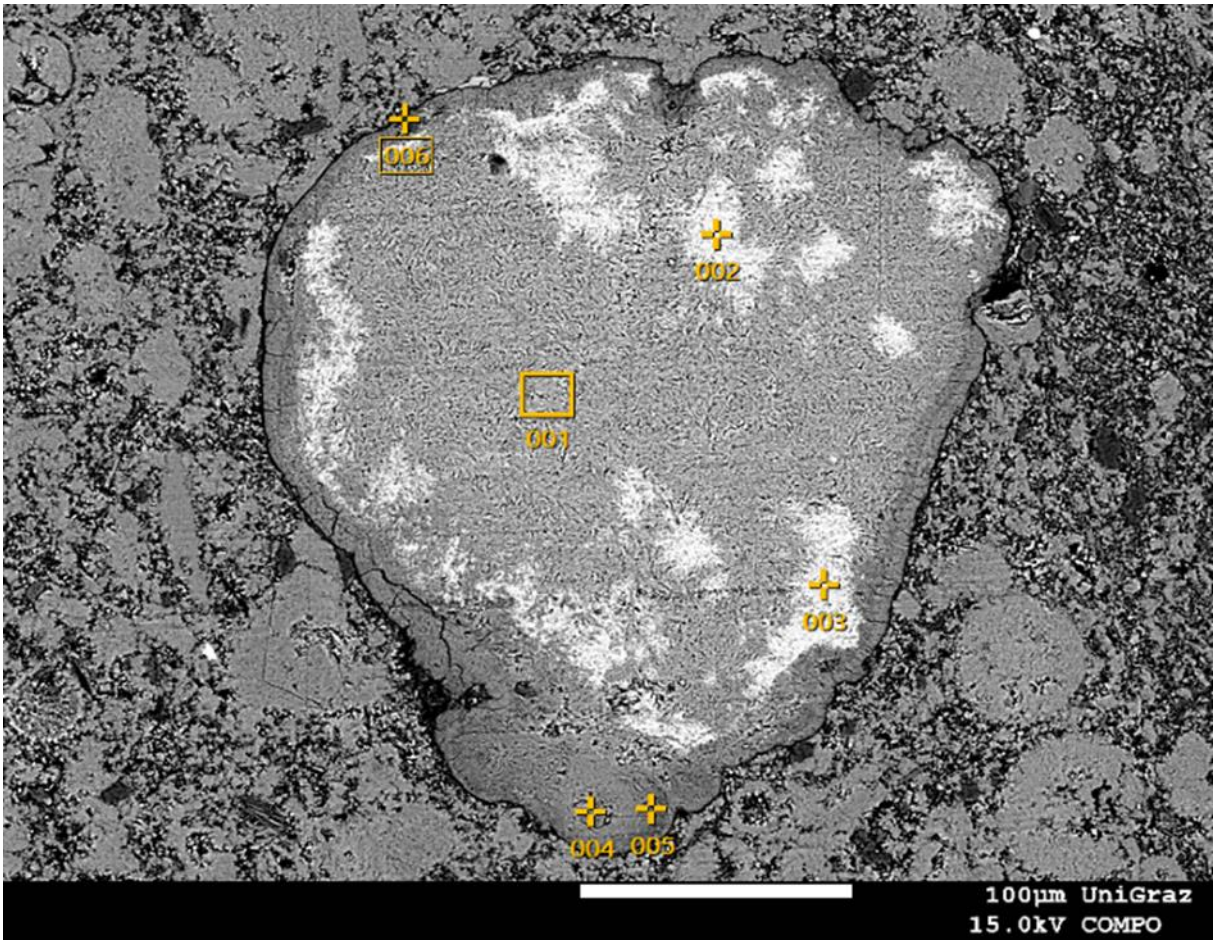
Supplementary Figure S1: Backscatter electron image showing mineral inclusions within a glauconite grain determined by electron microprobe (EMP) analysis. The chemical composition of the highlighted areas and points are given in the table below.



	F	Na_2O	MgO	Al_2O_3	SiO_2	P_2O_5	SO_3	K_2O	CaO	TFe
001			5.47	8.96	57.54			9.58		18.45
002	6.95		0.78	2.12	11.75	29.49	1.15	1.25	43.02	3.48
003	4.58	0.31	0.48	1.26	7.62	31.48	1.03	1.26	49.08	2.90
004			4.67	15.61	58.64			6.58		14.49
005			5.30	13.95	58.79			7.21		14.75
006			0.69	2.61	94.62			0.79	0.53	0.76

Supplementary Table S1: Compilation of $^{87}Rb/^{86}Sr$ and $^{87}Sr/^{86}$ Sr ratios with corresponding uncertainties (2σ) for both reference materials and glauconites determined by LA-ICP-MS/MS. NIST610 was used as primary reference material; BCR2G was used as secondary reference material. Rb and Sr concentrations (ppm) are reported only for the Langenstein glauconites.

Sample ID	Selection Label	Rb^{87}/Sr^{86}	±2SE	Sr^{87}/Sr^{86}	±2SE
1	G_NIST610_1	2.1	<0.1	0.7	<0.1
2	G_NIST610_2	2.1	<0.1	0.7	<0.1
3	G_NIST610_3	2.1	<0.1	0.7	<0.1
4	G_NIST610_4	2.2	<0.1	0.7	<0.1
5	G_NIST610_5	2.2	<0.1	0.7	<0.1
6	G_NIST610_6	2.2	<0.1	0.7	<0.1
7	G_NIST610_7	2.2	<0.1	0.7	<0.1
8	G_NIST610_8	2.2	<0.1	0.7	<0.1
9	G_NIST610_9	2.2	<0.1	0.7	<0.1
10	G_NIST610_10	2.2	<0.1	0.7	<0.1
11	G_NIST610_11	2.2	<0.1	0.7	<0.1
12	G_NIST610_12	2.2	<0.1	0.7	<0.1
13	G_NIST610_13	2.2	<0.1	0.7	<0.1
14	G_NIST610_14	2.3	<0.1	0.7	<0.1
15	G_NIST610_15	2.3	<0.1	0.7	<0.1
16	G_NIST610_16	2.3	<0.1	0.7	<0.1
17	G_NIST610_17	2.3	<0.1	0.7	<0.1
18	G_NIST610_18	2.3	<0.1	0.7	<0.1
19	G_NIST610_19	2.3	<0.1	0.7	<0.1
20	G_NIST610_20	2.3	<0.1	0.7	<0.1
21	G_NIST610_21	2.3	<0.1	0.7	<0.1
22	G_NIST610_22	2.3	<0.1	0.7	<0.1
23	G_NIST610_23	2.3	<0.1	0.7	<0.1
24	G_NIST610_24	2.3	<0.1	0.7	<0.1
25	G_NIST610_25	2.3	<0.1	0.7	<0.1
26	G_NIST610_1	2.3	<0.1	0.7	<0.1
27	G_NIST610_2	2.2	<0.1	0.7	<0.1
28	G_NIST610_3	2.2	<0.1	0.7	<0.1
29	G_NIST610_4	2.2	<0.1	0.7	<0.1
30	G_NIST610_5	2.3	<0.1	0.7	<0.1
31	G_NIST610_6	2.3	<0.1	0.7	<0.1
32	G_NIST610_7	2.3	<0.1	0.7	<0.1
33	G_NIST610_8	2.3	<0.1	0.7	<0.1
34	G_NIST610_9	2.3	<0.1	0.7	<0.1
35	G_NIST610_10	2.3	<0.1	0.7	<0.1
36	G_NIST610_11	2.3	<0.1	0.7	<0.1
37	G_NIST610_12	2.3	<0.1	0.7	<0.1
38	G_NIST610_13	2.3	<0.1	0.7	<0.1
39	G_NIST610_14	2.3	<0.1	0.7	<0.1
40	G_NIST610_15	2.3	<0.1	0.7	<0.1
41	G_NIST610_16	2.3	<0.1	0.7	<0.1
42	G_NIST610_17	2.3	<0.1	0.7	<0.1
43	G_NIST610_18	2.3	<0.1	0.7	<0.1
44	G_NIST610_19	2.3	<0.1	0.7	<0.1
45	G_NIST610_20	2.3	<0.1	0.7	<0.1
46	G_NIST610_21	2.3	<0.1	0.7	<0.1
47	G_NIST610_22	2.3	<0.1	0.7	<0.1
48	G_NIST610_23	2.3	<0.1	0.7	<0.1
49	G_NIST610_24	2.3	<0.1	0.7	<0.1
50	G_NIST610_25	2.3	<0.1	0.7	<0.1
51	G_NIST610_26	2.3	<0.1	0.7	<0.1
52	G_NIST610_27	2.3	<0.1	0.7	<0.1
53	G_NIST610_28	2.3	<0.1	0.7	<0.1
54	G_NIST610_29	2.2	<0.1	0.7	<0.1
55	G_NIST610_30	2.3	<0.1	0.7	<0.1
56	G_BCR2G_1	0.4	<0.1	0.7	<0.1
57	G_BCR2G_2	0.4	<0.1	0.7	<0.1
58	G_BCR2G_3	0.4	<0.1	0.7	<0.1

59	G_BCR2G_4	0.4	<0.1	0.7	<0.1
60	G_BCR2G_5	0.4	<0.1	0.7	<0.1
61	G_BCR2G_6	0.4	<0.1	0.7	<0.1
62	G_BCR2G_7	0.4	<0.1	0.7	<0.1
63	G_BCR2G_8	0.4	<0.1	0.7	<0.1
64	G_BCR2G_9	0.4	<0.1	0.7	<0.1
65	G_BCR2G_10	0.4	<0.1	0.7	<0.1
66	G_BCR2G_11	0.4	<0.1	0.7	<0.1
67	G_BCR2G_12	0.4	<0.1	0.7	<0.1
68	G_BCR2G_13	0.4	<0.1	0.7	<0.1
69	G_BCR2G_14	0.4	<0.1	0.7	<0.1
70	G_BCR2G_15	0.4	<0.1	0.7	<0.1
71	G_BCR2G_16	0.4	<0.1	0.7	<0.1
72	G_BCR2G_17	0.4	<0.1	0.7	<0.1
73	G_BCR2G_18	0.4	<0.1	0.7	<0.1
74	G_BCR2G_19	0.4	<0.1	0.7	<0.1
75	G_BCR2G_20	0.4	<0.1	0.7	<0.1
76	G_BCR2G_21	0.4	<0.1	0.7	<0.1
77	G_BCR2G_22	0.4	<0.1	0.7	<0.1
78	G_BCR2G_23	0.4	<0.1	0.7	<0.1
79	G_BCR2G_24	0.4	<0.1	0.7	<0.1
80	G_BCR2G_1	0.4	<0.1	0.7	<0.1
81	G_BCR2G_2	0.4	<0.1	0.7	<0.1
82	G_BCR2G_3	0.4	<0.1	0.7	<0.1
83	G_BCR2G_4	0.4	<0.1	0.7	<0.1
84	G_BCR2G_5	0.4	<0.1	0.7	<0.1
85	G_BCR2G_6	0.4	<0.1	0.7	<0.1
86	G_BCR2G_7	0.4	<0.1	0.7	<0.1
87	G_BCR2G_8	0.4	<0.1	0.7	<0.1
88	G_BCR2G_9	0.4	<0.1	0.7	<0.1
89	G_BCR2G_10	0.4	<0.1	0.7	<0.1
90	G_BCR2G_11	0.4	<0.1	0.7	<0.1
91	G_BCR2G_12	0.4	<0.1	0.7	<0.1
92	G_BCR2G_13	0.4	<0.1	0.7	<0.1
93	G_BCR2G_14	0.4	<0.1	0.7	<0.1
94	G_BCR2G_15	0.4	<0.1	0.7	<0.1
95	G_BCR2G_16	0.4	<0.1	0.7	<0.1
96	G_BCR2G_17	0.4	<0.1	0.7	<0.1
97	G_BCR2G_18	0.4	<0.1	0.7	<0.1
98	G_BCR2G_19	0.4	<0.1	0.7	<0.1
99	G_BCR2G_20	0.4	<0.1	0.7	<0.1
100	G_BCR2G_21	0.4	<0.1	0.7	<0.1
101	G_BCR2G_22	0.4	<0.1	0.7	<0.1
102	G_BCR2G_23	0.4	<0.1	0.7	<0.1
103	G_BCR2G_24	0.4	<0.1	0.7	<0.1
104	G_BCR2G_25	0.4	<0.1	0.7	<0.1
105	G_BCR2G_26	0.4	<0.1	0.7	<0.1
106	G_BCR2G_27	0.4	<0.1	0.7	<0.1
107	G_BCR2G_28	0.4	<0.1	0.7	<0.1
108	G_BCR2G_29	0.4	<0.1	0.7	<0.1
109	G_BCR2G_30	0.4	<0.1	0.7	<0.1
110	MicaMg_1	146.8	1.2	1.9	<0.1
111	MicaMg_2	144.5	1.0	1.8	<0.1
112	MicaMg_3	143.4	1.2	1.9	<0.1
113	MicaMg_4	144.6	1.2	1.8	<0.1
114	MicaMg_5	146.7	1.3	1.9	<0.1
115	MicaMg_6	146.5	1.1	1.8	<0.1
116	MicaMg_7	147.9	1.3	1.9	<0.1
117	MicaMg_8	149.9	1.2	1.9	<0.1
118	MicaMg_9	147.5	1.1	1.9	<0.1
119	MicaMg_10	146.3	1.6	1.9	<0.1
120	MicaMg_11	148.8	1.1	1.9	<0.1
121	MicaMg_12	148.7	1.3	1.9	<0.1
122	MicaMg_13	147.1	1.3	1.9	<0.1
123	MicaMg_14	147.7	1.2	1.9	<0.1

124	MicaMg_15	146.3	1.2	1.8	<0.1
125	MicaMg_16	141.4	1.2	1.9	<0.1
126	MicaMg_17	147.8	1.0	1.9	<0.1
127	MicaMg_18	147.6	1.3	1.8	<0.1
128	MicaMg_19	146.9	1.4	1.9	<0.1
129	MicaMg_20	144.8	1.1	1.8	<0.1
130	MicaMg_21	146.8	1.2	1.9	<0.1
131	MicaMg_22	147.1	1.1	1.9	<0.1
132	MicaMg_23	146.5	1.2	1.9	<0.1
133	MicaMg_24	142.9	1.0	1.9	<0.1
134	MicaMg_1	149.3	1.1	1.9	<0.1
135	MicaMg_2	147.1	1.2	1.9	<0.1
136	MicaMg_3	146.5	1.2	1.9	<0.1
137	MicaMg_4	144.4	1.0	1.9	<0.1
138	MicaMg_5	146.0	1.3	1.9	<0.1
139	MicaMg_6	146.6	1.4	1.8	<0.1
140	MicaMg_7	147.8	1.2	1.9	<0.1
141	MicaMg_8	147.6	1.1	1.9	<0.1
142	MicaMg_9	146.9	1.4	1.9	<0.1
143	MicaMg_10	145.7	1.2	1.9	<0.1
144	MicaMg_11	147.1	1.2	1.9	<0.1
145	MicaMg_12	145.4	1.1	1.9	<0.1
146	MicaMg_13	146.3	1.2	1.9	<0.1
147	MicaMg_14	146.1	1.3	1.9	<0.1
148	MicaMg_15	146.8	1.3	1.9	<0.1
149	MicaMg_16	145.4	1.2	1.8	<0.1
150	MicaMg_17	151.1	1.4	1.9	<0.1
151	MicaMg_18	148.5	1.1	1.8	<0.1
152	MicaMg_19	148.8	1.2	1.8	<0.1
153	MicaMg_20	150.2	1.2	1.9	<0.1
154	MicaMg_21	147.9	1.5	1.8	<0.1
155	MicaMg_22	148.5	1.2	1.9	<0.1
156	MicaMg_23	149.7	1.2	1.9	<0.1
157	MicaMg_24	146.3	1.2	1.9	<0.1
158	MicaMg_25	146.1	0.9	1.9	<0.1
159	MicaMg_26	149.6	1.4	1.8	<0.1
160	MicaMg_27	147.6	1.5	1.9	<0.1
161	MicaMg_28	147.6	1.4	1.9	<0.1
162	MicaMg_29	121.2	4.3	1.7	<0.1
163	MicaMg_30	148.9	1.6	1.9	<0.1
164	GA1550_1	81.7	0.8	0.8	<0.1
165	GA1550_2	83.6	0.6	0.8	<0.1
166	GA1550_3	99.9	1.2	0.9	<0.1
167	GA1550_4	101.3	1.1	0.9	<0.1
168	GA1550_5	106.7	1.1	0.9	<0.1
169	GA1550_6	107.6	1.2	0.9	<0.1
170	GA1550_7	95.1	1.0	0.8	<0.1
171	GA1550_8	83.7	0.8	0.8	<0.1
172	GA1550_9	105.7	1.2	0.9	<0.1
173	GA1550_10	104.2	1.3	0.9	<0.1
174	GA1550_11	80.3	0.9	0.8	<0.1
175	GA1550_12	88.0	1.0	0.8	<0.1
176	GA1550_1	206.3	2.4	1.0	<0.1
177	GA1550_2	104.2	1.1	0.9	<0.1
178	GA1550_3	183.8	2.4	1.0	<0.1
179	GA1550_4	183.1	2.1	1.0	<0.1
180	GA1550_5	172.2	2.0	1.0	<0.1
181	GA1550_6	220.6	3.0	1.0	<0.1
182	GA1550_7	185.6	2.5	1.0	<0.1
183	GA1550_8	164.9	2.0	1.0	<0.1
184	GA1550_9	123.3	1.3	0.9	<0.1
185	GA1550_10	27.0	10.0	0.8	<0.1
186	GA1550_11	131.1	1.7	0.9	<0.1
187	GA1550_12	180.2	2.1	1.0	<0.1
188	GA1550_13	172.6	2.0	1.0	<0.1

189	GA1550_14	211.6	3.1	1.0	<0.1
190	La_Posta_1	530.0	18.0	1.4	0.1
191	La_Posta_2	651.0	22.0	1.6	0.1
192	La_Posta_3	612.0	20.0	1.6	0.1
193	La_Posta_4	672.0	24.0	1.6	0.1
194	La_Posta_5	556.0	18.0	1.4	0.1
195	La_Posta_6	78.0	38.0	0.8	<0.1
196	La_Posta_7	370.0	11.0	1.2	<0.1
197	La_Posta_8	424.0	13.0	1.3	<0.1
198	La_Posta_9	519.0	17.0	1.4	0.1
199	La_Posta_10	542.0	20.0	1.4	0.1
200	La_Posta_11	582.0	23.0	1.5	0.1
201	La_Posta_12	558.0	19.0	1.5	0.1
202	La_Posta_1	635.0	21.0	1.6	0.1
203	La_Posta_2	564.0	19.0	1.5	0.1
204	La_Posta_3	923.0	45.0	1.9	0.1
205	La_Posta_4	789.0	31.0	1.8	0.1
206	La_Posta_5	702.0	28.0	1.7	0.1
207	La_Posta_6	643.0	24.0	1.5	0.1
208	La_Posta_7	743.0	31.0	1.7	0.1
209	La_Posta_8	709.0	26.0	1.6	0.1
210	La_Posta_9	889.0	41.0	1.9	0.1
211	La_Posta_10	235.0	25.0	1.0	<0.1
212	La_Posta_11	690.0	130.0	1.6	0.2
213	La_Posta_12	570.0	22.0	1.5	0.1
214	La_Posta_13	536.0	18.0	1.5	0.1
215	La_Posta_14	303.0	11.0	1.1	<0.1
216	La_Posta_15	1331.0	80.0	2.6	0.2
217	La_Posta_16	1132.0	51.0	2.2	0.1
218	La_Posta_17	1586.0	99.0	3.0	0.2
219	La_Posta_18	1950.0	120.0	3.5	0.2
220	H_gsbo_ms_1	14710.0	760.0	228.0	12.0
221	H_gsbo_ms_2	18300.0	1200.0	283.0	19.0
222	H_gsbo_ms_3	18800.0	1000.0	292.0	16.0
223	H_gsbo_ms_4	21400.0	1400.0	334.0	22.0
224	HogsbiMs_1	16110.0	760.0	259.0	12.0
225	HogsbiMs_2	17900.0	1000.0	290.0	17.0
226	HogsbiMs_3	14150.0	770.0	218.0	12.0
227	HogsbiMs_4	17200.0	1000.0	267.0	16.0
228	HogsbiMs_5	17800.0	1300.0	277.0	21.0
229	HogsbiMs_6	16500.0	1100.0	261.0	17.0
230	MDC_1	42.6	0.4	1.1	<0.1
231	MDC_2	44.6	0.4	1.1	<0.1
232	MDC_3	44.8	0.5	1.1	<0.1
233	MDC_4	42.7	0.7	1.1	<0.1
234	MDC_5	45.4	0.5	1.1	<0.1
235	MDC_6	45.3	0.5	1.1	<0.1
236	MDC_7	44.1	0.5	1.1	<0.1
237	MDC_8	44.4	0.5	1.1	<0.1
238	Mhbb_1	192.0	14.0	2.2	0.1
239	Mhbb_2	170.2	3.0	2.0	<0.1
240	Mhbb_3	479.0	11.0	4.5	0.1
241	Mhbb_4	481.0	10.0	4.5	0.1
242	MicaFe_1	10100.0	1400.0	47.6	6.5
243	MicaFe_2	6600.0	1700.0	32.4	8.0
244	MicaFe_3	24300.0	2100.0	113.0	9.8
245	MicaFe_4	20600.0	1900.0	97.1	8.9
246	MicaFe_5	33100.0	5500.0	153.0	25.0
247	MicaFe_6	43600.0	9800.0	201.0	44.0

Sample ID	**Selection Label**	**Rb^{87}/Sr^{86}**	**±2SE**	**Sr^{87}/Sr^{86}**	**±2SE**	**Sr^{87}/Rb^{87}**	**±2SE**	**Rb (ppm)**	**Sr (ppm)**
1	S1_1	372.0	11.0	1.2	<0.1	93.4	6.0	324.8	2.4
2	S1_2	243.6	9.5	1.0	<0.1	91.5	7.4	302.1	3.5

3	S1_3	293.0	43.0	1.1	0.1	93.0	12.0	312.4	3.4
4	S1_4	208.8	5.6	1.0	<0.1	96.1	9.1	297.9	3.9
5	S1_5	169.0	4.3	0.9	<0.1	94.0	7.1	311.8	5.0
6	S1_6	234.7	7.5	1.0	<0.1	94.1	6.4	306.2	3.6
7	S1_7	214.5	4.9	1.0	<0.1	101.3	6.5	298.2	3.8
8	S1_8	276.3	9.2	1.1	<0.1	98.1	6.9	294.5	3.0
9	S1_9	268.3	8.2	1.1	<0.1	100.7	7.5	289.3	3.0
10	S1_10	175.3	7.2	1.0	<0.1	100.7	8.4	287.4	4.5
11	S1_11	266.0	8.5	1.1	<0.1	92.4	5.3	314.9	3.4
12	S1_12	121.0	6.0	0.9	<0.1	99.1	8.3	308.7	7.1
13	S1_13	321.9	8.7	1.1	<0.1	93.1	5.7	289.0	2.6
14	S1_14	245.8	8.2	1.0	<0.1	95.4	5.9	314.4	3.6
15	S1_15	227.0	6.1	1.0	<0.1	95.3	6.8	293.5	3.7
16	S1_16	302.5	7.3	1.1	<0.1	97.0	5.3	297.5	2.8
17	S1_17	282.0	5.3	1.1	<0.1	95.1	5.5	290.2	2.9
18	S1_18	275.4	6.2	1.1	<0.1	98.0	6.3	289.0	3.0
19	S1_19	225.9	4.6	1.0	<0.1	100.2	6.4	279.7	3.4
20	S1_20	251.3	8.7	1.0	<0.1	96.0	6.8	284.8	3.2
21	S1_1	340.0	11.0	1.2	<0.1	98.4	6.9	313.9	2.7
22	S1_2	266.0	15.0	1.0	<0.1	89.5	7.6	298.1	3.2
23	S1_3	270.0	18.0	1.1	<0.1	96.7	6.7	306.3	3.5
24	S1_4	231.0	10.0	1.1	<0.1	103.9	8.9	294.1	4.8
25	S1_6	366.0	28.0	1.2	<0.1	97.8	6.2	307.0	2.7
26	S1_7	120.4	3.4	0.9	<0.1	93.0	10.0	308.4	7.3
27	S1_8	299.4	6.8	1.1	<0.1	96.4	4.9	296.7	2.9
28	S1_9	298.0	17.0	1.1	<0.1	93.1	6.6	309.0	3.1
29	S1_10	230.0	13.0	1.0	<0.1	102.3	5.7	295.0	3.8
30	S1_11	241.0	25.0	1.0	<0.1	93.5	6.5	298.3	3.6
31	S1_12	312.5	8.7	1.1	<0.1	95.7	6.8	300.2	2.9
32	S1_13	236.0	13.0	1.0	<0.1	100.6	7.3	299.8	3.4
33	S1_14	161.0	3.4	0.9	<0.1	99.4	7.5	289.4	5.1
34	S1_16	141.7	3.9	0.9	<0.1	93.9	9.7	263.2	18.6
35	S1_17	233.0	20.0	1.0	<0.1	101.1	8.5	307.2	6.1
36	S1_18	179.5	4.2	1.0	<0.1	96.5	9.0	287.3	4.0
37	S1_19	312.0	11.0	1.1	<0.1	95.9	6.1	310.8	5.0
38	S1_20	233.8	5.5	1.0	<0.1	94.9	7.1	290.1	2.8
39	S2_1	198.8	3.5	1.0	<0.1	96.7	6.7	307.3	4.1
40	S2_2	182.3	3.6	1.0	<0.1	104.4	5.9	287.9	4.1
41	S2_3	184.1	3.6	1.0	<0.1	106.7	6.5	287.5	4.3
42	S2_4	208.7	3.9	1.0	<0.1	98.2	6.4	289.4	4.3
43	S2_5	232.6	4.8	1.0	<0.1	93.2	6.3	279.5	3.7
44	S2_6	259.3	4.9	1.1	<0.1	98.9	5.6	291.2	3.5
45	S2_7	257.9	4.2	1.1	<0.1	101.8	5.8	279.6	3.0
46	S2_8	344.9	8.2	1.2	<0.1	99.4	6.2	276.1	3.0
47	S2_9	188.8	3.7	1.0	<0.1	100.0	7.1	290.5	2.4
48	S2_10	233.0	4.5	1.0	<0.1	97.4	6.3	299.7	4.4
49	S2_11	253.6	6.3	1.1	<0.1	103.2	6.4	302.2	3.6
50	S2_12	247.2	5.6	1.1	<0.1	98.1	5.3	304.8	3.4
51	S2_13	142.4	3.9	0.9	<0.1	100.2	8.3	292.6	3.3
52	S2_14	196.5	3.9	1.0	<0.1	95.5	6.6	290.3	5.7
53	S2_15	165.6	2.7	0.9	<0.1	100.0	6.6	292.1	4.1
54	S2_16	149.0	3.7	0.9	<0.1	102.4	7.7	290.5	4.8
55	S2_17	164.9	2.6	1.0	<0.1	103.5	6.3	293.4	5.5
56	S2_18	194.3	3.5	1.0	<0.1	95.9	6.2	286.8	4.8
57	S2_19	235.5	4.4	1.1	<0.1	102.1	5.8	286.6	4.1
58	S2_1	244.8	6.1	1.1	<0.1	101.6	6.6	288.6	3.5
59	S2_2	197.8	3.3	1.0	<0.1	104.6	7.7	308.3	3.7
60	S2_3	191.8	3.5	1.0	<0.1	99.6	8.0	288.2	4.3
61	S2_4	222.7	5.4	1.0	<0.1	95.0	7.1	297.7	4.6
62	S2_5	227.4	4.2	1.0	<0.1	102.1	7.4	297.8	3.9
63	S2_6	223.1	4.6	1.0	<0.1	101.3	6.4	301.4	3.9
64	S2_7	212.9	4.9	1.0	<0.1	104.8	7.5	297.4	3.9
65	S2_8	244.2	6.3	1.0	<0.1	95.2	7.1	302.3	4.3
66	S2_9	241.0	4.8	1.1	<0.1	99.9	7.5	301.2	3.8
67	S2_10	208.0	4.6	1.0	<0.1	101.3	6.8	295.2	3.5

68	S2_11	231.5	6.3	1.0	<0.1	101.0	7.5	295.7	4.1
69	S2_12	250.7	6.2	1.1	<0.1	106.2	8.0	287.4	3.7
70	S2_13	279.8	6.2	1.1	<0.1	98.8	6.3	289.6	3.5
71	S2_14	294.0	6.4	1.1	<0.1	104.6	5.9	294.0	3.1
72	S2_15	339.6	8.9	1.2	<0.1	95.7	5.6	285.0	2.9
73	S2_16	206.0	3.7	1.0	<0.1	96.9	6.8	303.3	2.7
74	S2_17	243.5	5.2	1.1	<0.1	102.7	6.3	295.9	4.2
75	S2_18	156.5	2.7	0.9	<0.1	97.6	8.4	298.3	3.7
76	S2_19	196.2	4.5	1.0	<0.1	101.0	7.3	290.0	5.2
77	S2_20	225.1	4.8	1.0	<0.1	96.7	7.5	295.2	4.4
78	S3_1	236.7	4.6	1.1	<0.1	104.2	5.0	284.8	3.7
79	S3_2	239.2	6.2	1.1	<0.1	103.4	5.8	310.9	3.6
80	S3_3	277.9	6.1	1.1	<0.1	97.4	5.3	309.8	3.7
81	S3_4	208.2	7.3	1.0	<0.1	96.4	5.7	304.0	3.1
82	S3_5	278.6	7.0	1.1	<0.1	91.7	6.4	293.0	4.0
83	S3_6	177.5	3.6	0.9	<0.1	93.2	6.7	303.0	3.0
84	S3_7	241.0	4.6	1.0	<0.1	98.0	5.8	319.3	5.0
85	S3_8	303.0	5.7	1.1	<0.1	92.4	5.8	308.1	3.5
86	S3_9	217.7	4.2	1.0	<0.1	96.4	6.2	317.4	2.9
87	S3_10	366.1	7.4	1.2	<0.1	96.3	4.5	288.6	3.7
88	S3_1	260.0	7.2	1.1	<0.1	96.9	7.9	310.2	2.4
89	S3_2	224.9	7.3	1.0	<0.1	99.9	7.8	312.9	3.7
90	S3_3	261.4	7.2	1.0	<0.1	90.7	7.4	300.7	4.2
91	S3_4	195.7	6.2	1.0	<0.1	101.0	14.0	304.4	3.5
92	S3_5	272.3	6.9	1.1	<0.1	98.9	6.0	293.3	5.4
93	S3_6	206.7	4.8	1.0	<0.1	92.0	7.2	306.9	3.4
94	S3_7	285.1	6.7	1.1	<0.1	94.4	5.7	307.2	4.2
95	S3_8	301.9	5.8	1.1	<0.1	94.2	5.1	301.6	3.2
96	S3_9	226.1	6.0	1.0	<0.1	98.7	7.0	312.5	3.0
97	S3_10	371.0	8.5	1.2	<0.1	101.8	5.6	292.2	3.9
98	S3_11	331.6	9.8	1.2	<0.1	98.6	6.4	305.2	2.4
99	S3_12	193.1	4.6	1.0	<0.1	95.5	6.5	309.0	2.8
100	S3_13	247.8	5.6	1.1	<0.1	100.0	6.4	283.5	4.3
101	S3_14	246.4	5.0	1.1	<0.1	99.9	7.7	306.8	3.7
102	S3_15	207.9	3.7	1.0	<0.1	92.4	7.3	306.8	3.6
103	S3_16	228.3	5.5	1.0	<0.1	99.4	6.9	293.2	3.9
104	S3_17	289.6	6.8	1.1	<0.1	89.6	6.7	316.0	4.0
105	S3_18	225.9	5.6	1.0	<0.1	94.5	7.4	304.6	3.1
106	S3_19	238.5	5.8	1.0	<0.1	94.7	7.0	307.9	4.0
107	S3_20	214.3	4.3	1.0	<0.1	93.3	6.5	317.9	4.0
108	S4_1	232.9	4.9	1.0	<0.1	97.7	5.2	319.9	4.4
109	S4_2	245.4	4.3	1.0	<0.1	94.3	5.6	317.4	3.8
110	S4_3	181.4	3.0	1.0	<0.1	104.4	6.4	304.8	3.4
111	S4_4	262.6	5.5	1.1	<0.1	98.3	5.8	300.0	4.5
112	S4_5	223.4	3.8	1.0	<0.1	96.2	5.2	299.7	3.1
113	S4_6	221.9	9.9	1.0	<0.1	95.7	7.5	298.0	3.7
114	S4_7	198.5	8.3	1.0	<0.1	92.6	6.9	306.6	4.0
115	S4_8	187.7	6.8	1.0	<0.1	93.8	6.1	304.4	4.3
116	S4_9	359.0	11.0	1.2	<0.1	94.2	5.2	293.3	4.4
117	S4_10	235.0	4.6	1.0	<0.1	92.3	6.0	310.7	2.5
118	S4_1	210.0	4.5	1.0	<0.1	95.0	7.4	310.5	3.8
119	S4_2	249.0	10.0	1.1	<0.1	99.6	7.1	314.5	4.5
120	S4_3	198.2	5.9	1.0	<0.1	99.9	8.7	315.4	3.7
121	S4_4	268.2	6.1	1.1	<0.1	96.1	6.6	314.7	4.6
122	S4_5	235.5	5.9	1.0	<0.1	93.4	7.6	307.8	3.3
123	S4_6	237.0	15.0	1.1	<0.1	109.7	7.6	302.2	3.7
124	S4_7	201.0	11.0	1.0	<0.1	95.6	8.2	297.2	3.8
125	S4_8	215.1	7.8	1.0	<0.1	99.1	7.4	294.0	4.2
126	S4_9	346.6	9.7	1.2	<0.1	92.3	5.4	287.1	3.9
127	S4_10	220.9	8.1	1.0	<0.1	101.3	7.3	303.1	2.6
128	S4_11	138.8	2.9	0.9	<0.1	100.5	8.4	305.1	4.0
129	S4_12	239.0	6.9	1.0	<0.1	93.5	6.3	307.3	6.4
130	S4_13	258.0	4.7	1.1	<0.1	100.9	7.2	296.0	3.6
131	S4_14	189.3	3.8	1.0	<0.1	102.8	8.1	298.5	3.3
132	S4_15	230.1	4.0	1.0	<0.1	90.4	6.4	280.3	4.2

133	S4_16	235.9	6.0	1.0	<0.1	96.9	7.4	297.9	3.7
134	S4_17	269.1	5.9	1.1	<0.1	98.4	6.6	306.8	3.8
135	S4_18	275.4	6.9	1.1	<0.1	100.2	7.0	314.4	3.4
136	S4_19	202.6	4.7	1.0	<0.1	88.7	7.9	311.6	4.5
137	S4_20	263.0	11.0	1.1	<0.1	92.4	7.7	320.1	3.8
138	S5_1	114.1	1.4	0.9	<0.1	88.6	7.0	304.4	10.0
139	S5_2	174.5	3.3	0.9	<0.1	94.2	7.7	294.4	5.8
140	S5_3	119.9	1.6	0.9	<0.1	98.7	8.5	293.5	6.8
141	S5_4	170.0	3.7	0.9	<0.1	91.1	6.6	297.8	5.6
142	S5_5	138.5	2.7	0.9	<0.1	103.0	8.1	294.7	6.2
143	S5_6	148.8	2.1	0.9	<0.1	97.2	7.8	296.7	5.9
144	S5_7	176.9	3.2	1.0	<0.1	102.9	7.5	293.8	4.6
145	S5_8	129.7	2.1	0.9	<0.1	93.0	8.0	305.7	6.3
146	S5_9	97.3	2.0	0.8	<0.1	95.4	9.6	293.3	8.1
147	S5_10	107.2	3.6	0.9	<0.1	93.2	9.5	280.9	8.3
148	S5_1	87.0	1.9	0.8	<0.1	94.0	10.0	305.2	8.5
149	S5_2	152.7	3.0	0.9	<0.1	94.4	9.2	290.0	5.3
150	S5_3	123.5	1.9	0.9	<0.1	91.9	8.6	296.3	6.7
151	S5_4	164.5	4.2	0.9	<0.1	96.0	7.7	299.7	5.1
152	S5_5	142.8	4.2	0.9	<0.1	95.7	9.4	294.1	5.8
153	S5_6	155.9	3.6	0.9	<0.1	99.1	8.6	298.9	5.5
154	S5_7	185.8	4.2	1.0	<0.1	91.7	8.4	296.3	4.4
155	S5_8	136.9	2.5	0.9	<0.1	106.8	9.8	306.4	6.6
156	S5_9	102.2	2.1	0.9	<0.1	100.5	9.9	285.2	8.5
157	S5_10	103.2	3.0	0.8	<0.1	94.0	12.0	270.2	9.5
158	S5_11	102.1	1.9	0.8	<0.1	97.0	10.0	304.5	7.2
159	S5_12	162.5	3.4	0.9	<0.1	98.2	7.5	285.9	4.5
160	S5_13	127.5	1.6	0.9	<0.1	97.0	8.1	293.4	6.7
161	S5_14	176.0	3.6	0.9	<0.1	94.0	8.5	296.9	4.8
162	S5_15	148.4	3.1	0.9	<0.1	96.4	8.7	294.6	5.9
163	S5_16	158.4	2.4	0.9	<0.1	93.9	7.7	287.9	5.4
164	S5_17	197.6	3.8	1.0	<0.1	92.2	6.4	285.5	4.5
165	S5_18	129.5	2.0	0.9	<0.1	100.5	7.9	301.1	6.4
166	S5_19	94.7	2.5	0.8	<0.1	100.0	12.0	289.1	8.1
167	S5_20	86.6	5.1	0.8	<0.1	102.0	11.0	284.7	7.4

Supplementary Table S2: Chemical composition (in wt.%) of glauconite grains (S1-5) sampled from the Langenstein profile obtained by LA-ICP-MS/MS analyses.

Sample number	Sample ID	SiO_2	Na_2O	MgO	Al_2O_3	K_2O	CaO	TiO_2	MnO	TFe
1	S1_1	50.9	<0.1	4.2	9.3	9.6	0.1	<0.1	<0.1	20.8
2	S1_2	51.5	<0.1	3.8	8.8	9.5	0.1	<0.1	<0.1	21.2
3	S1_3	52.0	<0.1	4.1	10.5	9.0	0.1	<0.1	<0.1	19.2
4	S1_4	51.8	<0.1	3.8	9.7	9.1	0.1	<0.1	<0.1	20.4
5	S1_5	52.6	<0.1	3.8	9.3	9.0	0.1	<0.1	<0.1	20.0
6	S1_6	53.0	<0.1	3.9	9.5	8.9	0.1	<0.1	<0.1	19.6
7	S1_7	52.5	<0.1	3.9	8.9	9.0	0.1	<0.1	<0.1	20.6
8	S1_8	53.3	<0.1	4.0	9.2	8.8	0.1	<0.1	<0.1	19.5
9	S1_9	52.5	<0.1	3.8	8.5	8.8	0.1	<0.1	<0.1	21.2
10	S1_10	53.6	<0.1	4.0	9.6	8.7	0.1	<0.1	<0.1	19.0
11	S1_11	52.8	<0.1	3.7	8.4	9.1	0.1	<0.1	<0.1	20.8
12	S1_12	53.3	<0.1	3.7	8.6	8.8	0.2	<0.1	<0.1	20.3
13	S1_13	53.0	<0.1	3.6	7.9	8.9	0.1	<0.1	<0.1	21.4
14	S1_14	53.4	<0.1	3.7	8.6	8.7	0.1	<0.1	<0.1	20.3
15	S1_15	53.9	<0.1	3.9	7.4	8.8	0.1	<0.1	<0.1	20.9
16	S1_16	53.3	<0.1	3.6	7.7	8.5	0.1	<0.1	<0.1	21.7
17	S1_17	54.0	<0.1	3.9	7.9	8.8	0.1	<0.1	<0.1	20.2
18	S1_18	53.1	<0.1	3.8	9.2	8.9	0.1	<0.1	<0.1	19.8
19	S1_19	53.7	<0.1	3.7	7.8	8.7	0.1	<0.1	<0.1	20.9
20	S1_20	54.2	<0.1	3.9	8.7	8.5	0.1	<0.1	<0.1	19.6
21	S1_1	53.9	<0.1	3.9	7.9	9.0	0.1	<0.1	<0.1	21.6
22	S1_2	54.7	<0.1	3.8	8.5	8.7	0.1	<0.1	<0.1	20.6
23	S1_3	54.7	<0.1	3.8	8.7	8.9	0.1	<0.1	<0.1	20.2
24	S1_4	54.7	<0.1	3.7	9.0	8.7	0.1	<0.1	<0.1	20.1
25	S1_5	54.1	<0.1	3.8	9.0	8.7	0.1	<0.1	<0.1	20.6
26	S1_6	55.0	<0.1	3.7	8.3	8.8	0.1	<0.1	<0.1	20.5
27	S1_7	55.1	<0.1	3.6	8.3	8.5	0.2	<0.1	<0.1	20.6
28	S1_8	54.6	<0.1	3.6	7.2	8.7	0.1	<0.1	<0.1	22.1
29	S1_9	54.7	<0.1	3.8	8.3	8.7	0.1	<0.1	<0.1	20.7
30	S1_10	55.2	<0.1	3.8	7.6	8.7	0.1	<0.1	<0.1	20.9
31	S1_11	54.6	<0.1	3.6	7.8	8.5	0.1	<0.1	<0.1	21.6
32	S1_12	54.7	<0.1	3.7	8.0	8.7	0.1	<0.1	<0.1	21.2
33	S1_13	54.5	<0.1	3.6	7.3	8.6	0.1	<0.1	<0.1	22.2
34	S1_14	52.9	<0.1	3.0	7.6	8.4	0.1	<0.1	<0.1	24.0
35	S1_15	60.8	<0.1	3.0	9.8	6.8	0.2	0.2	<0.1	15.3
36	S1_16	54.8	<0.1	3.6	8.2	8.6	0.2	<0.1	<0.1	20.9
37	S1_17	55.1	<0.1	3.8	8.2	8.8	0.1	<0.1	<0.1	20.4
38	S1_18	54.7	<0.1	3.6	7.9	8.5	0.1	<0.1	<0.1	21.3
39	S1_19	54.9	<0.1	3.6	8.5	8.4	0.1	<0.1	<0.1	20.8
40	S1_20	54.8	<0.1	3.6	7.7	8.7	0.1	<0.1	<0.1	21.4
	Average	53.9	<0.1	3.7	9.3	8.7	0.1	<0.1	<0.1	20.6
41	S2_1	53.6	<0.1	4.5	8.4	9.4	0.1	<0.1	<0.1	19.0
42	S2_2	53.0	<0.1	4.5	8.6	9.6	0.1	<0.1	<0.1	19.2
43	S2_3	53.2	<0.1	4.6	8.7	9.4	0.1	<0.1	<0.1	19.0
44	S2_4	53.2	<0.1	4.3	8.5	9.4	0.1	<0.1	<0.1	19.4
45	S2_5	53.2	<0.1	4.4	8.1	9.4	0.1	<0.1	<0.1	19.8
46	S2_6	54.5	<0.1	4.3	8.4	9.2	0.1	<0.1	<0.1	18.5
47	S2_7	55.2	<0.1	4.5	8.8	9.2	0.1	<0.1	<0.1	17.2
48	S2_8	55.1	<0.1	4.5	7.8	9.2	0.1	<0.1	<0.1	18.3
49	S2_9	51.9	<0.1	4.4	8.6	9.6	0.1	<0.1	<0.1	20.3
50	S2_10	52.0	<0.1	4.3	8.1	9.5	0.1	<0.1	<0.1	21.0
51	S2_11	52.8	<0.1	4.3	7.5	9.4	0.1	<0.1	<0.1	20.8
52	S2_12	53.0	<0.1	4.2	9.1	9.3	0.1	<0.1	<0.1	19.2
53	S2_13	52.7	<0.1	4.2	8.3	9.4	0.2	<0.1	<0.1	20.1
54	S2_14	52.9	<0.1	4.3	7.4	9.2	0.1	<0.1	<0.1	21.0
55	S2_15	53.3	<0.1	4.3	8.1	9.0	0.1	<0.1	<0.1	20.1
56	S2_16	52.7	<0.1	4.1	8.0	9.1	0.1	<0.1	<0.1	20.9
57	S2_17	53.5	<0.1	4.2	7.7	9.2	0.1	<0.1	<0.1	20.2
58	S2_18	53.4	<0.1	4.2	7.6	9.1	0.1	<0.1	<0.1	20.5
59	S2_19	53.7	<0.1	4.3	8.6	9.0	0.1	<0.1	<0.1	19.3

60	S2_1	54.3	<0.1	4.4	6.8	9.1	0.1	<0.1	<0.1	21.8
61	S2_2	54.2	<0.1	4.4	7.9	9.3	0.1	<0.1	<0.1	20.7
62	S2_3	55.1	<0.1	4.5	8.0	9.3	0.1	<0.1	<0.1	19.6
63	S2_4	54.6	<0.1	4.4	7.3	9.2	0.1	<0.1	<0.1	20.9
64	S2_5	54.9	<0.1	4.5	7.2	9.3	0.1	<0.1	<0.1	20.5
65	S2_6	55.2	<0.1	4.3	7.8	9.3	0.1	<0.1	<0.1	20.9
66	S2_7	55.1	<0.1	4.3	7.3	9.2	0.1	<0.1	<0.1	22.1
67	S2_8	55.0	<0.1	4.3	6.9	9.2	0.1	<0.1	<0.1	21.3
68	S2_9	55.1	<0.1	4.3	8.2	9.2	0.1	<0.1	<0.1	20.3
69	S2_10	55.1	<0.1	4.3	7.6	9.2	0.1	<0.1	<0.1	21.3
70	S2_11	54.5	<0.1	4.4	7.3	8.9	0.1	<0.1	<0.1	20.2
71	S2_12	54.1	<0.1	4.3	7.4	9.0	0.1	<0.1	<0.1	20.0
72	S2_13	54.9	<0.1	4.4	7.2	9.0	0.1	<0.1	<0.1	20.8
73	S2_14	54.8	<0.1	4.4	8.0	9.1	0.1	<0.1	<0.1	19.6
74	S2_15	54.5	<0.1	4.4	6.7	9.0	0.1	<0.1	<0.1	20.8
75	S2_16	54.4	<0.1	4.3	7.0	9.0	0.1	<0.1	<0.1	21.7
76	S2_17	55.0	<0.1	4.4	7.2	9.0	0.1	<0.1	<0.1	20.8
77	S2_18	53.9	<0.1	4.2	7.7	8.8	0.1	<0.1	<0.1	21.6
78	S2_19	54.7	<0.1	4.3	7.5	9.0	0.1	<0.1	<0.1	20.8
79	S2_20	54.9	<0.1	4.3	7.9	9.0	0.1	<0.1	<0.1	20.3
	Average	54.0	<0.1	4.3	8.2	9.2	0.1	<0.1	<0.1	20.2
80	S3_1	50.9	<0.1	4.6	7.9	9.9	0.1	<0.1	<0.1	21.6
81	S3_2	51.4	<0.1	4.5	8.5	10.0	0.1	<0.1	<0.1	20.5
82	S3_3	51.0	<0.1	4.2	7.4	9.7	0.1	<0.1	<0.1	22.6
83	S3_4	52.0	<0.1	4.3	8.1	9.3	0.1	<0.1	<0.1	21.1
84	S3_5	52.1	<0.1	4.4	7.7	9.6	0.1	<0.1	<0.1	21.1
85	S3_6	51.5	<0.1	4.6	8.0	9.9	0.1	<0.1	<0.1	20.8
86	S3_7	52.0	<0.1	4.7	7.8	9.9	0.1	<0.1	<0.1	20.4
87	S3_8	52.1	<0.1	4.6	7.0	9.6	0.1	<0.1	<0.1	21.6
88	S3_9	52.2	<0.1	4.3	8.5	9.5	0.1	<0.1	<0.1	20.4
89	S3_10	52.7	<0.1	4.4	7.1	9.4	0.1	<0.1	<0.1	21.2
90	S3_1	53.8	<0.1	4.5	6.6	9.2	0.1	<0.1	<0.1	22.3
91	S3_2	54.4	<0.1	4.4	7.6	9.4	0.1	<0.1	<0.1	20.7
92	S3_3	53.8	<0.1	4.2	6.9	9.3	0.1	<0.1	<0.1	22.2
93	S3_4	54.8	<0.1	4.1	7.1	8.9	0.1	<0.1	<0.1	21.4
94	S3_5	54.2	<0.1	4.4	7.1	9.4	0.1	<0.1	<0.1	21.4
95	S3_6	54.9	<0.1	4.6	7.1	9.2	0.1	<0.1	<0.1	20.7
96	S3_7	54.9	<0.1	4.6	6.9	9.3	0.1	<0.1	<0.1	20.8
97	S3_8	54.8	<0.1	4.5	6.5	9.0	0.1	<0.1	<0.1	21.5
98	S3_9	54.5	<0.1	4.3	7.2	9.0	0.1	<0.1	<0.1	21.4
99	S3_10	54.6	<0.1	4.4	6.6	9.2	0.1	<0.1	<0.1	21.5
100	S3_11	55.0	<0.1	4.6	7.3	9.2	0.1	<0.1	<0.1	20.4
101	S3_12	54.1	<0.1	4.0	7.4	8.7	0.1	<0.1	<0.1	21.8
102	S3_13	55.1	<0.1	4.6	6.8	9.0	0.1	<0.1	<0.1	20.9
103	S3_14	54.4	<0.1	4.4	7.2	9.1	0.1	<0.1	<0.1	21.3
104	S3_15	54.3	<0.1	4.2	7.7	8.9	0.1	<0.1	<0.1	21.3
105	S3_16	55.2	<0.1	4.7	7.1	9.2	0.1	<0.1	<0.1	20.3
106	S3_17	55.2	<0.1	4.6	7.5	9.2	0.1	<0.1	<0.1	20.0
107	S3_18	55.0	<0.1	4.5	7.3	9.1	0.1	<0.1	<0.1	20.6
108	S3_19	54.7	<0.1	4.6	7.0	9.3	0.1	<0.1	<0.1	20.9
109	S3_20	55.1	<0.1	4.5	6.5	9.1	0.1	<0.1	<0.1	21.2
	Average	53.7	<0.1	4.4	7.6	9.3	0.1	<0.1	<0.1	21.1
110	S4_1	52.1	<0.1	4.3	7.1	9.5	0.1	<0.1	<0.1	21.9
111	S4_2	52.6	<0.1	4.4	7.9	9.5	0.1	<0.1	<0.1	20.5
112	S4_3	52.8	<0.1	4.4	7.4	9.4	0.1	<0.1	<0.1	20.9
113	S4_4	52.8	<0.1	4.6	7.7	9.4	0.1	<0.1	<0.1	20.4
114	S4_5	52.3	<0.1	4.0	7.2	9.3	0.1	<0.1	<0.1	21.9
115	S4_6	52.2	<0.1	4.5	8.1	9.8	0.1	<0.1	<0.1	20.2
116	S4_7	52.7	<0.1	4.5	8.3	9.5	0.1	<0.1	<0.1	19.9
117	S4_8	52.9	<0.1	4.4	8.6	9.3	0.1	<0.1	<0.1	19.6
118	S4_9	53.3	<0.1	4.5	7.8	9.4	0.1	<0.1	<0.1	19.9
119	S4_10	53.2	<0.1	4.4	7.7	9.1	0.1	<0.1	<0.1	20.3
120	S4_1	54.1	<0.1	4.3	6.9	9.2	0.1	<0.1	<0.1	21.8
121	S4_2	54.3	<0.1	4.4	7.8	9.4	0.1	<0.1	<0.1	20.7
122	S4_3	54.5	<0.1	4.4	6.9	9.3	0.2	<0.1	<0.1	21.2

123	S4_4	54.6	<0.1	4.6	7.5	9.4	0.1	<0.1	<0.1	20.6
124	S4_5	53.9	<0.1	4.1	7.4	9.3	0.1	<0.1	<0.1	21.7
125	S4_6	54.5	<0.1	4.4	7.7	9.3	0.1	<0.1	<0.1	20.6
126	S4_7	54.7	<0.1	4.5	8.0	9.3	0.1	<0.1	<0.1	20.0
127	S4_8	54.8	<0.1	4.5	7.8	9.1	0.1	<0.1	<0.1	20.3
128	S4_9	54.4	<0.1	4.4	7.8	9.3	0.1	<0.1	<0.1	20.7
129	S4_10	54.6	<0.1	4.4	7.4	9.1	0.1	<0.1	<0.1	21.0
130	S4_11	54.1	<0.1	4.2	7.4	9.2	0.2	<0.1	<0.1	21.3
131	S4_12	54.8	<0.1	4.4	7.4	9.1	0.1	<0.1	<0.1	20.8
132	S4_13	53.9	<0.1	4.2	7.1	9.1	0.1	<0.1	<0.1	22.1
133	S4_14	54.4	<0.1	4.1	8.6	9.0	0.1	<0.1	<0.1	20.2
134	S4_15	55.2	<0.1	4.6	7.7	9.2	0.1	<0.1	<0.1	19.7
135	S4_16	54.8	<0.1	4.4	7.5	9.3	0.1	<0.1	<0.1	20.5
136	S4_17	54.7	<0.1	4.6	7.1	9.3	0.1	<0.1	<0.1	20.8
137	S4_18	55.0	<0.1	4.5	7.2	9.2	0.1	<0.1	<0.1	20.5
138	S4_19	55.0	<0.1	4.4	7.7	9.4	0.1	<0.1	<0.1	21.0
	Average	53.9	<0.1	4.4	7.6	9.3	0.1	<0.1	<0.1	20.7
139	S5_1	54.5	<0.1	4.7	7.4	9.3	0.1	<0.1	<0.1	20.0
140	S5_2	54.8	<0.1	4.3	7.8	9.2	0.1	<0.1	<0.1	21.9
141	S5_3	53.9	<0.1	4.3	7.5	9.2	0.1	<0.1	<0.1	20.5
142	S5_4	54.5	<0.1	4.3	7.4	9.3	0.1	<0.1	<0.1	21.7
143	S5_5	54.0	<0.1	4.4	7.4	9.1	0.1	<0.1	<0.1	19.7
144	S5_6	55.1	<0.1	4.4	7.4	9.1	0.1	<0.1	<0.1	20.9
145	S5_7	54.9	<0.1	4.6	7.3	9.0	0.1	<0.1	<0.1	20.1
146	S5_8	55.2	<0.1	4.3	7.2	9.3	0.1	<0.1	<0.1	21.3
147	S5_9	54.7	<0.1	4.3	7.9	9.1	0.1	<0.1	<0.1	20.5
148	S5_10	54.6	<0.1	4.5	6.9	8.7	0.1	<0.1	<0.1	19.5
149	S5_1	55.9	<0.1	4.8	7.5	9.2	0.1	<0.1	<0.1	20.2
150	S5_2	55.2	<0.1	4.3	7.9	9.1	0.1	<0.1	<0.1	21.5
151	S5_3	54.3	<0.1	4.3	7.8	9.1	0.1	<0.1	<0.1	20.4
152	S5_4	54.6	<0.1	4.3	7.5	9.2	0.1	<0.1	<0.1	21.3
153	S5_5	54.3	<0.1	4.5	7.4	8.9	0.1	<0.1	<0.1	19.5
154	S5_6	55.3	<0.1	4.3	7.4	9.1	0.1	<0.1	<0.1	20.8
155	S5_7	55.0	<0.1	4.7	7.6	9.2	0.1	<0.1	<0.1	20.0
156	S5_8	55.1	<0.1	4.3	7.4	9.3	0.1	<0.1	<0.1	21.9
157	S5_9	54.2	<0.1	4.3	8.4	9.0	0.1	<0.1	<0.1	19.8
158	S5_10	54.7	<0.1	4.4	7.4	8.7	0.1	<0.1	<0.1	18.6
159	S5_11	52.8	<0.1	4.9	8.1	9.7	0.1	<0.1	<0.1	19.4
160	S5_12	52.3	<0.1	4.3	8.3	9.5	0.1	<0.1	<0.1	20.5
161	S5_13	52.8	<0.1	4.3	8.0	9.4	0.1	<0.1	<0.1	20.3
162	S5_14	52.6	<0.1	4.2	7.4	9.3	0.1	<0.1	<0.1	21.4
163	S5_15	53.6	<0.1	4.6	8.0	9.3	0.1	<0.1	<0.1	19.3
164	S5_16	53.6	<0.1	4.4	8.3	9.0	0.1	<0.1	<0.1	19.6
165	S5_17	53.6	<0.1	4.7	8.1	9.1	0.1	<0.1	<0.1	19.3
166	S5_18	53.2	<0.1	4.3	7.6	9.2	0.1	<0.1	<0.1	20.6
167	S5_19	53.4	<0.1	4.3	8.3	9.1	0.1	<0.1	<0.1	19.8
168	S5_20	54.1	<0.1	4.5	7.1	9.1	0.1	<0.1	<0.1	20.0
	Average	54.2	<0.1	4.4	7.7	9.2	0.1	<0.1	<0.1	20.3

Supplementary Table S3: Comparison of stratigraphic ages, bulk glauconite depositional ages and deconvoluted glauconite depositional ages of samples taken from five glauconite-bearing intervals from the Langenstein profile. The mineralogical composition of the glauconite grains was determined by X-ray diffraction analyses. Rb-Sr data were collected by LA-ICP-MS/MS.

Sample ID	Stratigraphic age (Ma)	Rb-Sr bulk age (Ma)	Rb-Sr bulk age (2σ)	Glt (wt.%)	I-S (wt.%)	Ms (wt.%)	Qz (wt.%)	Decon. Glt age (Ma)
S1	100.0	97.3	1.5	95.0	3	2	0	100.2
S2	98.5	101.3	1.3	87.5	11	1.5	0	97.5
S3	97.5	97.7	1.4	94.0	5	1	0	96.8
S4	97.0	97.7	1.5	92.0	5	1	2	96.8
S5	96.0	97.1	1.7	n.a.	n.a.	n.a.	n.a.	96.1