

Supplementary material for *Globigerinoides ruber* morphotypes in the Gulf of Mexico: a test of null hypothesis

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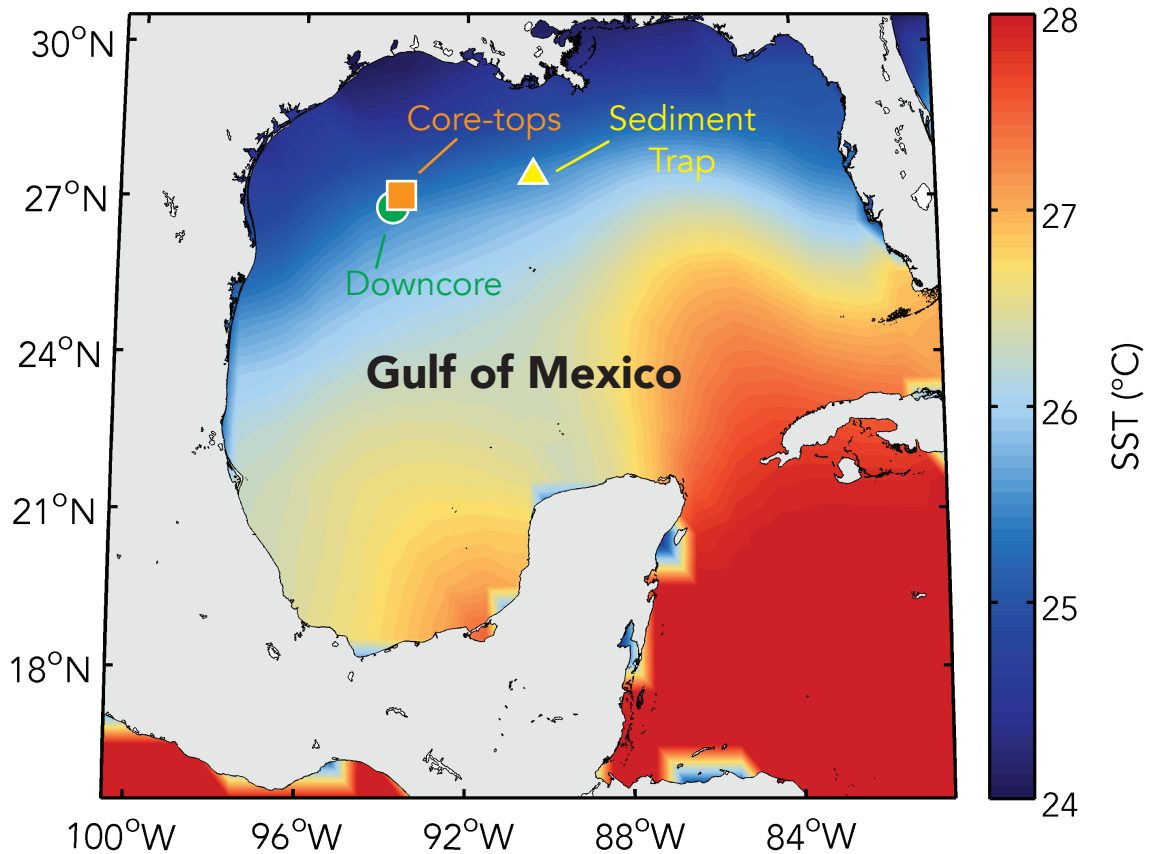
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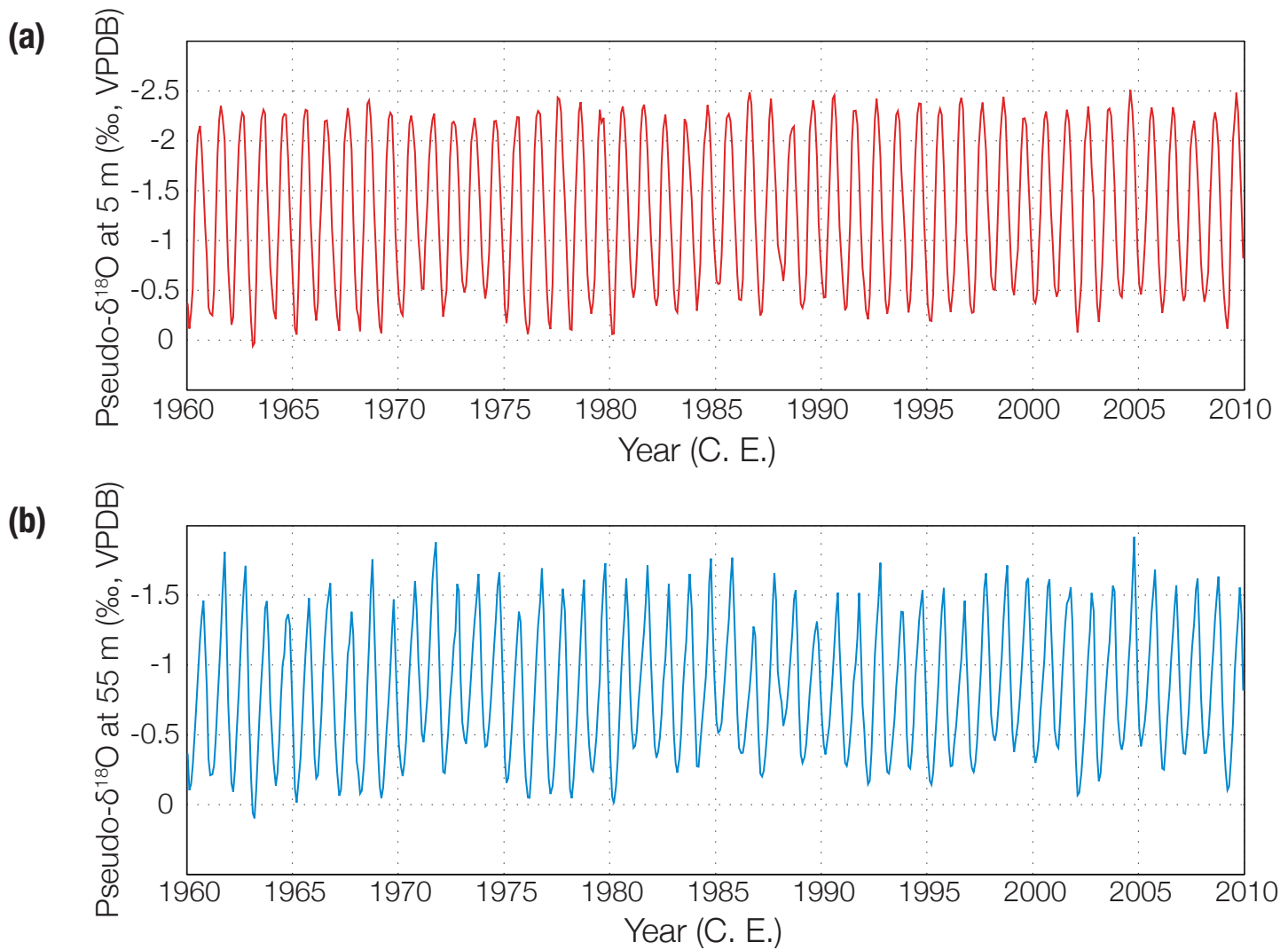
Table S1. The Range of Absolute Offsets Between Coeval ss-sl Samples and Intermediate Samples in each Archive.

	Sediment Trap	Core-Tops	Downcore
$ \Delta^{18}\text{O}_{\text{ss-sl}} $ (‰)	0.00 – 0.49	0.02 – 0.28	0.04 – 0.56
$ \Delta^{18}\text{O}_{\text{Null}} $ (‰)	0.01 – 0.27	0.09 – 0.34	0.05 – 0.53
$ \Delta^{13}\text{C}_{\text{ss-sl}} $ (‰)	0.02 – 0.49	0.00 – 0.35	0.02 – 0.52
$ \Delta^{13}\text{C}_{\text{Null}} $ (‰)	0.01 – 0.45	0.00 – 0.20	0.04 – 0.50

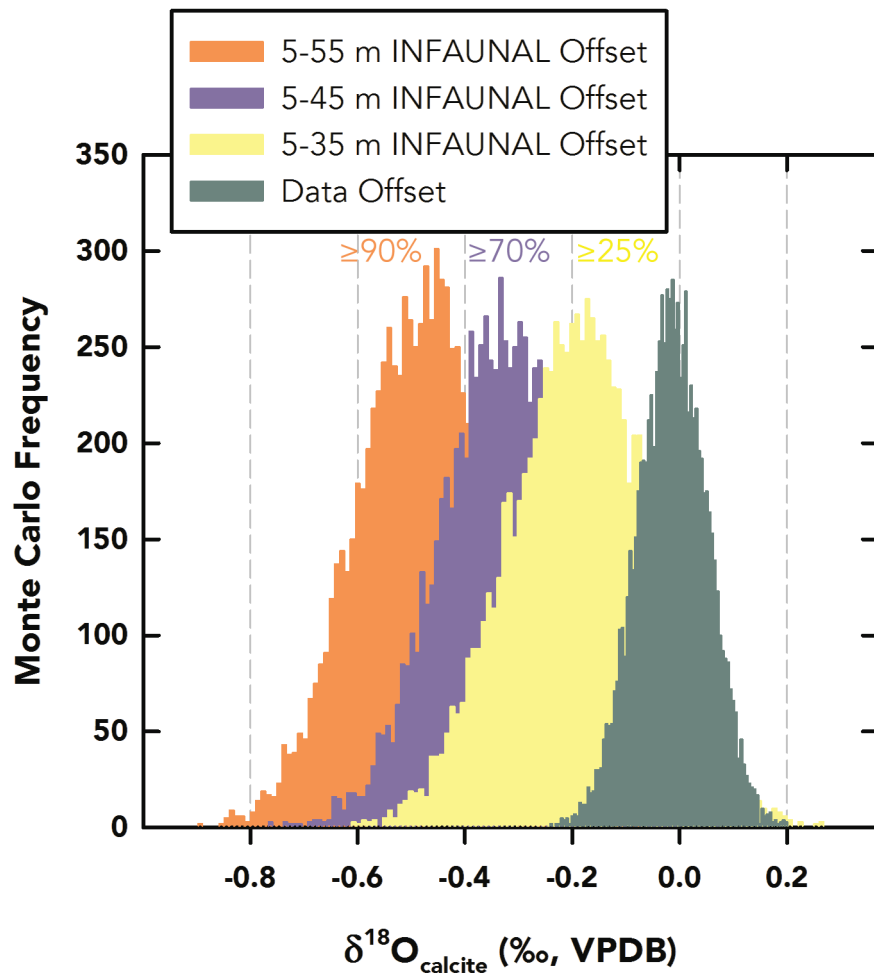
Mean Annual Sea-Surface Temperature (1970-2010)



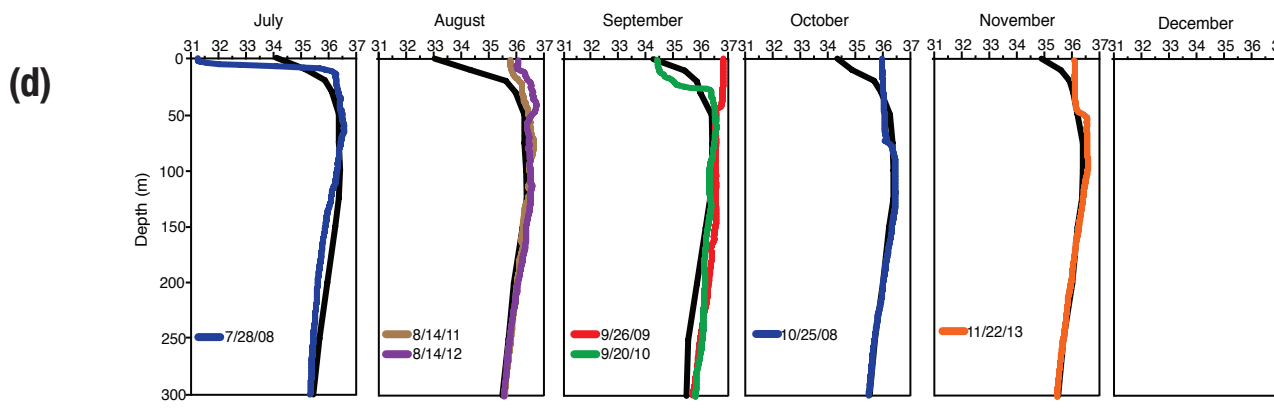
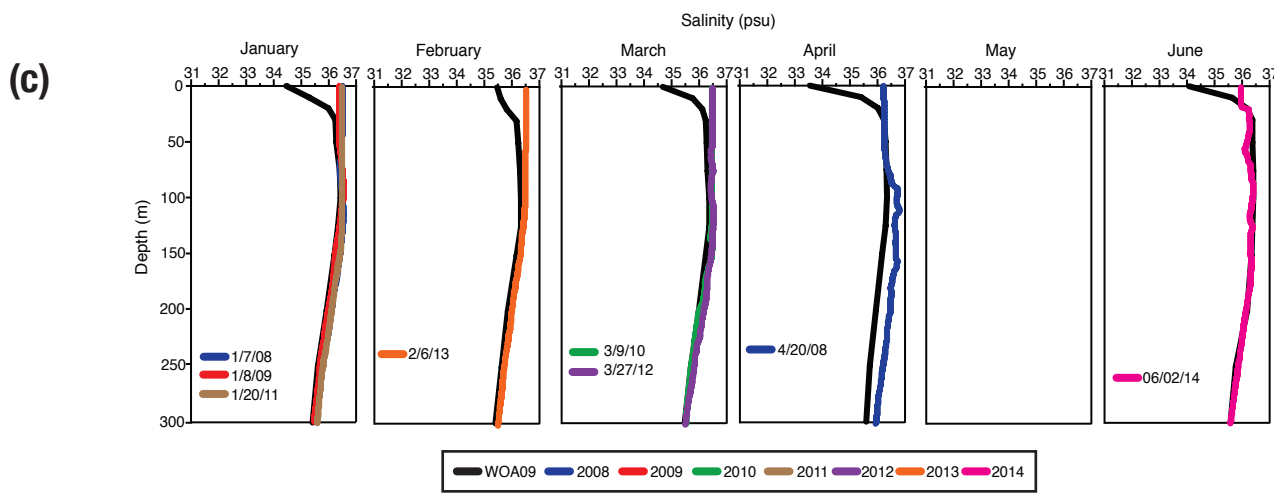
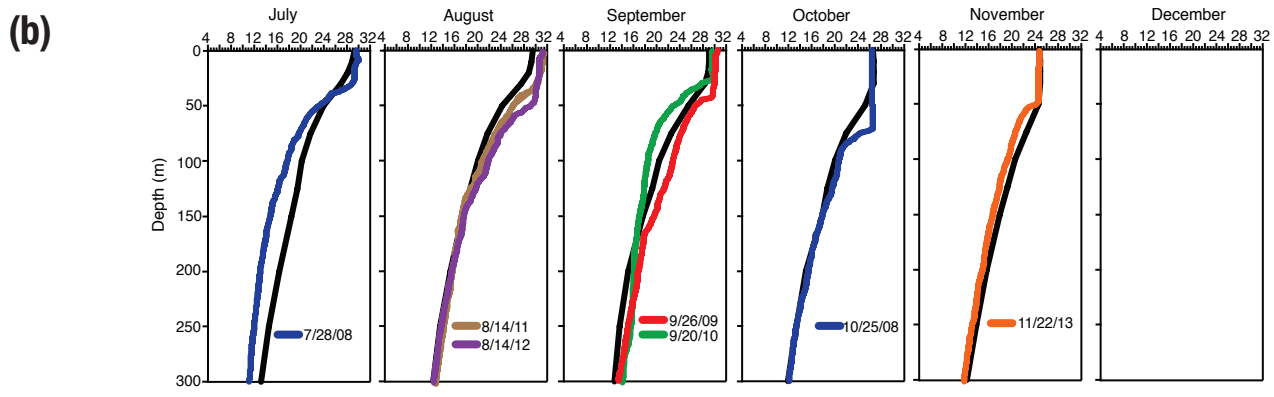
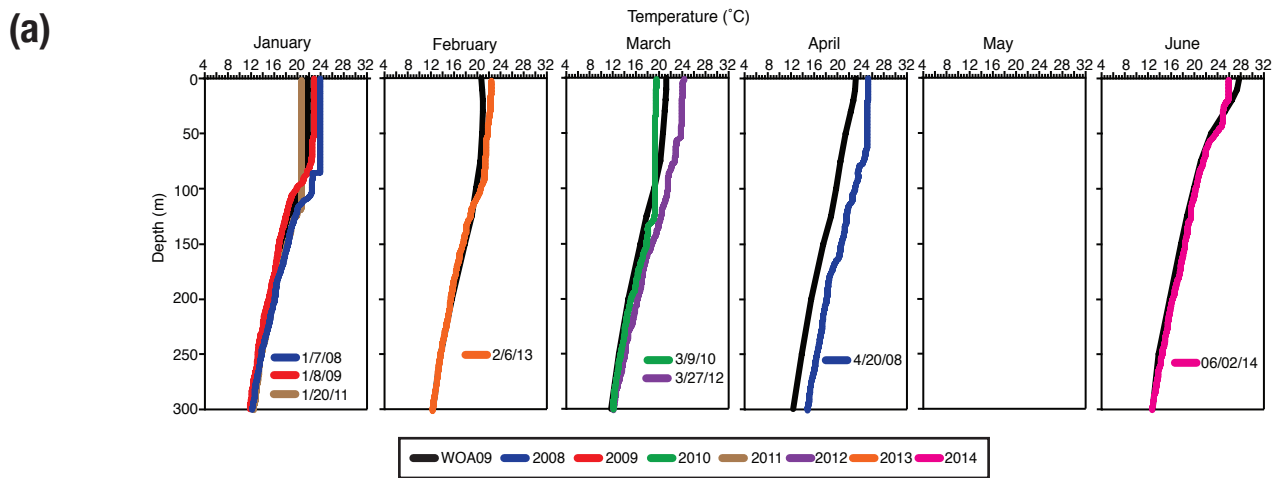
Supplementary Figure 1. Map of Study Area. Map of mean annual sea-surface temperatures (SSTs) in the Gulf of Mexico with locations of sampling archives used in the study. Downcore samples are all late Holocene in age while all core-top samples are modern. This figure was generated using the M_Map mapping package in MATLAB™ with SST data from HadISST.



Supplementary Figure 2. Pseudo- $\delta^{18}\text{O}$ Time Series Generated with INFAUNAL. Monte Carlo picking experiments were performed on pseudo- $\delta^{18}\text{O}$ time series at 5 m (a) and 55 m (b) generated as a function of temperature and salinity extracted from the ORA-S4 reanalysis dataset at 26.7°N, 93.9°W in the northern Gulf of Mexico.



Supplementary Figure 3. Data-Model Comparison of Simulated Offsets with Uncertainty Constraints. Histogram of mean offsets in ss-sl data (green histogram) from core-top/downcore samples compared with populations of mean offsets in pseudo- $\delta^{18}\text{O}$ time series at 5 m and 55 m (orange), 5 m and 45 m (purple), and 5 m and 35 m (yellow) depths generated using INFAUNAL. Percentages above the modeled histograms indicate the minimum probabilities that depth-specific signals can be resolved using picked means of 50 pseudo-foraminifera, as given by INFAUNAL. All three model-based histograms are significantly different from the data offset ($p < 0.001$) incorporating both analytical and sampling uncertainty, and are significantly distinct from zero ($p < 0.001$), while the data-based histogram is not different from zero ($p < 0.05$).



Supplementary Figure 4. Monthly Temperature and Salinity Profiles in the Upper 300 m of the Northern Gulf of Mexico. Vertical temperature (a and b) and salinity (c and d) profiles in the water column at the sediment trap site in the northern Gulf of Mexico. Note that the thermocline in most months is deeper than 55 m. WOA09 indicates World Ocean Atlas data while all other data are from CTD measurements. CTD data up to the 2012 casts are from Poore et al., 2013. (Ref. 33 in main text)