

Letters of Intent: EPR
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Simrad EM300/DSL-120/MAPR survey of Regional Volcanic and Hydrothermal Patterns in the Ridge 2000 Integrated Study Site on the East Pacific Rise, 8°-11°N

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Complete bathymetric surveys in EPR ISS were conducted with 12 kHz multibeam sonars, SeaMARC II side scan (accessible now only in analog format), and SeaMARC I side scan sonar [Macdonald et al., 1984]. The primary purpose of mapping at that scale was to establish the tectonic framework, large-scale ridge structure of the ridge and ridge flanks. Since then an enormous amount of seismic, geochemical, chemical, and near bottom work has been completed primarily between the 9°03'N OSC and Clipperton. Elsewhere, over two-thirds of the ridge axis in the ISS, the only available data is 100 m grids of bathymetry and analog side scan sonar data. Even less coverage is available over the full extent of the plate boundary zone defined by active faulting and ubiquitous volcanism as a part of the ISS.

We propose a two-part study to address our gaps in understanding of the basic patterns of volcanic, tectonic, and hydrothermal activity both along and across the ridge axis. The first part uses the Simrad EM300 30 kHz sonar system to obtain imagery of individual the volcanic and tectonic features (with an order-of-magnitude improvement in horizontal resolution over the available bathymetry) within the entire ISS from 8°N to 11°N over the full width of the plate boundary zone at the EPR. The second part focuses on hydrothermal plume distribution and the fine-scale volcanic structure at the ridge axis using MAPRs simultaneously with the DSL-120 120 kHz sonar.

This study directly pertains to the fundamental goals of the Ridge 2000 program for the ISS on the EPR of :

- (1.) the elucidation of patterns of magmatic flux related to ridge morphology and segmentation,
- (2.) the impact of hydrothermal venting on ridge structure, composition, and morphology, and
- (3.) understanding the thermal and permeability structure of the crust.

A combined sonar and plume survey will establish the links between large-scale ridge morphology, meso-scale volcanic features, and hydrothermal activity. This study also addresses the community data need for baseline data that will enable tectonic or magmatic events to be recognized, and the response of biological and hydrothermal systems to be studied. A comprehensive high-resolution survey of the resolution and accuracy of Simrad EM300 30 kHz sonar would provide 10 m resolution grids from which subsequent bathymetric changes anywhere an eruption is suspected or detected can be calculated.