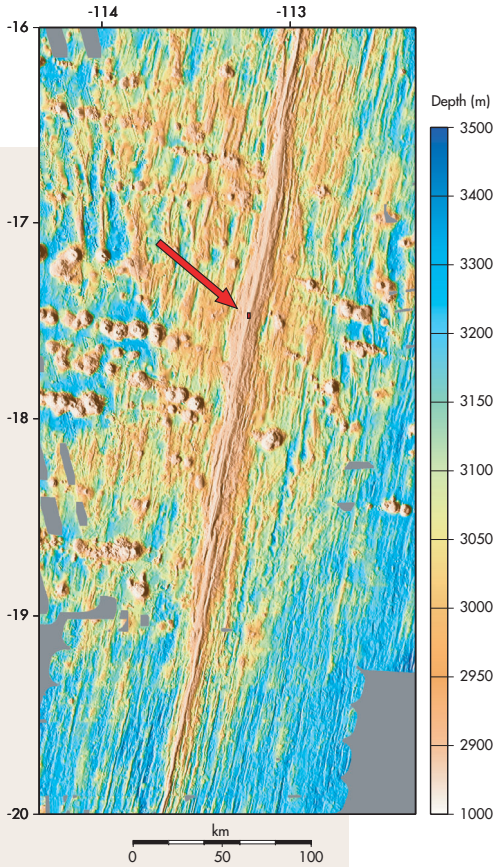
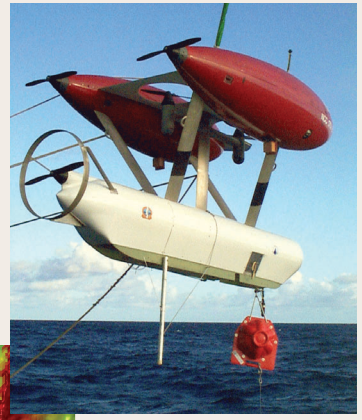
The southern East Pacific Rise is a linear volcanic ridge that accommodates 14 cm (about 6") of seafloor spreading every year. Numerous circular volcanoes are scattered on its flanks. This bathymetric map was produced from several NSF-funded shipboard surveys. The red arrow indicates the location of image at bottom left.

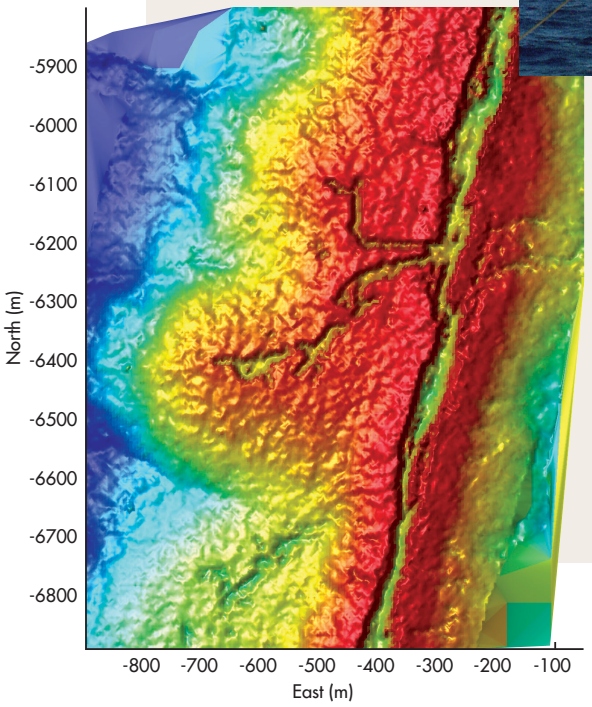


Mapping Submarine Volcanic Eruptions Using a Robot

ABE, a versatile underwater robot, is very portable and can be deployed from ships of opportunity.



Most of the volcanism on Earth occurs hidden from sight along the mid-ocean ridges at 2000-4000 m water depth. Shipboard bathymetric maps (right) routinely delineate these volcanic systems at scales of a few to tens of kilometers. Emerging deep-submergence technologies offer the potential to characterize eruptive vents and individual lava flows at scales of only a few meters. The southern East Pacific Rise is the fastest spreading mid-ocean ridge and frequent eruption is expected along its length. To gain a better understanding of this volcanic activity, the autonomous underwater vehicle ABE (photo) surveyed along pre-programmed tracks only meters from the seafloor, yielding continuous micro-bathymetry, snapshot video, magnetic field measurements, and water column properties. The microbathymetry precisely outlines field relations among subtle volcanic features (bottom left). In one area, it reveals a system of elongated drained lava lakes and their associated networks of lava channels and lava tubes. In another area, the seafloor subsided and late-stage volcanism was limited to small volcanic mounds. In combination with observations made from submersibles, this new type of data finally makes it possible to carry out underwater volcanology at the same resolution as on land.



The narrow trough at the center of the image is a system of drained lava lakes that developed above an eruptive fissure. The drainage pattern of the lavas is clearly outlined in this microbathymetry data. Collapsed lava tubes describe an arterial pattern west of the eruptive system. Maximum relief across the area is 40 m.

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