Antarctic microbial mats: A modern analogue for Archean lacustrine oxygen oases Data Repository

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Table DR1. Microscopic characterization of cyanobacteria morphotypes on genus level in mats at 9.0 m and 9.8 m in Lake Fryxell, Antarctica, obtained directly after sample collection in the field. Several samples were examined from each mat, and morphotypes were scored for abundance on a scale of rare (+, present in some fields of view), frequent (++, present in all fields of view) and common (+++, many trichomes in all fields of view).

Cyanobacteria morphotypes	Description	Mat at 9.0 m	Mat at 9.8 m
Leptolynbya sp. 1	Cells width 0.5-1 μm width, pointy end cell, longer than wide, purple colouration	+++	+
Leptolynbya sp. 2	Cells width 1-2 μm width, rounded end cell, longer than wide, constriction at cross-wall, purple colouration	++	+
Pseudanabaena sp.	Cell width ~ 2 μm, no sheath, cells constricted at cross-wall	+	+
Phormidium sp. 1	Cell width 6-7 μm, bright green colouration, cells as wide as long, cell not constricted at cross-wall, very motile	+	+++
Phormidium sp. 2	Cell width 6-7 μm, purple colouration, cells as wide as long, cell not constricted at cross-wall, some motility	+	+
Oscillatoria sp.	Cell width ~ 8 μm, olive-green colouration, cells shorter than wide, constricted at cross-wall, motile	+	+

Figure DR1. Motile, green *Phormidium* that dominates the mat at 9.8 m. Phase contrast image at x400 magnification. The scale bar is 10 µm.

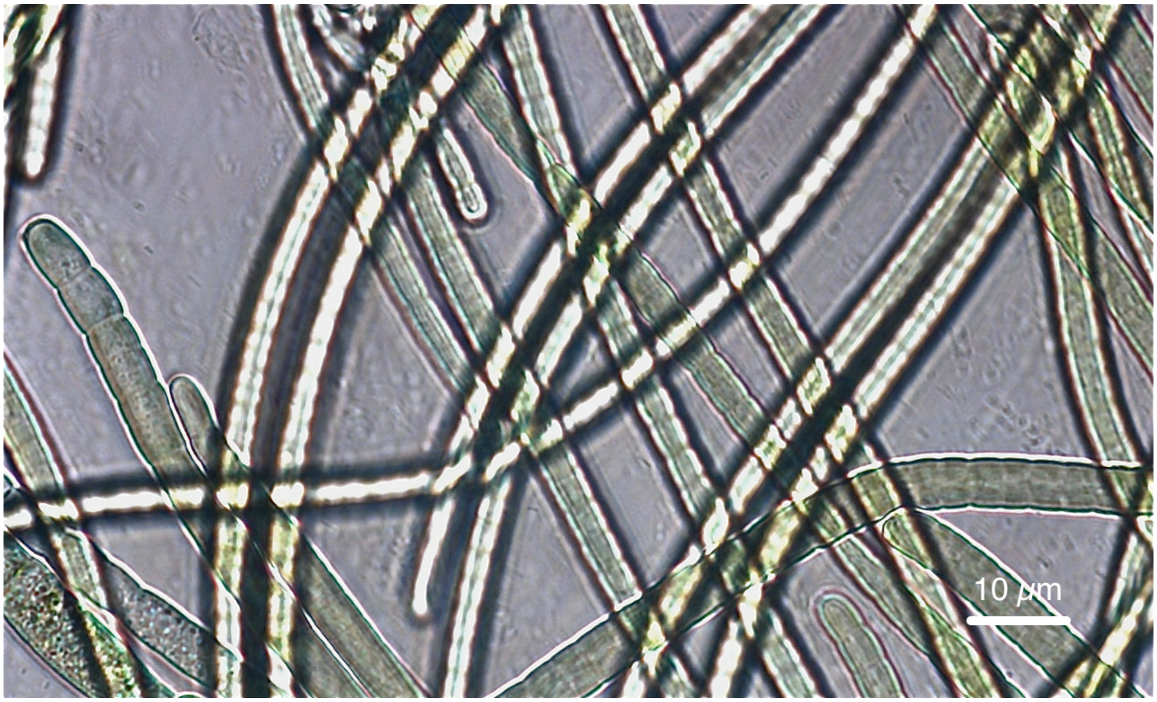

Table DR2. Microelectrode profiles of dissolved oxygen concentration in microbial mats at 9.0 m depth in Lake Fryxell. Zero depth indicates the mat-water interface, negative numbers are above the interface in the water column and positive numbers below in the mat.

Depth into mat (mm)	Profile 1 μmol O_2 L^{-1}	Profile 2 μmol O_2 L^{-1}
-5	646.5712	623.4847
-4	642.6301	624.1609
-3	651.8647	614.9263
-2	653.7773	626.0735
-1	664.2482	631.9271
0	748.6921	674.8153
1	838.6417	797.0859
2	837.1733	827.9387
3	838.6417	797.0859
4	830.8755	775.4678
5	818.4919	758.4670
6	798.2262	742.8186
7	784.4903	733.7000
8	755.6662	723.3450
9	736.0766	703.7555
10	719.7520	687.4309
11	694.8689	676.3997
12	673.9270	664.6924
13	668.7495	650.2803
14	649.7201	649.7201
15	648.4838	634.6319
16	647.2474	619.5436
17	641.3938	609.0727

Table DR3. Microelectrode profiles of dissolved oxygen concentration in microbial mats at 9.8 m depth in Lake Fryxell. Zero depth indicates the mat-water interface, negative numbers are above the interface in the water column and positive numbers below in the mat.

Depth into mat (mm)	Profile 1 μmol O_2 L^{-1}	Profile 2 μmol O_2 L^{-1}	Profile 3 μmol O_2 L^{-1}	Profile 4 μmol O_2 L^{-1}	Profile 5 μmol O_2 L^{-1}
-7	3.3	0.0	0.0	0.0	0.0
-6	4.6	0.0	0.0	0.0	0.0
-5	4.6	0.0	0.0	0.0	0.0
-4	7.5	0.0	0.0	8.8	2.9
-3	4.9	1.6	0.0	16.7	6.1
-2	8.8	3.3	7.5	15.7	8.8
-1	13.7	6.5	36.2	20.6	21.1
0	56.2	54.9	46.7	49.0	50.2
1	55.8	55.8	52.2	48.3	52.1
2	39.5	47.0	35.9	34.0	40.8
3	15.7	29.1	20.6	15.7	21.8
4	0.3	4.6	4.9	2.9	3.3
5	0.3	0.0	0.0	0.0	0.1
6	0.0	0.0	0.0	0.0	0.0
7	3.3	0.0	0.0	0.0	0.0

Note: At 9.8 m depth, the chemical boundary layer between the anoxic water column and the oxic mat varied in thickness from 1 to 5 mm in the five profiles measured. Because the water column was density stratified and lacked mixing under normal circumstances, such variability in the thickness of a boundary layer was not expected. This variation may reflect mixing due to turbulence from the diver who was measuring the profile using a manual micromanipulator. Any mixing due to turbulence would have reduced the total O_2 above the mat because the water column was anoxic. Thus, the substantial O_2 peak within the mat reliably demonstrates that the mat was a net source of O_2 to the environment.