

**Letters of Intent: Lau Basin**  
**Target Date: August 15, 2002**

**Collaborative Research: Hydrothermal plumes, vent sites, and petrology on the Eastern Lau Spreading Center**

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Start Date: Oct. 1, 2003

Duration: 3 years

We will submit a proposal Aug. 15 for a ~37-day cruise to survey the East Lau Spreading Center (ELSC) for 1) hydrothermal plumes using tow-yos, hydrocasts, Miniature Autonomous Plume Recorders (MAPR's), and NOAA's Vents In-Situ chemical Analyzer (VISA); 2) petrology, using dredges and wax cores, with MAPR's on the wire; and 3) hydrothermal vents and detailed geology using Argo II photographic and video surveys navigated within bottom-mounted transponder nets. Our cruise is intended to follow that being proposed by F. Martinez et al. (University of Hawaii) for a survey of the entire 380 km of the ELSC, from 22°45' to 19°20'S, using 30 kHz (one pass) and 120 kHz (two passes) side-scan sonars. As this prior cruise will employ both MAPR's on the wire and NOAA's VISA on the deadweight, we anticipate that we will already have considerable knowledge of hydrothermal plume distribution along the ELSC prior to our cruise. This will allow us to concentrate our tow-yos, hydrocasts, and camera surveys in the most promising localities.

As of June, 2002, an Australian cruise (R. Arculus, P.I.) has been funded and scheduled for March, 2003, to sample rocks and hydrothermal plumes along the 139-km long Valu Fa Ridge (VFR) using methods similar to ours, including tow-yos, hydrocasts, and MAPR's. Because of their coverage of the VFR, we will concentrate ours on the 241 km of the ELSC north of the VFR, from 21°30'S to 19°20'S. On the VFR itself we will perform only limited rock sampling, to complement the Australian sampling, plus an extensive Argo II survey of active hydrothermal vent sites. R. Arculus has offered to collaborate with us via an exchange of personnel on their and our cruise.

Along with data from the Australian cruise, we expect to produce for the entire ELSC from 22°45' to 19°20'S 1) comprehensive maps of hydrothermal plume distribution and chemistry, 2) an extensive and continuous petrologic data set, 3) a detailed (<1 m scale) geologic map of as much as 50 km of the most hydrothermally active parts of the 380-km long ELSC. We have planned for 250 km of bottom-transponder navigated Argo II trackline; combined with Argo's 20-m visual swath width, we could survey a swath up to 100 m wide (five passes) for up to 50 km along axis. In practice, of course, we are likely to produce greater coverage of smaller lengths of axis that are hydrothermally active, and so return with reliable maps of the most active hydrothermal fields. We intend to take along a biologist who can add distribution of macrofauna to the geologic maps. We expect to have preliminary maps ready at the end of the cruise to hand over to subsequent cruises that will deploy ROV's to map individual vent fields and sample their fluids, deposits, macrofauna, and microfauna.