

IODP Expedition 357: Atlantis Massif Serpentinization and Life

Gretchen Früh-Green¹, Beth Orcutt², *Yuki Morono^{3,4}, IODP Exp. 357 Scientists

1.ETH Zurich, 2.Bigelow Laboratory for Ocean Sciences, 3.Kochi Institute for Core Sample Research, JAMSTEC, 4.R&D Center for Submarine Resources, JAMSTEC

Serpentinization is a fundamental process that controls rheology and geophysical properties of the oceanic lithosphere and has major consequences for heat flux, geochemical cycles and microbial activity in a wide variety of oceanic and terrestrial environments. International Ocean Discovery Program (IODP) Expedition 357: Atlantis Massif Serpentinization and Life was conducted by the *James Cook* (Natural Environment Research Council, UK) at the Atlantis Massif on the slow-spreading Mid-Atlantic Ridge, where the Lost City vent field stands near the summit of the ridge, to better understand the role of serpentinization in driving hydrothermal systems, in sustaining microbiological communities, and in the sequestration of carbon in ultramafic rock. Expedition 357 was the first IODP Expedition to utilize seabed rock drills as a method for acquiring sub-surface core material. During Expedition 357, two seabed rock drills were deployed: the MeBo 70 rock drill from MARUM (Bremen, Germany) and the RD2 rock drill from the British Geological Survey. Although drilling conditions proved challenging, the drills recovered a wide range of lower crustal and upper mantle lithologies with varying degrees of alteration and deformation in the Atlantis Massif. The total length of cores recovered by two seabed drills during Expedition 357 was 57 m after 109 m of total penetration, and with an average core recovery of 53% at nine different sites. We present an overview of the scientific objective, operational performance, and some preliminary information from onboard activities of Expedition 357 including microbiological studies to study the links between serpentinization processes and life that can be supported in low temperature ultramafic hydrothermal systems.