TABLE DR1. STABLE ISOTOPE AND SR/CA DATA, ODP SITE 1050, BLAKE NOSE, WESTERN NORTH ATLANTIC

Sample ID	Depth	Coccolith fraction			*Praeglobo-truncana stephani*		*Rotalipora globo-truncanoides*		*Rotalipora reicheli*		*Rotalipora montsalvensis*		Benthic foraminifera	
	(mbsf)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	Sr/Ca (mmol /mol)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)
1050C-21R-1 10-11.0	500.30	-2.005	2.739	0.882	—	—	—	—	—	—	—	—	—	—
1050C-21R-1, 31-34	500.51	-1.864	2.895	0.775	—	—	—	—	—	—	—	—	—	—
1050C-21R-1 42-43.0	500.62	-1.895	2.553	0.830	—	—	—	—	—	—	—	—	—	—
1050C-21R-1 61-62	500.81	-2.007	2.700	0.943	—	—	—	—	—	—	—	—	—	—
1050C-21R-1 68-69	500.88	-1.869	3.000	0.976	—	—	—	—	—	—	—	—	—	—
1050C-21R-1 75-76	500.95	-1.684	2.808	0.860	—	—	—	—	—	—	—	—	—	—
1050C-21R-1 81-82	501.01	-1.599	2.521	0.938	—	—	—	—	—	—	—	—	—	—
1050C-21R-1 92-93.0	501.12	-1.431	2.640	0.701	—	—	—	—	—	—	—	—	—	—
1050C-21R-1, 105-108	501.25	-1.381	2.663	0.782	—	—	—	—	—	—	—	—	—	—
1050C-21R-1 120-121.0	501.40	-1.463	2.587	0.763	—	—	—	—	—	—	—	—	—	—
1050C-21R-1 135-136	501.55	-1.382	2.684	0.751	—	—	—	—	—	—	—	—	—	—
1050C-21R-2, 99-102	502.69	-1.535	2.524	0.993	—	—	—	—	—	—	—	—	—	—
1050C-21R-3, 56-59	503.76	-1.934	2.527	1.081	—	—	—	—	—	—	—	—	—	—
1050C-21R-4, 63-66	505.33	-1.661	2.330	0.938	—	—	—	—	—	—	—	—	—	—
1050C-21R-4, 129-132	505.99	-1.527	2.408	0.963	—	—	—	—	—	—	—	—	—	—
1050C-21R-6, 54-57	508.24	-1.723	2.431	1.049	—	—	—	—	—	—	—	—	—	—
1050C-21R-7 45-46	508.75	-1.490	2.334	0.868	—	—	—	—	—	—	—	—	—	—
1050C-21R-7 49-50	508.79	-2.254	2.389	1.246	—	—	—	—	—	—	—	—	—	—
1050C-21R-7 53-54	508.83	-2.250	2.429	1.217	—	—	—	—	—	—	—	—	—	—
1050C-21R-7 58-59	508.88	-1.500	2.305	0.857	—	—	—	—	—	—	—	—	—	—
1050C-21R-7, 105-108	509.35	-2.764	2.544	1.342	—	—	—	—	—	—	—	—	—	—
1050C-21R-cc, 8-9	509.80	-1.700	2.352	0.878	—	—	—	—	—	—	—	—	—	—
1050C-21R-cc, 22-23	509.80	-2.832	2.566	1.302	—	—	—	—	—	—	—	—	—	—
1050C-22R-1, 33-36	510.13	-1.632	2.124	0.881	—	—	—	—	—	—	—	—	—	—
1050C-22R-1, 46-50	510.26	-1.819	2.223	1.031	—	—	—	—	—	—	—	—	—	—
1050C-23R-1 4-5	519.44	-0.564	2.990	0.654	-1.929	3.450	-1.250*	2.864*	—	—	-1.140*	2.712*	0.023*	2.528*
1050C-23R-1 4-5	519.44	—	—	—	-2.033	3.105	-1.596	3.174	—	—	—	—	0.147	2.402
1050C-23R-1, 10-11	519.50	-0.421	2.949	0.660	-1.731	3.395	-1.447	3.139	—	—	-1.095	2.527	0.089	2.486
1050C-23R-1, 10-11	519.50	—	—	—	-1.689	3.291	-1.698	3.232	—	—	-1.389	2.767	—	—
1050C-23R-1, 23-24	519.63	-0.950	2.362	0.763	-2.095	2.675	-1.846	2.508	—	—	-1.593	1.987	-0.495	1.965
1050C-23R-1, 23-24	519.63	—	—	—	-1.814	2.530	—	—	—	—	—	—	—	—
1050C-23R-1, 36-37	519.76	-1.399	2.396	1.013	-2.311	2.399	-2.222	2.377	—	—	-1.712	2.152	-0.423	1.702
1050C-23R-1, 36-37	519.76	—	—	—	-2.193	2.425	—	—	—	—	-1.795	1.964	—	—
1050C-23R-1 50-51	519.90	-1.377	2.603	0.928	-2.216	2.733	-2.254	2.615	—	—	—	—	-0.974	2.060
1050C-23R-1, 75-76	520.15	-1.855	2.630	1.143	-2.299	2.695	-2.173	2.602	—	—	-1.888	2.372	-0.659	1.752
1050C-23R-1, 75-76	520.15	—	—	—	-2.449	2.694	-2.265	2.497	—	—	-1.911	2.303	—	—
1050C-23R-1, 75-76	520.15	—	—	—	-2.344	2.832	—	—	—	—	—	—	—	—
1050C-23R-1, 100-101	520.4	-1.497	2.663	0.885	-2.223	2.883	-2.211	2.720	—	—	—	—	-0.771	2.123

TABLE DR1. (CONTINUED)

Sample ID	Depth	Coccolith fraction			*Praeglobo-truncana stephani*		*Rotalipora globo-truncanoides*		*Rotalipora reicheli*		*Rotalipora montsalvensis*		Benthic foraminifera	
	(mbsf)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	Sr/Ca (mmol /mol)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)
1050C-23R-1, 100-101	520.4	—	—	—	-2.331	2.800	-2.090	2.561	—	—	—	—	—	—
1050C-23R-1, 126.5-128.5	520.67	-1.271	2.805	0.967	-2.316	2.979	-2.422	2.806	-1.694	2.726	-1.712	2.595	-0.459	2.140
1050C-23R-1, 126.5-128.5	520.67	—	—	—	-2.190	3.065	-2.153	2.841	-1.754	2.654	-1.753	2.583	—	—
1050C-23R-1, 148-149	520.88	-0.679	2.891	0.634	—	—	-1.949	2.943	—	—	-1.450	2.776	—	—
1050C-23R-1, 148-149	520.88	—	—	—	—	—	-2.007	2.975	—	—	—	—	—	—
1050C-23R-2, 19-21	521.09	-1.417	2.431	1.189	-2.109*	2.931*	-2.370	2.597	—	—	—	—	0.069*	1.998*
1050C-23R-2, 19-21	521.09	—	—	—	-2.529	2.891	-2.179	2.801	-1.930	3.006	—	—	-0.063	1.929
1050C-23R-2, 34-35	521.24	-0.719	2.945	0.670	-1.934	3.437	—	—	—	—	—	—	—	—
1050C-23R-2 48.5-49.5	521.39	-0.652	2.965	0.731	-2.158	3.270	-1.880*	3.160*	—	—	-1.555	2.834	-0.240*	2.632*
1050C-23R-2, 69-70	521.59	-1.977	2.244	1.147	-2.517	2.355	-2.471	2.257	-2.119	2.041	-2.210	1.919	-0.582	1.257
1050C-23R-2, 69-70	521.59	—	—	—	-2.609	2.329	-2.483	2.213	—	—	—	—	-0.673	1.328
1050C-23R-2, 69-70	521.59	—	—	—	-2.764	2.253	-2.323	2.275	—	—	—	—	—	—
1050C-23R-2, 89-90	521.79	-0.760	2.927	0.702	—	—	-1.860	3.206	—	—	-1.625	2.850	—	—
1050C-23R-2, 109-111	521.99	-1.354	2.337	1.033	-2.708	2.403	-1.918*	2.269*	-1.966	1.973	—	—	-0.762*	1.283*
1050C-23R-2, 109-111	521.99	—	—	—	-2.544	2.448	-2.231	2.030	-2.069	2.101	—	—	-0.396	1.712
1050C-23R-2, 141-142	522.31	-1.414	2.803	0.951	-2.210	2.919	-2.102	2.466	-2.020	2.822	—	—	0.210	2.486
1050C-23R-2, 141-142	522.31	—	—	—	—	—	-2.386	2.182	—	—	—	—	0.078	1.781
1050C-23R-2, 141-142	522.31	—	—	—	—	—	-2.092	3.151	—	—	—	—	—	—
1050C-23R-3, 22-24	522.62	-1.318	2.435	0.993	-2.550	2.784	-2.223	2.556	-2.151	2.429	-1.844	2.257	-0.070	2.083
1050C-23R-3, 22-24	522.62	—	—	—	-2.361	2.570	-2.165	2.233	-2.166	2.065	-1.919	1.930	—	—
1050C-23R-3, 49.5-50.5	522.90	-1.380	2.294	0.948	-2.451	2.579	-1.910*	2.459*	—	—	—	—	-0.500*	2.066*
1050C-23R-3, 74-75	523.14	-1.282	2.043	0.860	-2.220	2.114	-2.040	1.968	—	—	-1.871	1.799	—	—
1050C-23R-3, 74-75	523.14	—	—	—	—	—	-1.989	1.960	—	—	—	—	—	—
1050C-23R-3, 98-99	523.38	-1.850	1.995	1.103	-2.540	2.091	-2.192	1.871	—	—	-1.969	1.581	-0.650	1.080
1050C-23R-3, 98-99	523.38	—	—	—	-2.467	2.122	-2.209	1.861	—	—	—	—	—	—
1050C-23R-3, 98-99	523.38	—	—	—	-2.565	2.070	-2.050	1.810	—	—	—	—	—	—
1050C-23R-3, 122-124	523.62	-1.410	2.042	0.941	-2.678	2.224	-2.293	1.893	—	—	—	—	-0.210	2.080
1050C-23R-3, 127-130	523.67	-1.320	2.243	0.917	—	—	-2.050*	2.064*	-1.858	2.063	-1.738	1.969	-0.500*	1.186*
1050C-23R-3, 127-130	523.67	—	—	—	—	—	—	—	—	—	-1.652	2.139	—	—
1050C-23R-3, 131-134	523.71	-1.141	2.155	0.845	-2.386	2.198	-1.720*	2.023*	—	—	—	—	-0.410*	1.465*
1050C-23R-4, 20-22	524.10	-1.294	2.148	0.890	-2.458	2.068	-1.870	1.956	-1.724	1.832	-1.534	2.018	-0.561	1.154
1050C-23R-4, 20-22	524.10	—	—	—	-2.218	2.396	-1.943	2.210	—	—	-1.600	1.919	—	—
1050C-23R-4, 60-64	524.50	-1.198	2.163	0.938	-2.219	2.165	-1.920*	2.028*	-1.762	2.189	-1.613	1.848	-0.749*	1.279*
1050C-23R-4, 60-64	524.50	—	—	—	-2.462	2.461	—	—	—	—	-1.729	1.888	—	—
1050C-23R-4, 120-122	525.10	-1.324	2.040	0.900	-2.189	2.288	-2.143	2.204	—	—	—	—	-0.561	1.387
1050C-23R-4, 120-122	525.10	—	—	—	-2.149	2.175	-2.082	1.864	—	—	—	—	—	—
1050C-23R-5, 23-26	525.63	-1.136	2.098	0.909	-2.268	2.147	-1.770*	1.87*	—	—	—	—	-0.670*	1.319*
1050C-23R-5, 23-26	525.63	—	—	—	—	—	-1.810*	2.063*	—	—	—	—	—	—

TABLE DR1. (CONTINUED)

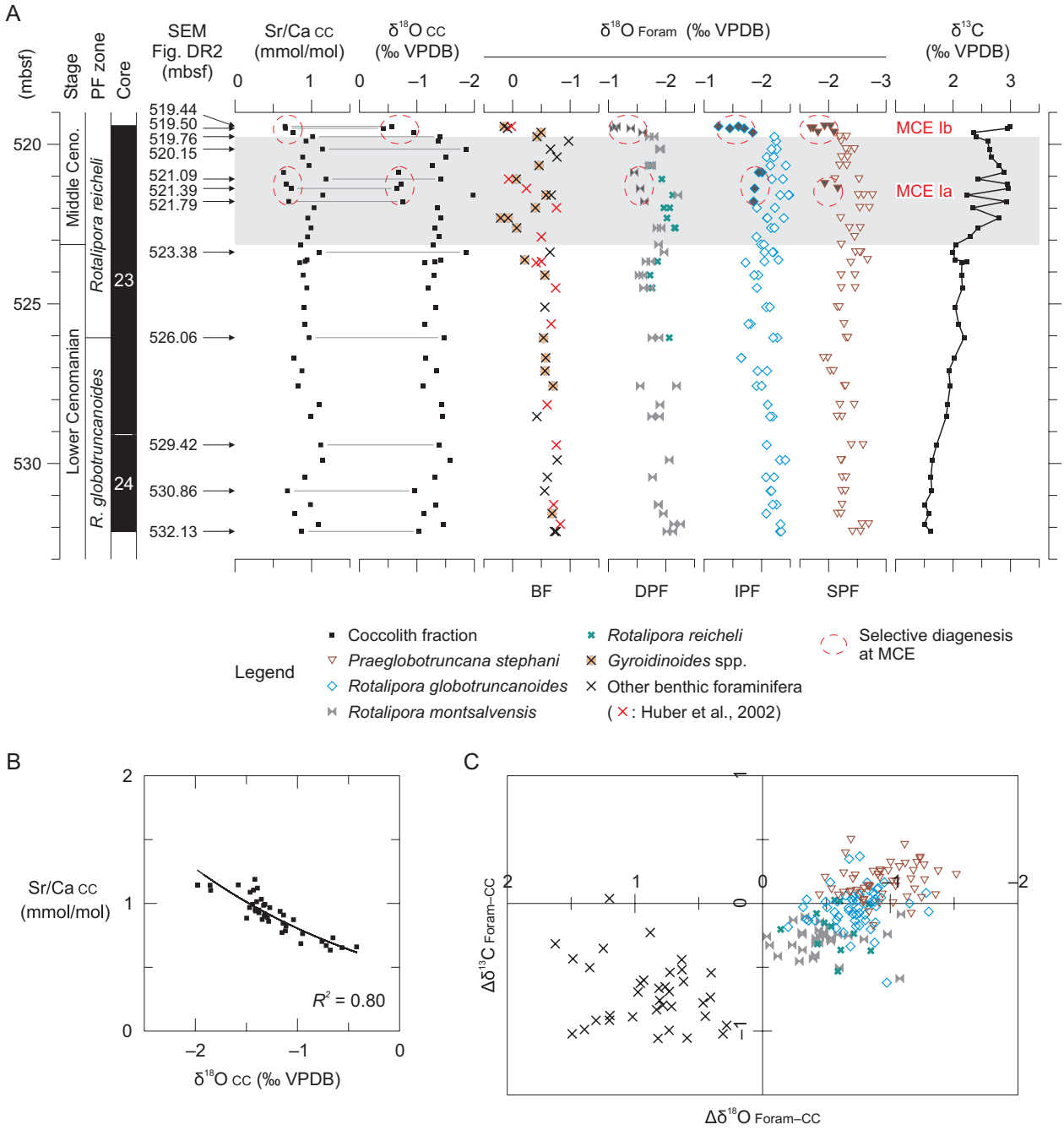
Sample ID	Depth	Coccolith fraction			*Praeglobo-truncana stephani*		*Rotalipora globo-truncanoides*		*Rotalipora reicheli*		*Rotalipora montsalvensis*		Benthic foraminifera	
	(mbsf)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	Sr/Ca (mmol /mol)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)
1050C-23R-5, 66-68	526.06	-1.469	2.192	0.968	-2.335	2.015	-2.202	2.102	-2.060	1.660	-1.882	1.787	-0.538	1.591
1050C-23R-5, 66-68	526.06	—	—	—	-2.302	2.124	-2.275	2.061	—	—	-1.757	1.739	—	—
1050C-23R-5, 129-131	526.69	-1.151	2.025	0.772	-1.909	2.158	-1.646	1.961	—	—	—	—	-0.575	1.008
1050C-23R-5, 129-131	526.69	—	—	—	-1.985	2.072	-1.648	1.895	—	—	—	—	—	—
1050C-23R-6, 20-22	527.10	-1.345	1.925	0.875	-2.084	2.027	-1.930	1.940	—	—	—	—	-0.563	1.128
1050C-23R-6, 20-22	527.10	—	—	—	-2.028	2.011	-2.096	1.890	—	—	—	—	—	—
1050C-23R-6, 67-69	527.57	-1.112	1.951	0.823	-2.293	2.206	-2.001	1.928	—	—	-1.553	1.641	-0.704	1.216
1050C-23R-6, 67-69	527.57	—	—	—	-2.274	2.140	-1.913	1.862	—	—	-2.187	1.363	—	—
1050C-23R-6, 126-129	528.16	-1.431	1.905	1.105	-2.195	1.989	-2.107*	1.849*	—	—	-1.898	1.660	-0.600*	1.072*
1050C-23R-6, 126-129	528.16	—	—	—	-2.446	2.076	—	—	—	—	—	—	—	—
1050C-23R-7, 13-15	528.53	-1.439	1.883	0.993	-2.147	2.074	-2.147	1.903	—	—	-1.889	1.619	-0.421	0.995
1050C-23R-7, 13-15	528.53	—	—	—	-2.231	1.905	-2.194	1.955	—	—	-1.752	1.518	—	—
1050C-24R-1, 32-35	529.42	-1.392	1.713	1.120	-2.395	2.034	-2.090*	1.745*	—	—	—	—	-0.760*	1.194*
1050C-24R-1, 32-35	529.42	—	—	—	-2.600	2.032	—	—	—	—	—	—	—	—
1050C-24R-1, 79-81	529.89	-1.580	1.642	1.145	-2.214	1.878	-2.415	1.742	—	—	-2.059	1.408	-0.774	0.882
1050C-24R-1, 79-81	529.89	—	—	—	-2.229	2.036	-2.318	1.662	—	—	—	—	—	—
1050C-24R-1, 133-136	530.43	-1.318	1.614	0.907	-2.303	1.869	-2.217	1.727	—	—	-1.767	1.470	-0.605	0.807
1050C-24R-1, 133-136	530.43	—	—	—	-2.236	1.815	-2.079	1.683	—	—	—	—	—	—
1050C-24R-2, 26-28	530.86	-0.967	1.630	0.685	-2.291	1.868	-2.172	1.721	—	—	—	—	-0.558	0.824
1050C-24R-2, 26-28	530.86	—	—	—	-2.226	1.869	-2.153	1.684	—	—	—	—	—	—
1050C-24R-2, 69-72	531.29	-1.331	1.508	0.986	-2.234*	1.733*	-2.194	1.529	—	—	-1.872	1.237	-0.712*	0.896*
1050C-24R-2, 69-72	531.29	—	—	—	—	—	-2.261	1.553	—	—	-1.867	1.212	—	—
1050C-24R-3, 12-16	531.57	-1.118	1.583	0.785	-2.214	1.796	-2.081	1.778	—	—	—	—	-0.687	0.968
1050C-24R-3, 12-16	531.57	—	—	—	-2.151	1.832	—	—	—	—	-1.956	1.519	—	—
1050C-24R-3, 45-48	531.90	-1.463	1.501	1.088	-2.580	1.812	-2.330*	1.584*	—	—	-2.135	1.248	—	—
1050C-24R-3, 45-48	531.90	—	—	—	-2.697	1.861	—	—	—	—	-2.258	1.219	-0.830*	1.060*
1050C-24R-3, 68-71	532.13	-1.039	1.606	0.873	-2.414	1.858	-2.340	1.542	—	—	-2.123	1.522	-0.757	0.651
1050C-24R-3, 68-71	532.13	—	—	—	-2.557	1.830	-2.320	1.688	—	—	-2.017	1.365	-0.729	0.585
1050C-25R-1, 27-30	538.97	-1.166	1.890	0.939	—	—	—	—	—	—	—	—	—	—
1050C-25R-1, 82-85	539.52	-1.076	1.914	1.002	—	—	—	—	—	—	—	—	—	—
1050C-25R-1, 133-136	540.03	-1.406	1.762	1.067	—	—	—	—	—	—	—	—	—	—
1050C-25R-2, 30-32	540.52	-1.630	1.834	1.156	—	—	—	—	—	—	—	—	—	—
1050C-25R-2, 83-87	541.03	-1.371	1.821	1.129	—	—	—	—	—	—	—	—	—	—
1050C-25R-2, 87-88	541.07	-1.689	1.784	1.117	—	—	—	—	—	—	—	—	—	—
1050C-25R-2, 130-132	541.50	-1.033	1.822	0.812	—	—	—	—	—	—	—	—	—	—
1050C-25R-3, 37-38	542.07	-1.643	1.914	1.139	—	—	—	—	—	—	—	—	—	—
1050C-25R-3, 60-64	542.30	-1.883	1.991	1.319	—	—	—	—	—	—	—	—	—	—
1050C-25R-3, 142-146	543.12	-1.327	1.912	1.041	—	—	—	—	—	—	—	—	—	—

TABLE DR1. (CONTINUED)

Sample ID	Depth	Coccolith fraction			*Praeglobo-truncana stephani*		*Rotalipora globo-truncanoides*		*Rotalipora reicheli*		*Rotalipora montsalvensis*		Benthic foraminifera	
	(mbsf)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	Sr/Ca (mmol /mol)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)	$\delta^{18}O$ (‰ VPDB)	$\delta^{13}C$ (‰ VPDB)
1050C-25R-4, 16-20	543.36	-1.335	1.814	1.051	—	—	—	—	—	—	—	—	—	—
1050C-26R-1, 7-9	548.47	-1.486	1.724	0.974	—	—	—	—	—	—	—	—	—	—
1050C-26R-1, 53-56	548.93	-0.988	1.862	0.771	—	—	—	—	—	—	—	—	—	—
1050C-26R-1, 139-141	549.79	-1.370	1.802	0.904	—	—	—	—	—	—	—	—	—	—
1050C-26R-2, 22-24	550.12	-1.001	1.845	0.687	—	—	—	—	—	—	—	—	—	—
1050C-26R-2, 24-26	550.14	-0.992	1.846	0.686	—	—	—	—	—	—	—	—	—	—
1050C-26R-2, 56-59	550.46	-1.337	1.738	0.707	—	—	—	—	—	—	—	—	—	—
1050C-26R-2, 114-116	551.04	-1.284	1.812	0.810	—	—	—	—	—	—	—	—	—	—
1050C-26R-2, 115-117	551.05	-1.808	1.820	1.038	—	—	—	—	—	—	—	—	—	—
1050C-26R-3, 15-18	551.55	-0.829	1.989	0.660	—	—	—	—	—	—	—	—	—	—
1050C-26R-3, 73-76	552.13	-0.636	1.964	0.556	—	—	—	—	—	—	—	—	—	—
1050C-26R-3, 120-122	552.60	-0.958	1.816	0.724	—	—	—	—	—	—	—	—	—	—
1050C-26R-4, 34-37	553.24	-1.237	1.970	0.721	—	—	—	—	—	—	—	—	—	—
1050C-26R-4, 53-55	553.43	-1.396	2.106	0.905	—	—	—	—	—	—	—	—	—	—
1050C-26R-4, 68-70	553.58	-2.242	2.249	1.398	—	—	—	—	—	—	—	—	—	—
1050C-26R-4, 83-86	553.73	-1.825	2.464	1.316	—	—	—	—	—	—	—	—	—	—
1050C 26R-4, 140-142	554.30	-1.861	2.411	1.258	—	—	—	—	—	—	—	—	—	—
1050C-26R-5, 83-86	555.23	-1.935	2.430	1.437	—	—	—	—	—	—	—	—	—	—
1050C-26R-CC, 9-10	556.59	-2.032	2.417	1.351	—	—	—	—	—	—	—	—	—	—
1050C-27R-1, 73-76	558.73	-1.879	1.908	1.934	—	—	—	—	—	—	—	—	—	—

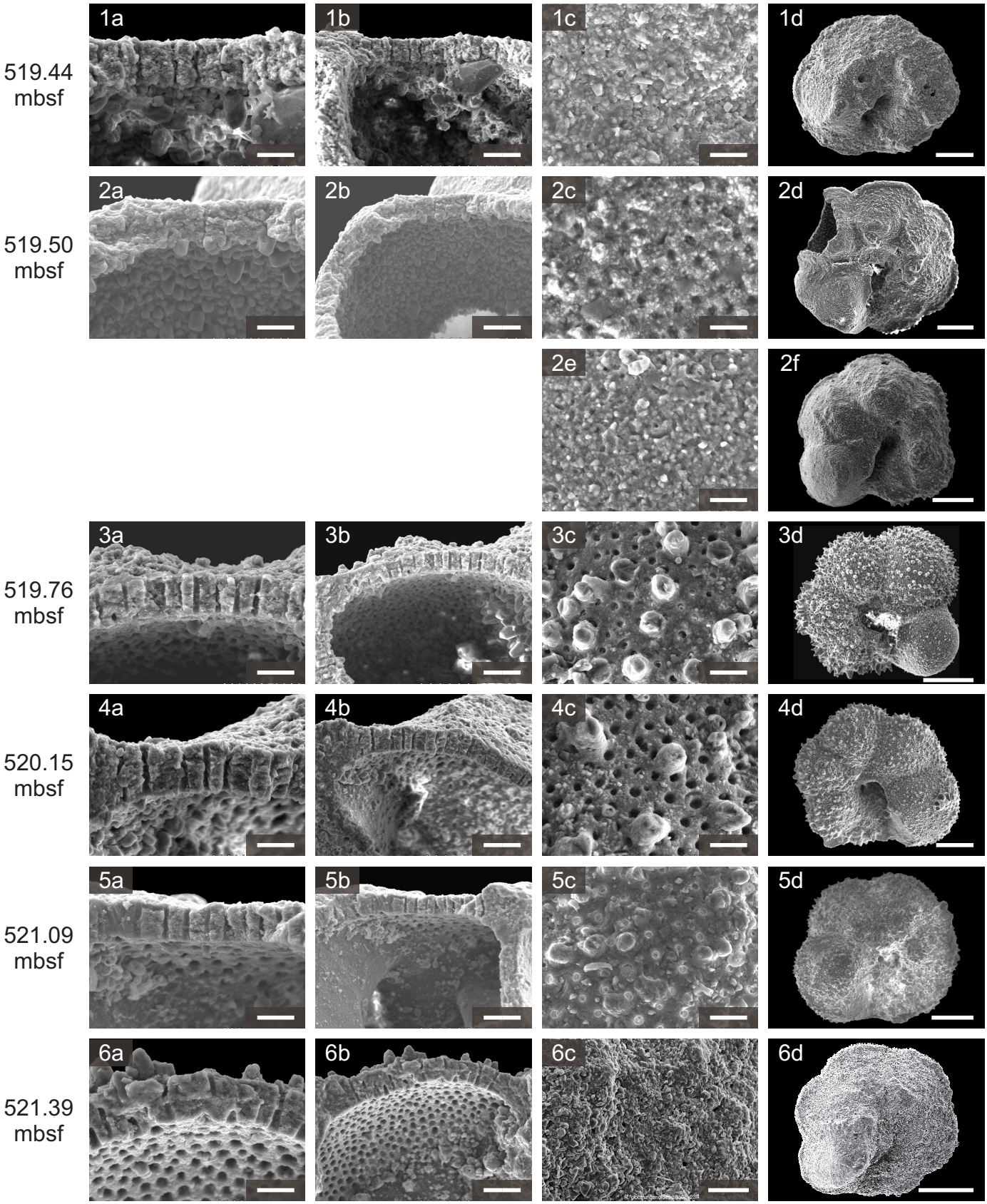
Note: Horizontal bar = data not generated

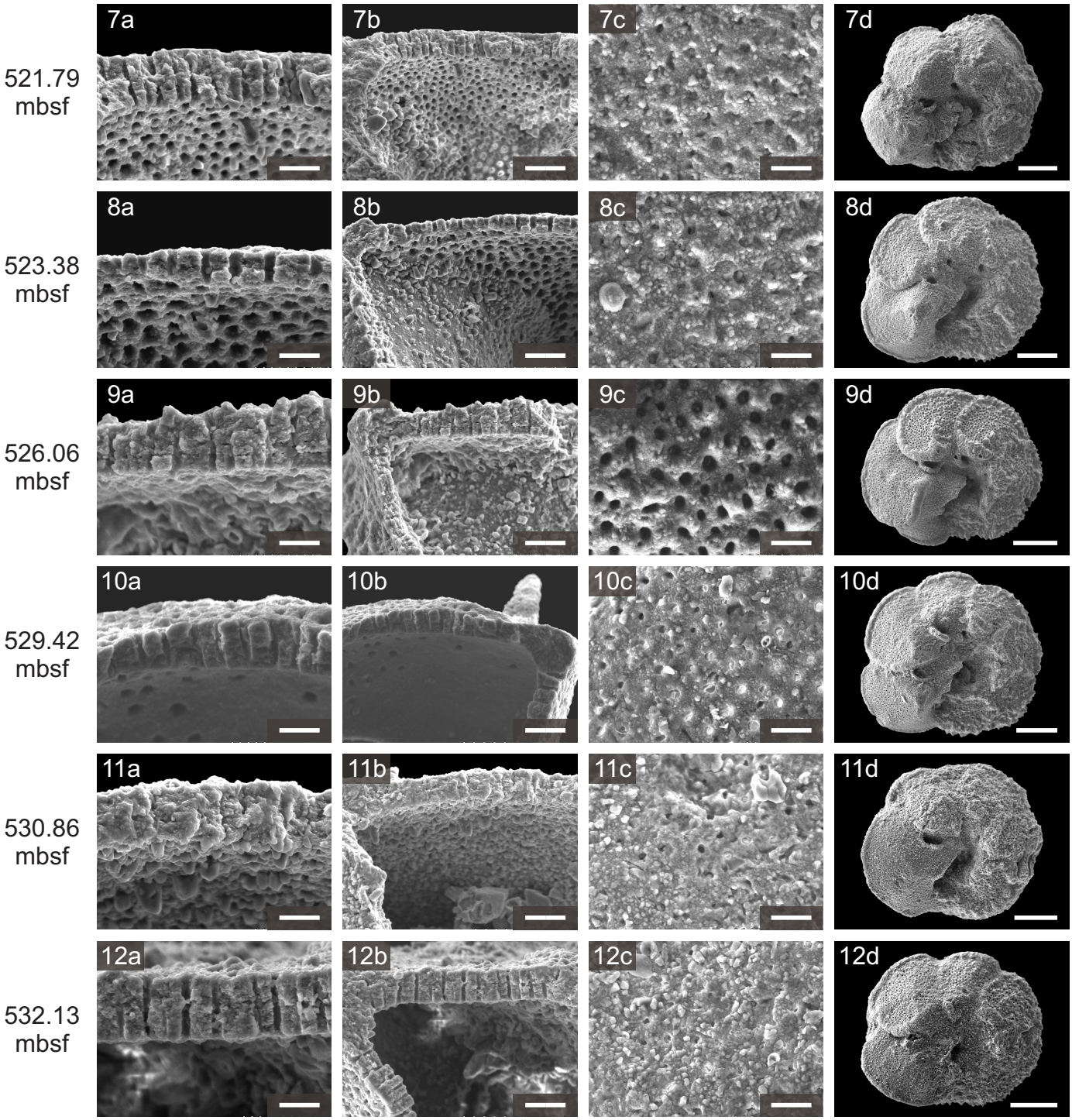
*Data from Huber et al. (2002)



Ando et al. (G25580)

Figure DR1


519.44 mbsf
1a
1b
1c
1d
519.50 mbsf
2a
2b
2c
2d
2e
2f
519.76 mbsf
3a
3b
3c
3d
520.15 mbsf
4a
4b
4c
4d
521.09 mbsf
5a
5b
5c
5d
521.39 mbsf
6a
6b
6c
6d



Ando et al. (G25580)

Figure DR2

Figure DR1. A: Taxonomically separated $\delta^{18}O$ records of surface-, intermediate- and deep-dwelling planktonic foraminifera (SPF, IPF and DPF, respectively), benthic foraminifera (BF), and coccolith fraction (CC) at ODP Site 1050. Horizontal lines linking Sr/Ca and $\delta^{18}O$ data points indicate the 12 levels chosen for SEM study (Fig. DR2). Screening of $\delta^{18}O$ data against selective diagenesis is based on Sr/Ca–$\delta^{18}O$ co-variation and SEM study. B: Cross-plot of Sr/Ca ratios vs. $\delta^{18}O$ values. Note strong correlation in the exponential function (R^2 = 0.80). C: Cross-plot of all foraminiferal $\delta^{18}O$ vs. $\delta^{13}C$ with values after standardization with respect to the coccolith fraction (= $\Delta\delta_{Foram-CC}$). Simplified version based on ± 1SD data distribution of each taxon/taxonomic group is shown in Figure 2A. Data from samples subjected to selective diagenesis (10 levels with Sr/Ca = <0.80; Table DR1) and a single data point at 521.09 mbsf with an anomalous $\Delta\delta^{13}C$ value of *R. reicheli* are eliminated.

Figure DR2. SEM images of selected specimens of planktonic foraminifera: (1) sample 1050C-23R-1, 4–5 cm; (2) sample 1050C-23R-1, 10–11 cm; (3) sample 1050C-2R3-1, 36–37 cm; (4) sample 1050C-23R-1, 75–76 cm; (5) sample 1050C-23R-2, 19–21 cm; (6) sample 1050C-23R-2 48.5–49.5 cm; (7) sample 1050C-23R-2, 89–90 cm; (8) sample 1050C-23R-3, 98–99 cm; (9) sample 1050C-23R-5, 66–68 cm; (10) sample 1050C-24R-1, 32–35 cm; (11) sample 1050C-24R-2, 26–28 cm; (12) sample 1050C-24R-3, 68–71 cm. Their respective sub-bottom depths in meters below seafloor (mbsf) are shown on left. a = close-up of wall cross section (usually the penultimate chamber); b = same field as (a) with lower magnification showing chamber interior; c, e = close-up of pored external chamber surface; d, f = whole specimen from which (c) or (e) is taken. All specimens were picked from the 212–300 μm fraction, namely, the same size as those used for isotopic analysis. Images (a, b) and (c, d) are taken from different specimens, except for 519.50 mbsf for which (a–d) and (e, f) are from different specimens. Pt-Pd coated images by using a HITACHI S-3500N SEM at Pusan National University. Species name: 1d, 2d, 6d, 8d, 9d, 10d, 11d, 12d = *Rotalipora globotruncanoides*; 2f, 7d = *Rotalipora reicheli*; 3d, 4d, 5d, = *Praeglobotruncana stephani*. Scale bars: a, c, e = 10 μm; b = 20 μm; d, f = 100 μm.

Specimens selected are the best quality observed in each of foraminiferal samples with essentially hollow shells under stereomicroscope. Stable isotope analysis was performed on the same grade of material. As mentioned in text, there exists good correlation between the coccolith fraction Sr/Ca ratio and foraminiferal preservation (see also Fig. DR1). For example, foraminiferal specimens from 521.09 and 529.42 mbsf are rated as very good, and Sr/Ca ratios of these levels are among the highest (1.19 and

1.12, respectively). On the other hand, the poorest preservation is recognized at 519.44, 519.50 and 530.86 mbsf, showing prevalence of secondary calcite overgrowth in chamber interior; these levels are characterized by distinctly low Sr/Ca ratios (0.65, 0.66 and 0.69, respectively). Similarly low Sr/Ca ratios are also obtained from 521.39 and 521.79 mbsf, yet their foraminiferal preservation of chamber interior appears to be moderately good. However, partial induration of chalk was observed at these levels during sample processing.

It is noteworthy that, except for the poorest preserved material, wall cross sections exhibit primary biogenic structures, not only pores and lamellar construction but also microgranular texture. No definitive evidence for recrystallization as manifested by corroded or dissolved appearance and by replacement with euhedral calcite (e.g., Sexton et al., 2006) has been recognized. Given that the style of burial diagenesis is simply overgrowth of secondary calcite, it may be the primary reason why interspecies $\delta^{18}O$ differences are excellently retained at Site 1050.