

Supplementary Table 1. Water column characteristics near study site. Data are from the World Ocean Database 2009 (http://www.nodc.noaa.gov/OC5/WOD09/pr_wod09.html). $\delta^{18}\text{O}$ values of sea water ($\delta^{18}\text{O}_{\text{sw}}$) were calculated from salinity using regional $\delta^{18}\text{O}$ –salinity relationship in South Pacific (LeGrande and Schmidt, 2006). Then from the $\delta^{18}\text{O}_{\text{sw}}$ and temperature, $\delta^{18}\text{O}$ values of equilibrium calcite ($\delta^{18}\text{O}_{\text{cal}}$) are calculated using equations of Kim and O’Niel (1997).

Cruise Information		Depth [m]	Temperature [°C]	Salinity [psu]	Phosphate [μmol/L]	Silicate [μmol/L]	Nitrate [μmol/L]	$\delta^{18}\text{O}_{\text{sw}}$ [% VPDB]	$\delta^{18}\text{O}_{\text{cal}}$ [% VPDB]	$\delta^{13}\text{C}_{\text{DIC}}$ [% VPDB]
NODC Cruise ID	: US-13615	2.3	25.5	—	0.04	1.30	0.01	—	—	1.41
Originators Station I	: 127	30.7	25.5	35.5	0.04	1.31	0.01	0.70	-1.24	1.44
Latitude	: -25.001	54.2	24.0	35.8	0.05	1.32	0.01	0.81	-0.83	1.41
Longitude	: -169.9988	81.1	21.7	35.7	0.07	1.39	0.03	0.78	-0.40	1.43
Year	: 1996	116.0	20.7	35.7	0.10	1.34	—	0.79	-0.18	1.33
Month	: 2	163.3	19.4	35.7	0.19	1.43	0.90	0.78	0.09	1.21
Day	: 22	215.5	18.2	35.7	0.29	1.66	2.61	0.75	0.31	1.13
Project	: World Ocean Circulation Experiment (WOCE)	263.6	17.2	35.6	0.35	1.82	3.44	0.73	0.48	1.17
Platform	: DISCOVERER	327.6	15.5	35.4	0.52	2.50	6.07	0.64	0.76	1.19
		416.6	13.0	35.1	0.86	4.03	11.37	0.49	1.17	1.18
		522.2	9.6	34.7	1.28	5.99	18.00	0.31	1.74	1.25
		625.1	7.5	34.4	1.55	8.12	22.18	0.21	2.14	1.18
		713.6	6.5	34.4	1.71	11.19	24.77	0.17	2.34	1.33
		823.3	5.7	34.3	1.89	16.72	27.45	0.16	2.51	1.26
		917.1	5.2	34.3	2.03	23.28	29.62	0.16	2.62	1.07
		1016.1	4.7	34.3	2.19	32.66	31.76	0.17	2.75	0.97
		1130.2	4.1	34.4	2.35	47.23	33.93	0.19	2.92	0.79
		1302.1	3.3	34.5	2.47	71.59	35.57	0.23	3.16	0.57

Kim, S. T., and J. R. O’Niel. 1997. Equilibrium and nonequilibrium oxygen isotope effects in synthetic carbonates. *Geochimica et Cosmochimica Acta* 61:3461–3475.

LeGrande, A.N., and G.A. Schmidt. 2006. Global gridded data set of the oxygen isotopic composition in seawater. *Geophysical Research Letters* 33:L12604. doi:10.1029/2006GL026011.