Tyler J. Mackey
Curriculum Vitae
06/2017

Massachusetts Institute of Technology
Department of Earth, Atmospheric and Planetary Sciences
77 Massachusetts Avenue, 54-1025
Cambridge, MA 02139

Email: tjmackey@mit.edu
Phone: 608 469 7590
Website: www.tylermackey.com

EDUCATION

Ph.D., University of California, Davis, 2016 — 2012–2016
Earth and Planetary Sciences Department
Advisor: Dr. Dawn Sumner

M.S., University of California-Davis, — 2009–2012
Geology Department

B.A., Carleton College *summa cum laude* — 2004–2008
Major: Geology (honors)

PROFESSIONAL APPOINTMENTS

Agouron Geobiology Postdoctoral Fellow, Massachusetts Institute of Technology Department of Earth, Atmospheric, and Planetary Sciences — 2017–2019

Postdoctoral Associate, Massachusetts Institute of Technology Department of Earth, Atmospheric, and Planetary Sciences — 2016–2017

PUBLICATIONS

Refereed Journal Articles

Rankin, AH, Pressel, S, Duckett, J, Remington, W, Hawes, I, Sumner, DY, **Mackey, TJ**, Castendyk, D, Schneider, H, Jungblut, AD (accepted) Characterisation of a deep-water moss from the perennially ice-covered Lake Vanda, Antarctica. *Polar Biology.*

Mackey, TJ, Sumner, DY, Hawes, I, Jungblut, AD, Lawrence, J, Leidman, S, Allen, B (in press) Increased mud deposition reduces stromatolite complexity. Geology, DOI:10.1130/G38890.1

Sumner, DY, Jungblut, AD, Hawes, I, Andersen, DT, **Mackey, TJ,** Wall, K (2016) Growth of elaborate microbial pinnacles in Lake Vanda, Antarctica. *Geobiology,* 14(6): 556-574. DOI:10.1111/gbi.12188

Jungblut, AD, Hawes, I, **Mackey, TJ**, Krusor, M, Doran, P, Sumner, DY, Eisen, J, Hillman, C, Goroncy, A (2016) Microbial mat communities along an oxygen gradient in a perennially ice-covered Antarctic lake. *Applied and Environmental Microbiology,* 82(2): 620-630. DOI:10.1128/AEM.02699-15

Sumner, DY, Hawes, I, **Mackey, TJ**, Jungblut, AD, Doran, P (2015) Antarctic microbial mats: A

modern analog for Archean lacustrine oxygen oases. *Geology*, 43: 887-890. DOI:10.1130/G36966.1

Zhang, L, Jungblut, AD, Hawes, I, Andersen, DT, Sumner, DY, **Mackey, TJ** (2015) Cyanobacterial diversity in benthic mats of the McMurdo Dry Valley lakes, Antarctica. *Polar Biology*, 38: 1097-1110. DOI:10.1007/s00300-015-1669-0

Mackey, TJ, Sumner DY, Hawes I, Jungblut AD, Andersen DT, (2015) Growth of modern branched columnar stromatolites in Lake Joyce, Antarctica. *Geobiology,* 13: 373-390. DOI:10.1111/gbi.12138

Harwood Theisen, C, Sumner, DY, **Mackey, TJ**, Lim, DS, Brady, AL, Slater, GF (2015) Carbonate fabrics in the modern microbialites of Pavilion Lake: two suites of microfabrics that reflect variation in microbial community morphology, growth habit, and lithification. *Geobiology* 13:357-372. DOI:10.1111/gbi.12134

Hawes, I, Sumner, DY, Andersen, DT, Jungblut, AD, **Mackey, TJ** (2013) Timescales of growth response of microbial mats to environmental change in an ice-covered Antarctic lake. *Biology,* 2: 151-176. DOI:10.3390/biology2010151

Hawes, I, Sumner, DY, Andersen, DT, and **Mackey, TJ** (2011) Legacies of recent environmental change in the benthic communities of Lake Joyce, a perennially ice-covered Antarctic lake. *Geobiology* **9**, 394-410. DOI: 10.1111/j.1472-4669.2011.00289.x

Runkel, A, **Mackey, TJ**, Cowan, C, and Fox, D (2010) Tropical Shoreline Ice in the Late Cambrian: Implications for Earth's climate between the Cambrian Explosion and the Great Ordovician Biodiversification Event. *GSA Today* **20**(11), 4-10. DOI: 10.1130/GSATG84A.1

Manuscripts in Review

Mackey, TJ, Sumner, DY, Hawes, I, Leidman, S, Andersen, DT, Jungblut, AD (in review) Stromatolite records of changing primary productivity in perennially ice-covered Lake Joyce, McMurdo Dry Valleys, Antarctica. *Biogeochemistry*.

Mackey, TJ, Sumner, DY, Hawes, I, Jungblut, AD (in review) Morphological signatures of microbial activity across depositional microenvironments of Lake Vanda, Antarctica. *Sedimentary Geology*.

GRANTS, FELLOWSHIPS AND AWARDS

Grants

Wrote rapid access proposal for beam time on the Stanford Synchrotron Radiation Lightsource in collaboration with Kristin Bergmann: "Oxygenation of Neoproterozoic Snowball Earth Habitats for Early Animal Evolution" 2017

Co-authored NASA Astrobiology: Exobiology and Evolutionary Biology proposal with Dawn Sumner: "Microbialite Morphology in Lake Joyce, Antarctica" ($495,739.00) 2013–2016

Fellowships and Awards

Agouron Institute Postdoctoral Fellowship in Geobiology 2017–2019

University of California-Davis Durrell Funds for dissertation/thesis research

support: 2010–2011 ($800), 2012–2013 ($1,200), 2013–2014 ($2,500), 2014–2015 ($1,800), 2015–2016 ($1,000)

NASA Ames Honor Award to PLRP for excellence in Group/Team 2014
NSF GRFP Honorable Mention 2010, 2011
Carleton College Geology Department Duncan Stewart Fellow 2007–2008

SELECTED PRESENTATIONS (asterisk denotes undergraduate mentee)

Mackey, TJ, Bergmann, KD, Fairchild, I (2017) Carbonate clumped isotope temperatures from the onset of the Cryogenian. Goldschmidt.

Jost, AB, **Mackey, TJ**, Bergmann, KD (2017) Preliminary temperature records from Marinoan-age low latitude carbonates. Goldschmidt.

Matys, ED, **Mackey, TJ,** Sumner, DY, Krusor, M, Wall, K, Jungblut, A, Hawes, I, Mueller, E, Summons, RE (2017) Bacteriohopanepolyols across environmental gradients in ice-covered lakes of the McMurdo Dry Valleys, Antarctica. Astrobiology Science Conference

Mackey, TJ, Sumner, DY, Hawes, I, Jungblut, AD, *Leidman, SZ, Andersen, DT (2016) Stromatolites record changing primary productivity in perennially ice-covered Lake Joyce, McMurdo Dry Valleys, Antarctica. American Geophysical Union, Fall Meeting, abstract B43D-06.

Mackey, TJ, *Leidman, S, *Allen, B, Hawes, I, Lawrence, J, Jungblut, AD, Krusor, M, Coleman, L, Sumner, DY (2015) Characterizing microbial mat morphology with Structure from Motion techniques in ice-covered Lake Joyce, McMurdo Dry Valleys, Antarctica. American Geophysical Union, Fall Meeting, abstract C41D-0726.

Mackey, TJ, Sumner, DY, Hawes, I, Jungblut, AD, Andersen, DT (2015) Calcification of Modern Stromatolites from Lake Joyce, McMurdo Dry Valleys, Antarctica: Preserved Carbon Pool Modification in a Changing Microbial Ecosystem. Astrobiology Science Conference.

*Leidman, SZ, **Mackey, TJ**, Sumner, DY (2015) Quantitative Analysis of Microbial Mat Morphologies via Structure from Motion Reconstructions. Astrobiology Science Conference.

*Allen, B, **Mackey, TJ**, Lawrence, J, *Leidman, S, Hawes, I, Krusor, M, Mowchan, L, Jungblut, AD, Sumner DY (2015) Analysis of Webbed Pinnacle Microbial Mat Variation Along a Decreasing Sediment Gradient in Lake Joyce, Antarctica. Astrobiology Science Conference.

Mowchan, LE, **Mackey, TJ**, Sumner, DY, Krusor, M (2015) Astrobiology Lessons Comparing Lake Joyce, Antarctica and Mars. Astrobiology Science Conference.

Mackey, TJ, *Leidman, S, Sumner, DY, Hawes, I, Jungblut, AD, Castendyk, D (2014) Benthic microbial mat expansion and nutrient uptake during lake level rise in ice-covered Lake Vanda, McMurdo Dry Valleys, Antarctica. Ecological Society of America Annual Meeting.

Lim, DSS, Hawes, I, **Mackey, TJ**, Brady, AL, Biddle, J, Andersen, DT, Belan, M, Slater, G, Abercromby, A, Squyres, SW, Delaney, M, Haberle, CW, Cardman, Z (2014) The microbial mats of Pavilion Lake microbialites: examining the relationship between photosynthesis and carbonate precipitation. American Geophysical Union, Fall Meeting, abstract #B23A-0183.

Mackey, TJ, Sumner, DY, Krusor, M, Wall, K, Hawes, I, Jungblut, AD, Andersen, DT (2013) Microbial mat morphology as a record of environmental change in perennially ice-covered Lake Joyce, Antarctica. Polar and Alpine Microbiology conference.

Mackey, TJ, Hawes, I, Forrest, A, Sumner, DY, Jungblut, AD, Doran, P (2013) Environmental influences on microbial mat biogeography in perennially ice-covered Lake Fryxell, Antarctica. Strategic Science in Antarctica Conference.

INVITED AND DEPARTMENTAL PRESENTATIONS

University of Birmingham, United Kingdom, School of Geography, Earth and Environmental Sciences 2017

Massachusetts Institute of Technology, Department of Earth, Atmospheric and Planetary Sciences, COG3 Departmental Seminar 2017

University of Canterbury, New Zealand, Gateway Antarctica 2014

US Antarctic Program, McMurdo Station Galley Talk 2014

Caltech, Division of Geological and Planetary Sciences, Geology Club Seminar 2014

Antarctica New Zealand, Scott Base Science Talk 2013

Antarctica New Zealand, Scott Base Science Talk 2012

TEACHING AND MENTORING EXPERIENCE

Teaching

Teaching assistant for sedimentology field course to Death Valley region, Department of Earth, Atmospheric, and Planetary Sciences, MIT 2017

Guest lecturer for Introduction to Geobiology, Department of Earth, Atmospheric and Planetary Sciences, MIT 2017

Teaching Assistant for Sedimentology and Stratigraphy, Department of Earth and Planetary Sciences, UC Davis 2011, 2013–2015

Guest lecturer for Sedimentology and Stratigraphy of Glacial and Periglacial Processes, Department of Earth and Planetary Sciences, UC Davis 2013–2015

Teaching Assistant for Solar System discussion group, Department of Earth and Planetary Sciences, UC Davis 2012

Teaching Assistant for geology term-abroad field course in New Zealand, Carleton College Geology Department 2012

Educational Associate post-baccalaureate intern and teaching assistant for Sedimentology and Stratigraphy, Carleton College Geology Department 2008–2009

Teaching Assistant for Sedimentology and Stratigraphy 2007–2008

Teaching Assistant for Introductory Geology 2007

Mentoring

Advisor to undergraduate student for independent research through the Earth, Atmospheric, and Planetary Sciences Department, MIT 2017

Advised 4 undergraduate research students for independent research through the Department of Earth and Planetary Sciences, UC Davis 2011, 2013–2015

RESEARCH EXPERIENCE

Field work

Neoproterozoic sedimentology in Svalbard investigating habitats for early animal evolution, upcoming field season planned for 08/2017 — 2016, 2017

Sedimentary geomicrobiology of lacustrine microbial mats and scientific diving in ice-covered lakes of the McMurdo Dry Valleys, Antarctica (co-investigator and field team lead 2014, 2015) — 2010–2015

Calcifying microbial communities and scientific diving in temperate lakes, Pavilion Lake Research Project, Pavilion and Kelly Lake, British Columbia, Canada, summer 2010, 2011, 2014, 2015. — 2010–2015

Agouron Field Course, stratigraphy and sedimentology of the Belt Supergroup, Montana and Idaho. — 2013

USC-Caltech International Geobiology course, interdisciplinary investigation of modern and ancient geomicrobiological systems. — 2012

Field assistant for Cambrian carbonate stratigraphy and sedimentology in NV for PhD research of Cara Harwood. — 2012

Sedimentology and stratigraphy of Cambrian siliciclastics of southeastern MN and modern winter beach processes — 2007–2009

Lab experience

Synchrotron-based X-ray absorption at near edge structure spectra, Stanford Synchrotron Radiation Lightsource — 2017

Biomarker extraction and characterization, Department of Earth, Atmospheric, and Planetary Sciences, MIT — 2017

Thin section preparation for carbonate petrography and microprobe analysis, Department of Earth, Atmospheric, and Planetary Sciences, MIT — 2017

Clumped isotope analysis using Nu Perspectives Isotope Ratio Mass Spectrometry, Department of Earth, Atmospheric, and Planetary Sciences, MIT — 2016–2017

Vacuum line water CO_2 extraction and cryogenic purification, Department of Earth and Planetary Sciences, UC Davis — 2012, 2015

Carbonate petrography and microdrilling for stable isotope geochemistry, Department of Earth and Planetary Sciences, UC Davis — 2011, 2013–2015

Scanning Electron Microscopy for microfossil analysis, Department of Earth and Planetary Sciences, UC Davis — 2010–2011

3D Visualization

Developing 3D reconstruction workflow for underwater imagery using Structure from Motion software, Department of Earth and Planetary Sciences, UC Davis — 2014–2016

3D visualization and documentation of x-ray CT scanned microbial mats and Antarctic stromatolites in UC Davis KeckCAVES, Department of Earth and Planetary Sciences, UC Davis — 2010–2012

PROFESSIONAL SERVICE AND PUBLIC OUTREACH

Professional Service

External reviewer for French National Research Agency	2017
Served on NASA Earth and Space Science Fellowship review panel	2017
Served on NASA proposal review panel	2017
UC Davis Diving Control Board Member involved in overseeing projects in the university scientific diving program	2011–2016
Lead for US Antarctic Program event G-063, with duties including coordination of scientific program, logistics, and field operations	2014, 2015
Served on review committee for PolarTREC applicants for teacher-researcher collaboration in polar science	2015

Public outreach

Developed activities for local middle school students through MIT Earth, Atmospheric and Planetary Sciences Opportunity Day	2017
Introduced principles of chromatography to pre-K children through hands-on activities as part of the Cambridge Science Festival.	2017
Developed and presented public outreach module to demonstrate natural selection for the UC Davis Picnic Day campus open house	2016
Research panelist for PolarTREC at Teacher Research Collaboration Conference	2015
Incorporated PolarTREC teacher Lucy Coleman in 2014 Antarctic field season	2014
Presented at Bodega Marine Lab community outreach “Science Uncorked” series	2014
Maintained blog on Antarctic field work: cyanobacterialadventures.blogspot.com	2010–2014
Interviews on Capital Public Radio program *Insight* related to research in ice-covered Antarctic lakes	2013, 2014
Interviewed and provided media for Antarctica NZ Stuff.co.nz documentary of Antarctic field research	2013
Demonstration and outreach at Angels for Hearts benefit for Sacramento region childhood heart patients	2013
Contributed field media for Natural History Museum of London Scott Exhibition highlight on modern Antarctic science	2012
Designed hands-on geology and ecology content and presented for elementary school KiDS field adventure day	2011