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Press Release

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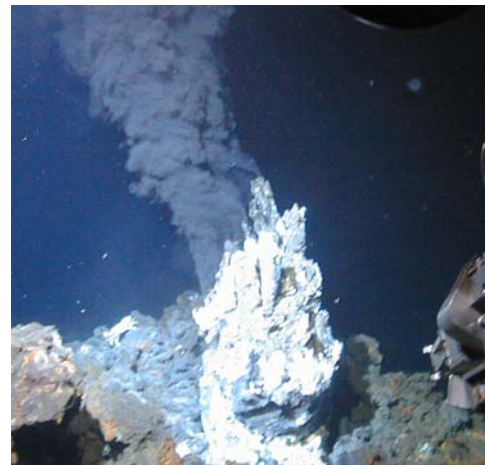
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Shorter timeframes discovered for submarine ocean ridge volcanism

Honolulu, HI –The time it takes for rock to form in volcanic mid-ocean ridges is a lot shorter than previously thought. A study in this week's *Nature* reports that it could take just a few decades, making the chemical and biological conditions surrounding these underwater volcanoes extremely variable. The team, led by Ken Rubin from the School of Ocean and Earth Science and Technology at the University of Hawaii, used natural radioactive isotopes in very young sea-floor lava flows to model how long it takes for rock to melt and rise from beneath the Earth's crust to where it solidifies and accumulates at the deep-sea ridge.

“Most volcanism on Earth occurs unseen, at submarine mid-ocean ridges. Yet such volcanoes are difficult to observe in real time and there are essentially no examples where we have the sorts of information about magma migration, accumulation, storage and eruption rates that we have on land” says Rubin. “We've determined such parameters for a handful of sites using a novel geochemical approach, and it turns out that the rates are quite similar to those at highly volcanically active Kilauea volcano.” There are few previous estimates of the rates of these processes, but work by Rubin and others in the late 1980s and early 1990s suggested that they were something less than a few thousand years. Even these rates were considered uncomfortably fast compared to the slow movement of the underlying volcanic source rock at a few centimeters per year. In a related commentary (also in this week's *Nature*), Dr. Tim Elliott of Bristol University states, "the latest results suggest such velocities were serious underestimates. Rubin et al. provide a dramatic illustration that magma rises to the surface with unexpected haste, in stark contrast to the stately movements of the solid from which it is derived."



A hydrothermal vent billows black "smoke" from a small chimney on a young lava flow on the Southern East Pacific Rise. One of the manipulator arms of the manned submersible Alvin can be seen in the right side of the photo and a crab to the left. Given sufficient time such vent sites can host large faunal communities. Rubin and colleague's work on this topic involves understanding the time scales of volcanic and associated phenomena at deep submarine ridge volcanoes to better understand how these systems operate. This research was funded by the US NSF. (Photo by K. Rubin, SOEST)

For more images, please see www.soest.hawaii.edu/SOEST_News/PressReleases/Rubin/

The team applied isotopes with short half-lives to determine the timescale more accurately, shaving it down to a maximum of approximately 100 years. Ocean ridge volcanoes harbor some of the Earth's most

unusual biological communities. The shorter timescale for crust formation implies that eruptions may be more frequent than we previously imagined, and that geological, biological and chemical conditions may fluctuate rapidly.

Rubin adds, "The ocean ridge system supports some of the most unique and perhaps most ancient habitats on earth, where highly localized communities thrive on chemical energy from volcanically-driven hydrothermal circulation, rather than converting light energy from the sun (as occurs in the surface oceans and on land). Our new constraints on magmatic rates suggest the conditions that allow such communities to colonize and then utilize this energy source can fluctuate much more rapidly than previously thought."

This study would not have been possible without the collection of very young samples using manned- and unmanned-submersibles operating in well-mapped terrains. Three of the paper's four authors participated in such expeditions, which were planned and led by a large number of researchers around the country, including University of Hawaii's John Sinton and Rodey Batiza (now at the National Science Foundation), plus researchers at Woods Hole Oceanographic Institute, NOAA, University of California Santa Barbara, Oregon State University and University of Florida. This study is funded by the U. S. National Science Foundation.

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Related "News and Views" commentary:
Unleaded high-performance, Tim Elliott, Nature 437, 485-486 (22 September 2005)

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About the School of Ocean and Earth Science and Technology, University of Hawaii at Manoa

The School of Ocean and Earth Science and Technology (SOEST) was established by the Board of Regents of the University of Hawaii in 1988. SOEST brings together in a single focused ocean, earth sciences and technology group, some of the nation's highest quality academic departments, research institutes, federal cooperative programs, and support facilities to meet challenges in the ocean and earth sciences. Scientists at SOEST are supported by both state and federal funds as they endeavor to understand the subtle and complex interrelations of the seas, the atmosphere, and the earth.