

# Recent Explorations of Submarine Volcanoes Along the Mariana and Kermadec Arcs– New Windows of Opportunity for Studying Active Volcanic and Hydrothermal Processes

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The past decade has marked a major surge in the exploration of the major intraoceanic arcs of the western Pacific, with international research teams conducting high resolution mapping programs, often in conjunction with water column surveys with specialized CTD packages, to detect hydrothermal and volcanic activity. These initial explorations were followed by *in situ* studies of some of the most active systems using both submersibles (Kermadec Arc, 2005) and remotely operated vehicles (Mariana Arc, 2004, 2005, 2006). The discoveries made during these dive programs provide some profound glimpses into the active processes that take place during the construction of arc volcanoes. These include: (1) the first observations and sampling of an active submarine eruption during 3 visits over 2 years; (2) intense magmatic degassing, including the occurrence of ubiquitous liquid sulfur in shallow reservoirs beneath some of the volcanoes in water depths < 600 m and a concentrated liquid CO<sub>2</sub> vent at 1600 m; and (3), the occurrence of very shallow (345m), high temperature (242°C) “black” smoker precipitation. The prolonged activity at several of the sites offers new opportunities to conduct time-series sampling and monitoring that will ultimately lead to a better understanding of how submarine arc volcanoes work.