Roger Larson (1943–2006)

An Appreciation

BY JAMES H. NATLAND

No one who ever saw Roger Larson in action would consider him a shrinking violet. A great deal of his action over four decades in marine geology was in connection with scientific ocean drilling, about which he was an unabashed advocate. Roger had a particular interest in the Mesozoic geology of the Pacific, and just about the only way to deal with this huge tract of Earth's surface beyond the examination of wiggly magnetic lineations and fuzzy profiler records was to core it. But what with thick sediments, flinty cherts, volcanic overprints, and basalt alteration, this was no simple business. Roger thus applied himself persistently, persuasively, vigorously, and with great voice to getting one drilling program after another onto the books and into the scientific literature. Roger's passing this last May at age 63 cut short not just an eminent career in geosciences and exploration of the ocean floor, but that of one of the leading drilling scientists of his generation.

From the start, Roger and scientific ocean drilling ran on parallel tracks.

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While he was still a graduate student at Scripps Institution of Oceanography (SIO), the Deep Sea Drilling Project (DSDP) first set up shop in a couple of renovated tinderboxes called T buildings adjacent to the SIO parking lot. Roger at that time was working with Fred Spiess and the Scripps Deep Tow group, the scientific wing of which was then housed in the corner of Sverdrup Hall nearest to the same T buildings. When DSDP began hiring, Roger steered a friend of his, Ted Gustafson, in their direction; the result for Gus, of course, was a full career as a marine technician and laboratory officer that began with DSDP Leg 1 in 1968 and continues after more than 100 legs and expeditions to this day.

Roger the graduate student was mainly a practicing geo-acoustician and magnetician. In his thesis, Roger parsed out for the first time the details of the opening of the Gulf of California and the magnetic character of young oceanic crust. However, his attention soon turned to the mapping and calibration of the Mesozoic (M-Series) magnetic lineations in the central and western Pacific, about which he co-authored papers with Clem Chase and Stu Smith, and the consequences of which he pursued with Walter Pitman at Lamont-Doherty Geological Observatory. One of these consequences followed from the revelation that the M-Series anomalies and adjacent Cretaceous "quiet zone" reveal a period of unusually high spreading rate wherever those anomalies exist. Larson and Pitman argued that the rapid emplacement of a large volume of young, warm lithosphere beneath spreading ridges displaced sea water, thus was a cause of sea-level rise and formation of epicontinental seas. With his inimitable Midwestern twang and enthusiasm, Iowa-born Roger would exclaim, "Why that's enough water to cover the rooster on top of the courthouse at Webster City, Iowa!" Faster spreading also meant faster rates of subduction, and thus might explain large-volume emplacement of batholiths around the Pacific Rim during the Cretaceous.

Roger's expertise with M-Series lineations in the Pacific was one factor in his selection at the age of only 30 as co-chief scientist (the other was Ralph Moberly) of DSDP Leg 32, which drilled and dated Mesozoic plateaus and magnetic lineations in the northwest Pacific. Then, when integration of magnetic studies showed that the oldest part of the Pacific Plate began existence as a Jurassic microplate that was surrounded by M-Series lineations spreading away in all directions, Roger, by now at the

Graduate School of Oceanography of the University of Rhode Island, and the late S.O. (Sy) Schlanger were named co-chief scientists of DSDP Leg 61. Their objective was to drill said Jurassic basement in the Nauru Basin. The great surprise was that the ancient basement is thickly carapaced by much younger basalt in the apparent form of a Cretaceous basin-filling outlier of the Ontong-Java Plateau. Emplacement of these lavas was evidently so rapid that it did not erase the magnetic signal of underlying Jurassic crust. The exigencies of crustal drilling provided some high drama when the core bit failed and left an entire roller cone as hard metallic "junk" at the bottom of the hole. A junk grinder and accompanying specialist were sent to the ship to salvage the hole. Roger's account of the proceedings to the JOIDES Ocean Crust Panel was both vivid and strongly to the point of how drilling deep holes in fractured basalt requires both patience and application of more technology than anyone anticipated.

Roger's career was propelled sharply forward in 1991 in two papers published in *Geology*. In the first, he integrated the research of many investigators, plus results from several legs of drilling in the Pacific, to develop a proposal for a mid-Cretaceous superplume centered on Ontong-Java Plateau. Roger argued that only a superplume could ring the bell of the core-mantle boundary sufficiently to disrupt the pattern of magnetic anomalies and trigger large-scale plateau volcanism and high spreading rates worldwide. Key to Roger's hypothesis lay in documenting the precise timing and short duration of the superplume event using several techniques, including studies of cored sediment and basalt. In the second paper, Roger explored the consequences of this event on sea level, global magmatism, emission of greenhouse gases, development of oil reservoirs, and global warming.

Roger went on to serve with Yves Lancelot as co-chief scientist one more time during Ocean Drilling Program Leg 129, again to drill ancient sedimentary and volcanic rocks in the far western Pacific. This time, at Site 801, drilling actually reached Jurassic basalt formed at a spreading ridge. Roger and Yves were lead authors on a splendid synthesis for *Proceedings of the Ocean Drilling Program*, Scientific Results for Leg 129. Here, they applied the full versatility of core studies, from rock magnetics to climate indicators among microfossils, to formulate an integrated history of the Pacific Plate from the Mesozoic into modern times. Finally, when Hole 801C was deepened during ODP Leg 185, Roger was aboard *JOIDES Resolution* as regional geologist and logging scientist.

Roger's drilling activities were not just as a scientist. He was an early member of the JOIDES Ocean Crust Panel, chaired the Steering Committee for the first Conference on Scientific Ocean Drilling (COSOD I, 1982), and served on the JOIDES Planning Committee twice (1984–1985 as chair; 1995–1997) and its continuation as the JOIDES Science Committee (1997–1998). He served on the JOIDES Executive Committee (2000–2001). Roger was a strong supporter of the several important changes made to the planning structure in 1997. He was first a member then chair of the U.S. Science Advisory Committee (USSAC) for the Ocean Drilling Program (1994–1997). Under his leadership, USSAC's role greatly expanded. It became a true national committee with responsibilities for staffing panels and working groups, and more importantly, it widened the participatory base of the Planning and Science Committees. During the run-up to IODP in 1996, Roger talked about drilling to MOHO at the International Workshop on Riser Technology in Japan. Most recently he was a member of the Science Planning and Policy Oversight Committee for IODP.

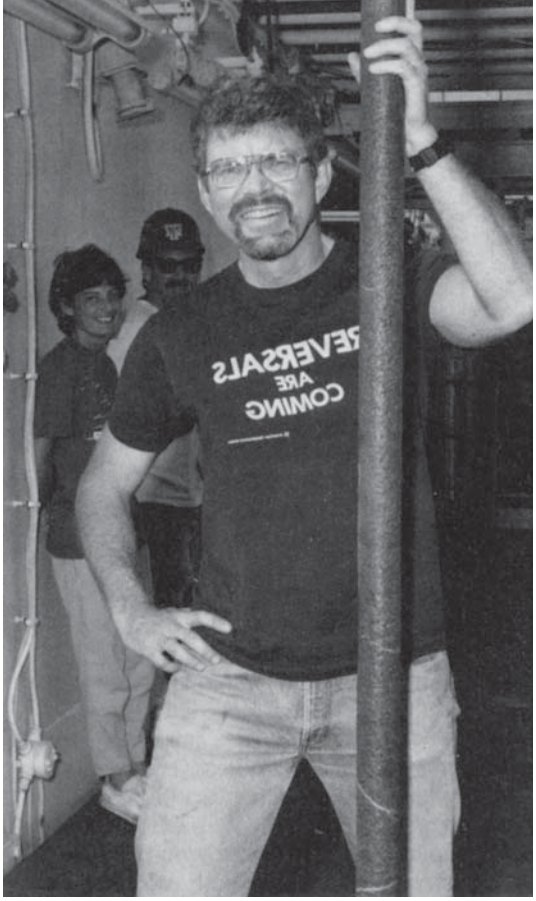

Photo caption: Roger and a 2-m-long piece of Jurassic basalt recovered during ODP Leg 129 from Hole 801C in the Pigafeta Basin, western Pacific. Elisabeta Erba and Lew Abrams are in the background. For those not familiar with the Da Vinci manner of writing, the shirt says, "Reversals are coming." Photo provided by John Beck, Integrated Ocean Drilling Program.

Roger, old friend, drilling scientist *par excellence*, statesman for scientific ocean drilling, we shall miss you and never forget you. Thanks for everything.