South Africa Trip

by Phil Brown and Basil Tikoff

A spectacular trip to South Africa, with instructors Phil Brown and Basil Tikoff, was held during two weeks at the end of May and early June 2002. Participants included eight graduate students from the structure and economic geology groups, one undergraduate, and Eric Ferré, the organizational heart of the endeavor. Eric was a post-doctoral fellow at the time at UW-Madison and now is an Assistant Professor at SIU-Carbondale. The trip had its share of minor mishaps (standard operating procedure), but overall was exciting, educational, and resulted in two new PhD projects.

Non-stop flights to South Africa are a bit pricey, so the group traveled through London to Johannesburg—the only down side being two consecutive nights in airplanes! Once on the ground, they fell into the capable and efficient hands of the Council for Geosciences—the South African equivalent of the USGS. In a previous life, Eric Ferré had taught in South Africa and had worked extensively with the Council. Because of his connections, they were able to rent three minibuses from the Council and several Council employees took turns shepherding them around the country. The young Council drivers (and occasional interpreters) clearly enjoyed their time with the crazy northerners—cultural exchanges took many forms and went both ways.

In what most geologists will recognize as perfectly normal field trip behavior the group left Madison, traveled for 30+ hours, arrived in the early afternoon and then drove north and east for eight hours to finally arrive on the Zimbabwe border in the historically important Cu mining town of Messina. That evening (and most evenings) they stayed in a campground but generally rented several small cabins with kitchen facilities. They couldn't really claim that they were roughing it, but the accommodations were surprisingly economical thanks to a good exchange rate. Most evenings dinner included a braai (barbeque) of local delicacies and excellent local wines.

The first three days in the field focused on variably deformed metamorphic and granitic rocks of the Limpopo Belt. The Limpopo marks a mobile belt between two Archean cratons—the Zimbabwe to the north and the Kaapvaal to the south. The details of the Limpopo deformation depend on whom you talk to—it may be evidence for Archean plate tectonics or may represent a different style of deformation. Dr. Gunter Brandl acted as the guide for part of the time, keeping the structural geologists scratching their heads about refolded folds, crosscutting relations, anisotropy, pseudotachylite (glass produced by fault movement), and the elusive "racetrack" outcrop. The exposures of the Sand River gneisses are spectacular—probably only rivaled by coastal Greenland for extent and cleanliness. Of course, random baboons and 40+°C temperatures kept thoughts of Greenland at bay.

They then visited the largest diamond mine in South Africa at Venetia. The brecciated kimberlite in the open pit was spectacular although one was essentially allowed to look and not touch. Diamond mines define the lower limit of grade or concentration of any economic property mined by man. Although the chances of actually seeing a diamond in the pit are literally one in a million, the group was required to wear clothes provided by the mine, and random visitors and most employees are subject to whole body x-ray scans as they leave the mine site. Diamonds fluoresce in x-rays and the security is trying to make sure that—well, you get the idea!

After leaving Messina the group proceeded south to the eastern end of the world famous Bushveld complex that Professor Gene Cameron of our department studied for nearly 40 years. The Bushveld is a huge (200x300km, 8km thick) igneous intrusive body that hosts the world's largest economic concentrations of platinum, chromium and vanadium. The group spent two days examining

Jon Van Alstine in front of pseudotachylite, cause by meteor impact in the Vredefort Crater (photo by Cheryl Waters)

contact relations below and above the composite intrusion and collected portions of the mineralized horizons. Here they camped on the shores of a lake with signs warning of crocodiles, hippos and intestinal parasites. Since swimming in the lake was thus discouraged, the government had constructed a nearly Olympic sized pool in the campground—imagine the delight when they discovered that it was in fact a huge hot tub! (Phil, in particular, took advantage of this unexpected comfort—BT.)

A few more hours south and east lie the Barberton mountains encompassing the Barberton greenstone belt, one of the most famous Archean crustal fragments on Earth. The Barberton area is bisected by the Komatii River (yup, the type locality of komatiites) and includes Spinifex Hill (that's right, where spinifex texture was first described). The rock packages include the Fig Tree Chert where some of the seminal scientific work on early life was done. The Barberton Mountain land hosts numerous gold deposits, was the site of some of the earliest major mineral exploration in South Africa in the 1880s and figures prominently in the political and social development of this fascinating country.

After a hot and humid underground tour at one of the world's more famous gold mines (the Sheba-Fairview, where John Marma will be doing his PhD), the group split up for a couple of days. Most of the group under Basil's care stayed in the Barberton for another day, examining sedimentary structures and growth strata—preserved in rocks that were deposited at 3.8 Ga!—and deformation in a non-glaciated greenstone belt. The following day, the group did a sunrise tour of the wildlife in Kruger National Park on the Mozambique border, marginally on the way to Vredefort (don't look too closely at a map). They spent the next day and a half looking at the Vredefort structure, one of the world's largest preserved and best studied ancient meteorite impact structures. This was incredible; more pseudotachylite than one could possibly imagine, exposed in rock quarries (see photo, preceding page). The rocks away from the center zone were folded and displayed other interesting rock deformation features.

Meanwhile, group two was doing something useful: Phil, Eric Ferré and Stephanie Maes (grad student) left the group in the Barberton and drove south for a looooong day to visit and sample the Insizwa igneous complex. This 300m thick igneous sill hosts minor Cu-Ni sulfide mineralization and served as part of the plumbing system feeding the Karoo flood basalts that erupted about 180 million years ago coincident with the break up of Gondwanaland. Samples from this sill will comprise part of Stephanie's PhD project focusing on the magnetic properties of layered mafic intrusions.

The group reassembled the last day in Pretoria and at the Jo'burg airport for the trip home—an experience punctuated by shipping many heavy samples back to Madison and a heated discussion with our airline about the distribution of weight among the bags of the gang of 12. Logic did not prevail (a recommendation—all geologists should avoid Air France) and many rands had to change hands—welcome back to the real world!

The trip was an amazing educational experience for all involved on many levels. Substantial support for airfares came from the Weeks Fund for which they are grateful. These are the kinds of trips that are career-changing for many and the group in particular (and the department in general) wish to thank our alumni donors for providing the funds that allow such field trips to be taken.

Participants:

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Phil Brown
Karoun Charkoudian
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Scott Giorgis
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Stephanie Maes
John Marma
Basil Tikoff
Sarah Titus
Jon Van Alstine
Cheryl Waters

Eric Ferré by a beautiful exposure of the Sand River Gneiss. (photo by Basil Tikoff)