GSA DATA REPOSITORY 2011038 Supplementary Material

Synchronized Post-Glacial Colonization by Magnetotactic Bacteria

Øyvind Paasche* and Reidar Løvlie

*E-mail: oyvind.paasche@bjerknes.uib.no

This section includes:

FIGURES:

TABLES:

FIGURES

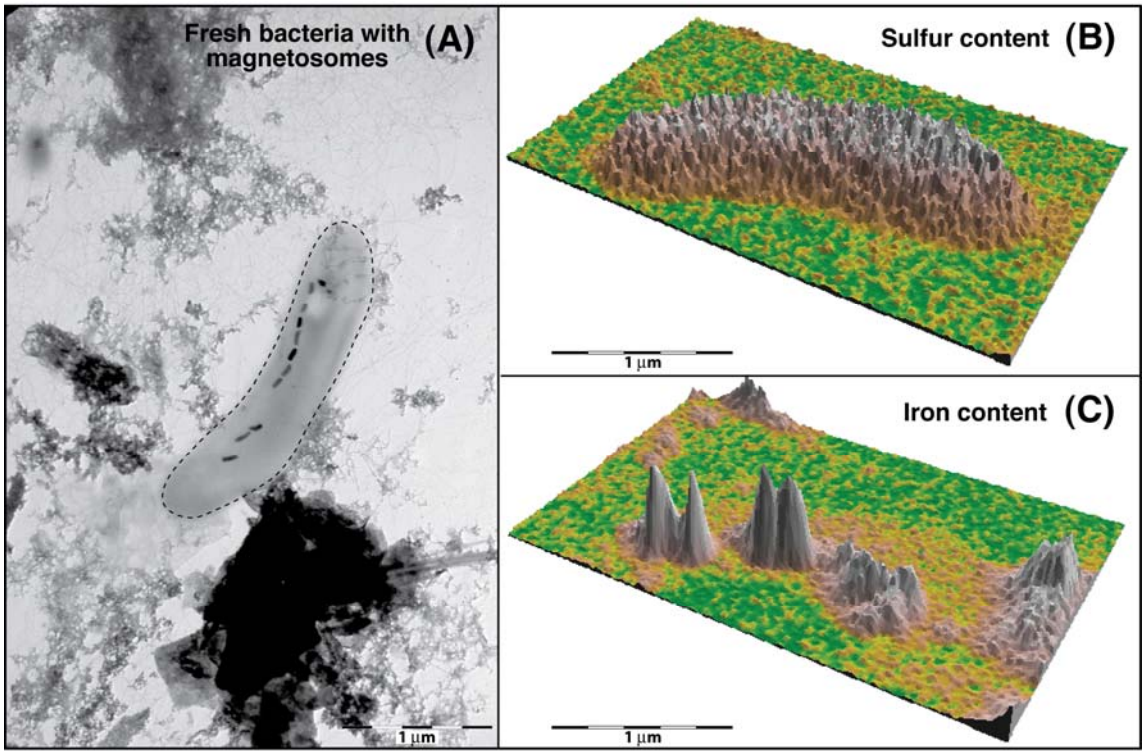

Figure DR1. (A) Bright-field TEM image of unfixed and unstained magnetotactic bacterium. Electron dense particles inside the bacterium are magnetosomes, i.e., Fe_3O_4 particles. (B) The shape of the MTB cell is evident in a map of sulfur content, which is evenly distributed throughout the cell. (C) Elemental mapping of Fe in the same MTB cell as shown in (B). Individual magnetosomes are visible as dark grey peaks. Fresh samples were collected during Autumn 2008.

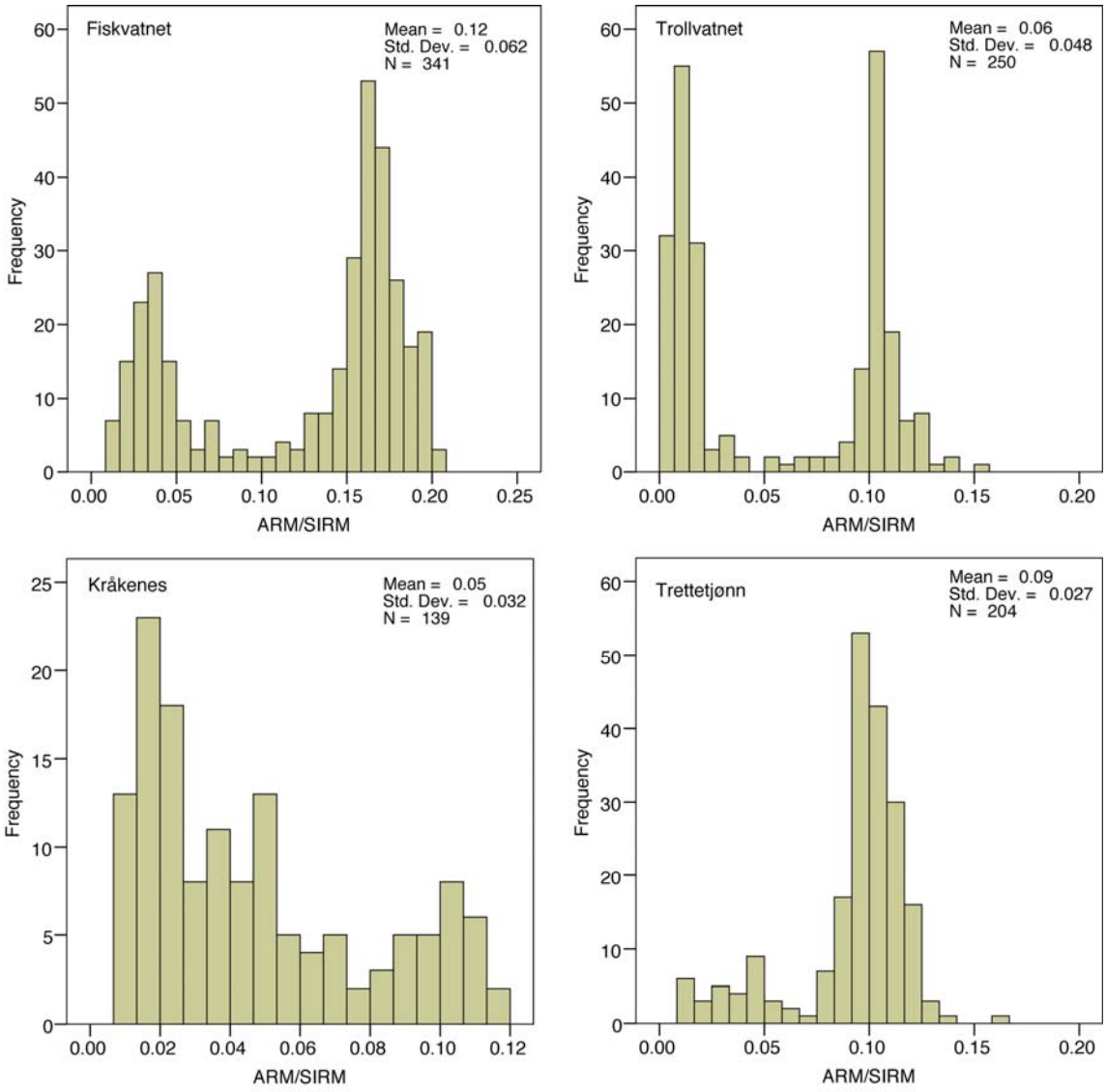

Figure DR2. ARM/SIRM frequency charts for the four investigated lakes. All records show a bimodal distribution, indicating two populations of significantly different magnetic grain size. ARM/SIRM ratios with values higher than 0.1 ± 0.01 are arguably due to the presence of MTB.

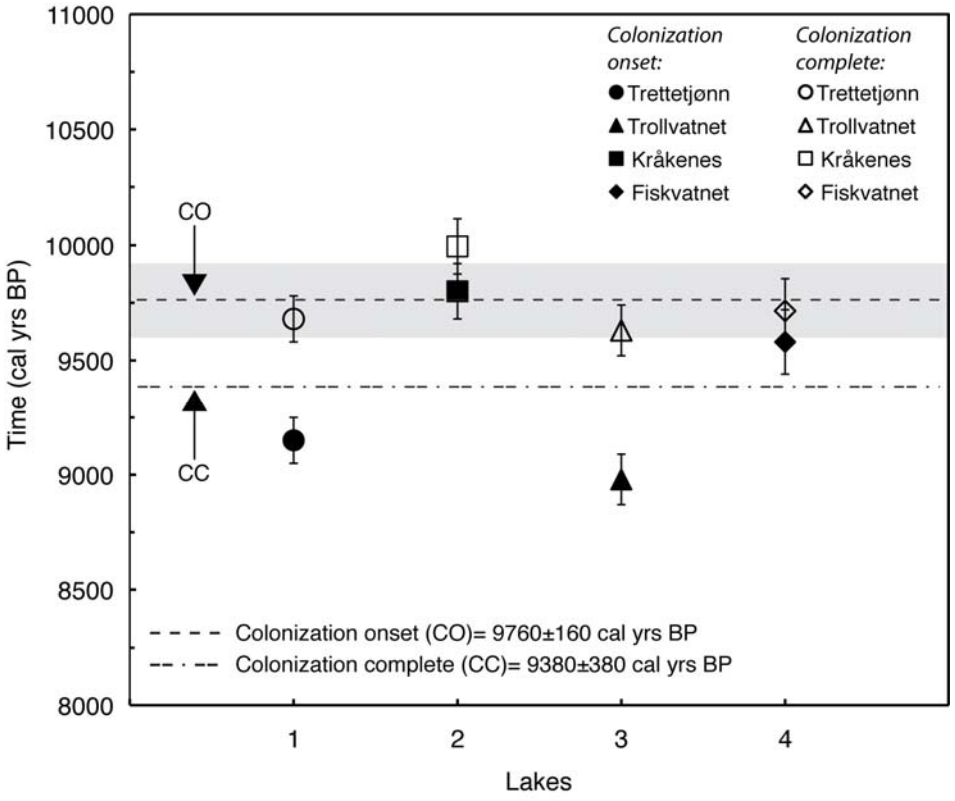

Figure D R3. Timing the MTB colonization with respect to onset (open symbols) and completion (closed symbols) in the four investigated Norwegian lakes with corresponding dating uncertainty (error bars). The colonization onset is defined by an unequivocal rise in ARM/SIRM and the completion of this process is set when values reach 0.1±0.01. An example of how this has been accomplished is shown in Figure DR4. The mean of the four individual ages ±1σ (highlighted by the grey bar in the figure) suggests that the onset of this colonization occurred 9760 ± 160 years ago, which is nearly 2000 years after the last glacial-interglacial transition, and that it was completed 9380 ±3 80 yrs ago. The overall dating uncertainty (1σ) is on the order of ±220 years.

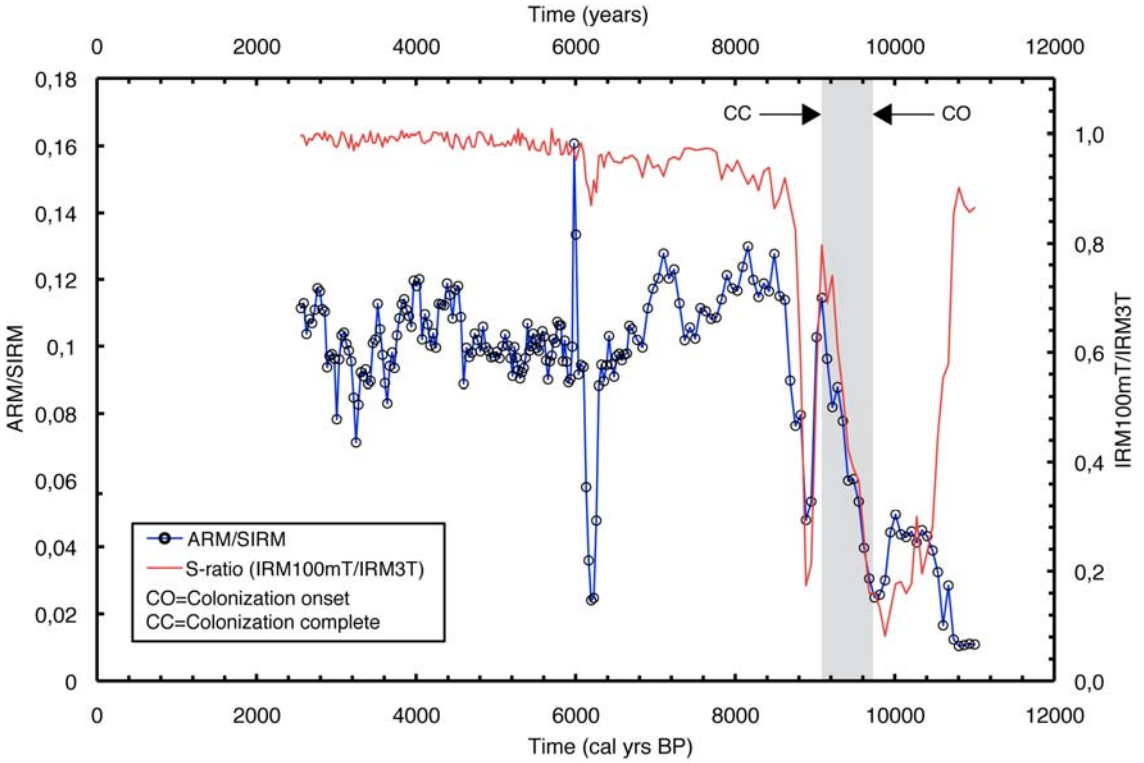

Figure DR4. ARM/SIRM versus IRM_{100mT}/IRM_{3T} (commonly referred to as the S-ratio) for Lake Trettetjønn, where the former ratio reflects changes in magnetic granulometry and the latter changes in magnetic mineralogy. A branch of the local ice sheet retreated up-valley during the earliest part of the Holocene, whereupon it deposited the oldest sediments retrieved from the lake. These sediments have a magnetic signature (high S-ratio, low ARM/SIRM values) that is significantly different from later deposits. Prior to the onset of the MTB colonization, there is a short period with catchment-derived sediments only, yielding very low S-ratio values and also low ARM/SIRM values. The grey bar in the figure highlights the onset and the completion of the MTB-colonization.

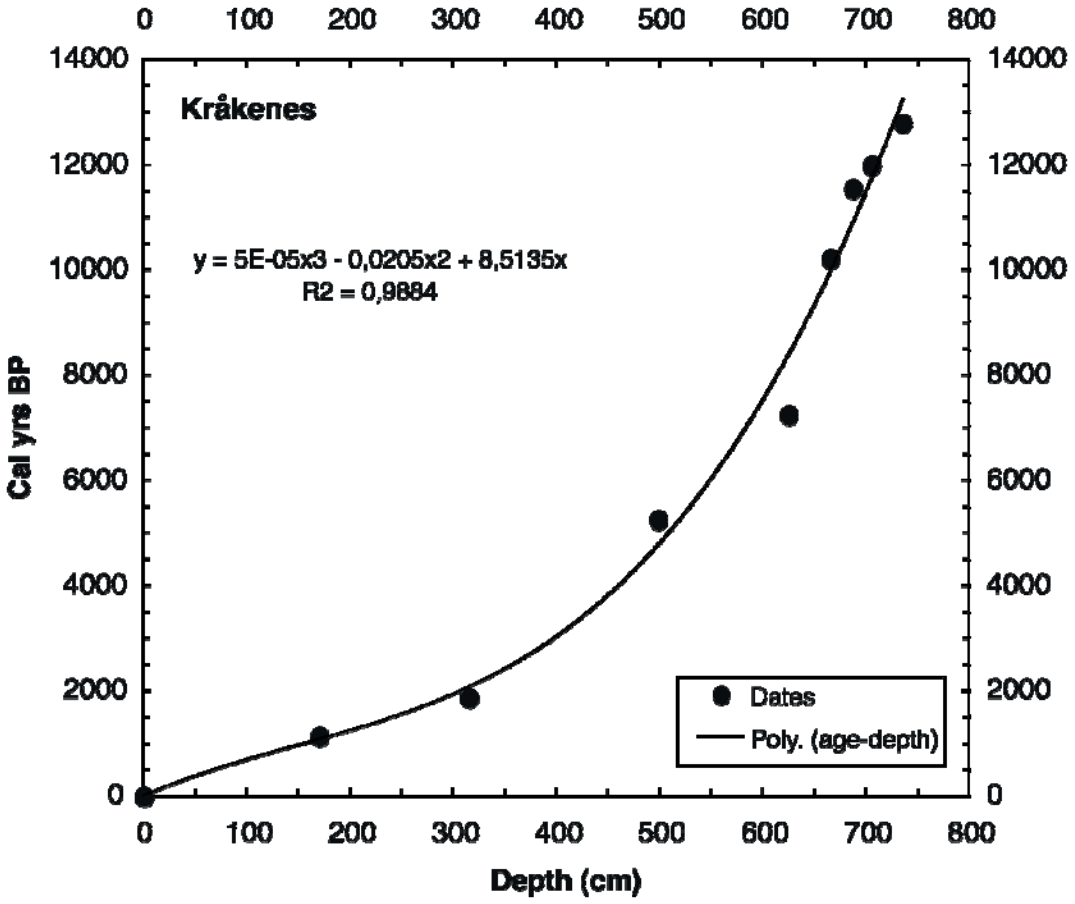

Figure DR 5. Age-depth model for Lake Kråkenes. Dates used to construct the model are presented in Table DR1.

TABLES

Table DR1. Age-depth data from Kråkenes

Depth (cm)	Material	14C-age BP	Age Cal yr BP[4]
0	Present surface[1]	-	0
170 ± 2	Bulk sample[1]	1250±90	1140
315 ± 2.5	Bulk sample[1]	1940±100	1880
498 ± 2	Bulk sample[1]	4600±80	5260
625 ± 5	Bulk sample[1]	6330±90	7250
665	Volcanic ash[2]	-	10220
687	Startigraphic boundary[3]	-	11550
705	Volcanic ash[2]	-	12000
735	Startigraphic boundary[3]	-	12800

[1]Løvlie and Larsen (1981)
[2]Birks et al. (1996)
[3]Gulliksen et al. (1998)
[4]All radiocarbon dates were calibrated with CALIB 4.4.2.

Table DR2. Mineral magnetic data from the four cores

Kråkenes			
Sample	**Depth (cm)**	**R_{af} AR**	**M/SIRM**
3	569	0.458	0.0988
10	580	0.446	0.1098
16	589	0.452	0.1007
17	591	0.458	0.1057
18	592	0.463	0.0637
19	594	0.445	0.1149
21	597	0.443	0.0976
25	603	0.469	0.0759
29	609	0.456	0.0727
38	624	0.443	0.0593
39	625	0.465	0.0379
51	644	0.439	0.0485
65	652	0.480	0.0268
72	666	0.391	0.0835
98	677	0.343	0.0190
102	686	0.272	0.0106
108	692	0.261	0.0101
113	697	0.276	0.0103
123	706	0.313	0.0152
129	721	0.378	0.0235
132	728	0.293	0.0165
136	737	0.411	0.0208

Trettetjønn			
Sample	**Depth**	**ARM/SIRM**	**R**
81	81	0.111	0.403
128	128	0.118	0.403
166	166	0.093	0.387
191	191	0.102	0.415
210	210	0.103	0.409
230	230	0.106	0.412
248	248	0.114	0.411
258	258	0.088	0.480
271	271	0.043	0.467
300	300	0.011	0.291

Fiskvatnet			
Sample	**Depth**	**ARM/SIRM**	**R**
2	2	0.154	0.447
13	13	0.149	0.447
14	14	0.154	0.443
32	32	0.175	0.457
33	33	0.165	0.470
38	38	0.156	0.467
39	39	0.159	0.463
59	59	0.106	0.543
60	60	0.133	0.441
78	78	0.169	0.458
79	79	0.155	0.454
90	90	0.149	0.443
92	92	0.154	0.442
99	99	0.144	0.458
100	100	0.145	0.453
160	160	0.129	0.434
313	313	0.108	0.406
318	318	0.030	0.261
Trollvatnet			
Sample Depth		**ARM/SIRM**	**R**
21	21	0.0130	0.411
37	37	0.1320	0.414
101	101	0.0518	0.405
102	102	0.0733	0.417
109	109	0.1446	0.413
110	110	0.1423	0.409
115	115	0.1134	0.388
117	117	0.1084	0.392
118	118	0.1048	0.392
120	120	0.0792	0.367
121	121	0.0567	0.350
122	122	0.0499	0.334
126	126	0.0288	0.397
129	129	0.0086	0.335
156	156	0.0057	0.311