

LIFE BETWEEN A ROCK AND A HARD PLACE: MICROBE-MINERAL INTERACTIONS WITHIN OCEANIC CRUST. Beth N. Orcutt¹, Julie A. Huber², and Jason B. Sylvan³, ¹Bigelow Laboratory for Ocean Sciences, 60 Bigelow Drive, East Boothbay, ME, 04544, USA, borcutt@bigelow.org, ²Woods Hole Oceanographic Institution, ³Texas A&M University.

To constrain the possibilities for where life might exist within icy ocean worlds with rocky inner cores, analog environments within Earth's oceanic crust provide a rich training ground for understanding the spectrum of fluid-rock-microbe interactions, energy sources for chemosynthesis, and potential biosignatures of life. The past decade has witnessed a remarkable renaissance of documenting life in the crustal subseafloor, with several dedicated scientific ocean drilling expeditions, *in situ* observatory installations, exploration missions, and sampling of the effluent of hydrothermal circulation. New habitat types have been documented, including hydrogen-rich mafic environments and areas with cool but rapid hydrothermal circulation, which are expanding our concepts of the range of environments to consider on other planets. Coupled with state-of-the-art advances in analytical capabilities, this new body of work is changing the landscape of thinking about the energetic requirements of life and how to interpret chemical disequilibria, the abundance of life in oceanic crust, the mechanisms that microbial life uses to harness energy and carbon in these systems, and the diversity of life that thrives or survives in the rocky subsurface. This keynote will summarize the latest discoveries about life in Earth's oceanic crust, highlight new questions spurred by recent research, and speculate on signatures to look for on icy ocean worlds.