

## **Microbial Diversity and Metabolic Activity in the Lower Ocean Crust as an Analog for Serpentinizing Extraterrestrial Habitats**

SHU YING WEE<sup>1</sup>, VIRGINIA EDGCOMB<sup>2</sup>, DAVID BEAUDOIN<sup>2</sup>, SHARI YVON-LEWIS<sup>1</sup>, JASON SYLVAN<sup>1</sup>

<sup>1</sup>Department of Oceanography, Texas A&M University, College Station, TX, United States

<sup>2</sup>Geology and Geophysics Departments, Woods Hole, MA, United States

International Ocean Discovery Program Expedition 360 was a drilling expedition that drilled and cored Hole U1473A to 790 meters below seafloor on Atlantis Bank, an oceanic core complex on the Southwest Indian Ridge. Samples for detection of microbial communities and biosignatures were collected throughout the cores, and recovered cores were composed primarily of olivine gabbros and oxide-rich gabbros. This composition provides the necessary elements for serpentinization: the aqueous alteration of ultramafic rocks such as olivine in the presence of water that results in the precipitation of serpentine and abiotic production of short hydrocarbons, methane, and hydrogen. The released electron donors ( $H_2$  and  $CH_4$ ) can be harvested by microorganisms for metabolic energy. Due to the presence of abiotic electron donors and the high iron and sulfur content found in igneous rocks, environments like Atlantis Bank are candidates for analogs to life on early earth as well as on extraterrestrial bodies such as Mars, Europa, and Enceladus where water-rock reactions have occurred in the past and/or are ongoing. This project's goal was to a) quantify the biomass in over 60 rock samples spanning the depth of the core, b) determine if nutrient supply controls biomass using bioassays where 12 selected rock samples from the core were added to artificial seawater with no additions,  $NH_4^+$ ,  $NH_4^+$  plus  $PO_4^{3-}$ , and organic acids, and c) assess the nutrient supply controls on the microbial diversity of the selected samples using 16S rRNA sequencing analysis. Data generated can indicate the nutrients that are more important for supporting biomass and diversity in subseafloor oceanic basement, which can provide insight on extraterrestrial life in similar habitats.