

Hybrid ROV Surveys Reveal Hadal Megafaunal Community Structure Varies with Depth in the Kermadec Trench

T.M. Shank¹, J. Drazen², P. Yancey³, A. Jamieson⁴, A. Rowden⁵, M. Clark⁵, D. Mayor⁶, J. Bourque⁸, A. Demopoulos⁸, D. Bartlett⁹, S. Piertney⁶, & H. Ruhl⁷

¹WHOI, Woods Hole, MA 02543; ²Univ of Hawaii, Honolulu, HI 96822; ³Whitman College, Walla Walla, WA 99362; ⁴New Castle University, UK; ⁵NIWA, Wellington, NZ; ⁶Univ of Aberdeen, UK; ⁷NOC, Southampton, UK; ⁸U.S. Geological Survey, Gainesville, FL 32653 ; ⁹SIO, La Jolla CA, 92093

The Hadal Ecosystems Studies Program is aimed at determining the composition and distribution of hadal species, the role of pressure, food supply, physiology, depth, and topography on deep-ocean communities and evolution of life. We examined faunal community structure and the relationship between POC and bacterial biomass as a function of depth and location via systematic high-definition ROV imaging and sediment/faunal sampling transects from abyssal to full trench depths. In May 2014, video imaging revealed that the hadal Kermadec seafloor hosts a high diversity of habitats, including wood, differing rock and sediment types, evidence of chemosynthetic communities below 8,000m, and of pumice delivering organic material to the hadal seafloor. Analysis of more than 30 hours of HROV *Nereus* video, including 10 ultra-high-definition 4k imaging transects, indicated that species varied with depth: 7000m depth horizon was dominated by xenophyophores and anemones, 8000m by crinoids, 9000m by holothurians, and 10000m by polychaetes (with increasing abundance/diversity of amphipods; and infaunal nematodes over these depths). These observations correspond with observed organic carbon and lipid concentrations increasing to 9000m. Initial genetic investigations of trench metazoan populations and species are revealing isolation between the Kermadec and Mariana trenches; with studies underway to examine whether or not trench habitats promote speciation/endemism and/or genetic divergence through genetic isolation.