

Collecting and Documenting Vent-Obligate Megafauna

Thomas Giguère

In an effort to better understand the volcanically active areas in the Southwest Pacific, the 2018 ‘Tonga-Rift’ cruise on the *RV Sonne* sought to collect data from in and around hydrothermally active areas along the Tonga Arc and Lau Backarc Basin. This interdisciplinary scientific endeavor aimed to explore four main locations within this region: the Niua arc volcano; the seamounts south of Niua; the Niutahi caldera; and the Northeast Lau Spreading Centre (NELSC). Geologists analyzed various rocks from locations throughout the region to better understand the characteristics, age, and history of the geologic features. Geochemists focused on measuring the chemical profiles of the fluids released from hydrothermal vents to better understand the fluid chemistry occurring below the crust. Microbiologists on board focused on collecting chemosynthetic endosymbiotic bacteria from *Bathymodiolus* mussels, identifying differences between microbial communities from different hydrothermal conditions, and characterizing the protists present in the various hydrothermal habitats.

As a macrobiologist, my first objective was to collect a variety of hydrothermal-dependent macrofauna that resembled those found in the Mariana Backarc Basin (MBB). A section of my research thesis seeks to identify all the vent-obligate species present in the MBB and determine the degree of species endemism in the region. By collecting specimens in the Lau region that resemble those living in the MBB, I aim to determine if there are species that are shared between the two regions. The taxa I was searching for include; various limpets (Gastropoda), barnacles (Cirripedia), scaleworms (Polynoidae), and zoanthids (Cnidaria). I was successful in collecting multiple specimens from each of these taxa. As the only macrobiologist, my secondary role on board was to identify any animals that could be seen through the ROV video feed for the rest of the researchers.

My second objective was to collect close-up video footage and photographs of a hydrothermal vent located on the south end of the Niua arc volcano. The purpose of this objective was to use this data to create a detailed photo mosaic of this particular chimney. Although collecting the footage and photos under the proper photo mosaic protocols was difficult, I believe the data is good enough to complete my objective. Once the photo mosaic of this chimney is created, I will be able to characterize the faunal distributions along its surface to determine if zonation patterns exist among the various species present.

My third objective was to collect video footage and biological samples from a dense mussel bed within a hydrothermally active site located on the north end of the Niua arc volcano. The purpose of this objective was to provide data that would contribute to a biological description of this site. Sediment samples were particularly important for collecting information on the small animals living under the mussels that cannot be seen in the video footage. We were successful in collecting both the video footage and sediment samples containing many small animals from underneath the mussels. These samples will help to create a more complete species list for the biological description of this site.

