

Table S3. Pearson correlation for major and trace elements of the ferromanganese nodule

	Mn	Fe	Mn/Fe	Al	Ca	P	K	Ti	Mg	Na	Li	Be	Sc	V	Co	Ni	Cu	Zn	Ga	Rb	Sr	Zr	Nb	Mo	Cd
Mn	1																								
Fe	0.982**	1																							
Mn/Fe	-0.906*	0.970**	1																						
Al	-0.332	-0.258	0.127	1																					
Ca	0.906*	0.914*	-0.888*	-0.035	1																				
P	-0.808	-0.802	0.735	0.389	-0.522	1																			
K	0.599	0.687	-0.774	0.508	0.722	-0.484	1																		
Ti	-0.581	-0.688	0.802	-0.474	-0.782	0.333	-0.955*	1																	
Mg	0.802	0.675	-0.477	-0.569	0.635	-0.620	0.110	-0.057	1																
Na	0.998**	0.978**	-0.898*	-0.382	0.880*	-0.832	0.565	-0.542	0.811	1															
Li	-0.365	-0.277	0.128	0.987**	-0.029	0.478	0.474	-0.487	-0.624	-0.416	1														
Be	-0.332	-0.230	0.065	0.960**	0.027	0.490	0.493	-0.541	-0.633	-0.384	0.991**	1													
Sc	0.996**	0.982**	0.912*	0.259	-0.910*	0.820	-0.658	0.623	-0.777	0.991**	0.300	0.273	1												
V	-0.915*	0.962**	0.976**	-0.012	-0.939*	0.701	-0.852	0.857	-0.515	-0.897*	0.004	-0.044	0.933*	1											
Co	0.237	0.157	-0.019	-0.915*	-0.160	-0.520	-0.490	0.572	0.494	0.295	-0.957*	0.975**	-0.187	0.106	1										
Ni	0.885*	0.933*	-0.934*	-0.422	0.727	-0.858	0.553	-0.553	0.536	0.900*	-0.432	-0.376	-0.874	-0.853	0.361	1									
Cu	0.073	0.140	-0.219	0.641	0.049	-0.374	0.684	-0.475	-0.240	0.058	0.537	0.475	-0.158	-0.303	-0.340	0.114	1								
Zn	0.979**	0.979**	0.932*	0.135	-0.952*	0.754	-0.740	0.723	-0.711	0.966**	0.168	0.134	0.989**	0.968**	-0.043	-0.844	-0.199	1							
Ga	0.071	0.171	-0.314	0.787	0.456	0.290	0.685	-0.798	-0.312	0.014	0.840	0.889*	-0.114	-0.415	-0.938*	-0.031	0.312	-0.258	1						
Rb	-0.434	-0.313	0.127	0.940*	-0.183	0.367	0.460	-0.439	-0.771	-0.471	0.943*	0.931*	0.366	0.052	-0.827	-0.357	0.669	0.251	0.708	1					
Sr	-0.882*	-0.937*	0.966**	-0.081	-0.941*	0.643	-0.878	0.896*	-0.460	-0.859	-0.072	-0.124	0.903*	0.996**	0.188	-0.817	-0.315	0.950*	-0.491	-0.016	1				
Zr	-0.921*	-0.844	0.695	0.615	-0.741	0.759	-0.253	0.228	-0.949*	-0.934*	0.653	0.634	0.894*	0.687	-0.518	-0.770	0.193	0.832	0.255	0.740	0.633	1			
Nb	-0.957*	-0.913*	0.814	0.270	-0.948*	0.623	-0.540	0.560	-0.847	-0.944*	0.288	0.252	0.949*	0.861	-0.106	-0.733	0.067	0.949*	-0.177	0.449	0.839	0.905*	1		
Mo	-0.946*	0.972**	0.959**	0.032	-0.952*	0.727	-0.820	0.811	-0.601	-0.929*	0.058	0.018	0.963**	0.994**	0.057	-0.845	-0.277	0.989**	-0.361	0.124	0.984**	0.748	0.904*	1	

Cd	-0.923*	0.971**	0.986**	0.095	-0.951*	0.664	-0.774	0.820	-0.533	-0.908*	0.090	0.025	0.927*	0.986**	0.054	-0.882*	-0.153	0.958*	-0.384	0.145	0.981**	0.721	0.878	0.978**	1
	Mn	Fe	Mn/Fe	Al	Ca	P	K	Ti	Mg	Na	Li	Be	Sc	V	Co	Ni	Cu	Zn	Ga	Rb	Sr	Zr	Nb	Mo	Cd
Cs	-0.694	-0.586	0.421	0.643	-0.637	0.328	0.057	0.027	-0.891*	-0.698	0.625	0.586	0.641	0.422	-0.399	-0.456	0.605	0.594	0.198	0.825	0.386	0.862	0.805	0.491	0.507
Ba	0.620	0.730	-0.845	0.347	0.823	-0.317	0.890*	-0.982**	0.094	0.584	0.384	0.458	-0.646	-0.872	-0.508	0.616	0.313	-0.741	0.768	0.327	-0.908*	-0.290	-0.606	-0.823	-0.867
Hf	0.823	0.906*	-0.970**	0.118	0.881*	-0.635	0.898*	-0.921*	0.333	0.803	0.116	0.173	-0.846	-0.979**	-0.208	0.831	0.371	-0.898*	0.511	0.104	-0.986**	-0.542	-0.747	-0.951*	-0.964**
Ta	0.764	0.862	-0.936*	-0.262	0.723	-0.650	0.606	-0.686	0.294	0.768	-0.227	-0.139	-0.751	-0.841	0.125	0.939*	0.072	-0.760	0.212	-0.155	-0.830	-0.573	-0.631	-0.800	-0.890*
W	0.838	0.854	-0.815	-0.671	0.638	-0.786	0.283	-0.318	0.627	0.863	-0.664	-0.601	-0.801	-0.704	0.559	0.951*	-0.172	-0.742	-0.239	-0.606	-0.656	-0.834	-0.710	-0.710	-0.772
Tl	-0.779	-0.792	0.784	-0.310	-0.919*	0.462	-0.878	0.866	-0.483	-0.740	-0.280	-0.301	0.816	0.898*	0.400	-0.547	-0.373	0.886*	-0.620	-0.127	0.915*	0.541	0.825	0.909*	0.849
Pb	-0.675	-0.718	0.750	-0.468	-0.795	0.497	-0.968**	0.906*	-0.296	-0.637	-0.418	-0.423	0.732	0.864	0.461	-0.515	-0.622	0.807	-0.646	-0.339	0.884*	0.377	0.664	0.858	0.780
Bi	0.901*	0.949*	-0.967**	-0.014	0.970**	-0.602	0.803	-0.857	0.512	0.880*	-0.006	0.058	-0.910*	-0.986**	-0.148	0.827	0.166	-0.953*	0.466	-0.087	-0.988**	-0.684	-0.881*	-0.977**	-0.994**
Th	0.102	-0.057	0.270	-0.816	-0.159	-0.142	-0.697	0.735	0.623	0.140	-0.846	-0.879*	-0.044	0.308	0.801	-0.026	-0.621	0.079	-0.831	-0.905*	0.374	-0.480	-0.148	0.220	0.247
U	-0.377	-0.458	0.559	-0.732	-0.641	0.131	-0.924*	0.927*	0.046	-0.326	-0.723	-0.743	0.439	0.681	0.773	-0.244	-0.594	0.558	-0.892*	-0.626	0.733	0.026	0.414	0.647	0.604
La	0.944*	0.939*	-0.878*	-0.530	0.849	-0.711	0.414	-0.473	0.755	0.951*	-0.519	-0.454	-0.914*	-0.829	0.348	0.909*	-0.197	-0.886*	-0.015	-0.574	-0.794	-0.913*	-0.902*	-0.849	-0.890*
Ce	0.919*	0.975**	-0.997**	-0.102	0.918*	-0.716	0.788	-0.817	0.505	0.907*	-0.103	-0.042	-0.926*	-0.987**	-0.016	0.913*	0.213	-0.951*	0.347	-0.126	-0.979**	-0.708	-0.845	-0.975**	-0.995**
Pr	0.613	0.594	-0.526	-0.864	0.447	-0.457	-0.129	0.008	0.600	0.643	-0.811	-0.733	-0.542	-0.390	0.645	0.701	-0.613	-0.469	-0.382	-0.813	-0.343	-0.745	-0.567	-0.406	-0.516
Nd	0.751	0.732	-0.659	-0.787	0.606	-0.553	0.042	-0.149	0.689	0.774	-0.747	-0.670	-0.691	-0.551	0.568	0.790	-0.509	-0.630	-0.272	-0.774	-0.506	-0.839	-0.712	-0.571	-0.660
Sm	0.604	0.572	-0.486	-0.905*	0.405	-0.486	-0.175	0.076	0.634	0.638	-0.864	-0.796	-0.533	-0.351	0.712	0.685	-0.607	-0.449	-0.464	-0.858	-0.298	-0.764	-0.552	-0.376	-0.472
Eu	0.873	0.865	-0.806	-0.591	0.807	-0.581	0.289	-0.396	0.724	0.880*	-0.555	-0.476	-0.829	-0.742	0.352	0.842	-0.369	-0.802	-0.026	-0.631	-0.711	-0.876	-0.861	-0.759	-0.830
Gd	0.562	0.539	-0.481	-0.631	0.589	-0.147	-0.069	-0.137	0.564	0.567	-0.540	-0.443	-0.492	-0.404	0.280	0.511	-0.747	-0.473	-0.032	-0.679	-0.389	-0.655	-0.643	-0.420	-0.542
Tb	0.710	0.682	-0.601	-0.813	0.570	-0.496	-0.029	-0.088	0.690	0.733	-0.767	-0.691	-0.644	-0.492	0.580	0.737	-0.576	-0.582	-0.299	-0.807	-0.447	-0.823	-0.686	-0.516	-0.609
Dy	0.680	0.644	-0.551	-0.875	0.489	-0.537	-0.095	0.005	0.695	0.710	-0.840	-0.775	-0.614	-0.432	0.681	0.728	-0.563	-0.534	-0.416	-0.852	-0.379	-0.822	-0.634	-0.460	-0.545
Y	-0.452	-0.456	0.408	0.710	-0.065	0.804	0.023	-0.127	-0.374	-0.504	0.761	0.760	0.428	0.266	-0.843	-0.700	-0.054	0.314	0.678	0.539	0.194	0.538	0.215	0.276	0.287
Ho	0.481	0.413	-0.292	-0.930*	0.305	-0.313	-0.363	0.251	0.657	0.514	-0.884*	-0.826	-0.402	-0.177	0.713	0.490	-0.763	-0.314	-0.521	-0.932*	-0.125	-0.714	-0.490	-0.218	-0.307
Er	0.644	0.599	-0.496	-0.887*	0.465	-0.477	-0.155	0.054	0.702	0.674	-0.848	-0.783	-0.574	-0.381	0.678	0.671	-0.625	-0.495	-0.428	-0.879*	-0.329	-0.809	-0.620	-0.414	-0.500
Tm	0.635	0.590	-0.487	-0.901*	0.442	-0.490	-0.168	0.074	0.696	0.667	-0.865	-0.802	-0.565	-0.368	0.703	0.673	-0.615	-0.482	-0.456	-0.884*	-0.314	-0.804	-0.601	-0.400	-0.485
Yb	0.551	0.495	-0.383	-0.931*	0.357	-0.409	-0.279	0.179	0.672	0.585	-0.890*	-0.831	-0.476	-0.261	0.730	0.584	-0.689	-0.387	-0.512	-0.917*	-0.207	-0.757	-0.533	-0.298	-0.385
Lu	0.555	0.508	-0.408	-0.908*	0.384	-0.385	-0.253	0.136	0.648	0.587	-0.859	-0.791	-0.480	-0.284	0.686	0.595	-0.702	-0.398	-0.458	-0.890*	-0.234	-0.744	-0.542	-0.315	-0.414

GR	-0.793	-0.878	0.948*	-0.182	-0.897*	0.552	-0.907*	0.949*	-0.304	-0.767	-0.189	-0.251	0.818	0.969**	0.299	-0.775	-0.346	0.882*	-0.595	-0.150	0.985**	0.501	0.745	0.939*	0.957*
	Cs	Ba	Hf	Ta	W	Tl	Pb	Bi	Th	U	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Y	Ho	Er	Tm	Yb	Lu
Cs	1																								
Ba	-0.136	1																							
Hf	-0.264	0.934*	1																						
Ta	-0.330	0.770	0.876	1																					
W	-0.621	0.422	0.652	0.868	1																				
Tl	0.374	-0.834	-0.859	-0.538	-0.363	1																			
Pb	0.108	-0.834	-0.863	-0.514	-0.268	0.956*	1																		
Bi	-0.496	0.896*	0.965**	0.850	0.705	-0.891*	-0.819	1																	
Th	-0.622	-0.671	-0.473	-0.268	0.238	0.372	0.547	-0.293	1																
U	-0.124	-0.855	-0.739	-0.366	0.024	0.849	0.914*	-0.670	0.785	1															
La	-0.774	0.571	0.750	0.837	0.937*	-0.607	-0.458	0.854	0.194	-0.190	1														
Ce	-0.451	0.857	0.973**	0.913*	0.792	-0.823	-0.779	0.982**	-0.266	-0.590	0.880*	1													
Pr	-0.763	0.153	0.317	0.649	0.882*	-0.070	0.118	0.452	0.504	0.342	0.825	0.507	1												
Nd	-0.813	0.294	0.469	0.727	0.930*	-0.259	-0.071	0.605	0.432	0.178	0.918*	0.649	0.981**	1											
Sm	-0.769	0.077	0.267	0.602	0.876	-0.031	0.154	0.403	0.574	0.403	0.807	0.467	0.995**	0.972**	1										
Eu	-0.826	0.521	0.664	0.802	0.915*	-0.517	-0.332	0.796	0.252	-0.101	0.982**	0.809	0.889*	0.959*	0.865	1									
Gd	-0.853	0.307	0.332	0.548	0.683	-0.239	0.016	0.524	0.372	0.118	0.773	0.490	0.883*	0.890*	0.850	0.878	1								
Tb	-0.835	0.240	0.405	0.674	0.898*	-0.211	-0.008	0.554	0.482	0.230	0.890*	0.592	0.988**	0.997**	0.980**	0.943*	0.911*	1							
Dy	-0.809	0.142	0.339	0.635	0.902*	-0.130	0.060	0.481	0.553	0.325	0.859	0.537	0.991**	0.987**	0.995**	0.906*	0.860	0.992**	1						
Y	0.198	0.086	-0.231	-0.520	-0.758	-0.120	-0.082	-0.187	-0.374	-0.404	-0.512	-0.357	-0.614	-0.591	-0.657	-0.451	-0.178	-0.560	-0.644	1					
Ho	-0.833	-0.093	0.067	0.394	0.732	0.073	0.299	0.249	0.721	0.522	0.696	0.284	0.953*	0.910*	0.966**	0.784	0.868	0.939*	0.954*	-0.517	1				
Er	-0.837	0.096	0.281	0.579	0.863	-0.099	0.107	0.439	0.598	0.361	0.832	0.485	0.989**	0.979**	0.993**	0.891*	0.881*	0.989**	0.996**	-0.597	0.974**	1			
Tm	-0.821	0.075	0.268	0.575	0.866	-0.076	0.124	0.421	0.608	0.384	0.823	0.474	0.989**	0.975**	0.996**	0.880*	0.864	0.985**	0.997**	-0.624	0.974**	0.999**	1		
Yb	-0.819	-0.025	0.157	0.484	0.805	0.018	0.228	0.322	0.675	0.473	0.756	0.370	0.977**	0.945*	0.988**	0.827	0.860	0.964**	0.981**	-0.592	0.993**	0.992**	0.993**	1	
Lu	-0.818	0.024	0.189	0.517	0.810	-0.003	0.210	0.353	0.630	0.437	0.769	0.396	0.986**	0.956*	0.990**	0.847	0.889*	0.974**	0.983**	-0.562	0.990**	0.994**	0.993**	0.998**	1

GR	0.265	-0.963**	-0.994**	-0.844	-0.593	0.885*	0.878	-0.968**	0.514	0.788	-0.721	-0.957*	-0.277	-0.433	-0.220	-0.644	-0.345	-0.372	-0.294	0.126	-0.034	-0.241	-0.225	-0.116	-0.153
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GR-Growth rates

The values followed by * are correlations.at 95% confidence level.

The values followed by ** are correlations.at 99% confidence level.