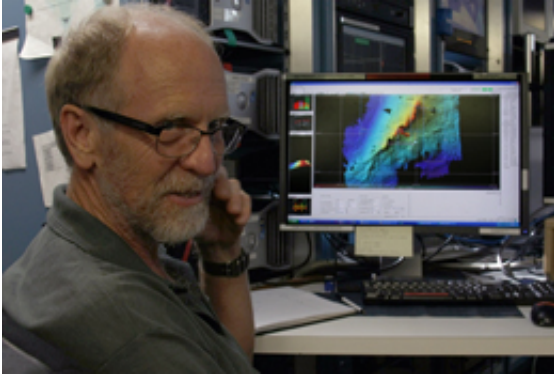


Getting to the bottom of the Fijian Ocean

June 13 2012



Professor Richard Arculus is trying to understand what's been happening through time deep in the Earth beneath Fiji. Credit: Charles Tambiah

(Phys.org) -- Scientists will soon have a greater understanding of the dramatically spreading, rifting and faulting boundary of the Australian and Pacific tectonic plates, thanks to research from The Australian National University.

Professor Richard Arculus from the Research School of [Earth Sciences](#), part of the ANU College of Physical and [Mathematical Sciences](#), led a research team of [geologists](#) on a three-week research voyage over May to June.

In the waters between Fiji and the French territory of Futuna, Professor Arculus and his team have been investigating the widespread submarine volcanism and hydrothermal activity along this highly active part of the

Australian-Pacific [tectonic plate boundary](#).

“The area has long been regarded as a geological anomaly. If you look at any map of the world’s oceans that shows depths, Fiji and its basins to the east and west look really strange: anomalously shallow, with Fiji itself looking like the centre of a geological hurricane,” Professor Arculus said.

“What we found was the region to the north of Fiji is one that joins the colliding Pacific and Australian plates. These plates are respectively being driven beneath each other, the Pacific beneath Australia along the Tonga Trench, and Australia beneath the Pacific along the New Hebrides Trench. In between the ends of the trenches is a zone of faults and ridges where huge amounts of magma have erupted on the ocean floor, forming lots of underwater volcanoes and mineral-laden hot spring deposits.”

The research targeting this region was done on board Australia’s Marine National Facility (MNF) research vessel, Southern Surveyor, which is owned and operated by CSIRO, and is available to all Australian scientists.

“On this voyage, we made detailed maps of the seafloor with the ship’s high resolution multi-beam sonar system. Using these maps, we targeted areas of particularly intense volcanic, hydrothermal, and tectonic activity, obtaining samples of the seafloor and the water above the hot springs,” Professor Arculus said.

“We focused on recovering volcanic rock samples whose compositions will mirror those of their source regions in the Earth’s mantle. Now we have rock samples from a 1000km swathe from east to west that have tapped different mantle sources, giving us a window through space and time of the flow patterns of the mantle.

“With these samples, we have all the materials we need to be able to understand what’s been happening through time deep in the Earth beneath [Fiji](#). The research could help us understand the distribution of seismic activity, tsunamis in the Pacific region, potentially rich deposits of copper and gold, and how the Earth works.”

In 2013 RV Southern Surveyor will be replaced by RV Investigator, a new state-of-the-art 93.9-metre research vessel capable of spending up to 300 days a year at sea, and able to support scientific research across the oceanographic, climate, geological, fisheries and ecosystems disciplines.

Provided by Australian National University

Citation: Getting to the bottom of the Fijian Ocean (2012, June 13) retrieved 27 April 2024 from <https://phys.org/news/2012-06-bottom-fijian-ocean.html>

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