



Lee Powell (kneeling) and Cliff Thurber (standing) completing the installation of a temporary seismic station on the San Andreas fault near Parkfield, CA. This is one of about 50 such installations that were part of a detailed study of the fault zone structure at the proposed site for the San Andreas Fault Observatory at Depth (SAFOD). (photo by Steve Roecker, RPI)

paleoceanography of this important oil source rock. In Spain, I am advising a PhD student working on a recent delta, which is an aquifer with problems of salt intrusion. It is a very interesting project as we are applying reservoir characterization techniques in a reservoir that we have historical dates and we can model in great detail sedimentary processes. GPR and seismic imaging are on the horizon.

The teaching front has been dedicated to improve the new curriculum courses, Introduction to Geologic Structures, and Geologic Evolution of the Earth. I am co-teaching these courses with **Basil Tikoff** and we are trying to expose the freshman and juniors to geology in a dynamic way; hopefully they will be interested and become geology majors.

Brad Singer

2002 marked the publication of papers in the *Journal of Geophysical Research and Earth and Planetary Science Letters* addressing global paleomagnetic field behavior during the past one million years based on the first $^{40}\text{Ar}/^{39}\text{Ar}$ ages determined in the UW-Madison Rare Gas Geochronology Laboratory. Thus, the laboratory that I established in 2000 is on the map, with several papers on paleomagnetism, paleoclimate, stratigraphy, volcanic petrology and structural geology in the press. Some of this work was showcased in 4 presentations at the GSA meeting in Denver and four more at the fall AGU meeting in San Francisco.

Mike Smith defended his MS thesis on the geochronology of the Green River Formation in Wyoming (keep your eyes on GSA Bulletin for this work) and is now working on an NSF funded project on Eocene lacustrine basin evolution in Wyoming and Utah for his PhD with **Alan Carroll** and me. **Brian Jicha** completed his MS thesis using radiogenic isotopes to constrain the origin and timing of volcanism at three Aleutian Island arc volcanoes. This work reflects extensive collaboration with **Clark Johnson** and **Brian Beard**, particularly with Hf isotopes

measured on the new Multicollector ICP-MS. **Brian Jicha** submitted his thesis to the *Journal of Petrology* and began to focus on a PhD dissertation on the origin and time scales of volcanic and plutonic processes in the central Aleutian arc.

PhD student **Danny Douglass**, Weeks Post-doctoral Fellow **Mike Kaplan** and I traveled to southern Argentina twice in 2002 for our NSF funded project to establish a chronology and terrestrial paleoclimate record for Pleistocene glaciations of the Patagonian Andes using in situ cosmogenic nuclides. **Dave Mickelson** and **Jim Bockheim** (UW professor of Soils Science) joined us during the second field campaign. **Mike Kaplan** was awarded a prestigious Fellowship from the Royal Society of London and is now working at Edinburgh University, Scotland in collaboration with Danny and myself.

In July, **Dr. Kyle Min** joined the department as an Assistant Research Scientist and assumed responsibilities of managing the Rare Gas Geochronology Laboratory. This is no small feat because in addition to the PhD projects that **Mike Smith** and **Brian Jicha** are pursuing, **Miriam Barquero-Molina** and **Melissa Harper** are undertaking MS thesis projects on the chronology of Plio-Pleistocene volcanism in the Central and Southern Volcanic Zones of the Chilean Andes, **Lauren Chetel** is attempting to obtain a precise chronology for Ordovician bentonites and associated strata in the Upper Mississippi Valley in collaboration with myself and **Toni Simo**, and **John Hora** joined the group from UCLA with plans to explore for his PhD the chronology and time scales of subvolcanic magma differentiation within 70 km thick continental crust of northern Chile. The success of the Rare Gas Geochronology Laboratory is further reflected in the collaborative research projects underway with scientists and students at 10 institutions from coast to coast in the USA and in Italy, France, Germany, and Bulgaria. I am looking forward to a decision regarding my tenure and working together with everyone to carry forward the effort in geochronology during 2003.

Cliff Thurber

It is hard to imagine a more challenging and rewarding year than 2002 was for me. Drilling for the 2-km "San Andreas Fault Observatory at Depth" (SAFOD) Pilot Hole at Parkfield, CA, took place over the summer, aimed at setting the stage for drilling the main SAFOD fault-crossing hole (part of the EarthScope project). We finished off our seismic field project on the San Andreas Fault at Parkfield with a literal bang—with our collaborators at RPI, we carried out a major active-source seismic experiment in October, involving 16 shots of 100 to 500 lbs in size. We are in the process of refining our 3-D model of the seismic velocity structure around the SAFOD drill site, and are steadily improving the accuracy with which we can determine the locations of clusters of small earthquakes (magnitude about 2) that are the target for SAFOD drilling. **Lee Powell**, grad student **Kyle Roberts**, and post-doc **Shirley Baher** participated in this project. We continued work on a major nuclear explosion monitoring project, involving former post-doc **Charlotte Rowe**, new post-doc **Wayne Du**, grad student **Haijiang Zhang**, and Assistant Scientist **Bill Lutter**. This project involves the development of sophisticated tools for accurate real-time location of seismic events. My volcano seismology research continued along two fronts. Work on the deep structure of Kilauea volcano's East Rift Zone using seismic velocity and attenuation tomography was carried out by grad student **Samantha Hansen**, who defended her MS thesis in December. Our work on high-precision location of volcanic earthquakes at the Soufriere Hills volcano, Montserrat, has produced dramatic improvements in the determination of

the locations of dozens of earthquake clusters associated with the 1995-96 eruption, showing an intense concentration of earthquake activity within a very small volume (less than 1 cubic km). Similar studies are underway for Redoubt volcano, Alaska, Mauna Loa volcano, Hawaii, and the Hengill area, Iceland. Former post-doc Charlotte Rowe and post-doc Shirley Baher worked on this project. I also obtained a new NSF grant to work on high-precision earthquake location in the New Zealand and Japan subduction zones. Post-doc Wayne Du and grad students **Xiaowei Yan** and **Haijiang Zhang** are working on this project. I continued my heavy involvement in managing the IRIS Consortium, including my final year of membership on the Executive Committee, Chair of the Nominating Committee, and as a regular member of the IRIS Board of Directors. I also finished my fourth year as an Associate Editor for JGR-Solid Earth. All this resulted in quite a bit of travel for me again this year, including three IRIS Executive Committee meetings and the annual IRIS workshop (for which I was the meeting co-organizer), two Department of Defense nuclear monitoring meetings, one trip to Parkfield, and a trip to the fall AGU meeting where my research group had six presentations.

Basil Tikoff

It is only when you look back, do you realize how crazy one really is. Let's see, what happened in 2002? Well, two theses, six classes, and fieldwork on four continents later, I seem to still be standing. Barely.

Major achievements include the successful defenses of **Eric Horsman** and **Sarah Titus**, who both now have Master's degrees. Eric worked on the internal fabrics of sills in the Henry Mountains of Utah. Sarah did a combined geological and geophysical study of the Johnson Granite porphyry, in the geological center of the universe—the Sierra Nevada mountains. **Karoun Charkoudian** and **Selena Mederos** (co-advised by **Alan Carroll**) continued working on their Masters dissertations, combining gravity data and geological mapping. **Cheryl Waters** continued to work on her study of deformation of mafic granulites in the lower crust, exposed in central Australia. She saw the first publication from this work come out and presented the work at the Geological Society of America and a special meeting of the Geological Society of London. Closer to home, **Scott Giorgis** continues to work in the Salmon River suture zone of western Idaho. Lately, he showed that one of my ideas about the regional tectonics was completely wrong (paleomagnetism is an incredibly useful technique—thanks to Paul Kelso of Lake Superior State University for working with us), which I thought was great. **Stephanie Maes** has started a PhD on layered mafic intrusions in South Africa, co-advised by **Phil Brown** and myself. The two post-doctoral fellows—**Eric Ferre** and **Sarah Tindall**—both landed tenure track jobs and have moved on (to Southern Illinois University and Kutztown University, respectively).

The year did take me to South Africa, for a great fieldtrip co-lead by **Phil Brown** (see report elsewhere). The fieldtrip consisted of both undergraduates and, mostly, graduate students. There is an unbelievable amount of incredible geology in South Africa, and in a relatively small area. I also attended a Penrose conference in Switzerland in August and then visited **Tom Lapen's** field area in Italy (with **Clark Johnson**, his advisor). I was interested to see this area because Clark informed me the area was beautiful, the geology was fascinating, and there were espresso huts everywhere. Well, I'll have to take Clark's word for it, because it decided to rain and snow for the entire week (In August! In Italy!). So despite the fact that we worked there anyway, I didn't get to see the southern Alps in their

full glory. The last major boondoggle was going to New Caledonia over the winter break, getting Sarah Titus set up to do her PhD work on the ultramafic rocks there.

In terms of teaching, I had a great, but busy, year. With a little arm twisting, I convinced **Bob Dott** to give a series of guest lectures for History of Geological Thought. In fact, Bob called me his TA, which was pretty appropriate and there is no one I would have rather been the TA for (having said that, I forgot how much work being the TA is). It was definitely a highlight of my fall. I co-taught a class with **David Alumbaugh** on Potential Field methods which was, well, a learning experience for all involved. Still, I enjoyed teaching with Dave, who is masquerading in the Civil Engineering department, although we know he really is a geophysicist. In addition, I co-taught our new Introduction to Geological Structures course with **Toni Simo**. This class includes the becoming-legendary fall trip to the Black Hills. I am still amazed how much students learn in one weekend in the field (with some topography); and if the teaching evaluations are correct, the students are also impressed. Although teaching last fall was a little too much overall, it did make me realize something: I really like the University of Wisconsin undergraduates. What a bunch of smart and interesting young people. They are not whiners (with a few notable exceptions) and they almost invariably rise to the occasion. In fact, I can't really imagine any other group of students I'd rather teach.

John Valley

Last year, I was heavily involved with a campus-wide effort to acquire an ion microprobe for the University of Wisconsin to be housed in Weeks Hall (see article elsewhere in the *Outcrop*). Our use of this instrument has continued to grow, both for stable isotope studies and geochronology.

Last summer, **Aaron Cavosie** and I traveled to Beijing to use the new Chinese ion microprobe. In the past two years, my students and I have also traveled to UCLA, Stanford, Ottawa and Edinburgh for beam time. In Beijing, Aaron and I dated detrital zircons from Western Australia, continuing work started with **William Peck** (PhD 2000). We found one crystal with a 4.33 Ga core, the third oldest known from Earth. After completing 125 hours of analysis, we traveled with Chinese and Australian colleagues to Inner Mongolia to collect granites from a poorly known



Geology 916 students prepare to descend into the Yellowstone Mine, near Red Lodge Montana. From left to right: Cory Clechenko, Jade Star Lackey, Prof. CS Wei (University of Science and Technology, Hefei, China), unidentified platinum miner, Joyashish Thakurta, Aaron Cavosie, Melissa Harper, and Beth Valaas. (photo by John Valley)