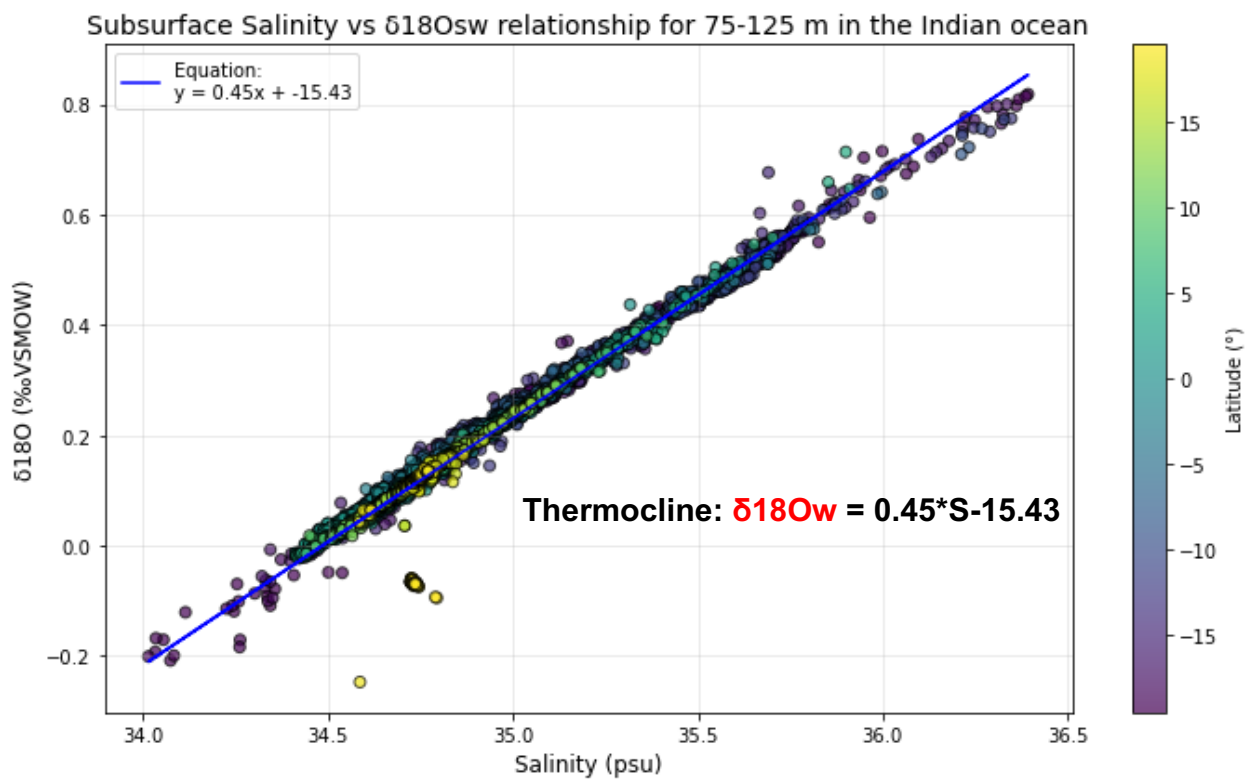


**Supplementary figures for the main paper:**

**Assessing the potential of Individual Foraminifera Analyses ( $\delta^{18}\text{O}$ ) to reconstruct variability, seasonality and extremes in the tropical Indian Ocean**



**Figure S1:** Relationship for  $\delta^{18}\text{O}_{\text{sw}}$  vs salinity for the subsurface in the tropical Indian Ocean

## Surface data

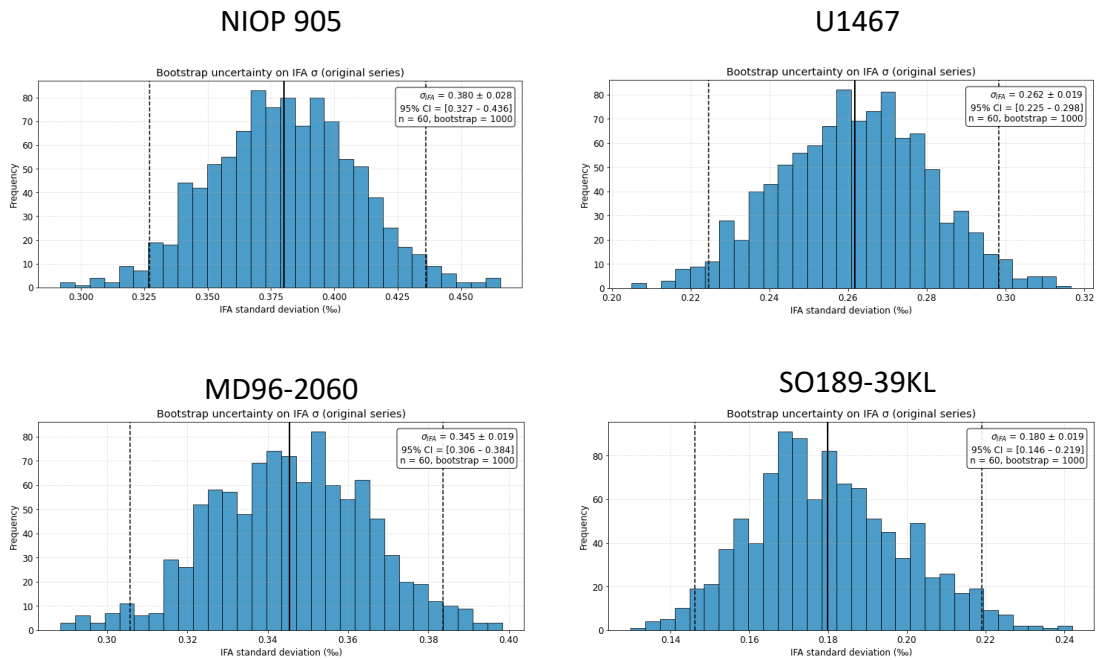
Site	Type	n_tot	n_outliers	mean_all	std_all	mean_no_outliers	std_no_outliers	min	max	skewness	kurtosis	Shapiro_p	Dagostino_p	Normality
NIOP905	Real_coretop	75	3	-1,470	0,646	-1,537	0,565	-2,78	0,46	0,702	0,373	0,008	0,028	Non-normal
NIOP905	Synth_coretop	60	0	-1,613	0,377	-1,613	0,377	-2,302	-0,847	-0,035	-0,981	0,148	0,041	Non-normal
MD96-2060	Real_coretop	41	2	-1,676	0,465	-1,750	0,336	-2,442	-0,065	1,450	2,719	0,001	0,000	Non-normal
MD96-2060	Synth_coretop	60	0	-2,114	0,353	-2,114	0,353	-2,799	-1,515	0,043	-1,259	0,007	0,000	Non-normal
U1467	Real_coretop	84	1	-2,755	0,283	-2,746	0,272	-3,51	-2,08	-0,178	-0,174	0,982	0,777	Normal
U1467	Synth_coretop	60	0	-2,881	0,276	-2,881	0,276	-3,56905	-2,381	-0,481	-0,636	0,050	0,147	Normal
SO189-39KL	Real_coretop	58	0	-2,939	0,213	-2,939	0,213	-3,45774	-2,498	-0,234	-0,024	0,516	0,684	Normal
SO189-39KL	Synth_coretop	60	1	-3,139	0,187	-3,146	0,177	-3,507	-2,69	0,110	-0,368	0,729	0,868	Normal

## Thermocline

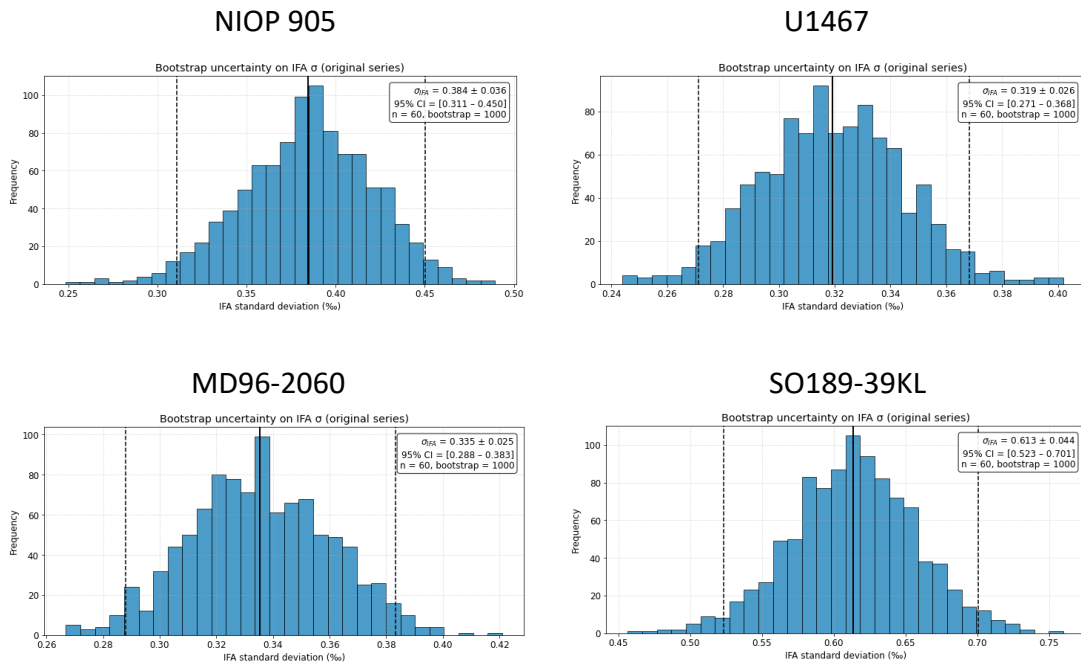
Site	Type	n_tot	n_outliers	mean_all	std_all	mean_no_outliers	std_no_outliers	min	max	skewness	kurtosis	Shapiro_p	Dagostino_p	Normality
NIOP905	Real_coretop	37	0	-0,027	0,526	-0,027	0,526	-0,93	1,19	0,674	-0,011	0,084	0,176	Normal
NIOP905	Synth_coretop	60	0	-0,641	0,431	-0,641	0,431	-1,362	0,398	0,486	-0,536	0,073	0,192	Normal
MD96-2060	Real_coretop	54	2	-1,339	0,373	-1,344	0,296	-2,395	0,003	0,552	2,487	0,032	0,005	Non-normal
MD96-2060	Synth_coretop	60	0	-1,530	0,338	-1,530	0,338	-2,243	-0,871	0,176	-0,762	0,265	0,248	Normal
U1467	Real_coretop	44	1	-1,630	0,462	-1,683	0,304	-2,354	0,644	2,790	11,592	0,000	0,000	Non-normal
U1467	Synth_coretop	60	0	-1,854	0,315	-1,854	0,315	-2,361	-0,992	0,406	-0,442	0,184	0,334	Normal

Figure S2: Synthesis of all statical parameter of each dataset used in this study

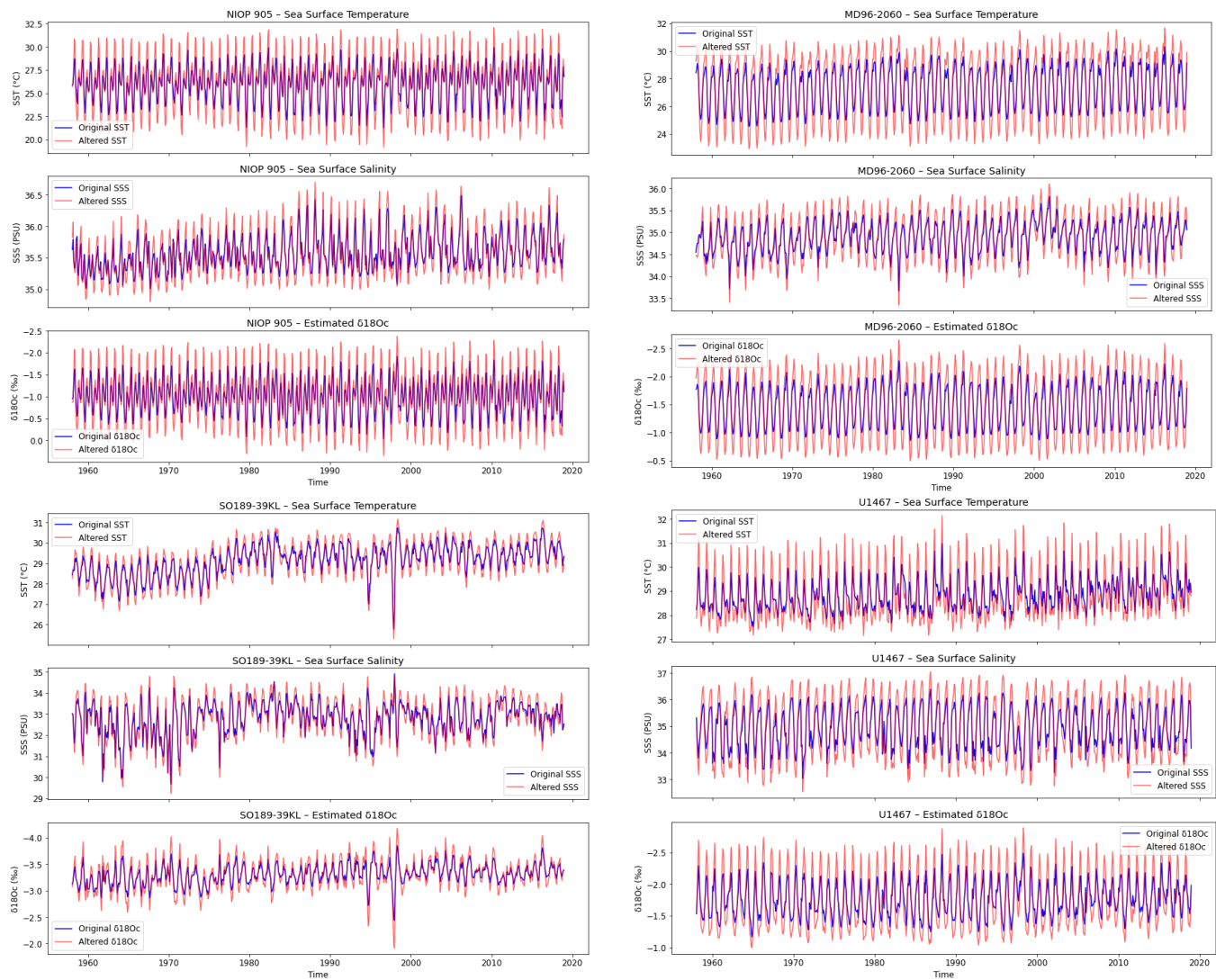
## Surface data



# Thermocline

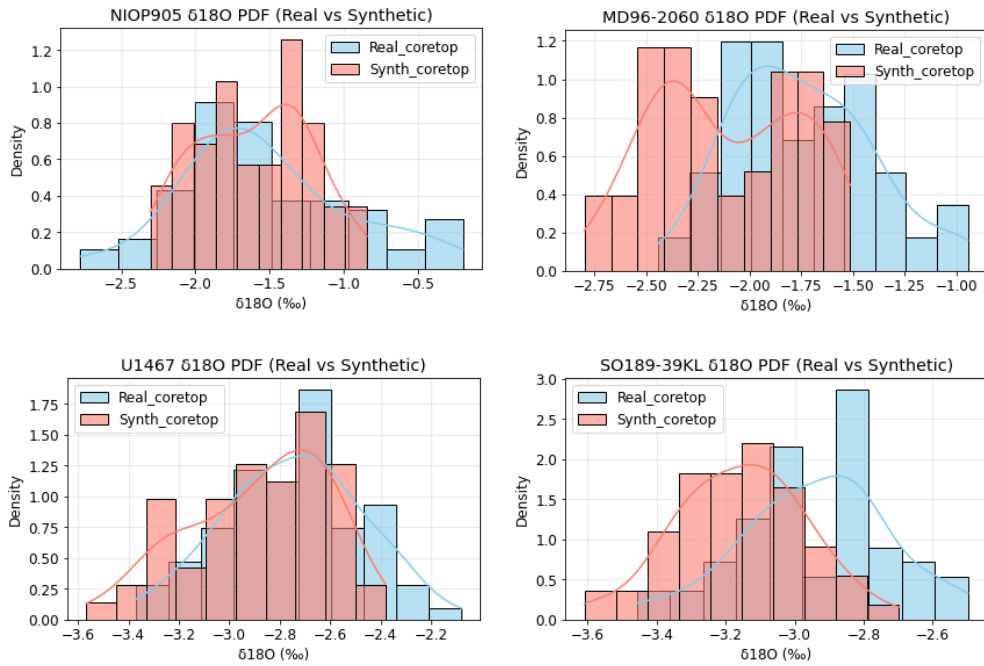


**Figure S3:** Monte Carlo bootstrap resampling of N=60 individuals to estimate the sampling distribution (1000 times) of the standard deviation for the Surface and thermocline depth



**Figure S4:** Comparison of monthly reanalysis dataset for an “original” and “Altered” climate for the surface and thermocline temperature, Salinity,  $\delta^{18}O$

# Surface



# Thermocline

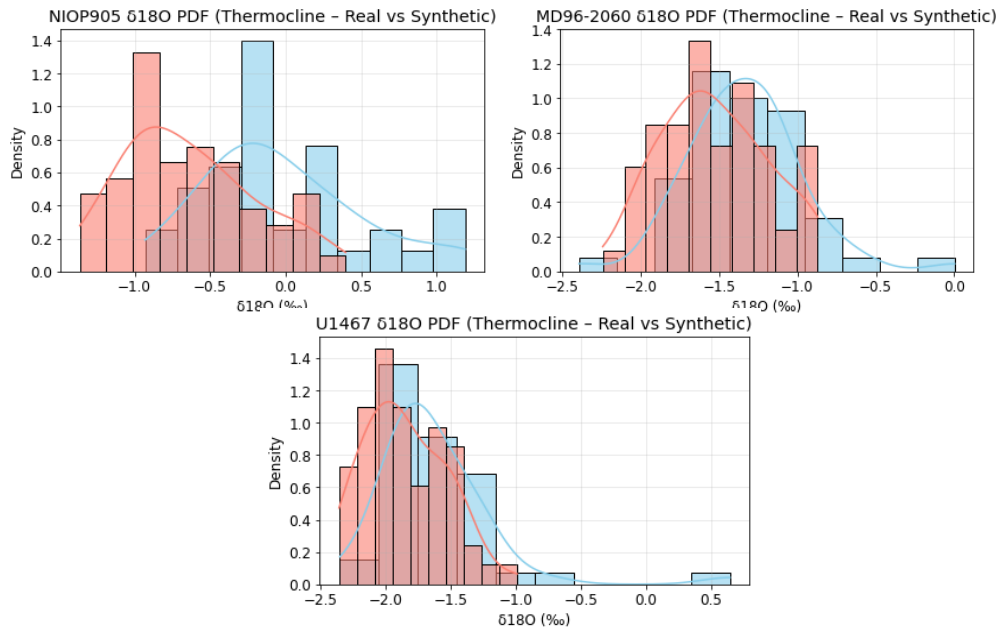
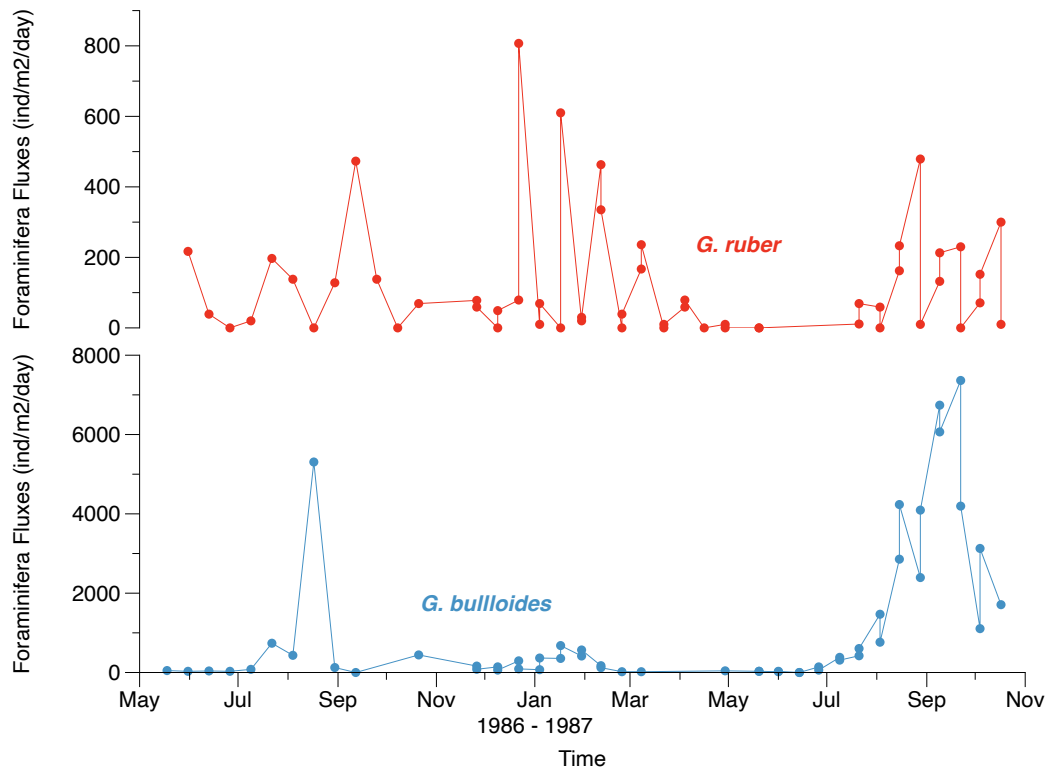
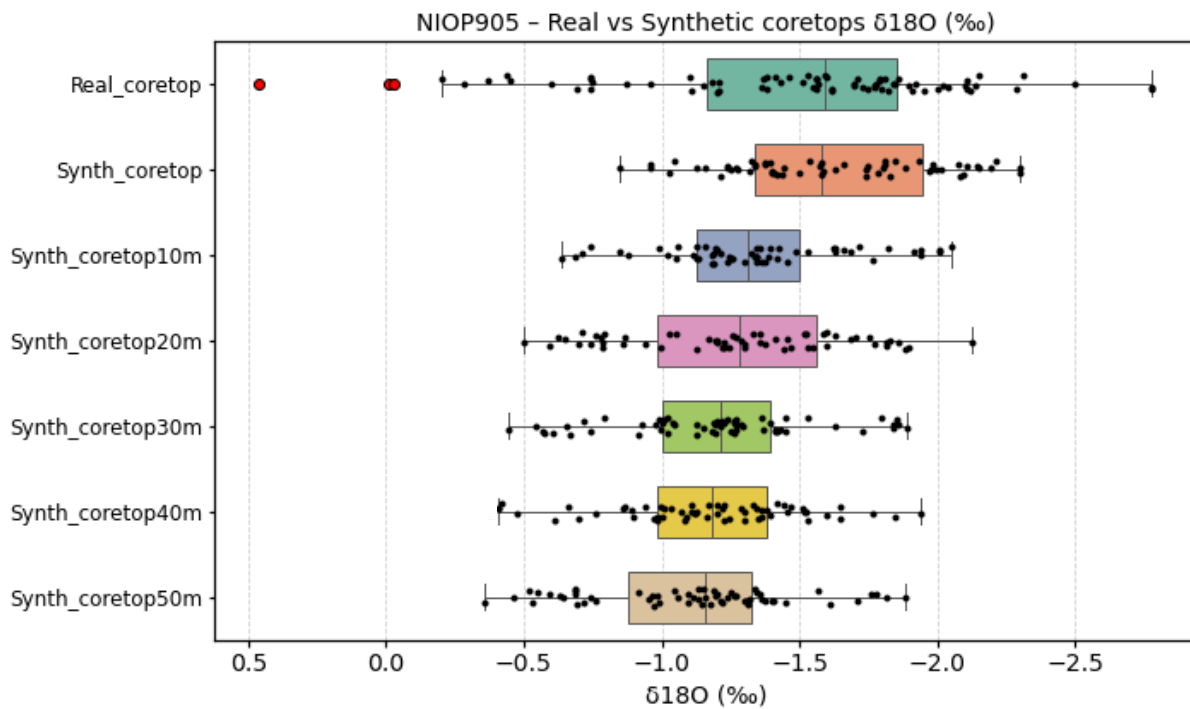


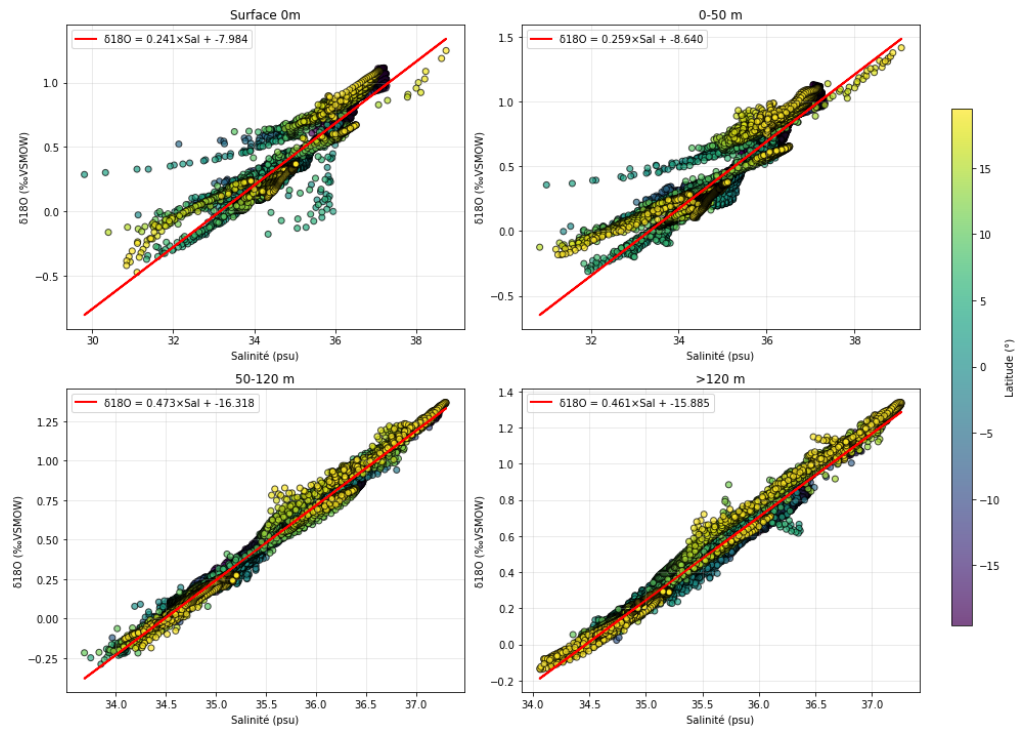
Figure S5: PDF function from histogram for each site at surface and thermocline



**Figure S6: Foraminifera flux from sediment trap over Arabian sea. Data are extracted from the Forcis database (Chaabane et al., 2023).** Both plots show the proportion of surface planktic foraminifera near site NIOP 905. Most *G. bulloides* flux are found during the summer monsoon (July-Setemper) and can be related to the upwelling intensity. *G. ruber* is found throughout the year.



**Figure S7: Effect of calcification depth on modelled IFA- $\delta^{18}O$  distributions at site NIOP 905.**



**Figure S8:** Relationship for  $\delta^{18}\text{O}_{\text{sw}}$  vs salinity for different depth from the surface to subsurface in the tropical Indian Ocean