

Letters of Intent: EPR
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Geophysical Monitoring of Magmatic, Tectonic and Hydrothermal Processes at the EPR ISS - Geodesy

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At the ridge crest, hydrothermal activity is to some extent controlled by ongoing deformation of the locally fractured crust. Changes will result from both volcanic and tectonic processes. Diking and faulting events, as well as the continuing strain accumulation related to plate motion, will change the state of the plumbing in which hydrothermal systems and related subterranean biological communities evolve.

Seafloor geodesy has developed to the extent that observations can be made with accuracies such that conclusions can be drawn that are relevant to this class of questions - see FNS white paper for Albuquerque meeting for summary of state of the art in seafloor geodesy.

Given the emerging state of seafloor geodetic techniques and the bullseye decision, first priority will be given to coordination with other measurement programs concerned with local seismic effects and hydrothermal system variability. This implies starting a geodetic program with a dense, focused direct path installation across the narrow neo-volcanic zone in the immediate vicinity of known vents. We will want pre-proposal information from others before selecting an exact site location, but the concentration will be at about 9-50 N.

The direct path system will provide daily determinations of local deformation across the neo-volcanic zone and along strike for several km. These data will complement the seismic observations by quantifying the effects of OBS-recorded events and by determining the importance of slow steady or intermittent aseismic activity. In addition we will propose GPS/Acoustic installations 10-15 km out on each side of the ridge at the bullseye latitude. The flanking GPS/Acoustic installations, surveyed on an annual basis, will provide measurement of the nature of the long term background plate motion.

While there is no model to predict the magnitude of vertical displacements that might be expected, pressure gauges on the direct path units will allow centimeter level determination of inflation/deflation on an intermediate time scale, limited by sensor drift.