

Supplementary Material

1 MINIMUM CONNECTIVITY TIME AT DEPTHS UNDER DIFFERENT CONSTRAINT SCENARIOS

In Table S1, we summarize the maximum of the minimum connectivity times between all the sample stations that is obtained for different constraints and at different depths investigated in this study. For thermal niche constraint *TN Type1* (15-25°C) at 500 m, no connectivity was found between the sample stations as it is unlikely to have temperatures within this thermal niche at depths. A general trend of increasing maximum of the minimum connectivity times between stations is observed with increasing depth (Table S1). However, it requires investigation into connectivity pathways between station pairs to fully interpret these numbers as connectivities between stations changes over depth.

Table S1. Summarizing maximum of the minimum connectivity time (in years) between all the sample stations under different constraint scenarios

Depth	No constraints	Thermal Niche (°C)			Adaptation Potential (°C)		
		<i>TN Type1</i>	<i>TN Type2</i>	<i>TN Type3</i>	<i>AP Type1</i>	<i>AP Type2</i>	<i>AP Type3</i>
Near surface	2.67	1.5	0.83	3.0	3.25	3.75	3.08
50 m	2.58	2.5	0.92	2.17	4.75	3.75	2.92
100 m	3.0	2.42	1.0	2.33	5.42	4.42	3.5
200 m	3.25	2.67	4.08	2.83	4.83	3.92	3.75
500 m	3.75	NA	3.83	1.67	5.17	4.17	3.83

2 SURFACE TEMPERATURE MEAN IN THE ATLANTIC OCEAN

Sea surface temperature mean from 10 years of model data from GLOB16 is shown in Figure S1.

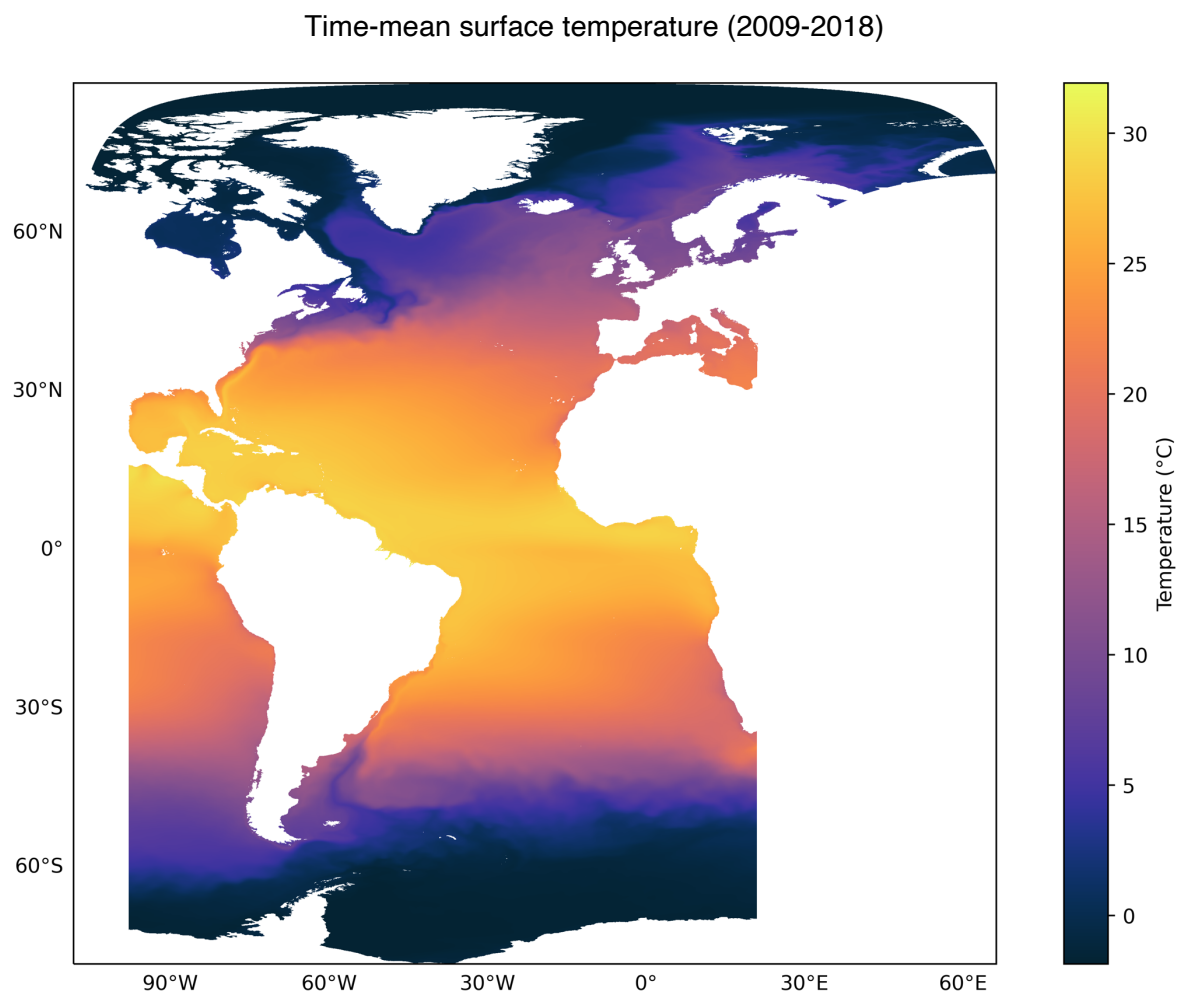


Figure S1. Time-mean of surface temperature from GLOB16 Ocean data (2009-2018)