

Geochemical exploration of hydrothermal emissions in Kermadec volcanic arc

Junichiro Ishibashi[1], Cornel EJ de Ronde[2], Gary J Massoth[2], Edward T. Baker[3], John E. Lupton[3], Scientific Party of NZAPLUME Cruises Cornel de Ronde

[1] Dept. Earth & Planet. Sci., Kyushu Univ., [2] GNS, NZ, [3] NOAA/PMEL

Systematic surveys of hydrothermal activities at seafloor volcanoes of Kermadec arc have been conducted by GNS (Institute of Geological and Nuclear Sciences, New Zealand). The Kermadec-Tonga arc forms part of the 2500 km-long Lau-Havre-Taupo arc-backarc complex associated with Pacific-Australian plate convergence. Information obtained from the seafloor hydrothermal systems of the southern Kermadec arc will provide us with a unique opportunity to compare the range of vent fluids, mineralized samples and rocks that accompany different tectonic/geological settings, from the subaerial geothermal systems/epithermal deposits of the Taupo Volcanic Zone, through island arc sites of the southern Kermadec arc, and backarc seafloor spreading sites of the Valu Fa ridge.

In 1996, the first direct evidence for high temperature seafloor hydrothermal activity was detected by the dredging of a number of massive sulfides from the calderas of the Brothers and Rumble II West seamounts along the southern Kermadec arc (Wright et al., 1998). In 1998 towed camera investigations by R/V Sonne confirmed that low-temperature, diffuse venting is occurring at Monowai, Rumble III and Clark volcanoes, and also discovered that high-temperature, black smoker venting is occurring within Brothers caldera (Stoffers et al., 1999). Following them, NZAPLUME cruise of 1999 marked a systematic survey of hydrothermal emissions employing a continuous hydrographic, optical, and chemical profiling system, including the collection of numerous discrete water samples (de Ronde et al., 2001). 13 volcanoes of the southern Kermadec arc was surveyed for hydrothermal plumes and found at least 7 (and possibly 2 others) were hydrothermally active. Analysis of discrete water samples show the plumes are variable in their chemical composition and have some unique signatures that can be different between vent sites. NZAPLUMEII cruise is scheduled for May, 2001 to conduct further explorations in the middle part of Kermadec Arc.

