



## Research Charter – Voyage SS02/2009

### Hydrothermal plume and structural geology mapping in the Tonga/Fiji region.

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#### Contribution to Australia's national benefit:

A considerable proportion of Australia's mineral wealth, such as that mined at Broken Hill and Mount Isa, is derived from fossilised hydrothermal systems. Study of active examples of these systems in the backarc basins adjacent to island arcs in the western Pacific, is important from two points of view: knowledge of active examples is a vital prerequisite for understanding ancient systems; in themselves, the remarkably high base and precious metal concentrations in deposits around actively venting systems render these as potentially minable, and the object of active exploration company effort. Using the Marine National Facility, Australian scientists in collaboration with international partners have been studying the hydrothermal systems in a number of backarc basins in the Pacific Region for a number of years. This Voyage (2 legs) was a collaborative effort between the Australian National University and Nautilus Minerals, and targeted the Lau Basin straddling Fijian and Tongan waters, capitalising on three previous MNF voyages to the region.

#### As a result of this voyage:

1. We have a better understanding of the tectonic development of the Lau Basin (one of the fastest zones of oceanic crust formation on the planet), the location of active hydrothermal vents, and the distribution of actively spreading and currently inactive ridges.

2. We have found at least 30 new sources of active hydrothermal venting, recovered volcanogenic massive sulfides associated with one of these vents, and pristine basaltic volcanic glass endowed with potential ore-forming metals.

3. We have mapped at higher resolution than heretofore segments of active and inactive ridges, and fault systems linking these ridges together. We have also mapped in 2 and 3-D the water columns above these ridges for signs of hydrothermal plume activity.

4. We have commenced a program of spatial mapping and analytical studies that will lead to a refined understanding of the tectonic and magmatic development of the Lau Basin, and lead to follow-up studies of the active vent sites by autonomous and remotely operated vehicles.

#### Addressing National Research Priorities

##### An Environmentally Sustainable Australia

- Goal 6: Developing deep earth resources

#### > Charter voyage track SS02-2009

