Supplementary Information

SEM-EDS Data

Table 1A: SEM spot analyses in weight %

Spectrum	Desc.	Sample session/site	Wt % Na	Wt % Mg	Wt % S	Wt % Cl	Wt % Ca	Wt % Sr	Wt % O	Wt % Total
sp25	C	H302	0.068	21.222	0.000	0.401	0.159	0.000	14.053	35.902
sp45	C	H302	0.065	21.310	0.000	0.199	0.172	0.000	14.115	35.861
sp20	C	H302	0.087	19.951	0.000	0.562	0.258	0.000	13.263	34.121
sp6	C	H47 Sn1/2	0.101	17.319	0.000	0.638	0.232	0.000	11.525	29.816
sp21	C	H302	0.101	21.079	0.000	0.541	0.284	0.000	14.020	36.025
sp16	C	H302	0.059	21.478	0.000	0.628	0.299	0.000	14.274	36.737
sp13	C	H47 Sn2 pt	0.135	19.706	0.000	0.465	0.302	nm	13.135	33.744
sp15	C	H47 Sn2 pt	0.199	19.551	0.000	0.397	0.426	nm	13.105	33.678
sp11	C	H47 Sn2 pt	0.137	17.942	0.000	0.496	0.410	nm	12.019	31.005
sp15	C	H302	0.068	12.187	0.000	0.459	0.319	0.000	8.171	21.204
sp1	C	H47 Sn1/2	0.073	9.809	0.000	0.458	0.276	0.000	6.590	17.207
sp3	C	H47 Sn1/3	0.100	15.259	0.000	0.427	0.430	0.000	10.248	26.464
sp5	C	H47 Sn1/2	0.046	9.594	0.000	0.314	0.277	0.000	6.440	16.669
sp45	C	H47 Sn1/2	0.072	9.468	0.000	0.353	0.402	0.000	6.416	16.712
sp11	C	H47 Sn1/2	0.046	6.759	0.000	0.387	0.347	0.000	4.602	12.140
sp7	C	H47 Sn1/2	0.116	15.058	0.000	0.652	1.154	0.000	10.410	27.390
sp37	C	H302	0.000	6.705	0.048	0.399	0.516	0.000	4.691	12.359
sp36	C	H302	0.130	19.724	0.058	0.467	1.733	0.000	13.804	35.916
sp14	R	H47 Sn1/4	0.444	13.140	0.098	0.559	13.001	0.181	14.171	41.594
sp27	R	H302	0.459	9.410	0.065	0.877	9.641	0.167	10.328	30.948
sp38	R	H302	0.576	15.127	0.048	0.440	16.790	0.156	16.958	50.095
sp26	R	H302	0.287	9.841	0.064	0.933	10.929	0.149	11.062	33.264
sp40	R	H302	1.008	12.180	0.000	0.419	13.695	0.289	13.885	41.475
sp10	R	H47 Sn1/1	0.045	7.186	0.059	0.228	8.570	0.000	8.254	24.342
sp15	R	H47 Sn1/2	0.420	9.042	0.000	0.393	10.789	0.209	10.442	31.294
H48r	R	H47 Sn1/2	0.287	8.709	0.048	0.357	10.432	0.192	10.102	30.126
sp41	R	H302	0.889	11.248	0.000	0.451	13.707	0.277	13.233	39.805
sp30	R	H302	0.652	10.846	0.099	1.486	13.781	0.286	13.065	40.215
sp3	R	H47 Sn3/11	nm	8.865	nm	nm	11.298	nm	10.404	30.567
sp32	R	H47 Sn1/4	0.088	5.233	0.000	0.256	6.976	0.111	6.280	18.944
sp34	R	H302	0.321	10.257	0.076	0.872	14.078	0.189	12.630	38.423
sp15	R	H47 Sn1/4	0.288	10.303	0.069	0.378	14.915	0.244	12.983	39.181
sp6	R	H47 Sn1/4	0.200	6.931	0.000	0.397	10.371	0.121	8.793	26.812
sp11	R	H47 Sn1/4	0.329	7.826	0.048	0.419	11.782	0.193	10.075	30.673
sp1	R	H47 Sn1/4	0.359	8.104	0.047	0.615	13.016	0.213	10.764	33.118
sp10	R	H47 Sn1/4	0.360	7.226	0.064	0.414	12.857	0.293	10.227	31.498
sp31	R	H302	0.342	8.785	0.092	1.048	15.741	0.111	12.342	38.462
sp13	R	H47 Sn1/4	0.281	5.853	0.139	0.281	10.894	0.000	8.507	25.955
H481	R	H47 Sn1/1	0.471	12.642	0.137	1.258	23.571	0.301	18.152	56.531
sp24	R	H302	0.382	10.841	0.358	0.551	21.189	0.000	16.260	49.581
sp12	R	H47 Sn1/4	0.249	5.484	0.058	0.436	11.652	0.153	8.461	26.493
sp1	R	H47 Sn1/3	0.041	6.825	0.065	0.172	14.643	0.000	10.447	32.193
sp3	R	H47 Sn3/6	nm	9.028	nm	nm	19.375	nm	13.675	42.077
sp1	R	H47 Sn3/11	nm	8.184	nm	nm	17.737	nm	12.466	38.387
sp10	R	H47 Sn1/2	0.205	6.314	0.122	0.295	13.701	0.186	9.912	30.734

sp2	R	H47 Sn3/15	nm	8.200	nm	nm	18.110	nm	12.625	38.935
sp7	R	H47 Sn1/4	0.344	8.364	0.082	0.353	18.618	0.217	13.218	41.196
sp8	R	H47 Sn1/4	0.372	8.052	0.066	0.281	18.833	0.159	13.074	40.837
sp1	R	H47 Sn3/16	nm	8.768	nm	nm	21.265	nm	14.258	44.291
sp4	R	H47 Sn1/3	0.298	7.576	0.094	0.377	19.183	0.216	12.926	40.670
sp3	R	H47 Sn1/4	0.719	8.144	0.149	0.210	21.090	0.236	14.294	44.842
sp4	R	H47 Sn1/4	0.681	8.159	0.153	0.172	21.292	0.000	14.334	44.789
H481	R	H47 Sn1/1	0.713	7.973	0.185	0.341	21.472	0.275	14.393	45.352
sp2	R	H47 Sn3/13	nm	7.133	nm	nm	19.421	nm	12.447	39.001
sp1	R	H47 Sn3/13	nm	7.014	nm	nm	19.222	nm	12.289	38.526
sp20	W	H47 Sn3/3	nm	1.806	nm	nm	8.509	nm	4.585	14.901
sp4	W	H47 Sn3/14	nm	4.684	nm	nm	23.083	nm	12.297	40.065
sp3	W	H47 Sn1/2	0.121	2.725	0.125	0.103	13.954	0.099	7.611	24.739
sp16	W	H47 Sn2 pt	0.537	4.910	0.240	0.077	25.506	nm	13.960	45.231
sp9	W	H47 Sn1/2	0.225	3.640	0.142	0.209	19.017	0.183	10.310	33.725
sp22	W	H302	0.379	5.139	0.426	0.282	26.975	0.194	14.955	48.350
sp1	W	H47 Sn3/15	nm	4.318	nm	nm	23.348	nm	12.161	39.826
sp4	W	H47 Sn3/6	nm	5.208	nm	nm	28.216	nm	14.690	48.113
sp4	W	H47 Sn3/13	nm	4.605	nm	nm	25.180	nm	13.081	42.866
sp6	W	H302	0.051	1.672	0.082	0.401	9.577	0.000	5.063	16.847
sp14	W	H47 Sn2 pt	0.351	4.129	0.214	0.071	25.125	nm	13.190	43.081
sp48	W	H302	0.176	3.971	0.343	0.103	24.266	0.195	12.910	41.963
sp17	W	H47 Sn2 pt	0.340	3.459	0.255	0.066	21.285	nm	11.273	36.678
sp29	W	H47 Sn1/1	0.130	2.953	0.100	0.252	18.567	0.000	9.550	31.552
sp5	W	H47 Sn3/14	nm	3.322	nm	nm	20.999	nm	10.568	34.889
sp19	W	H47 Sn3/3	nm	4.500	nm	nm	28.454	nm	14.320	47.274
sp16	W	H47 Sn3/3	nm	2.550	nm	nm	16.461	nm	8.249	27.261
sp2	W	H47 Sn3/10	nm	1.963	nm	nm	12.838	nm	6.416	21.218
sp12	W	H47 Sn1/2	0.068	3.037	0.100	0.115	20.462	0.000	10.339	34.120
sp13	W	H47 Sn3/3	nm	3.977	nm	nm	26.832	nm	13.328	44.136
sp28	W	H302	0.610	3.958	0.153	0.196	26.883	0.242	13.821	45.863
sp18	W	H47 Sn3/3	nm	3.789	nm	nm	26.643	nm	13.129	43.560
sp3	W	H47 Sn3/4	nm	3.622	nm	nm	25.704	nm	12.644	41.970
sp29	W	H302	0.383	3.554	0.191	0.230	25.349	0.172	12.908	42.787
sp1	W	H47 Sn3/10	nm	2.713	nm	nm	19.847	nm	9.708	32.268
sp3	W	H47 Sn3/15	nm	3.763	nm	nm	30.321	nm	14.580	48.664
sp17	W	H47 Sn3/3	nm	2.849	nm	nm	23.587	nm	11.290	37.726
sp7	W	H302	0.093	2.602	0.160	0.187	21.767	0.000	10.673	35.481
wall	W	H47 Sn1/1	0.187	2.940	0.292	0.131	25.445	0.196	12.631	41.823
sp6	W	H47 Sn3/6	nm	3.478	nm	nm	30.791	nm	14.580	48.849
sp1	W	H47 Sn3/4	nm	3.693	nm	nm	32.835	nm	15.537	52.066
sp2	W	H47 Sn3/6	nm	3.484	nm	nm	31.660	nm	14.931	50.075
sp32	W	H47 Sn1/1	0.234	3.066	0.224	0.074	28.067	0.153	13.723	45.591
sp23	W	H302	0.251	3.035	0.351	0.133	27.987	0.157	13.811	45.725
sp12	W	H47 Sn2 pt	0.159	2.695	0.225	0.050	25.517	nm	12.351	40.997
sp14	W	H47 Sn3/3	nm	2.511	nm	nm	24.383	nm	11.386	38.280
sp10	W	H47 Sn1/3	0.127	2.002	0.174	0.127	20.085	0.132	9.664	32.311
sp14	W	H302	0.142	2.447	0.196	0.105	25.033	0.164	11.975	40.061
sp2	W	H47 Sn3/11	nm	2.336	nm	nm	24.022	nm	11.126	37.485
sp12	W	H47 Sn3/3	nm	2.924	nm	nm	30.439	nm	14.075	47.437
sp6	W	H47 Sn1/3	0.160	2.393	0.228	0.081	25.634	0.118	12.225	40.840
sp43	W	H302	0.199	2.684	0.278	0.000	30.203	0.208	14.346	47.919
sp42	W	H302	0.255	2.572	0.285	0.000	30.542	0.188	14.434	48.276

sp13	W	H47 Sn1/2	0.090	1.757	0.184	0.157	20.900	0.000	9.806	32.893
sp8	W	H47 Sn1/2	0.153	2.227	0.253	0.092	28.381	0.139	13.252	44.496
sp3	W	H47 Sn3/13	nm	1.841	nm	nm	23.641	nm	10.648	36.130
sp13	W	H302	0.101	1.931	0.166	0.089	24.934	0.120	11.529	38.869
sp33	W	H47 Sn1/1	0.061	1.617	0.155	0.083	20.970	0.000	9.736	32.663
sp44	W	H302	0.117	2.096	0.274	0.000	28.930	0.154	13.407	44.979
sp1	W	H47 Sn3/7	nm	1.939	nm	nm	28.582	nm	12.685	43.206
sp4	W	H302	0.066	1.433	0.133	0.104	23.018	0.079	10.368	35.203
sp31	W	H47 Sn1/1	0.091	1.677	0.190	0.056	27.519	0.114	12.426	42.073
sp5	W	H47 Sn1/3	0.117	1.470	0.193	0.068	25.248	0.149	11.402	38.647
sp3	W	H302	0.061	1.182	0.135	0.102	21.164	0.000	9.450	32.093
sp11	W	H47 Sn1/3	0.083	1.488	0.173	0.000	27.141	0.103	12.120	41.107
sp1	W	H47 Sn3/8	nm	1.426	nm	nm	27.154	nm	11.777	40.357
sp5	W	H302	0.096	1.278	0.157	0.106	24.532	0.095	10.920	37.183
sp1	W	H302	0.097	1.395	0.208	0.083	28.289	0.106	12.575	42.753
sp3	W	H47 Sn3/8	nm	1.096	nm	nm	26.502	nm	11.300	38.899
sp2	W	H302	0.031	0.612	0.172	0.062	24.901	0.000	10.610	36.387
sp16	R	H302	0.201	0.141	0.089	0.057	34.661	1.686	14.440	51.274

Table 1A: Weight %. Some of the weight totals of the SEM analyses of magnesium calcite, protodolomite and especially magnesite are slightly lower than would be expected for the ideal minerals. This can be explained with the presence of organic material in the coralline algae's skeleton and cells, as samples were collected fresh and not subject to bleaching. Using the secondary electron imaging we were able to see porous textures in some cells, and cells that were not completely mineralized, i.e., there was beam charging. When analysing such features, the analysis total (weight %) was noticeably lower. Such analyses were not considered reliable and were not included in our final datasets. Sn2 pt indicates platinum coating; nm= not measured. C= cell, R = rim, W = cell wall, Oxygen is calculated based on the oxides.

Table 1B: SEM spot analyses in atomic % with calculated mol.% $MgCO_3$

Spectrum	Desc.	Sample session/site	Mol. % $MgCO_3$	At % Na	At % Mg	At% S	At % Cl	At % Ca	At % Sr	At % O
sp25	C	H302	99.55	0.167	49.331	0	0.639	0.224	0	49.639
sp45	C	H302	99.51	0.160	49.479	0	0.317	0.242	0	49.801
sp20	C	H302	99.22	0.227	48.972	0	0.947	0.384	0	49.470
sp6	C	H47 Sn1/2	99.19	0.301	48.762	0	1.232	0.396	0	49.309
sp21	C	H302	99.19	0.249	48.982	0	0.862	0.401	0	49.507
sp16	C	H302	99.16	0.141	48.989	0	0.982	0.414	0	49.473
sp13	C	H47 Sn2 pt	99.08	0.355	48.884	0	0.792	0.454	nm	49.515
sp15	C	H47 Sn2 pt	98.70	0.525	48.626	0	0.677	0.642	nm	49.530
sp11	C	H47 Sn2 pt	98.63	0.391	48.572	0	0.921	0.674	nm	49.442
sp15	C	H302	98.44	0.285	48.392	0	1.250	0.769	0	49.304
sp1	C	H47 Sn1/2	98.32	0.379	48.123	0	1.542	0.822	0	49.134
sp3	C	H47 Sn1/3	98.32	0.335	48.455	0.829	0	0.929	0	49.452
sp5	C	H47 Sn1/2	98.28	0.243	48.428	0	1.086	0.847	0	49.396
sp45	C	H47 Sn1/2	97.49	0.385	47.867	0	1.224	1.232	0	49.292

sp11	C	H47 Sn1/2	96.98	0.341	47.343	0	1.857	1.472	0	48.986
sp7	C	H47 Sn1/2	95.56	0.380	46.842	0	1.391	2.177	0	49.209
sp37	C	H302	95.54	0	46.379	0.254	1.893	2.167	0	49.307
sp36	C	H302	94.94	0.325	46.681	0.104	0.759	2.489	0	49.643
sp14	R	H47 Sn1/4	62.49	1.078	30.180	0.880	0.171	18.114	0.115	49.461
sp27	R	H302	61.67	1.510	29.284	0.152	1.872	18.198	0.144	48.839
sp38	R	H302	59.76	1.170	29.050	0.07	0.579	19.559	0.083	49.488
sp26	R	H302	59.75	0.884	28.680	0.142	1.865	19.321	0.121	48.989
sp40	R	H302	59.45	2.477	28.312	0	0.668	19.310	0.186	49.047
sp10	R	H47 Sn1/1	58.02	0.188	28.543	0.178	0.620	20.650	0	49.821
sp15	R	H47 Sn1/2	58.01	1.379	28.059	0	0.835	20.309	0.180	49.237
H48r	R	H47 Sn1/2	57.92	0.979	28.072	0.117	0.789	20.395	0.171	49.477
sp41	R	H302	57.50	2.294	27.435	0	0.754	20.280	0.187	49.050
sp30	R	H302	56.47	1.685	26.504	0.183	2.490	20.427	0.194	48.517
sp3	R	H47 Sn3/11	56.40	nm	28.087	nm	nm	21.712	nm	50.086
sp32	R	H47 Sn1/4	55.29	0.483	27.107	0.909	0	21.917	0.159	49.425
sp34	R	H302	54.57	0.871	26.276	0.148	1.532	21.876	0.134	49.164
sp15	R	H47 Sn1/4	53.25	0.767	25.912	0.653	0.132	22.752	0.170	49.614
sp6	R	H47 Sn1/4	52.42	0.780	25.577	1.003	0	23.213	0.124	49.303
sp11	R	H47 Sn1/4	52.27	1.122	25.237	0.926	0.119	23.049	0.173	49.375
sp1	R	H47 Sn1/4	50.65	1.143	24.371	1.267	0.108	23.744	0.178	49.189
sp10	R	H47 Sn1/4	48.10	1.211	23.007	0.904	0.154	24.829	0.259	49.478
sp31	R	H302	47.92	0.945	22.956	0.183	1.878	24.949	0.081	49.008
sp13	R	H47 Sn1/4	46.97	1.144	22.527	0.741	0.406	25.432	0	49.750
H481	R	H47 Sn1/1	46.93	0.887	22.546	0.186	1.539	25.499	0.149	49.195
sp24	R	H302	45.75	0.817	21.920	0.548	0.764	25.989	0	49.962
sp12	R	H47 Sn1/4	43.69	1.012	21.046	1.148	0.168	27.124	0.163	49.341
sp1	R	H47 Sn1/3	43.45	0.137	21.466	0.372	0.154	27.938	0	49.934
sp3	R	H47 Sn3/6	43.44	nm	21.603	nm	nm	28.122	nm	49.725
sp1	R	H47 Sn3/11	43.20	nm	21.602	nm	nm	28.398	nm	50.000
sp10	R	H47 Sn1/2	43.17	0.715	20.872	0.307	0.668	27.473	0.171	49.794
sp2	R	H47 Sn3/15	42.74	nm	21.371	nm	nm	28.629	nm	50.000
sp7	R	H47 Sn1/4	42.55	0.899	20.666	0.597	0.154	27.905	0.149	49.630
sp8	R	H47 Sn1/4	41.34	0.982	20.118	0.482	0.126	28.544	0.11	49.639
sp1	R	H47 Sn3/16	40.47	nm	20.233	nm	nm	29.767	nm	50.000
sp4	R	H47 Sn1/3	39.43	0.797	19.151	0.653	0.180	29.414	0.152	49.654
sp3	R	H47 Sn1/4	38.90	1.738	18.619	0.330	0.258	29.248	0.150	49.658
sp4	R	H47 Sn1/4	38.72	1.643	18.624	29.481	0.264	0.269	0	49.719
H491O	R	H47 Sn1/1	37.97	1.710	18.091	0.318	0.530	29.553	0.173	49.625
sp2	R	H47 Sn3/13	37.72	nm	18.858	nm	nm	31.142	nm	50.000
sp1	R	H47 Sn3/13	37.56	nm	18.781	nm	nm	31.219	nm	50.000
sp20	W	H47 Sn3/3	25.92	nm	12.962	nm	nm	37.038	nm	50.000
sp4	W	H47 Sn3/14	25.07	nm	12.534	nm	nm	37.466	nm	50.000
sp3	W	H47 Sn1/2	24.35	0.556	11.807	0.412	0.305	36.681	0.119	50.120
sp16	W	H47 Sn2 pt	24.09	1.341	11.582	0.430	0.125	36.491	nm	50.032
sp9	W	H47 Sn1/2	23.99	0.759	11.598	0.343	0.456	36.758	0.161	49.925
sp22	W	H302	23.90	0.888	11.369	0.715	0.428	36.202	0.119	50.279
sp1	W	H47 Sn3/15	23.36	nm	11.682	nm	nm	38.318	nm	50.000
sp4	W	H47 Sn3/6	23.33	nm	11.664	nm	nm	38.336	nm	50.000
sp4	W	H47 Sn3/13	23.17	nm	11.583	nm	nm	38.417	nm	50.000
sp6	W	H302	22.34	0.348	10.738	0.399	1.767	37.320	0	49.428
sp14	W	H47 Sn2 pt	21.32	0.927	10.325	0.406	0.121	38.106	nm	50.114
sp48	W	H302	21.25	0.479	10.214	0.669	0.181	37.859	0.139	50.459

sp17	W	H47 Sn2 pt	21.13	1.055	10.144	0.567	0.132	37.864	nm	50.238
sp29	W	H47 Sn1/1	20.77	0.471	10.143	0.261	0.594	38.685	0	49.846
sp5	W	H47 Sn3/14	20.68	nm	10.288	nm	nm	39.455	nm	49.744
sp19	W	H47 Sn3/3	20.68	nm	10.279	nm	nm	39.424	nm	49.703
sp16	W	H47 Sn3/3	20.35	nm	10.173	nm	nm	39.827	nm	50.000
sp2	W	H47 Sn3/10	20.13	nm	10.067	nm	nm	39.933	nm	50.000
sp12	W	H47 Sn1/2	19.66	0.228	9.676	0.240	0.251	39.547	0	50.058
sp13	W	H47 Sn3/3	19.64	nm	9.784	nm	nm	40.041	nm	49.825
sp28	W	H302	19.53	1.527	9.372	0.274	0.319	38.615	0.159	49.733
sp18	W	H47 Sn3/3	18.99	nm	9.495	nm	nm	40.505	nm	50.000
sp3	W	H47 Sn3/4	18.85	nm	9.425	nm	nm	40.575	nm	50.000
sp29	W	H302	18.78	1.032	9.044	0.368	0.401	39.125	0.121	49.909
sp1	W	H47 Sn3/10	18.39	nm	9.196	nm	nm	40.804	nm	50.000
sp3	W	H47 Sn3/15	16.99	nm	8.493	nm	nm	41.507	nm	50.000
sp17	W	H47 Sn3/3	16.61	nm	8.303	nm	nm	41.697	nm	50.000
sp7	W	H302	16.46	0.303	8.038	0.374	0.397	40.788	0	50.100
wall	W	H47 Sn1/1	16.00	0.518	7.711	0.581	0.235	40.477	0.143	50.334
sp6	W	H47 Sn3/6	15.70	nm	7.849	nm	nm	42.151	nm	50.000
sp1	W	H47 Sn3/4	15.64	nm	7.821	nm	nm	42.179	nm	50.000
sp2	W	H47 Sn3/6	15.36	nm	7.634	nm	nm	42.080	nm	49.713
sp32	W	H47 Sn1/1	15.26	0.597	7.388	0.409	0.122	41.027	0.102	50.251
sp23	W	H302	15.17	0.637	7.285	0.639	0.218	40.745	0.104	50.371
sp12	W	H47 Sn2 pt	14.83	0.452	7.221	0.457	0.091	41.481	nm	50.298
sp14	W	H47 Sn3/3	14.51	nm	7.257	nm	nm	42.743	nm	50.000
sp10	W	H47 Sn1/3	14.11	0.458	6.842	41.639	0.451	0.297	0.125	50.187
sp14	W	H302	13.88	0.414	6.750	0.409	0.199	41.896	0.126	50.206
sp2	W	H47 Sn3/11	13.82	nm	6.908	nm	nm	43.092	nm	50.000
sp12	W	H47 Sn3/3	13.67	nm	6.801	nm	nm	42.948	nm	49.749
sp6	W	H47 Sn1/3	13.34	0.459	6.476	42.082	0.467	0.151	0.089	50.277
sp43	W	H302	12.78	0.486	6.202	0.487	0	42.326	0.133	50.365
sp42	W	H302	12.19	0.618	5.902	0.497	0	42.521	0.120	50.342
sp13	W	H47 Sn1/2	12.17	0.321	5.920	0.470	0.363	42.717	0	50.209
sp8	W	H47 Sn1/2	11.45	0.403	5.561	0.479	0.158	43.002	0.096	50.300
sp3	W	H47 Sn3/13	11.38	nm	5.689	nm	nm	44.311	nm	50.000
sp13	W	H302	11.32	0.305	5.532	0.360	0.174	43.336	0.096	50.196
sp33	W	H47 Sn1/1	11.28	0.220	5.498	0.399	0.193	43.256	0	50.310
sp44	W	H302	10.67	0.306	5.188	0.515	0	43.446	0.106	50.439
sp1	W	H47 Sn3/7	10.06	nm	5.028	nm	nm	44.972	nm	50.000
sp4	W	H302	9.31	0.223	4.562	0.321	0.228	44.444	0.070	50.151
sp31	W	H47 Sn1/1	9.13	0.257	4.464	0.384	0.102	44.439	0.084	50.269
sp5	W	H47 Sn1/3	8.76	0.358	4.265	44.431	0.424	0.136	0.120	50.266
sp3	W	H302	8.43	0.226	4.129	0.359	0.244	44.862	0	50.180
sp11	W	H47 Sn1/3	8.29	0.241	4.063	44.962	0.359	0	0.078	50.298
sp1	W	H47 Sn3/8	7.97	nm	3.970	nm	nm	45.862	nm	49.832
sp5	W	H302	7.91	0.308	3.863	0.361	0.219	44.995	0.079	50.174
sp1	W	H302	7.52	0.270	3.671	0.415	0.149	45.145	0.078	50.273
sp3	W	H47 Sn3/8	6.38**	nm	3.191	nm	nm	46.809	nm	50.000
sp2	W	H302	3.89**	0.102	1.908	0.407	0.132	47.136	0	50.315
sp16	R	H302	0.67*	0.485	0.321	0.154	0.088	47.898	1.066	49.988

Table 1B: Molecular % $MgCO_3$ and Atomic %.

Sn2 pt indicates platinum coating; nm= not measured, * = aragonite, **= low Mg-calcite, Oxygen is calculated based on the oxides.

Table 2A: SEM spot analyses in weight % (sample H56)

Spectrum	description	Wt % Na	Wt % Mg	Wt % S	Wt % Cl	Wt % Ca	Wt % Sr	Wt % O	Wt % Total
sp6	R	0.248	8.183	0.064	0.092	22.653	0.290	14.663	46.193
sp7	R	0.249	8.112	0.139	0.357	23.642	0.315	15.128	47.943
sp8	C	0.408	5.597	0.169	0.240	24.737	0.164	13.982	45.296
sp9	C	0.396	5.559	0.167	0.237	24.751	0.191	13.961	45.262
sp12	R	0.388	5.667	0.153	0.243	24.242	0.221	13.811	44.724
sp17	C	0.565	3.676	0.216	0.419	23.587	0.000	12.354	40.818
sp18	R	0.527	3.722	0.209	0.382	23.819	0.118	12.475	41.251
sp19	C	0.568	3.775	0.251	0.412	24.071	0.000	12.666	41.743
sp21	C	0.279	3.652	0.209	0.214	25.635	0.122	13.068	43.180
sp22	W	0.310	4.664	0.198	0.163	27.494	0.000	14.449	47.278
sp23	C	0.292	1.685	0.207	0.586	14.018	0.000	7.117	23.906
sp24	R	0.337	1.788	0.213	0.579	14.737	0.000	7.496	25.150
sp27	C	0.530	6.043	0.177	0.474	15.314	0.000	10.540	33.078
sp28	R	0.522	6.310	0.184	0.486	15.742	0.109	10.913	34.266
sp29	R	0.462	6.192	0.181	0.523	15.998	0.128	10.916	34.400
sp31	C	0.504	4.566	0.181	0.281	21.914	0.367	12.266	40.078
sp53	W	0.485	3.260	0.258	0.375	27.149	0.000	13.537	45.064
sp54	W	0.441	3.728	0.204	0.343	16.827	0.000	9.629	31.172

Legend as per table 1A

This sample (H56) of coralline algae displayed calcite peak asymmetry in the XRD pattern, but did not have a distinct protodolomite shoulder. However, SEM analyses reveal that it contains protodolomite with 38-40 mol.% $MgCO_3$ (lowest 'protodolomite' measured 36.13 mol.% $MgCO_3$) opening up the possibility that studies relying solely on XRD for mineral identification may overlook its presence. This sample appeared to contain multiple genera, and identification to the species level was not possible. However, it seemed that both *Hydrolithon* sp and *Lithophyllum* sp were likely to be present. This is in agreement with crustose coralline algae identified from this part of Heron Island (Ringeltaube and Harvey, 2000)

Table 2B: SEM spot analyses in atomic % (sample H56) with calculated mol.% $MgCO_3$

Spectrum	**description**	**Mol.% $MgCO_3$**	**At%Na**	**At%Mg**	**At%S**	**At% Cl**	**At% Ca**	**At% Sr**	**At% O**
sp6	R	37.32	0.587	18.323	0.109	0.141	30.768	0.180	49.892
sp7	R	36.13	0.572	17.580	0.229	0.530	31.080	0.189	49.821
sp8	C	27.17	1.012	13.133	0.300	0.385	35.208	0.107	49.854
sp9	C	27.02	0.985	13.065	0.298	0.383	35.286	0.125	49.860
sp12	R	27.82	0.974	13.457	0.276	0.395	34.917	0.145	49.834
sp17	C	20.44	1.581	9.725	0.432	0.760	37.844	0.000	49.657
sp18	R	20.48	1.461	9.758	0.416	0.687	37.885	0.086	49.707
sp19	C	20.54	1.553	9.755	0.492	0.730	37.732	0.000	49.739
sp21	C	19.02	0.744	9.201	0.399	0.370	39.173	0.086	50.028
sp22	W	21.86	0.746	10.628	0.342	0.255	38.001	0.000	50.028
sp23	C	16.54	1.413	7.704	0.719	1.836	38.880	0.000	49.448
sp24	R	16.66	1.549	7.761	0.702	1.725	38.811	0.000	49.452
sp27	C	39.42	1.732	18.671	0.415	1.004	28.698	0.000	49.480
sp28	R	39.79	1.648	18.836	0.416	0.996	28.507	0.091	49.506
sp29	R	38.95	1.459	18.481	0.409	1.070	28.965	0.106	49.510
sp31	C	25.57	1.423	12.187	0.367	0.515	35.483	0.272	49.754
sp53	W	16.52	1.243	7.899	0.474	0.624	39.908	0.000	49.851
sp54	W	26.75	1.583	12.670	0.527	0.799	34.689	0.000	49.731

Legend as per table 1B

Table 3: Bulk sample Mg-content, XRD and ICP-AES data

Sample	XRD mol.% $MgCO_3$	ICP-AES mol.% $MgCO_3$	s or d	Aragonite
H302	18.07	33.33	s	No
H118	17.82	nm	s	No
H107	17.79	nm	s	Yes
H47	17.66	32.08	s	Yes
H50	17.49	nm	d	No
H400	17.48	27.01	d	No
H403 (subsample 400)	17.48	22.61	s	Yes
H431	17.36	23.80	s	Yes
H45	17.27	nm	s	Yes
H41	17.25	nm	s	Yes
H318	17.14	26.17	s	No
H48 (subsample 47)	16.93	32.85	s	Yes
H56	16.84	nm	d	No
A23255	16.74	22.60	d	No
H323	16.70	17.92	d	Yes
H326 (subsample 323)	16.65	14.05	d	Yes
A23252	16.63	12.28	d	Yes
H428	16.25	15.64	d	Yes
H317 (subsample 318)	16.24	13.54	d	Yes

s = dolomite to magnesite shoulder present, d = dolomitic asymmetry on curve, nm= not measured. Aragonite: the aragonite phase was not quantified or subtracted from the ICP-AES data, thus lowering the relative Mg-content. The main paper ICP-AES results are only those samples without aragonite. H refers to Heron Island. Subsamples were different parts of the same crust. Sample size ranged from 1cm - 3 cm across. Sub samples H317 and H318 have distinctly different mineralogy as H317 contained a large amount of aragonite. All samples were crustose and living layers were identified as *H.onkodes* however H56 under SEM-EDS appeared to have multiple species and it is possible other samples also contained segments of other species. To test variation within a sample, H302 was broken into 7 pieces, average mol. % $MgCO_3$ = 17.75, std. dev 0.26

Replicates (re-running the same sample) were run for the following samples

replicates	std. dev
H48 (r=4)	0.08 mol. %
H400 (r=6)	0.06
H302 (r=2)	0.01

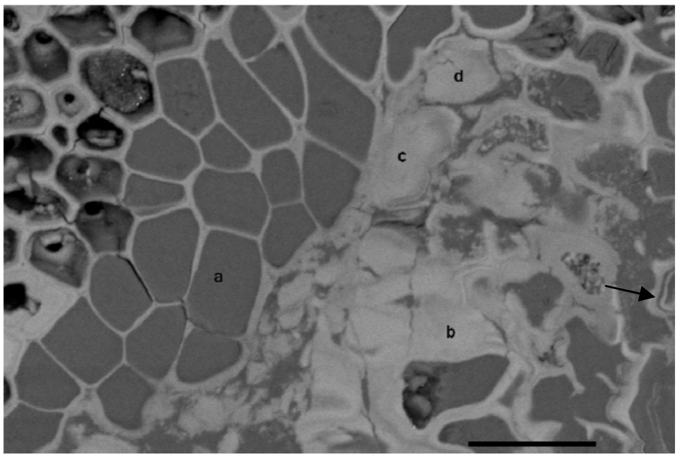

Figure 1 SEM of coralline section showing 3 distinct zones of mineralization. At the left cell in-fill is heterogeneous with small amounts of magnesite, the remaining composition is either organic or lower phase dolomite – Mg-calcite. The grey filled cells through the centre are magnesitic with structural cell wall material near fully dolomitised. On the right the cells are high range Mg-calcite, similar to the cell walls and cell walls are difficult to define. Measurements for b, c, and d are averages for mixed mineralogy as can be seen by shades of grey. On the right edge there appear to be the edges of micron scale concentric zonations (arrows). This image is from a *H.onkodes* crust, however the structure here is different in appearance from the rest of the thallus and may represent a second coralline species. **a** = 99.51 mol. % $MgCO_3$, **b** = 28.11 mol. % $MgCO_3$, **c** = 31.89 mol. % $MgCO_3$, **d** = 21.23 mol. % $MgCO_3$. Scale bar = 20 µm. Cell wall structure Mg-calcite 8-25 mol. % $MgCO_3$ dolomitic range 39-62 mol. % $MgCO_3$, magnesite 95-99.55 mol. % $MgCO_3$, void of mineral in-fill

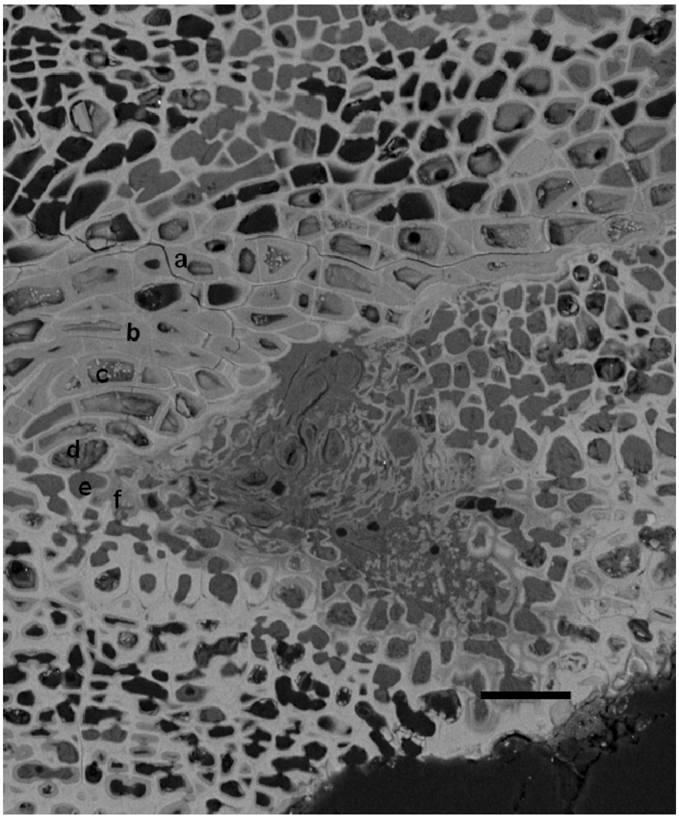

Figure 2 SEM of coralline section (base) showing a messy part of the normally layered structure. The grey band containing a-d may be a second coralline species. Cell inclusions of a variety of shapes are seen in all layers. The cracks through the sample are possibly due to sample preparation, note the cracks are aligned to the cell walls indicating a pre-existing structural weakness. **a** = 54.57 mol. % $MgCO_3$,. % $MgCO_3$, **c**= 59.76 mol. % $MgCO_3$, **d** = 94.94 mol. % $MgCO_3$, **e** = 95.54 mol. % $MgCO_3$,. Scale bar = 40 µm.

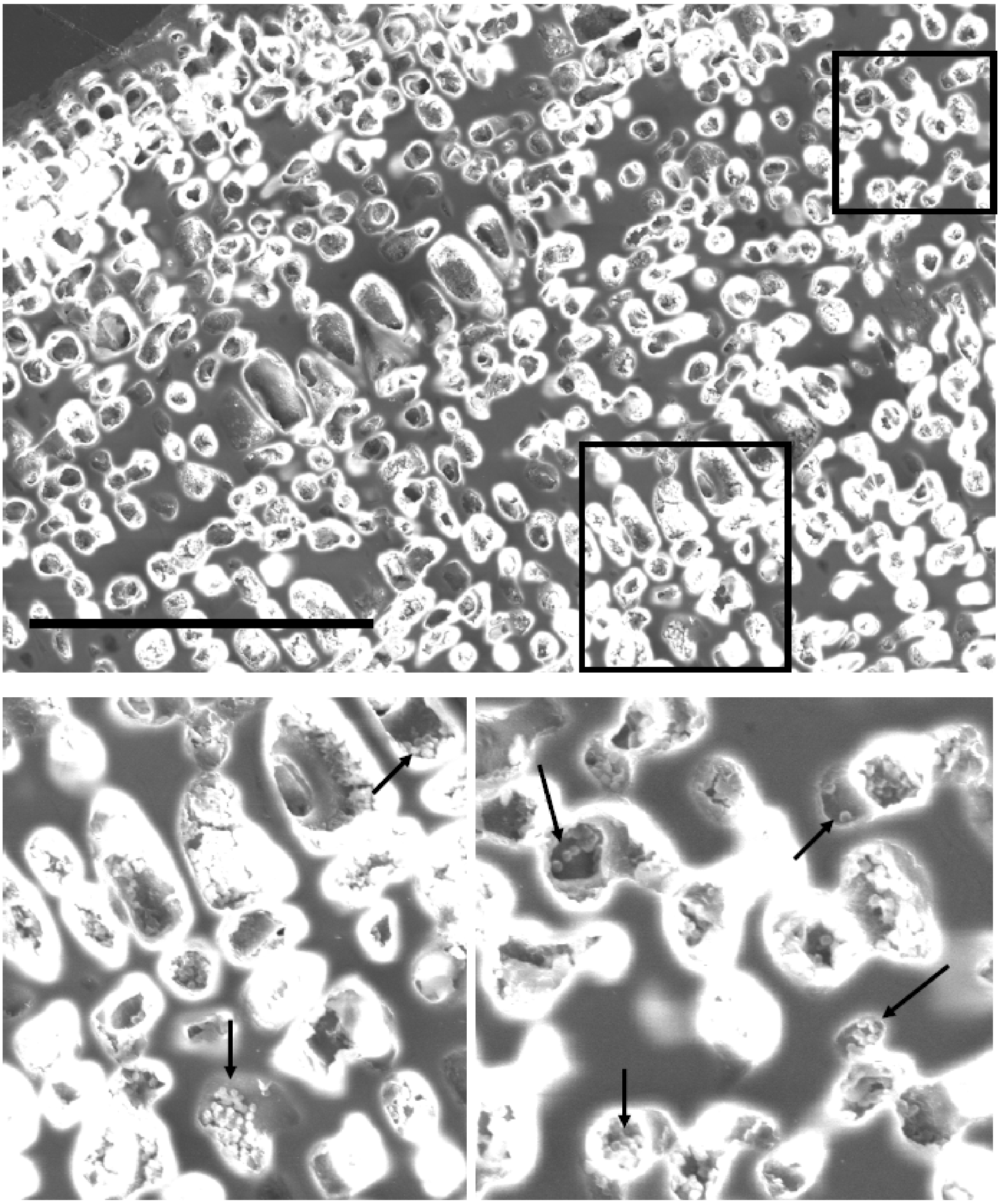

Figure 3: top 200 microns of sample 47 showing that starch grains are present in many cells (arrows in enlarged sections). SEM analyses confirmed that magnesite is present in this top layer. Scale bar = 100 μm.

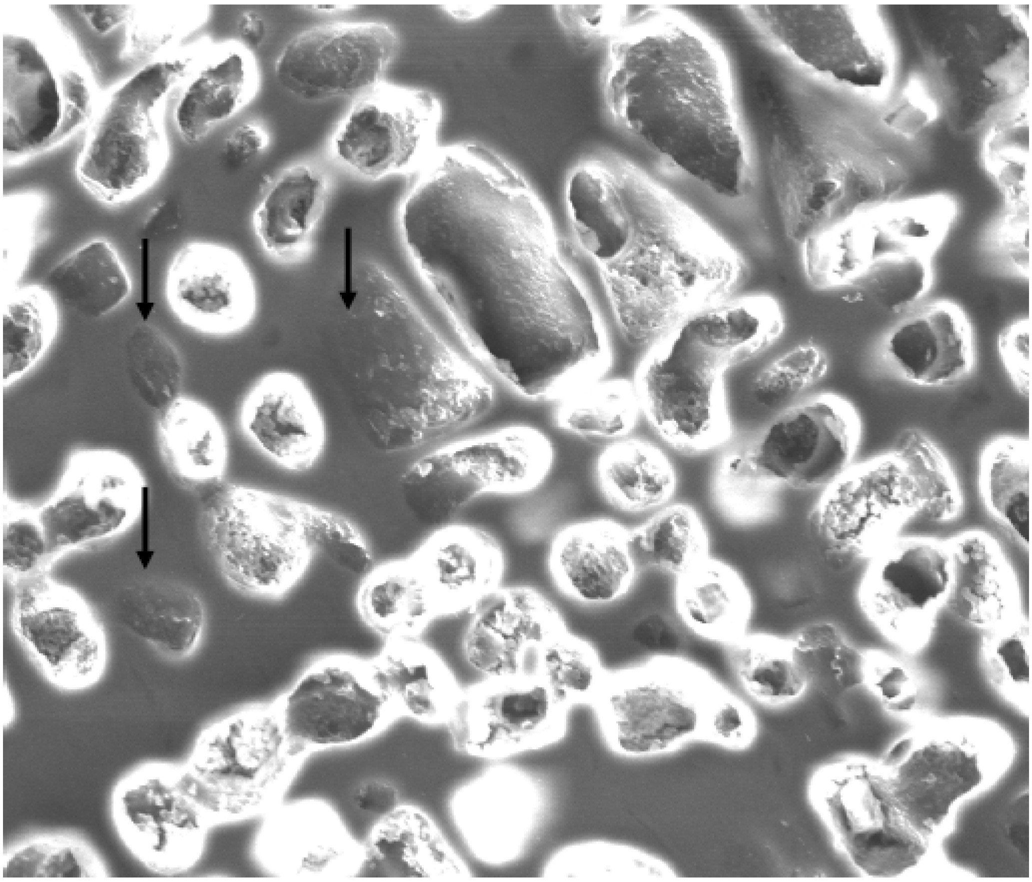

Figure 4: close up of figure 1 showing cells with some in-fill (arrows) in layers above cells containing starch grains.

Ringeltaube, P., and Harvey, A.: Non-Geniculate Coralline Algae (Corallinales, Rhodophyta) on Heron Reef, Great Barrier Reef (Australia), Bot. Mar., 43, 431, 2000.