

PALEOCEANOGRAPHY

Caribbean Megaeruptions Drove a Global Ocean Crisis

Things got pretty ugly in the world ocean 93.5 million years ago. Deeper waters turned foul as their oxygen disappeared and the sea floor around the globe became a lethal black ooze. Many bottom-dwelling shelled animals from the microscopic to the gigantic went extinct. Now new geochemical evidence recovered from that ancient muck strongly links this global crisis—called Oceanic Anoxic Event 2 (OAE2)—to one of the world's largest episodes of volcanism.

The new work “nails the coffin shut” on this long-suspected volcanic connection, says paleoceanographer Timothy Bralower of Pennsylvania State University in State College. The finding also adds support to nearly a half-dozen other proposed volcanic crises during the past 250 million years, including the greatest mass extinction of them all.

OAE2 “was the big one,” says Bralower, who was not involved in the new work. “It was the most global, the most dramatic” of a half-dozen OAEs during the exceptional warmth of the mid-Cretaceous period 120 million to 80 million years ago. The young Atlantic Ocean was as narrow as a few hundred kilometers, the sea ran free between Europe and Africa and into the western Pacific, and high sea levels drove the ocean up onto the continents.

Something in this mid-Cretaceous world had made the ocean liable to shift dramatically the way it operated. During OAE2 about 93.5 million years ago, for example, life-giving oxygen abruptly disappeared from deeper waters, and so much organic matter accumulated in muddy bottom sediments that for a half-million years the sediment turned black until the seas recovered. Paleoceanographers looking for triggers of OAEs, especially OAE2, have long turned their attention to humongous volcanic eruptions, such as the lava outpourings of a large igneous province (LIP) now lying beneath the Caribbean Sea. A shift in lead isotopes recorded at the very onset of OAE2 in Italy supported that idea (*Science*, 27 April 2007, p. 527), but the evidence remained regional in scale.

This week in *Nature*, paleoceanographers Steven Turgeon and Robert Creaser of the University of Alberta (UA) in Edmonton, Canada, report geographically broad-based isotopic evidence for a volcano-OAE2 link. They measured the element osmium in sediments across OAE2 from Italy—which was in the

Tethys seaway between Europe and Africa at the time—and just off northeast South America, which was then in the opening Atlantic.

At both sites, the osmium abundance shot up by a factor of 30 to 50 above background just before the onset of OAE2. In the Atlantic, the lag between osmium increase and anoxia was between 10,000 and 20,000 years, the UA researchers estimate. And just as vastly more osmium was entering the ocean, the ratio of osmium-187 to osmium-188 plummeted. All that is just what would happen, say Turgeon and Creaser, when thousands upon thousands of cubic kilometers of lava delivered osmium from Earth's mantle to the sea floor of the Caribbean, a LIP eruption previously dated to within a few million years of OAE2.



Crunch time. A dark band in an Italian quarry marks an ocean crisis 93.5 million years ago.

The new osmium data “do make the argument more compelling” that the largest eruptions can trigger anoxic crises in the ocean, says Millard Coffin of the University of Southampton, U.K., who specializes in LIPs. The trigger “is most likely volcanic,” he agrees. The work has broader implications too. The largest LIP of the past half-billion years—the Siberian Traps—seems to have coincided with the largest mass extinction, the Permian-Triassic, but dating uncertainties still allow the extinctions to precede the eruptions by hundreds of thousands of years (*Science*, 25 April, p. 434). In the case of OAE2, at least, the coincidence was tighter still. —RICHARD A. KERR

Occupational Safety Proves an Unsafe Occupation

U.S. health researchers are worrying about the future of federal research on worker safety following the puzzling decision to let the popular director of the National Institute for Occupational Safety and Health (NIOSH) go. Centers for Disease Control and Prevention (CDC) Director Julie Gerberding announced 3 July that she plans to replace NIOSH Director John Howard after his 6-year assignment ends this week despite his interest in serving another term. The physician had resounding support from labor, business, and health professionals. “It’s really distressing. He’s been a great guy,” says Sarah Felknor of the University of Texas School of Public Health in Houston, who chairs NIOSH’s board of scientific counselors. She and others are worried about the continuity of programs such as nanotoxicology research. Others fear that CDC will now push ahead with a plan that Howard resisted 4 years ago to move NIOSH down in the CDC hierarchy (*Science*, 16 July 2004, p. 323). A CDC spokesperson says that “there are no plans to reorganize NIOSH,” and Gerberding was unavailable for comment. —JOCELYN KAISER

Tough New Conflicts Rules

Three leading journals have adopted or announced plans to adopt conflict-of-interest disclosure policies of unprecedented strictness. *Addiction*, the *Journal of the National Cancer Institute*, and the *Journal of the American College of Surgeons* are now requiring authors to disclose every financial tie, regardless of size, held within 3 years prior to submission. Editors from each journal collaborated with the Center for Science in the Public Interest (CSPI) to develop the policy, which the center released this week. *Addiction* editor Thomas Babor says it’s an attempt to preserve scientific integrity amid revelations of scientists who concealed industry backing of their research. CSPI has circulated the model among hundreds of journals but no others have signed on; many feel their current policies are sufficient, says CSPI project director Merrill Goozner.

Others may fear the added burden such a stringent policy could impose on submitters. But Babor says the policy creates little extra work for the journals and only slightly more for authors—work that researchers are beginning to expect as par for the course of submitting a paper. “We are being perceived as a better journal,” he says, noting steadily rising submissions. —RACHEL ZELKOWITZ