Continental margins research through MARGINS and GeoPRISMS

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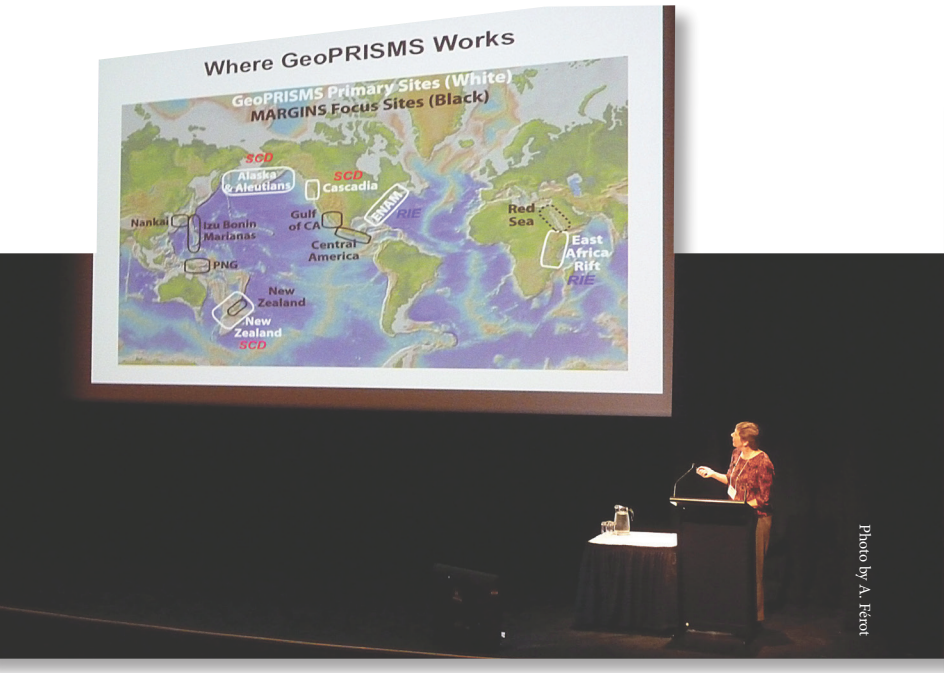
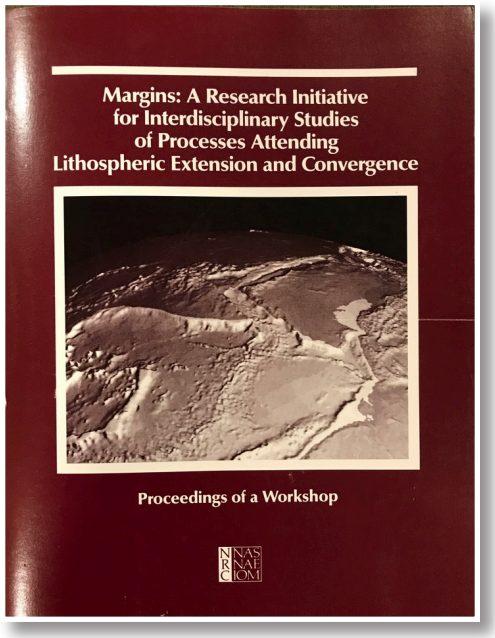
More than three decades ago, back in the last century, an idea was hatched in a room full of great minds that continental margins were the place where land people and sea people could sit down together, and start to talk to each other. This first meeting, held in 1988 in Irvine, CA, was close enough to the shoreline that each group was near familiar territory. Up until that time, the National Science Foundation generally divided the world into two parts: one you could see from an airplane, on foot, or in a vehicle (NSF EAR), whereas the other required a boat, submersible, or diving gear (NSF OCE). The scientists funded by these NSF divisions typically received grants to work in one place or the other, but with some exceptions, generally didn't have many opportunities to talk to each other.

Remarkably, the fifty-seven men and eight women in attendance realized that, with enough mental fluidity and a well positioned gathering place, it was possible to bring these two worlds together to discuss exciting scientific ideas, and the concept of the NSF MARGINS Program was born. Over the following decade, more women joined the group, more meetings happened near beaches (such as Avalon, Kona, La Jolla, Quinault, and, oddly, Snowbird) and the two groups gradually developed a common language, one that allowed terrestrial geoscientists to communicate with marine geoscientists. In the process, they discovered that they were actually studying the exact same things, and great science began to happen.

It started small, with modest deployments of onland seismometers combined with nearshore marine seismic sources, or comparisons of uplifted and deformed rocks in the mountains with muds collected from the seafloor. But it became increasing clear to all, including NSF, that the two parts of the world were closely connected, and thus neither could be fully understood without consideration of the other. This realization came about largely through the involvement of graduate students and young scientists who were trained within these novel shoreline crossing investigations, and helped to develop new approaches to integrate such observations, and design hypotheses to test. The MARGINS community gradually expanded to include a wider range of expertise: geophysicists, geochemists, structural geologists, volcanologists, sedimentologists, as well as experimentalists, modelers, and so many more. Scientists and graduate students came from around the world, gathering with their colleagues in attractive places, which moved progressively to higher and higher elevations (Eugene, Mount Hood, Snowbird again). In these settings, participants discussed new ideas and new approaches, and presented cutting edge science emerging from these collaborative, interdisciplinary, shoreline-crossing efforts. The outcomes of these stimulating gatherings (Theoretical and Experimental Institutes, TEIs) were enshrined in books destined for shelves all over the world.



The original National Academy report on a Margins research initiative, arising from the 1988 Irvine workshop



MARGINS and GeoPRISMS meetings and workshops locations.

The success of the MARGINS movement in advancing our understanding of continental margins that cross the shoreline was acknowledged by the NSF MARGINS Decadal Review (2009). This enabled a new movement called GeoPRISMS (i.e., Geodynamic Processes at RIfting and Subducting MarginS), which formalized the best attributes of the MARGINS effort while broadening the community of scientists who participating in the movement. Research programs coalesced in several new locations, including active and passive margins around the US (Alaska, Cascadia, Eastern North America), the East African Rift, and New Zealand, while also enabling the synthesis and deeper comprehension of rifting and subducting margins around the world. A key characteristic of this movement continued to be attractive conference venues where scientists could gather to exchange ideas, sometimes near the shorelines (Portland, OR; Wellington, NZ; Morristown, NJ), but occasionally a bit farther inland on ancient or future continental margins (San Antonio and Bastrop, TX; Albuquerque, NM; Bethlehem, PA). Importantly, each setting fostered collaborative discussions during which a broad community of investigators could define the key science questions that will drive continental margins investigations in the future, design integrative amphibious science investigations, and most essentially, share ideas and build a science community that could work effectively for decades to come.

As the GeoPRISMS Program comes to a close, after two decadal programs that had their origins more than thirty years ago, we can look back on the significant achievements that have been made possible by the active community efforts facilitated by the MARGINS and GeoPRISMS Offices, supported by direct funding from NSF EAR&OCE to teams of researchers. We have seen the research community diversify, become younger (academically speaking), and much more engaged in interdisciplinary and international research than we could have hoped for when the MARGINS ship started sailing. We have also seen major scientific advances enabled by these programs, in our understanding of the fluid cycles and thermal structure of subduction zones, of the behavior and geologic controls on great earthquakes, in the ways in which continents break apart, how magmas are produced in all of these settings, and many other areas. We are happy to have been strongly involved at various stages of these programs and look forward to seeing a large number of ongoing projects come to fruition in the coming years. ■

Photo by A. Férot