

Table S1. The level of 13 trace elements in the outer, middle, and inner site of the shell.

	Na	Sr	Mg	Fe	B	Mn	Zn	P	Ba	Li	Ni	Cu	Pb
	Ppm												
DS-w-1-I	16793.9070	1946.0470	440.4062	13.1522	43.1634	22.6128	1.5105	12.8359	1.8347	3.3524	0.5850	0.4874	0.1273
DS-w-1-M	16963.1283	1738.6671	839.2895	289.8449	51.3515	11.1356	2.1028	6.7399	1.5590	6.5987	412.1868	2.9746	0.5562
DS-w-1-O	20034.5809	1167.9069	542.8054	6.7259	58.4654	1.0359	4.4220	5.2899	0.7823	4.1643	2.1902	0.2533	0.0608
DS-w-2-I	14617.6839	2205.8277	470.7417	5.7514	45.0593	23.6063	1.0578	7.6924	2.5691	2.9716	3.5650	0.4089	0.1905
DS-w-2-M	17507.1529	1424.8686	601.9501	12.4273	55.9730	4.6776	12.5462	11.2419	1.3690	5.9305	3.4922	0.3893	0.1955
DS-w-2-O	18402.2159	1194.9798	477.5037	4.7538	73.8792	0.6743	1.3897	3.3308	0.7132	2.8419	0.2723	0.1814	0.1148
DS-w-3-I	17516.6237	1739.5420	650.3098	81.2376	33.9682	65.2156	14.6255	49.6612	2.2377	15.5978	1.5311	7.7735	0.1593
DS-w-3-M	17308.0323	1501.5784	654.0134	20.3759	59.5727	11.1211	12.9345	10.2307	1.2705	4.1357	0.7342	0.6110	0.1022
DS-w-3-O	16870.5666	1276.5476	768.2713	22.8269	61.0033	3.0786	21.6162	28.6971	0.8051	2.5943	14.9585	1.1981	0.1855
SS-w-1-I	20081.1532	2055.9380	419.6984	121.5156	82.5527	50.4974	1.9677	35.1366	5.2791	3.3726	2.8164	0.5799	0.0890
SS-w-1-M	16934.8478	2152.2588	475.7193	37.9622	110.9675	18.4583	2.4090	10.5288	4.3565	3.7196	268.2877	2.0945	0.3819
SS-w-1-O	26133.9110	2227.1774	341.2365	7.3483	197.9757	74.5306	4.8217	16.9300	4.9752	5.1326	0.4358	0.2570	0.0529
SS-w-2-I	19233.6724	2235.9412	555.1867	155.1152	84.1397	42.0622	1.2470	17.3561	5.9002	3.4963	1.2241	0.2239	0.0744
SS-w-2-M	16200.6105	2458.9030	562.3823	41.1789	120.2752	42.7290	3.5441	11.1077	4.6655	3.5167	347.2583	1.0778	0.4464
SS-w-2-O	21428.9078	1991.4113	411.9428	52.9960	183.1072	48.1091	11.6982	11.8330	4.1893	4.8563	0.8200	0.5881	0.0789
SS-w-3-I	17382.4877	1644.3688	529.2535	68.7118	49.1238	53.9801	59.4519	41.8707	4.3895	2.8761	2.2434	1.4250	0.1630
SS-w-3-M	17958.6268	2883.7490	705.6823	208.2853	124.1189	20.3279	21.1600	31.2100	5.6062	5.0033	1.3267	1.0609	0.1709
SS-w-3-O	24310.0535	1861.7405	414.9964	11.2342	195.5938	12.0982	9.3492	14.1859	3.5703	5.5371	0.9079	0.5570	0.0444
XX-w-1-I	17538.6808	1595.3476	671.5073	8.1473	27.4411	32.3200	0.7158	6.7400	1.2436	6.3859	0.2881	0.2964	0.1156
XX-w-1-M	16748.0452	1163.8066	728.0186	10.9137	62.3503	3.7807	0.8139	3.5477	0.9370	4.8085	0.6663	0.6986	0.1058
XX-w-1-O	22480.4288	1126.1384	685.3910	9.6222	56.6339	3.1546	1.8761	4.1813	0.6812	11.3784	0.3641	1.0662	0.0868
XX-w-2-I	17230.6096	1446.3751	801.8887	1.3219	45.8926	5.7291	1.8170	2.7211	1.4840	5.4316	1.2929	0.4675	0.0163
XX-w-2-M	16106.8493	1499.5342	726.8768	17.9214	45.6332	17.4766	1.2953	6.0460	1.1729	4.9028	1.7926	0.4596	0.1236
XX-w-2-O	20785.4695	1277.0166	663.6608	7.8643	74.3169	4.5602	0.9753	3.5425	0.8406	8.9374	1.6877	1.2902	0.0309
XX-w-3-I	16132.9062	1901.5529	466.6568	102.4935	46.5842	28.5940	26.1214	30.0233	1.6259	5.4225	6.2105	6.4606	0.6636
XX-w-3-M	16415.4360	1581.1110	1071.5975	78.8346	59.5928	15.8303	19.2865	16.6079	1.6947	5.4684	6.7873	4.6746	0.3304
XX-w-3-O	21809.8909	1197.6905	593.7593	59.8878	57.8031	5.8254	86.7235	16.4456	0.9001	13.2368	9.0745	1.3138	0.1888
ZS-w-1-I	16036.7739	1485.6861	528.7279	30.3210	22.3833	20.1632	1.3369	14.5869	1.4274	3.8572	6.0305	1.9339	0.1590
ZS-w-1-M	17318.2224	1586.8703	985.7935	20.7798	48.7585	6.2017	2.3051	5.9536	1.8360	6.9777	3.2189	0.5950	0.1406

ZS-w-1-O	20751.0319	1181.8065	586.7852	22.1588	63.6057	3.1027	1.2365	6.9971	1.4560	5.8399	2.8290	0.3558	0.0800
ZS-w-2-I	18548.1376	1701.8583	399.1071	10.6454	26.3261	25.7470	2.1359	4.2920	2.0540	6.3820	4.6774	0.2119	0.1287
ZS-w-2-M	18274.3331	1368.3164	949.8658	11.8485	50.9203	3.1579	1.5189	3.8425	1.3359	12.0218	2.7356	0.3984	0.1307
ZS-w-2-O	21669.7135	1338.5729	644.2915	7.6865	90.7385	1.6066	2.2891	6.1545	1.9139	6.7530	0.5262	0.2684	0.0759
ZS-w-3-I	18953.3705	1962.5674	603.5038	55.4375	56.4193	9.0463	24.3783	21.2966	2.5231	6.3660	1.9756	1.2073	0.3724
ZS-w-3-M	18247.3435	1410.3332	1104.3692	21.0919	58.3630	4.8840	9.7125	15.8650	1.7543	8.1316	0.4381	0.8944	0.1100
ZS-w-3-O	24828.0775	1140.5021	730.9788	14.8832	92.9451	2.1673	14.5978	15.0297	0.9186	14.2374	1.3145	0.7847	0.0882
CH01-1-I	—	1583.5915	577.6358	82.9563	39.1363	—	—	23.2971	3.6651	—	n.d.	n.d.	0.1227
CH01-1-M	17055.5422	1705.5084	668.1655	17.9570	42.1019	37.5559	7.9464	7.7158	10.0062	5.6620	3.0569	1.2802	0.0787
CH01-1-O	20284.7077	1657.8236	676.1320	13.2417	37.5364	22.1559	9.1439	14.4254	4.0566	6.8124	0.9774	1.7513	0.0763
CH01-2-I	16560.3183	1672.4254	348.2983	25.2230	36.4335	28.8291	6.7096	16.7977	8.6469	3.8032	5.5077	1.8220	0.9296
CH01-2-M	17013.7305	1365.8224	626.7447	32.6698	33.4063	8.0182	2.3595	8.0493	10.0899	5.2844	10.4329	1.0777	0.0994
CH01-2-O	26405.1590	1822.0336	1464.4145	46.0192	60.0311	7.3399	14.2939	13.2386	4.5463	10.4987	29.0386	1.2824	0.1795
CH01-3-I	15326.8587	1470.8260	366.6354	71.6488	17.4037	90.5020	5.9189	26.7970	7.8060	3.2858	4.8212	1.2262	0.3902
CH01-3-M	17389.8152	1979.6203	614.1797	27.9284	42.3240	36.3357	6.2250	8.9914	15.1355	5.8903	13.7269	0.5025	0.1249
CH01-3-O	20300.9402	1395.6808	735.7061	23.4109	27.4273	4.9527	2.4316	9.8596	3.7117	5.9302	1.2068	0.5546	0.1660
CH02-1-I	15184.3780	1949.3029	771.3722	147.7081	32.2696	86.7526	28.2306	40.8491	7.6327	2.5227	3.9148	0.9483	0.1050
CH02-1-M	14979.0813	2459.8973	602.2527	31.4865	40.1531	15.6586	17.3391	10.3676	18.3997	3.3384	0.7390	23.8160	0.0774
CH02-1-O	18405.3139	2112.2899	593.4025	69.0247	34.0315	10.9679	35.8211	17.2492	8.8268	5.3959	0.4754	2.4573	0.3347
CH02-2-I	13613.1278	2635.3043	696.1730	34.2307	25.2180	198.5121	6.5224	11.8149	21.5200	1.9902	2.6149	0.8766	0.9515
CH02-2-M	14856.5011	1297.1971	510.1356	22.9879	17.8789	13.6847	3.4333	6.1861	6.7702	3.5625	12.9147	0.8543	0.1547
CH02-2-O	21795.3614	1847.9890	1056.9861	90.6674	33.8820	25.9062	11.8811	27.7246	8.4894	9.3099	1.5197	1.0626	0.4373
CH02-3-I	16657.1995	2557.6976	776.0889	50.8538	27.1106	89.4852	7.5568	13.6665	20.6891	2.0473	1.6822	0.4374	0.2144
CH02-3-M	16382.3204	2361.2280	843.2426	32.1083	46.9927	102.0121	3.7894	7.7416	16.5964	4.6650	20.2231	0.5628	0.1193
CH02-3-O	20407.9720	2339.9992	1021.1349	20.5109	43.9156	21.7255	2.2031	14.9876	11.3997	7.8463	0.7142	0.6399	0.1518
CH03-1-I	16298.9928	2246.0354	575.9659	85.6844	38.7775	93.2782	33.5749	23.3377	10.3967	3.2954	0.8069	11.0492	0.1187
CH03-1-M	16246.6855	2076.7538	597.7358	78.4034	50.6963	128.8014	9.7106	19.0201	6.2947	4.0479	0.5951	12.8119	0.0788
CH03-1-O	17428.2399	1833.8479	965.2126	46.0763	32.0602	12.0134	12.2182	18.2446	6.5246	5.1407	1.0498	3.6178	0.0900
CH03-2-I	15299.7155	1907.5259	585.0865	95.8716	40.1224	80.5727	2.6924	42.4890	10.7491	3.7966	3.4810	0.5608	0.1444
CH03-2-M	16290.3421	2513.9322	804.1607	23.3679	28.5474	7.1493	17.8955	11.2194	12.7395	6.6710	2.2487	0.6204	0.1667
CH03-2-O	16321.9736	2086.0079	879.8205	33.5744	35.4913	18.6488	5.2682	18.3665	9.7498	5.8875	1.3290	0.9363	0.1175
CH03-3-I	14216.7435	2447.8112	646.9900	51.3092	28.2478	71.4757	8.1623	13.0973	9.8199	2.8415	18.2812	0.8275	0.4574
CH03-3-M	15408.8131	2712.8160	672.3566	121.3017	33.1504	81.7201	7.1233	33.2439	10.5033	2.9499	0.6944	2.2170	0.3078

CH03-3-O	22242.2314	1810.5265	836.9195	70.7151	39.1887	11.6909	4.2308	18.1028	7.0733	6.6598	4.9946	2.1117	0.3807
CH04-1-I	13547.8600	1705.0829	706.7735	100.5727	56.5218	—	15.6629	—	3.4778	—	2.0884	3.9269	0.0388
CH04-1-M	16472.5101	1913.4079	801.3241	55.1332	32.0529	18.6551	3.3460	9.2720	3.8551	4.6416	0.9116	5.3141	0.1096
CH04-1-O	21767.0877	2328.7827	567.7892	50.9519	48.8726	7.4292	16.0084	12.6550	5.9729	5.8390	0.5173	3.4259	0.0812
CH04-2-I	13587.2564	2425.2633	691.3192	23.0072	23.7814	65.2751	16.0145	14.9151	4.8093	2.5819	0.8737	0.4028	0.2473
CH04-2-M	14885.2450	2000.1744	979.3076	23.9287	25.2064	9.8050	6.0850	8.0674	4.2272	7.0735	5.8043	0.9521	0.1306
CH04-2-O	22694.1348	2149.8374	1049.4686	27.0731	58.7351	15.2788	7.0055	78.0146	4.7328	8.2199	0.8175	3.4939	0.2499
CH04-3-I	15335.2644	2065.8260	599.3621	67.3918	24.1217	57.9719	43.8035	49.4938	10.8849	3.7004	13.7831	1.2621	0.2484
CH04-3-M	15380.3383	1701.5165	1420.0356	51.8733	36.6028	7.8010	8.3663	13.1899	3.7795	6.8651	101.4542	1.2750	0.3376
CH04-3-O	16046.3134	1838.5381	832.0391	36.7478	38.0040	9.1979	6.1270	—	4.1783	6.4383	—	1.8448	0.4039
CH05-1-I	15751.4207	2024.3976	347.7292	36.6999	20.0671	65.4675	27.7121	44.7154	8.1833	3.2182	5.3091	1.7637	0.0787
CH05-1-M	15750.6568	1534.5060	920.3028	27.8697	24.0241	31.7611	29.7908	13.3997	4.1420	4.6372	1.0736	6.4286	0.1126
CH05-1-O	16748.7611	2143.8099	773.3930	23.3232	35.0141	8.1791	16.7175	10.1821	4.0243	5.4420	0.6203	0.9084	0.0879
CH05-2-I	12604.3000	2279.9662	312.5668	21.5777	21.8292	84.4958	6.3640	10.1427	6.5095	2.7928	14.9570	5.6067	0.2979
CH05-2-M	18601.5032	1900.2120	768.1664	23.0857	46.1076	13.6206	4.8300	27.4269	3.8779	5.6457	9.0715	1.0466	0.3151
CH05-2-O	20695.9254	1931.3706	825.0721	22.8039	46.5527	13.8480	3.6009	28.5276	4.1207	6.6456	0.4578	0.6916	0.3155
CH05-3-I	13790.0189	2146.9666	399.4183	92.1960	16.6985	97.3629	5.6534	11.1819	6.7119	3.2018	11.7328	0.7417	0.1876
CH05-3-M	16743.2356	1753.8397	904.6362	34.2090	25.3469	5.4664	5.1388	7.8672	3.6932	6.4927	192.5447	1.2288	0.2077
CH05-3-O	17257.4134	1673.7543	716.4681	49.1421	37.9256	9.5408	5.5424	16.9272	3.9697	5.7902	6.6242	1.6669	0.1509
CH06-1-I	14547.5878	1632.5265	520.0564	113.6886	28.5506	61.1626	6.0084	22.7617	4.8455	3.0683	2.2337	8.2047	0.0925
CH06-1-M	16327.2777	1462.7247	572.7169	83.3801	31.7928	48.6259	3.7107	13.6878	4.0150	3.1735	1.5008	7.1837	0.0949
CH06-1-O	15106.0700	1404.4630	780.6497	42.1565	19.9339	10.3427	2.5787	6.6082	6.5959	3.2261	2.4634	1.1620	0.0800
CH06-2-I	13485.6572	1728.5388	615.9902	464.9213	26.7309	71.1676	4.7740	58.9721	4.6705	3.2484	2.3765	1.9588	0.6561
CH06-2-M	16125.1633	1318.2710	826.9692	77.8859	30.4885	32.2363	4.7073	14.4454	7.7619	5.0586	0.9749	3.5417	0.3291
CH06-2-O	16151.7583	1337.9485	643.5998	36.4277	34.1482	8.0137	2.2905	7.8420	7.1860	3.3293	1.2837	2.7917	0.6321
CH06-3-I	12663.4124	1978.8489	709.0443	29.8524	18.6256	51.1686	16.8772	10.7959	7.0077	1.9904	27.6510	0.8536	0.2185
CH06-3-M	19499.5205	1663.3626	1212.3423	39.3533	61.8395	6.1914	6.8180	15.1777	11.2401	9.1340	6.2887	2.9743	0.0629
CH06-3-O	15906.3115	1544.4778	960.2165	29.6603	40.8124	4.8343	4.5459	8.2488	7.9020	3.6653	1.8102	1.0581	0.1407
ML01-1-I	17212.3516	1690.4476	830.6530	36.8956	24.3901	36.9838	11.1649	39.8863	4.9515	5.6740	0.9801	110.7289	0.0663
ML01-1-M	16020.9616	1341.6570	584.5288	140.2158	49.2247	11.9398	13.7764	48.5365	4.2410	2.9774	1.0506	9.3273	0.0851
ML01-1-O	20543.2220	1094.7464	646.2506	88.6027	44.6786	9.6609	3.0499	8.3928	2.2088	5.2045	16.0765	0.5580	0.0454
ML01-2-I	15017.2724	2106.5496	514.2223	112.3286	24.5664	31.5504	6.0588	38.9570	10.0958	4.0191	1.2024	6.0630	0.3582
ML01-2-M	15838.6976	1731.7705	567.8599	44.8884	44.0645	19.1272	3.6238	18.1589	6.5010	3.4652	3.0075	0.3985	0.2030

ML01-2-O	17775.3425	1221.9335	697.9981	21.1719	50.4047	5.0714	1.7772	8.4253	3.0007	3.8369	4.0250	2.2469	0.0767
ML01-3-I	18152.8556	1785.4343	401.5584	290.0173	18.9791	22.2550	4.1361	69.9104	6.1776	3.4682	6.7993	0.8162	0.2906
ML01-3-M	15652.4337	2697.0440	559.4705	76.3063	37.0615	19.0971	3.8736	21.1725	15.0115	4.3961	74.7879	1.2527	0.2362
ML01-3-O	17639.7198	1500.4189	1027.4219	22.4572	48.8750	4.4204	2.4327	11.3302	3.6349	4.1017	1.6928	0.5328	0.1295
ML02-1-I	15514.1448	2494.9199	748.1542	45.7049	32.1001	86.9438	62.3886	12.8504	4.5106	4.1210	1.6945	48.7007	0.0884
ML02-1-M	17624.5881	1625.0742	811.4128	60.6851	39.1921	55.7787	33.3226	16.2655	5.2190	3.7258	4.9575	100.0854	0.1217
ML02-1-O	20031.6688	2159.5118	774.3599	21.4577	72.5497	18.9184	15.0324	10.0645	14.2504	5.1751	1.2431	2.2673	0.0896
ML02-2-I	12697.3818	2019.4375	679.9445	106.5371	19.6622	105.2162	6.0274	21.6654	18.2144	2.1740	5.0002	1.5327	0.1015
ML02-2-M	18053.8911	1195.4153	693.6677	19.6783	43.4258	16.5341	5.4634	6.2763	4.9846	4.9030	15.8273	0.5988	0.0667
ML02-2-O	24069.4450	1756.7382	980.3512	18.8296	60.8954	14.6794	3.4745	25.8416	12.2477	5.9966	0.0749	0.5927	0.0493
ML02-3-M	17560.1320	2173.9910	814.8369	94.6659	42.6289	14.3178	27.2260	34.8424	17.5612	8.0048	156.4900	3.6167	0.6970
ML02-3-O	20558.8094	1711.9870	1212.7953	41.9375	36.1432	9.3536	48.1031	—	10.5930	6.3111	4.7383	2.9986	0.3205
TX01-1-I	16931.6201	2039.2625	605.5299	34.1192	59.9736	78.0543	29.9969	12.9872	5.0899	3.9651	8.0645	1.1030	0.0974
TX01-1-M	17613.7432	1714.2495	425.7080	78.2976	35.0222	63.2362	4.3908	12.2621	10.2172	4.9539	1.0175	1.0394	0.0698
TX01-1-O	22705.1193	1741.7443	620.8176	34.9535	70.7710	27.9118	6.2453	15.8623	23.3738	5.4987	0.7242	219.4189	0.0539
TX01-2-I	17197.4535	1901.6459	665.3787	60.6570	24.2351	113.4774	3.2831	29.4705	5.6209	3.3035	66.1802	0.7557	0.0683
TX01-2-M	16179.2287	1893.9682	651.6223	48.4869	39.4587	51.3942	3.9611	9.1543	35.5098	5.4185	104.1722	1.1828	0.0990
TX01-2-O	22604.8035	1938.6860	852.4433	24.9043	79.2685	48.8068	2.6891	40.8839	27.2780	5.4697	9.0970	1.2476	0.0535
TX01-3-I	15179.6573	2153.0323	801.0045	392.7557	38.8607	65.1589	38.1962	69.2699	11.2025	4.6533	2.1819	1.4343	0.1691
TX01-3-M	16394.8304	1893.1878	1231.6160	49.2910	42.9662	59.9222	20.7405	17.7128	26.7759	6.3077	1.5534	1.2617	0.0964
TX01-3-O	25290.5060	1364.0455	733.2661	96.4656	102.3562	22.1179	42.6587	51.4522	17.8875	5.1999	2.3025	1.0107	0.1845
TX02-1-I	18266.7278	1840.4732	443.8042	35.4648	55.3555	89.4680	61.1445	24.9656	14.1473	2.4177	0.9335	1.5988	0.1638
TX02-1-M	23521.3375	1839.2017	580.9640	50.5365	82.1256	32.0747	—	54.2393	14.3653	4.0639	1.0909	106.5168	0.2921
TX02-1-O	22378.4192	1750.1796	593.7908	30.7762	65.8634	23.2170	31.7774	14.4978	13.3768	4.6748	0.6937	24.2311	0.0734
TX02-2-I	13639.8045	1932.3611	477.4406	27.5069	36.5239	72.2526	5.3611	19.6908	23.0684	1.9949	1.9511	1.0604	0.1215
TX02-2-M	18086.6193	1113.0580	462.0725	21.7869	35.6739	26.9760	3.0903	10.0693	9.6821	3.1120	1.8259	0.6568	0.1591
TX02-2-O	20241.0479	1521.7099	871.3143	31.6807	52.4426	19.5752	7.7991	13.5881	13.6517	4.3877	0.4893	0.8093	0.0888
TX02-3-I	17692.9628	1891.9985	497.1118	57.7231	53.4823	41.7154	93.3489	65.1084	21.2207	2.8761	1.3692	5.5420	0.3514
TX02-3-M	16553.7790	1216.4613	1004.6116	28.4702	67.9549	6.0728	19.9046	11.0534	2.9641	5.8637	0.9889	1.5587	0.1135
TX02-3-O	23030.4013	1544.9770	753.9727	19.6472	85.7653	18.9597	16.6053	27.1450	12.2077	4.5092	0.5858	1.0069	0.0669
TX03-1-I	16387.2965	1550.0072	433.6207	30.3831	43.0523	49.4843	11.9399	7.9963	13.9102	2.7936	n.d.	n.d.	0.0673
TX03-1-M	—	1339.3186	838.1111	41.9880	53.5240	20.5448	599.8299	—	12.7097	4.4159	0.6868	0.8568	—
TX03-1-O	23462.0583	1304.4545	441.9859	17.9649	53.2962	6.1070	11.2143	6.4693	12.6254	3.4816	0.3439	36.6723	0.0415

TX03-2-I	13986.9212	1796.0977	903.2772	444.6014	26.5547	51.6182	8.0105	45.9847	16.1564	2.2666	17.1737	4.3638	0.1050
TX03-2-M	17125.3256	1317.1476	546.9663	26.7269	27.5041	35.6766	3.2475	7.3832	11.0249	3.4695	93.1398	1.3436	0.0803
TX03-2-O	20707.6016	1333.4038	810.4100	13.4296	45.8253	8.7505	3.4607	11.0349	12.3857	3.1625	2.7872	0.4742	0.0429
TX03-3-I	14912.5167	1756.7982	599.2378	689.2893	36.3032	133.2496	16.0461	57.4879	12.8779	3.3207	6.9151	2.7597	0.2138
TX03-3-M	17558.5573	1492.1324	582.2880	45.9551	40.0857	22.6274	27.7218	14.4589	12.2625	4.6743	2.6577	2.1514	0.1544
TX03-3-O	24902.2897	1240.4945	967.6316	300.6710	59.8389	12.1346	21.7361	21.0405	12.1607	3.6047	5.9870	1.7242	0.1099
TX04-1-I	16925.0697	1495.2126	571.6795	106.1501	42.3888	60.3001	18.6099	13.0150	6.2721	3.4423	0.8646	90.6860	0.0755
TX04-1-M	16633.3500	1399.4657	509.6528	37.9847	51.8203	19.5525	26.3189	12.7444	6.4851	3.6301	1.1698	5.4467	0.0683
TX04-1-O	19164.4639	1588.5067	417.1402	48.6861	25.1933	10.4760	15.7024	13.6953	14.6218	4.5580	0.8426	97.9225	0.0626
TX04-2-I	13762.7018	2115.7223	571.8445	107.7103	23.0391	78.6904	4.3537	15.2137	9.1889	2.2394	5.8042	1.0050	0.0825
TX04-2-M	14404.1268	2399.0912	637.6065	29.1487	47.8800	467.3078	4.5092	8.8081	19.1856	4.3110	68.3496	0.7699	0.0696
TX04-2-O	17009.8468	1582.0838	682.1808	33.5340	18.9670	13.2820	6.4018	21.3305	14.5738	4.7162	5.0883	0.9332	0.0580
TX04-3-I	14491.6120	2802.9268	632.5405	131.7661	39.7196	177.2918	11.9481	25.9503	19.9158	2.0668	1.9432	0.8727	0.1288
TX04-3-M	18413.4197	2342.9133	782.8829	39.1368	77.1061	48.9115	8.8840	10.8761	22.7688	6.0561	2.5239	0.7523	0.0926
TX04-3-O	18401.9352	1435.9790	678.7292	35.1875	28.6528	10.3203	16.6486	40.5255	13.3143	4.6788	2.4142	2.5078	0.0744
TX05-1-I	11965.8789	2439.1030	478.7174	212.5180	35.3392	67.3803	3.0524	44.8288	6.9508	1.9228	32.9120	128.5271	0.1755
TX05-1-M	19304.2977	1867.3469	741.2838	69.9399	41.4013	17.5402	9.0991	10.5068	7.6226	5.8618	n.d.	n.d.	0.1281
TX05-1-O	18401.6271	1889.4447	481.5135	37.4920	46.3221	38.3039	3.7190	5.1040	8.0670	5.4372	3.7903	2.3682	0.0843
TX05-2-I	11258.1252	2413.3645	810.8120	79.6546	34.7362	64.5789	6.9676	18.6335	7.5005	2.3537	2.5232	1.2486	0.6423
TX05-2-M	17631.5401	2121.3534	1150.3249	78.3524	43.3882	107.6397	10.7178	16.8024	8.4214	6.3687	11.4739	2.5471	0.1198
TX05-2-O	23005.6006	1633.8450	785.8004	26.0031	58.3584	34.2214	6.3368	8.8434	5.1285	5.1888	1.0468	0.7715	0.1010
TX05-3-I	15913.3792	2286.4961	651.3513	57.4960	47.8436	85.9983	34.5834	33.6494	8.4633	3.9530	5.8613	4.1426	0.2072
TX05-3-M	20065.1159	1838.8627	567.3435	47.9018	38.3446	126.0821	45.7655	24.4558	6.3879	5.6694	1.1330	2.3851	0.1525
TX05-3-O	28214.5332	1763.4236	818.7590	15.7670	76.2012	45.2978	38.9577	17.9686	5.6157	6.7243	0.8581	0.9979	0.0809
TX06-1-I	18867.1337	2435.7898	365.2645	9.6975	54.9231	136.7840	3.8898	19.0468	26.3167	1.2652	n.d.	n.d.	0.0955
TX06-1-M	19285.1898	2912.9463	766.3452	n.d.	74.3399	2.3625	0.6931	n.d.	37.6507	5.5963	n.d.	n.d.	n.d.
TX06-1-O	20238.4805	1422.1761	716.4981	1.3186	68.2564	4.7678	7.1160	6.8821	11.3255	2.8892	n.d.	n.d.	0.0023
TX06-2-I	15060.4380	2692.8093	436.0571	35.8905	44.7726	171.0978	2.9755	34.9189	28.0953	2.3345	n.d.	n.d.	0.2079
TX06-2-M	17015.8222	2250.2884	911.1091	49.0101	92.9677	44.2760	10.4255	16.5739	42.5514	9.7789	n.d.	n.d.	0.2434
TX06-2-O	18678.5375	1434.4219	639.6078	30.2132	65.3935	6.5457	5.9535	19.6582	12.2123	3.8169	n.d.	n.d.	0.0333
TX06-3-I	14265.6285	2009.2347	334.9822	39.7130	43.3261	86.5904	27.1533	20.3551	27.2980	3.9860	1.5590	3.0410	0.1788
TX06-3-M	20617.0894	1727.6640	554.8291	117.8029	93.4877	62.4261	263.6815	—	n.d.	8.4721	n.d.	n.d.	0.7200
TX06-3-O	19974.3171	1301.8546	806.6921	70.2476	73.7729	9.5685	59.0258	16.8413	10.2423	3.8558	1.0897	1.2210	0.1030

CY-1-I	13050.9784	2419.5348	663.3433	40.0272	29.7095	153.3404	2.5755	18.1604	8.1608	2.1356	1.3077	0.5688	0.1328
CY-1-M	15347.8606	1410.5742	718.9749	35.9207	33.2406	9.3110	21.5355	17.9107	4.5855	4.3880	3.7918	0.3149	0.1304
CY-1-O	20139.1866	1487.1859	739.0703	18.2410	63.6387	14.5047	1.3881	4.1605	7.6030	3.9356	0.3885	0.3617	0.0529
CY-2-I	13934.0340	2299.5667	689.8583	122.6436	28.0694	155.1980	2.9809	48.1936	9.5908	2.9547	33.0823	2.4204	0.1495
CY-2-M	14590.2721	1739.6985	845.5140	20.4201	39.5763	6.8094	1.4606	6.4987	8.7168	4.2774	194.9139	0.7590	0.1917
CY-2-O	20149.2053	1626.9578	703.2159	31.1104	65.9087	14.9538	8.9619	4.6321	8.0214	4.2491	0.8076	0.2062	0.0105
CY-3-I	17315.2635	2173.0412	760.6626	76.6897	46.0558	174.6529	46.2341	41.2629	5.5250	3.5236	4.2878	0.8095	0.2496
CY-3-M	13899.6817	2240.4651	1188.0526	34.8593	42.2366	10.7111	12.2097	10.2766	9.3261	8.8902	1.0032	0.8236	0.0973
CY-3-O	22851.4011	1956.3688	881.3506	16.2622	79.5834	15.7606	29.9331	11.0249	9.0167	5.2011	0.9868	0.7082	0.0683
BM-1-I	16556.3101	1686.5093	584.3621	326.3346	32.1013	99.3206	3.7723	51.9028	6.5908	3.2101	2.8639	1.4577	0.1021
BM-1-M	15551.9445	1647.3760	553.7957	32.9821	48.3059	9.3278	3.0551	7.7710	2.7969	3.4679	136.1777	1.4647	0.2244
BM-1-O	19671.9570	1673.0344	529.0950	63.9007	71.0568	15.0870	1.3218	8.0888	3.7376	4.0799	20.2918	0.6377	0.2110
BM-2-I	17381.9751	1846.4001	320.0035	33.1727	37.1153	42.2393	5.6735	36.4801	3.7602	2.9728	137.5336	1.1455	0.1019
BM-2-M	16580.5445	1430.9717	415.8999	33.0572	36.8967	13.6948	1.7370	6.7452	2.2903	4.5201	9.6716	0.7678	0.0979
BM-2-O	20541.7697	1455.9665	868.8644	15.2449	82.3446	6.6833	1.0572	5.0318	2.8690	4.5429	3.7420	0.5291	0.0586
BM-3-I	17831.9105	1455.8224	519.4547	165.1220	42.8334	70.7899	66.9773	29.6668	5.5830	3.9368	7.8139	2.6191	0.3509
BM-3-M	17036.5575	1294.6909	974.6048	119.2471	58.1294	20.4730	71.4825	31.4896	2.4597	7.5256	2.1914	1.1661	0.2018
BM-3-O	24010.2543	1814.5487	1016.5312	35.7519	56.2413	37.6909	13.9343	33.4071	4.9072	7.7803	0.3579	0.8451	0.0925
QG-1-I	18076.9236	2038.8159	516.9266	182.5987	81.1295	75.9462	19.3140	20.7886	5.7865	3.8961	7.4851	0.7979	0.0735
QG-1-M	16267.1583	2294.4945	550.1412	60.2629	78.6000	21.4714	1.8129	10.4743	7.3544	3.9251	1.3830	1.1011	0.0923
QG-1-O	23359.7348	1504.6976	472.6977	3.3223	89.8275	8.2764	0.7323	2.7926	3.0341	4.4333	0.4236	0.1289	0.0350
QG-2-I	16318.6178	2324.7429	690.7415	309.0564	82.8055	62.0758	2.7078	35.4367	6.9389	4.6280	20.2574	0.9742	0.1414
QG-2-M	16806.0841	1884.6655	635.1613	70.9018	68.5531	8.6421	9.7530	13.3095	5.3557	4.7585	3.9112	0.4675	0.1422
QG-2-O	21661.2991	1385.5045	536.5483	10.6804	82.5813	5.5288	2.1457	6.8786	2.9377	4.7750	2.0045	0.3174	0.0485
QG-3-I	16121.0731	2368.9981	679.5959	63.3453	90.4745	60.0458	54.3858	39.9945	6.1590	3.2772	2.7057	3.6246	0.2883
QG-3-M	16253.5809	1177.1718	825.5921	94.7390	77.5543	14.9733	90.7718	23.2150	8.4636	5.1772	n.d.	n.d.	0.2188
QG-3-O	23585.9895	2188.4566	587.6322	27.4924	104.5881	9.3686	23.9148	16.8987	6.0740	7.1423	2.3403	1.2696	0.1250

I : inner site ; M : middle site ; O : outer site.

Table S2. The mean \pm standard deviation (SD) of 13 trace element concentrations (ppm) in the inner site of the shell at each site.

Sampling site	Na	Sr	Mg	Fe	B	Mn	Zn	P	Ba	Li	Ni	Cu	Pb
DS-w	16309 \pm 1509	1964 \pm 234	520 \pm 113	33.4 \pm 41.6	40.7 \pm 5.9	37.1 \pm 24.3	5.7 \pm 7.7	23.4 \pm 22.9	2.2 \pm 0.4	7.3 \pm 7.2	1.9 \pm 1.5	2.9 \pm 4.2	0.16 \pm 0.03

SS-w	18899 ± 1380	1979 ± 303	501 ± 72	115.1 ± 43.6	71.9 ± 19.8	48.8 ± 6.1	20.9 ± 33.4	31.5 ± 12.7	5.2 ± 0.8	3.2 ± 0.3	2.1 ± 0.8	0.7 ± 0.6	0.11 ± 0.05
XX-w	16967 ± 739	1648 ± 232	647 ± 169	37.3 ± 56.5	40 ± 10.9	22.2 ± 14.4	9.6 ± 14.4	13.2 ± 14.7	1.5 ± 0.2	5.7 ± 0.6	2.6 ± 3.2	2.4 ± 3.5	0.27 ± 0.35
ZS-w	17846 ± 1580	1717 ± 239	510 ± 103	32.1 ± 22.5	35 ± 18.6	18.3 ± 8.5	9.3 ± 13.1	13.4 ± 8.6	2 ± 0.5	5.5 ± 1.5	4.2 ± 2.1	1.1 ± 0.9	0.22 ± 0.13
CH	14616 ± 1301	2025 ± 353	569 ± 153	88.6 ± 100.4	29 ± 10.1	80.8 ± 36.2	14.2 ± 12.1	25.6 ± 15.7	8.8 ± 5.1	3 ± 0.6	6.8 ± 7.5	2.4 ± 3	0.31 ± 0.28
ML	15719 ± 2111	2019 ± 315	635 ± 175	118.3 ± 101.9	23.9 ± 5.2	56.6 ± 37	18 ± 25	36.7 ± 21.9	8.8 ± 5.7	3.9 ± 1.3	3.1 ± 2.6	33.6 ± 47.5	0.18 ± 0.13
TX	15372 ± 2084	2086 ± 366	571 ± 156	141.8 ± 183.8	41.1 ± 10.6	90.2 ± 40.2	21.2 ± 24	31 ± 18.5	14.6 ± 7.9	2.8 ± 0.9	8.7 ± 16.5	13.8 ± 35.5	0.18 ± 0.14
CY	14767 ± 2251	2297 ± 123	705 ± 50	79.8 ± 41.4	34.6 ± 9.9	161.1 ± 11.8	17.3 ± 25.1	35.9 ± 15.7	7.8 ± 2.1	2.9 ± 0.7	12.9 ± 17.5	1.3 ± 1	0.18 ± 0.06
BM	17257 ± 647	1663 ± 196	475 ± 138	174.9 ± 146.8	37.4 ± 5.4	70.8 ± 28.5	25.5 ± 36	39.3 ± 11.4	5.3 ± 1.4	3.4 ± 0.5	49.4 ± 76.4	1.7 ± 0.8	0.19 ± 0.14
QG	16839 ± 1077	2244 ± 179	629 ± 97	185 ± 122.9	84.8 ± 5	66 ± 8.7	25.5 ± 26.4	32.1 ± 10	6.3 ± 0.6	3.9 ± 0.7	10.1 ± 9.1	1.8 ± 1.6	0.17 ± 0.11

Table S3. The mean ± standard deviation (SD) of 13 trace element concentrations (ppm) in the middle site of the shell at each site.

Sampling site	Na	Sr	Mg	Fe	B	Mn	Zn	P	Ba	Li	Ni	Cu	Pb
DS-w	17259 ± 275	1555 ± 164	698 ± 125	107.5 ± 157.9	55.6 ± 4.1	8.98 ± 3.7	9.2 ± 6.1	9.4 ± 2.4	1.4 ± 0.15	5.6 ± 1.3	138.8 ± 236.8	1.33 ± 1.43	0.28 ± 0.24
SS-w	17031 ± 883	2498 ± 367	581 ± 116	95.8 ± 97.4	118.5 ± 6.8	27.2 ± 13.5	9 ± 10.5	17.6 ± 11.8	4.9 ± 0.7	4.1 ± 0.8	205.6 ± 181.3	1.41 ± 0.59	0.33 ± 0.14
XX-w	16423 ± 321	1415 ± 221	842 ± 199	35.9 ± 37.4	55.9 ± 9	12.4 ± 7.5	7.1 ± 10.5	8.7 ± 6.9	1.27 ± 0.39	5.1 ± 0.4	3.1 ± 3.3	1.94 ± 2.37	0.19 ± 0.12
ZS-w	17947 ± 544	1455 ± 116	1013 ± 81	17.9 ± 5.2	52.7 ± 5	4.7 ± 1.5	4.5 ± 4.5	8.6 ± 6.4	1.64 ± 0.27	9 ± 2.6	2.1 ± 1.5	0.63 ± 0.25	0.13 ± 0.02
CH	16412 ± 1228	1873 ± 425	797 ± 234	44.7 ± 28.2	36 ± 10.9	34 ± 36	8.3 ± 6.9	13.1 ± 7.2	8.5 ± 4.8	5.3 ± 1.6	21.3 ± 48.6	4.09 ± 5.88	0.16 ± 0.1
ML	16792 ± 1066	1794 ± 558	672 ± 120	72.7 ± 41.9	42.6 ± 4.2	22.8 ± 16.4	14.5 ± 12.9	24.2 ± 15.1	8.9 ± 5.8	4.6 ± 1.8	42.7 ± 62.3	19.21 ± 39.76	0.24 ± 0.24
TX	17680 ± 1592	1815 ± 469	719 ± 232	47.8 ± 26.1	54.7 ± 21	67.5 ± 104.9	13.3 ± 12.5	12.2 ± 15.5	15.9 ± 12.3	5.4 ± 1.7	16.2 ± 34	7.1 ± 24.8	0.16 ± 0.16
CY	14613 ± 724	1797 ± 418	918 ± 243	30.4 ± 8.7	38.4 ± 4.6	8.9 ± 2	11.7 ± 10	11.6 ± 5.8	7.5 ± 2.6	5.9 ± 2.6	66.6 ± 111.2	0.63 ± 0.28	0.14 ± 0.05

BM	16390 ± 760	1458 ± 178	648 ± 291	61.8 ± 49.8	47.8 ± 10.6	14.5 ± 5.6	25.4 ± 39.9	15.3 ± 14	2.52 ± 0.26	5.17 ± 2.11	49.3 ± 75.3	1.13 ± 0.35	0.17 ± 0.07
QG	16442 ± 315	1785 ± 565	670 ± 141	75.3 ± 17.7	74.9 ± 5.5	15 ± 6.4	34.1 ± 49.2	15.7 ± 6.7	7.06 ± 1.58	4.62 ± 0.64	1.8 ± 2	0.52 ± 0.55	0.15 ± 0.06

Table S4. The mean ± standard deviation (SD) of 13 trace element concentrations (ppm) in the outer site of the shell at each site.

Sampling site	Na	Sr	Mg	Fe	B	Mn	Zn	P	Ba	Li	Ni	Cu	Pb
DS-w	18436 ± 1582	1213 ± 57	596 ± 153	11.4 ± 9.9	64.4 ± 8.3	1.6 ± 1.3	9.1 ± 10.9	12.4 ± 14.1	0.8 ± 0.05	3.2 ± 0.8	5.8 ± 8	0.54 ± 0.57	0.12 ± 0.06
SS-w	23958 ± 2372	2027 ± 185	389 ± 42	23.9 ± 25.3	192.2 ± 8	44.9 ± 31.3	8.6 ± 3.5	14.3 ± 2.6	4.2 ± 0.7	5.2 ± 0.3	0.7 ± 0.3	0.47 ± 0.18	0.06 ± 0.02
XX-w	21692 ± 854	1200 ± 75	648 ± 48	25.8 ± 29.5	62.9 ± 9.9	4.5 ± 1.3	29.9 ± 49.2	8.1 ± 7.3	0.8 ± 0.11	11.2 ± 2.2	3.7 ± 4.7	1.2 ± 0.14	0.1 ± 0.08
ZS-w	22416 ± 2139	1220 ± 104	654 ± 73	14.9 ± 7.2	82.4 ± 16.3	2.3 ± 0.8	6 ± 7.4	9.4 ± 4.9	1.4 ± 0.5	8.9 ± 4.6	1.6 ± 1.2	0.47 ± 0.28	0.08 ± 0.01
CH	19220 ± 3082	1848 ± 308	854 ± 214	40.6 ± 20.2	39.1 ± 9.9	12.3 ± 6.1	9 ± 8.3	18.9 ± 16.4	6.3 ± 2.31	6.2 ± 1.9	3.3 ± 6.8	1.75 ± 1.02	0.23 ± 0.16
ML	20103 ± 2351	1574 ± 388	890 ± 219	35.7 ± 27.2	52.3 ± 12.8	10.4 ± 5.6	12.3 ± 18.2	12.8 ± 7.4	7.7 ± 5.3	5.1 ± 1	4.6 ± 5.9	1.53 ± 1.1	0.12 ± 0.1
TX	21578 ± 2887	1544 ± 209	704 ± 151	48.3 ± 66.6	59.8 ± 21.6	20 ± 13.8	16.9 ± 16.1	19.6 ± 12.9	13.3 ± 5.38	4.5 ± 1	2.1 ± 2.5	21.85 ± 54.82	0.07 ± 0.04
CY	21047 ± 1563	1690 ± 241	775 ± 94	21.9 ± 8.1	69.7 ± 8.6	15 ± 0.6	13.4 ± 14.8	6.6 ± 3.8	8.2 ± 0.73	4.5 ± 0.7	0.7 ± 0.3	0.43 ± 0.26	0.04 ± 0.03
BM	21408 ± 2295	1648 ± 181	805 ± 250	38.3 ± 24.4	69.9 ± 13.1	19.8 ± 16	5.4 ± 7.4	15.5 ± 15.6	3.8 ± 1.02	5.5 ± 2	8.1 ± 10.7	0.67 ± 0.16	0.12 ± 0.08
QG	22869 ± 1052	1693 ± 433	532 ± 58	13.8 ± 12.4	92.3 ± 11.2	7.7 ± 2	8.9 ± 13	8.9 ± 7.3	4 ± 1.78	5.5 ± 1.5	1.6 ± 1	0.57 ± 0.61	0.07 ± 0.05

