

Alumnus Luis Marin (MS 1986) organized and led the field trip that served as the capstone of a hydrogeology graduate seminar (Karst Hydrogeology of the Yucatan Peninsula) of the preceding fall semester. The field trip greatly enhanced all that we read about in the seminar portion of the course. We are especially grateful to those who contributed to the Hydro Fund and other department funds, which provided financial support for the trip.

Field Trips: KARST HYDROGEOLOGY of the Yucatan Peninsula



Group at the Great Pyramid overlooking Uxmal. Front (from left): Jean Bahr, Rachel Greve, Heidi Crosby, Jeff Wilcox, Jon Carter. Back: Laura Craig, Chris Lowry, Jeff Schneider, Mike Cobb, Chris Muffels. (Carl Bowser)



High permeability of the underlying limestone and lack of soil results no surface drainage (i.e. lakes and rivers) in the northern peninsula. Most cities have been established around cenotes, important sources of drinking water. They are also a source of recreation and are often used as garbage cans. This cenote has a layer of bottles and rubbish at its bottom. (Jean Bahr)

During spring break 2006, a group of intrepid Geobadgers made their way across Mexico's Yucatan Peninsula on a field trip exploring the region's unique hydrogeology. The group included Professors Jean Bahr and Carl Bowser and grad students Jeff Wilcox, Heidi Crosby, Rachel Greve, Mike Cobb, Jonathon Carter, Chris Muffels, Chris Lowry, Laura Craig, and Jeff Schneider (GLE).

Karstification of the Yucatan Peninsula has progressed to the point that its northern half is devoid of surface drainage. Sinkholes—known as cenotes—are the most prominent karst features and serve as the sole water supply for many communities.

In our travels we encountered a variety of cenote forms. The maturity of a cenote could be determined by the extent to which its ceiling remained intact. At one location, we visited three cenotes aligned along a joint that spanned the development spectrum. At another series of cenotes, we snorkeled through the maze of passageways of a submerged cave system, complete with stalactites and stalagmites.

At the ancient Mayan cities of Uxmal, Chichen Itza and Tulum we learned about the centrality of water in the Mayan society. Chichen Itza was established in close proximity to two cenotes, which became important features of their religion as they were believed to be portals to the underworld. Unlike Chichen Itza, Uxmal and Tulum did not have the luxury of cenotes close at hand. The water storage system of Uxmal was quite impressive and included numerous cisterns into which sporadic rainfall was channeled over the paved surface of the city.

The issues currently threatening the water resources of the Yucatan Peninsula result from a lack of wastewater treatment—Merida, a city of 500,000, lacks centralized wastewater treatment—and overexploitation of the thin freshwater aquifer. Communities throughout the Yucatan

(and most other parts of Mexico) are now faced with the prospect of limited and increasingly contaminated sources of freshwater. The pea soup appearance of the water of the ceremonial cenote at Chichen Itza provided a stark illustration of the degradation of water quality by the untreated effluent from the adjacent community.

The effects of rapid, haphazard and environmentally-unsound inland development have been rapidly transferred to the waters of the eastern coast through extensive networks of submerged caves. A local cave diver told us that in some areas the divers have entered cenotes several miles inland and resurfaced in the ocean. The potential for widespread destruction of the fragile reef ecosystems has spurred some to call for responsible planning and innovative wastewater treatment, though lax environmental regulations and enforcement suggest that the call is not being heeded.

Despite some difficult adjustments to “Mexican time” and cuisine, the trip went off without a hitch.

For a detailed description of the field trip, with many photos, please view our website at: <<http://www.geology.wisc.edu/~hydro/Yucatan>>. ●

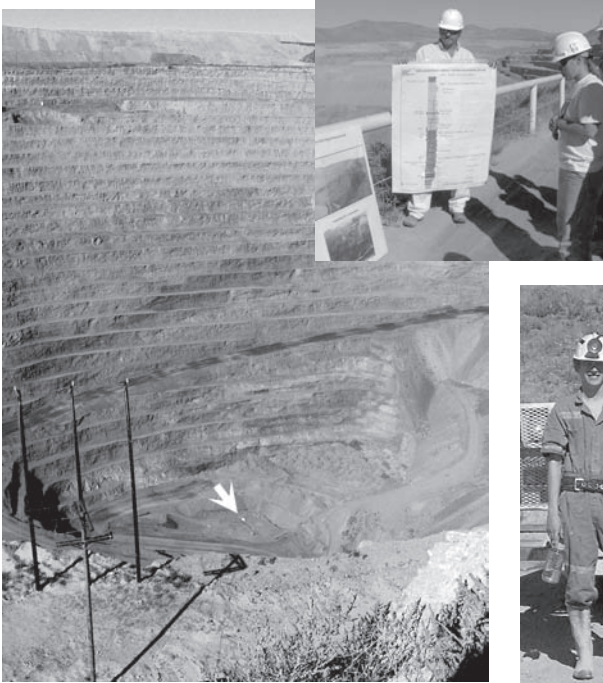


The beach at Akumal: Paul Sanchez-Navarro, director of the Centro Ecologico Akumal (CEA), shows recent algal growth on rocks at the water line. It is believed that contaminated ground water discharged into the bay may have a detrimental effect on the reefs offshore. (Chris Lowry)

Field Trips:

ECONOMIC GEOLOGY 515

Visits Four Northern Nevada Mines



Day 1: Phil Brown's students visited the South Mega Pit at Newmont's Twin Creeks Mine, Northern Nevada. This is the deepest part of the pit—note the buildings in the bottom (arrow) for scale. Inset: A Twin Creeks geologist describes the geology of the area to the group.

Phil Brown

During the last few days of September, I took nine students from my Economic Geology (515) class to north central Nevada to visit four gold mines. The trip was organized with the help of Newmont Mining Corporation and gift funds contributed to the Eugene Cameron Fund in the department made it possible by paying for the group's airfare.

We flew from Madison to Reno on Wednesday afternoon, picked up two rental minivans, and drove three hours to Winnemucca arriving at 1 AM. We were able to stay in a facility that Newmont had rented for the summer for their interns and thus slept well, if briefly. On Thursday we started our tour at the sprawling Twin Creeks open pit mine and after lunch visited an interesting (and abandoned) nodular barite mine. Twin Creeks was the first mine visit for much of the class of seven undergraduates and two graduate students.

Friday upped the ante when we had a tour of the underground Midas mine—a spectacular, multiple generation banded quartz-carbonate vein deposit. One of the students, Matt Riederer, is undertaking a fluid inclusion and phase equilibria MS thesis at Midas and the tour was run by John Marma, a 2002 MS graduate from Madison. After lunch in the

Below, Day 2: Our group on the surface after a tour of the Midas underground mine.



Left, Day 3: A geologist at Newmont's Phoenix mine describes the local geology at an overlook of a mined out pit and its associated pit lake, visible in the lower left corner of the picture. Each step in the wall in the background is approximately 20 feet.

(Photos by Matt Riederer)

rustic Midas Saloon in downtown Midas (a couple of double-wides and hunting cabins and a burned-down school house) we visited the core facility and the surface expressions of the veins and were impressed (and depressed) by how cryptic the appearance of the structures were only a few hundred vertical feet above a multimillion dollar deposit. Friday evening Newmont hosted a delicious Basque dinner in the Martin Hotel in Winnemucca where the students had an opportunity to talk to geologists from many of the Newmont properties within a hundred miles of Winnemucca.

Saturday provided two other views of the modern mining endeavor. In the morning we visited the Phoenix Project—as the name implies, the rebirth of a couple of mines. Several closed mines in the Battle Mountain district are scattered across the top of a

mountain and are being reopened as a single large operation with all new processing technologies and facilities. Saturday afternoon we visited Lone Tree—a mine in the process of being decommissioned and eventually reclaimed.

Support provided by you, the alumni, in this case through the Cameron Fund, allowed us to pull off this wonderful experience of three days jam packed with diverse geology and an introduction to the modern world of prospecting and mine development. The resurgence of mineral prices over the past 3-4 years has resulted in the Phoenix-like rebirth of mining company's interest in hiring geologists—geologists who can not only run an Excel spreadsheet ore reserve calculation but are willing and eager to get dirty doing the real work of exploration, ore control and production. ●

This field trip was made possible by alumni contributions to the department. The faculty and, especially, the students would like to thank the alumni for supporting these field trips, which are an integral part of undergraduate and graduate education.

Field Trips: SIERRA PAMPEANAS Argentina



Basil Tikoff explains the intricacies of thrust belts.

On a snowy day in March 2006, a group of UW graduate students and professors started a spring break trip to Argentina. Although we

got dropped off at the Milwaukee airport (rather than the Madison airport, in order to save money), the weather was sufficiently bad that we had to catch a bus to O'Hare in order to catch our international plane to Buenos Aires. We barely made it. This was the auspicious start of our trip.

In fact, we had a fabulous time and learned a lot. The fieldtrip was led by two Argentine colleagues: Dr. Jorge Rabassa and Dr. Claudio Carignano. One could not ask for better geological and cultural guides. Exactly how the fieldtrip got planned is yet another long story, but Jorge had worked with David Mickelson and had started corresponding with Toni Simo about a possible field trip. Ultimately, there were three faulty (Alan Carroll, Brad Singer, Basil Tikoff), 12 graduate students, and two undergraduates. We also had the benefit of taking along a department alumnus—Charlie Andrews—who was a great addition to the trip (and a particularly fine walking-around-Buenos-Aires compatriot).

We also tried to do our part for international relations, as each person in the group took a box of academic geology books for the new university in the La Rioja province where Dr. Carignano is a faculty member. Only a group of geologists would consider carrying 15 boxes of books through Buenos Aires as “light” work (paper has very low density compared to rocks).

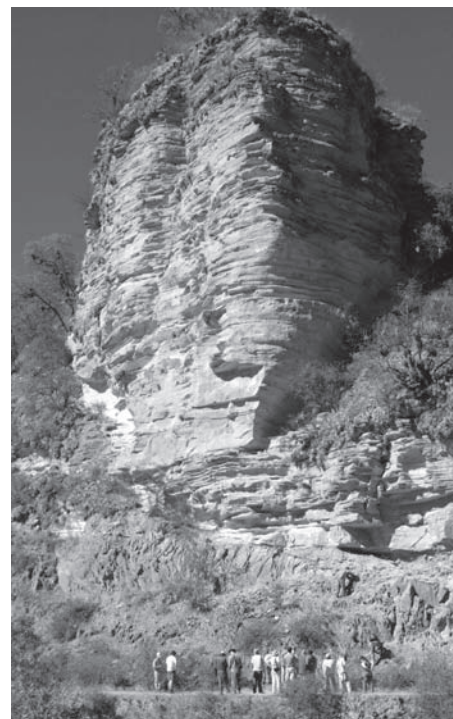
We first spent a day in Buenos Aires (seeing where Evita gave her famous address, tangoing, visiting neighborhoods), getting over the lack of sleep, and getting used to the concept of summer. The next day, after procuring geological

maps, we got on an overnight bus to the field area. The next day, we woke up to warm desert day in the province of La Rioja and started doing geology (and unloaded the books).

What we saw in the next seven days was amazing. We were principally visiting the Sierra Pampeanas, an area of “Laramide-style”, basement-cored block uplifts. These uplifts are interpreted to occur because of flat-slab subduction underneath South America. Drs. Rabassa and Carignano are geomorphologists, so we spent a lot of time looking at evidence of uplift of the Sierra Pampeanas prior to the ongoing Andean orogeny. In fact, we were shown pretty convincing evidence that at least part of the topography was old (Late Paleozoic?) in age, dated by sedimentary rocks in the paleo-valleys.

There were several highlights of the trip. We went up to see the volcanoes on the southern edge of the Puna plateau, including the Cerro Bonete Chico volcano (translated as “Party Hat”, which I must admit it looks like). In addition to the volcanoes, there were cryogenic soils and flamingos in shallow lake basins (at 14,000 ft!). Another highlight was the amazing Talampaya National Park, with its amazing organ-pipe-like geomorphology. And, of course, we can't forget to mention the empanadas (a mini pasty-type treat we ate for lunch, which worked well until the last day: this is a story you probably don't want to hear).

The real highlight of the trip was the interaction of people. The graduate students (and faculty) from different areas in the department worked together to understand the different areas. This involved peer teaching and group problem solving (and a fair amount of “winging it” by the professors). Getting to know our Argentine hosts, as well as the people we met when traveling throughout the country, was also wonderful. ●



Carboniferous glaciogenic sandstone/ conglomerate valley fill, above unconformity.



Sunset in the Triassic fluvial rocks at the Talampaya National Park.

Participants: Charlie Andrews, Bryn Benford, Alan Carroll, Lauren Chetel, Adam Eisenach, Amalia Doebbert, Justin Fairchild, JoAnn Gage, Justin Gosses, Jessica Lopez, Paul Mayer, Nick Legg, Jen Nielsen, Brad Singer, Betty Socha, Mike Smith, Kurt Refsnider, Buddy Tangalos, and Basil Tikoff.

(Photos by Alan Carroll)