

Letter to prospective graduate students (2019-2020):

Thank you for your interest in the Mackey micro-sedimentology lab at the University of New Mexico. I will be starting my lab fall term 2020 and look forward to developing a collaborative research group to explore the microbial record of life on Earth, past and present. The majority of Earth history is microbial, so microbial sedimentary deposits serve as a window to key evolutionary transitions and changes in habitats through time.

My research uses the tools of sedimentology to understand what evidence of microbial communities can enter the rock record, how we recognize these deposits, and what sorts of observations in modern microbial ecosystems can give us useful search patterns to bring back to the rock record. This work is necessarily interdisciplinary, and I approach geobiological systems by integrating field-based sedimentology with microbial ecology, carbonate geochemistry and diagenetic studies. As a result of this interdisciplinary focus, my students will have opportunities to build skill sets in the field, my lab, and in collaboration with the other exceptional facilities available throughout the UNM Department of Earth and Planetary Sciences.

Active areas of work in my lab currently include microbial mats and habitats of modern ice-covered Antarctic lakes as well as Neoproterozoic (1000–541 Ma) environments surrounding the expansion of complex life. In both cases, microbial mats contain microenvironments that structure the local ecosystem and leave behind signatures in associated authigenic minerals like carbonates. As a starting point for further investigation, incoming students interested in modern sedimentary environments will be able to work with samples I have previously collected from Antarctic ice-covered lakes. Possible areas of investigation include – but are certainly not limited to – exploring how local microbial activity within mats modulate sediment geochemistry (carbonate stable isotopes, redox-sensitive elements, etc.) and lead to the growth of macroscopic structures like stromatolites. My students will also help shape the lab's continuing field program in our pending and future proposals. Students with an interest in the ancient sedimentary record will be able to take advantage of regional Neoproterozoic sections of the Grand Canyon Supergroup to explore deposits from microbially-dominated ecosystems. Detailed investigations of these strata are necessary to disentangle local effects of microbial activity from broader paleoenvironmental conditions and diagenetic processes. In addition to the areas of work listed above, I am always excited to discuss other possible project ideas with prospective students.

If you would like more information, please email me at tjmackey@unm.edu. I also plan to present at the AGU Fall Meeting this December and would be happy to meet and discuss graduate projects ahead of the UNM application deadline January 15.

All the best in this application season!

Tyler Mackey