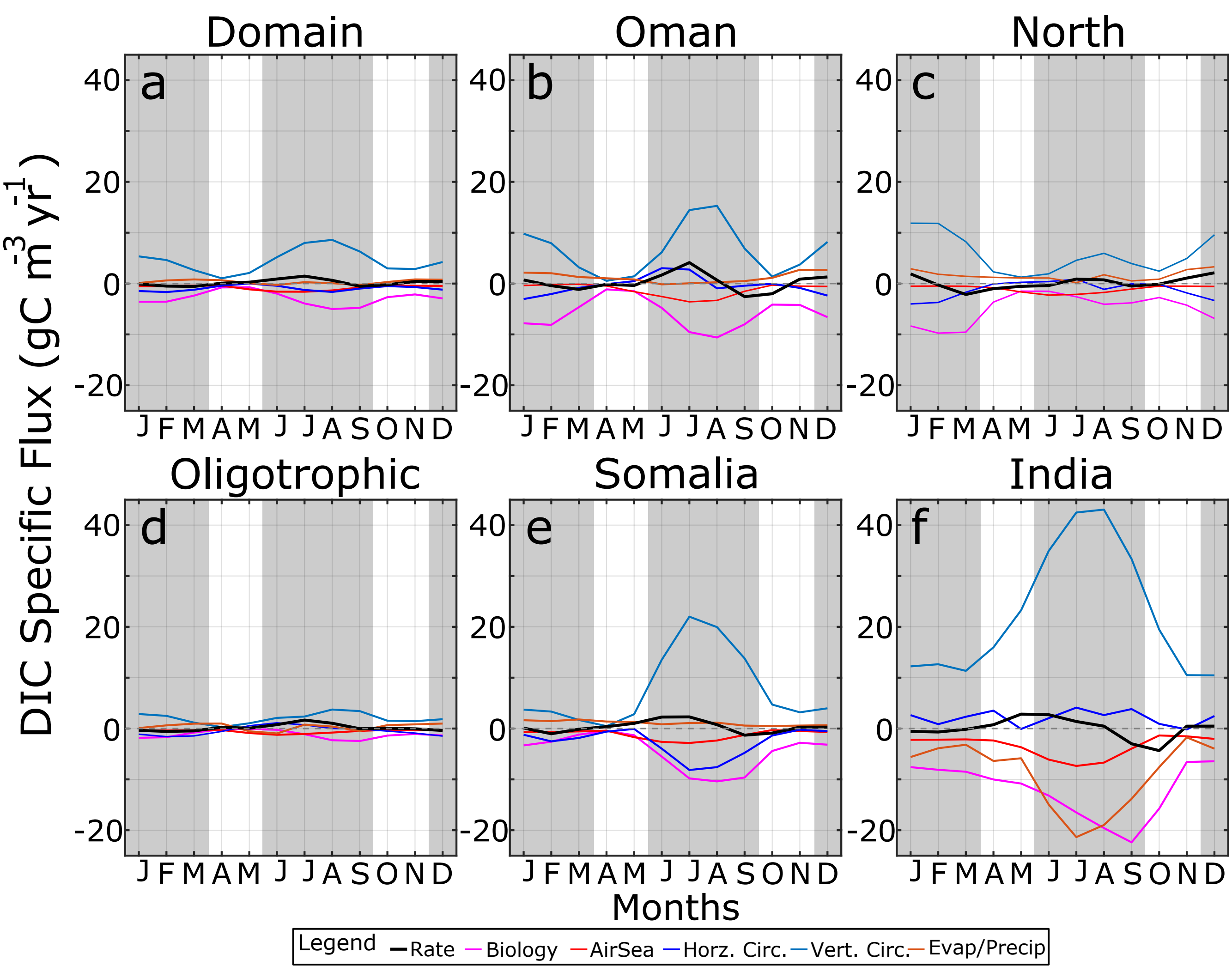
Supp Fig 8. (a) Scatter plot of SOCAT-LDEO SST vs. model SST (°C). (b) Scatterplot similar to (a) but with SSS. (c) Model DIC plotted vs. GLODAP ungridded DIC (N=334). (d) Similar to (c) but with TA. Red lines indicate 1:1 relationship.



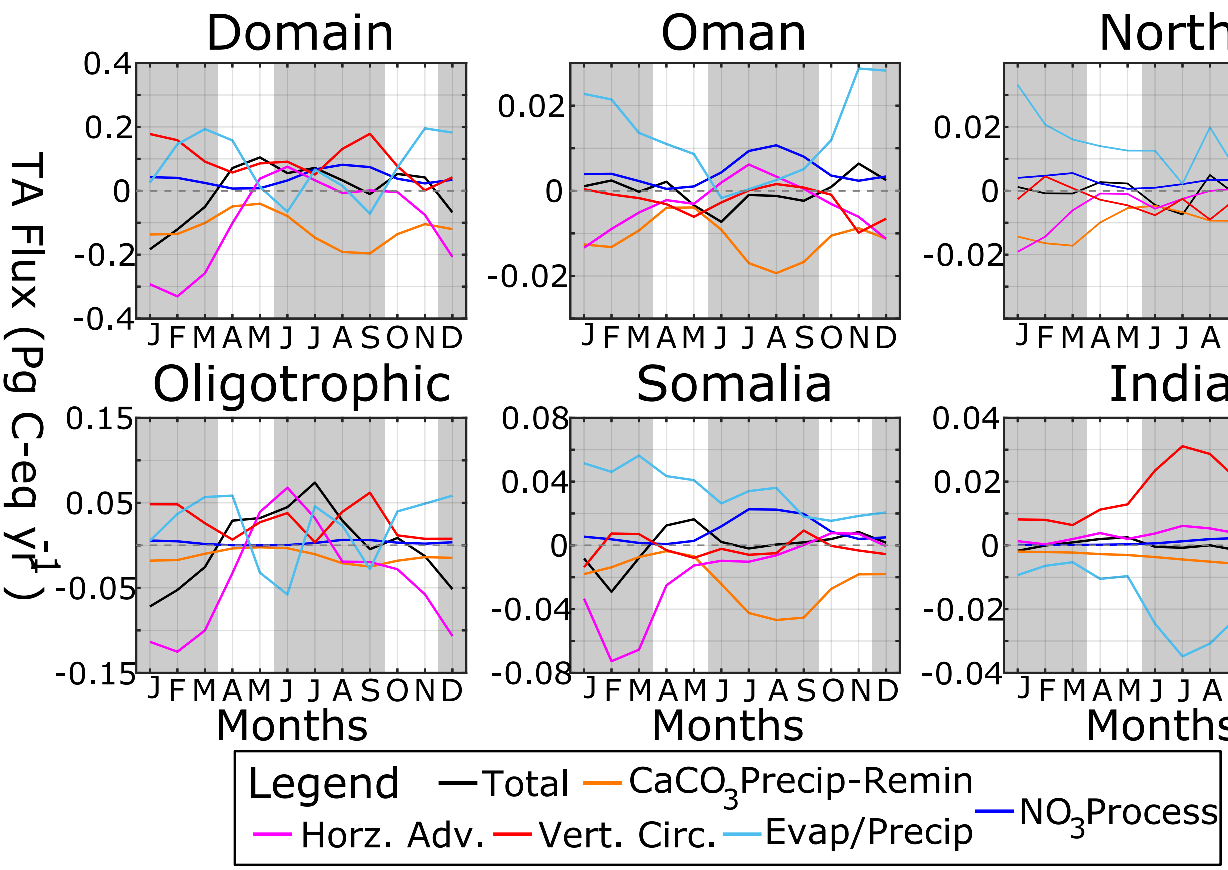
Supp Fig 9. Taylor diagrams of (a) SST and (b) SSS between SOCAT-LDEO ungridded data and model output. Symbols and coloration indicate seasons and bias, as in Fig. 4.



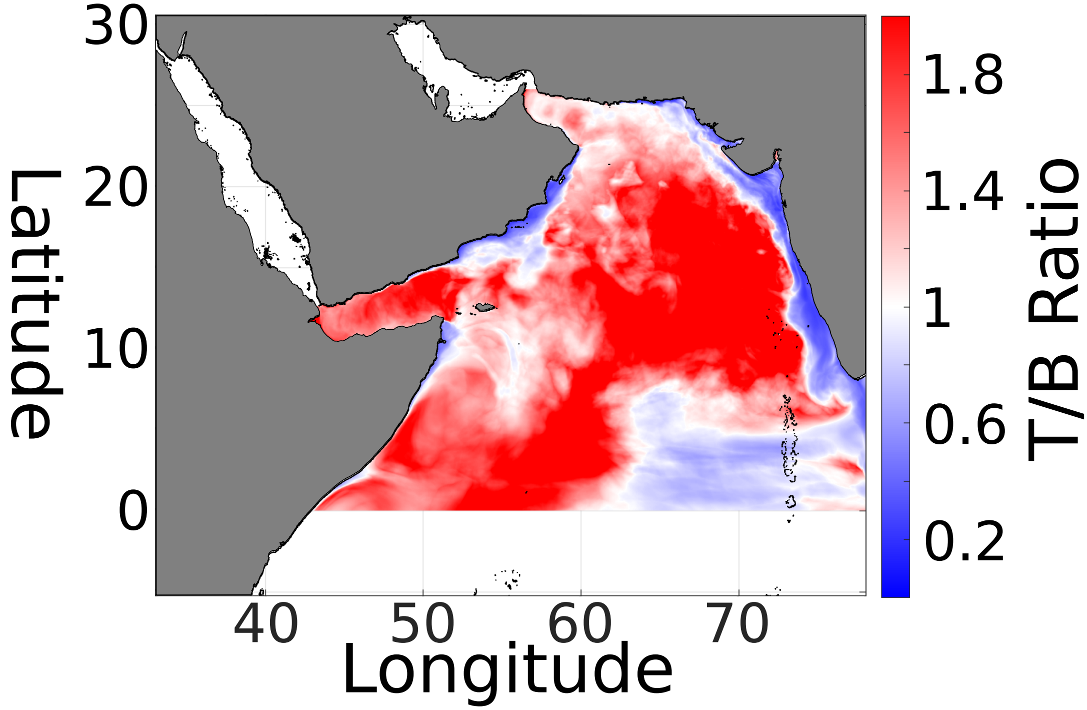
Supp Fig 10. (a) Summer JJAS mean windspeed (ms^{-1}) over the AS. (b) JJAS model mean SST ($^{\circ}\mathrm{C}$). (c) pCO_2 effect ($\mu\mathrm{atm}$) due to SST, reproduced from Fig. 10c.



Supp Fig 11. Monthly timeseries of volume-specific DIC fluxes ($\mathrm{gCm^{-3}yr^{-1}}$), arranged similarly to Fig. 12.



Supp Fig 12. Monthly timeseries of TA fluxes ($\mathrm{PgC-eqyr^{-1}}$), arranged similarly to Fig. 12.



Supp Fig 13. Ratio T/B of temperature over biological effects on pCO_2, using methodology of Takahashi et al. (2002). Ratio greater than 1 (red) indicates temperature control, less than one biological (blue) control.