Built in Japan at a cost of nearly $600 million, the *Chikyu* will be devoted to scientific ocean drilling and is the largest oceanographic vessel ever constructed. Harold Tobin's NanTroSEIZE will be *Chikyu*'s first project.

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Alumni Newsletter — Nov 2005

Harold Tobin climbing the drilling rig of the Joides Resolution on an Ocean Drilling Program research cruise in the Pacific Ocean.

Tobin Leads Mega-thrust Mega–Drilling Project

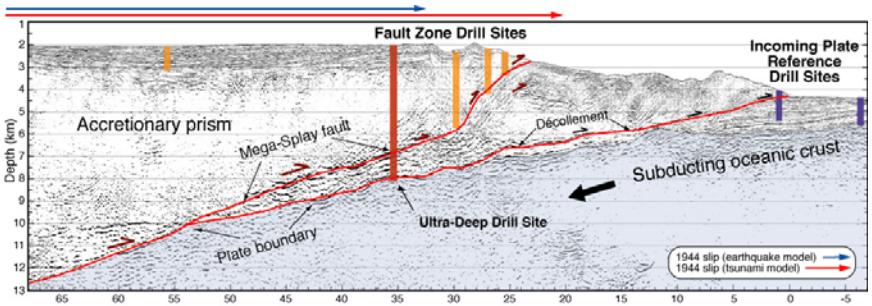
By Harold Tobin
Associate Professor of Geophysics

The high desert of Socorro, New Mexico, is not the most likely home base for a marine geophysicist, but since sea level isn't much of a boundary for plate tectonics, it isn't one for earth science research at New Mexico Tech (NMT) either.

Harold Tobin has been working across disciplinary and plate boundaries for many years studying the structure and mechanics of plate boundary fault zones on land and at sea. Now Tobin and colleagues have cooked up a megaproject to match these megafaults: drilling into and instrumenting a subduction plate boundary fault zone off the Pacific coast of Japan to tackle the processes governing great earthquakes in subduction zones.

Megathrust earthquakes at subduction zones, like the one that produced the devastating tsunami in the Indian Ocean in December, 2004, are the largest seismic events on the planet. They nearly always take place on faults that are off-shore beneath the continental

Inside



Deep seismic reflection profile from the Nankai Trough, with planned drilling sites. Drilling begins in 2007.

slope, hidden from view and from the efforts of field geologists. Novel techniques are needed to study these fundamental tectonic systems.

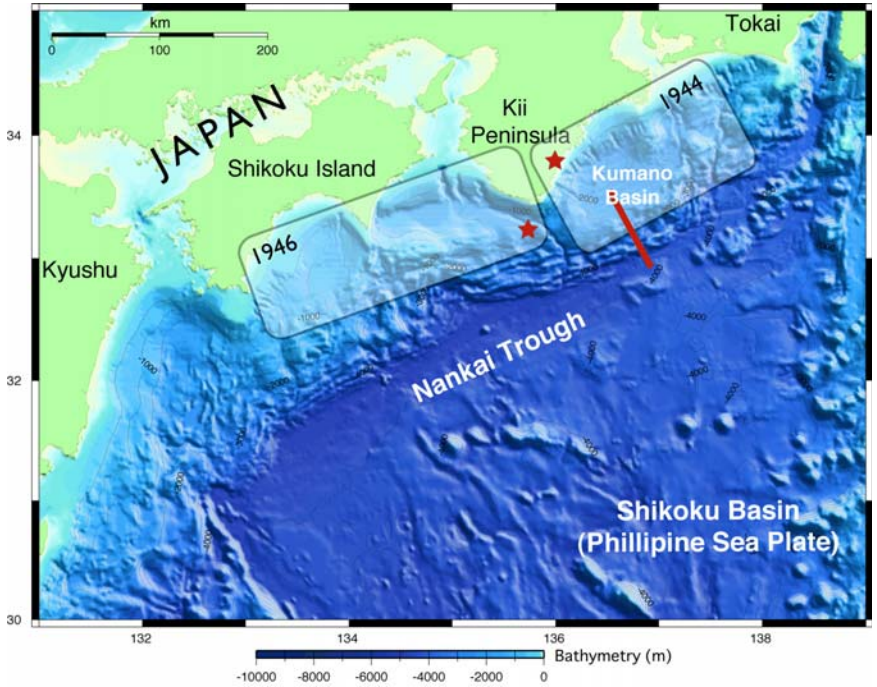
Since his graduate school days, Tobin has used a combination of seismic reflection studies, core sample analysis, downhole geophysical logs—even field geology on the sea floor from the *Alvin* research submarine—to shed light on the properties of thrust faults. This work has made major use of the capabilities of the Ocean Drilling Program (ODP) and its scientific drilling vessel, the *JOIDES Resolution*. Trading his rock hammer and compass for a drill bit and seismic data, Tobin's research has taken him to the Cascadia (Pacific Northwest), Barbados, and Costa Rica subduction zones as well as the Nankai Trough off southwestern Japan.

The *Resolution* has proven capable of drilling into faults more than 1,000 meters below the sea floor—deep enough to learn a lot about fault mechanics in sediments—but not as deep as the up-dip limit of the seismogenic zone, which is that portion of the plate boundary capable of contributing to the destructive slip of megathrust earthquakes. Since the late 1990s, Tobin and colleagues from the US, Canada, Japan, and Europe have hoped one day to drill into that seismogenic zone. That day is rapidly approaching.

The successor to ODP is IODP (the "I" stands for Integrated), an unprecedented international partnership between the US National Science Foundation and its Japanese counterpart with European and Chinese participation as well. The IODP will operate two ships starting in summer 2007, and one will be the phenomenal

new drill ship *Chikyu* (meaning "Planet Earth" in Japanese), which has the capability to perform scientific drilling to great depth using cutting-edge deepwater drilling technology employed in the oil and gas industry. *(See photo on back cover.)*

Beginning in 2001, Tobin headed up a group of more than forty scientists from seven countries that proposed to drill down as much as six kilometers (3.7 miles) below the sea bottom into and across the plate interface zone at the Nankai Trough, a location of many great earthquakes and large tsunami. This project, known as the Nankai Trough Seismogenic Zone Experiment (NanTroSEIZE), has been accepted as the first project to be undertaken by *Chikyu*.



The Nankai Trough of Japan has the world's longest record of great subduction earthquakes and tsunami, including the two shown here from the 1940s.

Tobin has been named co-Chief Scientist for this six-to-eight-year effort, along with Dr. Masa Kinoshita of JAMSTEC (the major marine earth science research center in Japan).

The goals of NanTroSEIZE are to drill a network of boreholes into different parts of the fault system at various depths dissecting its anatomy and to install seismometers, strainmeters, pore pressure sensors, and other devices to take the pulse of this seismogenic zone that has repeatedly slipped resulting in great (magnitude 8 or greater) subduction earthquakes. By leaving data-recording instruments down the boreholes over many years, scientists hope to capture in situ signals of the seismic cycle of strain accumulation and release.

NanTroSEIZE is the most ambitious undertaking in scientific ocean drilling since the famous Project MoHole of the 1960s, which old-timers will no doubt remember (the main objective—drilling across the Moho into the mantle—still has not been achieved). Drilling and instrumenting the holes will involve many separate expeditions to the area, scores of scientists and engineers, and hundreds of days of ship time. In the end, this wired fault zone will give us an unprecedented, real-time look at how faults work.

Besides drilling, Tobin is also getting ready for a 3D seismic reflection survey of the region to be carried out by a commercial vessel in March 2006. In another major milestone, this will be the first state-of-the-art marine 3D survey ever performed for purely scientific goals. Imaging of the fault system to this level of detail will help researchers map out the distribution of stresses and strains in the plate boundary.

Tobin and his students spend a lot of time processing and interpreting seismic reflection data, trying to extract key information about the physical properties, pore fluid pressure, and stress state in the faults and sediments of subduction zone accretionary wedges. The hallmark of Tobin's work has been a broad interdisciplinary approach to fault zone studies, and students have also worked on laboratory rock mechanics, field geophysics over faults from Rio Rancho, New Mexico, to Half Moon Bay, California, and structural geology of fault rocks.

Since Tobin's arrival at NMT over eight years ago, he has seen fault zone and continental margin research burgeon here. With recently arrived faculty Susan Bilek and Glenn Spinelli in geophysics, and Gary Axen in geology, NMT is now on the map as a major center for fault studies and could be on its way to becoming known as an oceanographic institute! We may have to wait a while for global warming to raise sea levels enough to get our own shipyard, however.

Drilling of the NanTroSEIZE Project is slated to begin in summer 2007 under the leadership of Tobin and Kinoshita. It will be among the biggest geoscientific experiments ever mounted. The NanTroSEIZE project will keep NMT at the forefront of a worldwide effort to understand the hazards posed by earthquakes and tsunami.

EES Alumni Reception at AGU

Attending the AGU meeting?
Live in the Bay Area?

Join us for drinks and hors d'oeuvres at

Johnny Foley's Irish House
243 O'Farrell Street, San Francisco **Map**

Tuesday, December 6, 2005
7:30-10:30 pm

Visit with old friends and meet
some of our new students and faculty!

Robert S. Bowman
Department Chairman
Professor of Hydrology

TECHtonics

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November 2005

Note from the Chair

This past year has been a time of change for both the department and the New Mexico Tech campus. We added two faculty members who bring new energy and expertise to the department. Gary Axen and Glenn Spinelli describe their backgrounds and interests elsewhere in this issue. Also highlighted is Enrique Vivoni, our newest faculty member in hydrology, who joined us in 2003.

These days, New Mexico Tech resembles a construction zone more than a college campus. We're still recovering from the October 2004 hailstorm, plus several new buildings are going up and others are receiving major facelifts. The new Student Services Center will house a much-improved cafeteria and snack bar. The 60s-era addition to Cramer Hall has been demolished and is being rebuilt more in tune with the traditional architecture of Brown and Weir Halls.

This summer we submitted concept drawings for a new Earth Sciences Complex that would house our department along with the Bureau of Geology. The first attempts to fund this joint facility will occur in the 2006 legislative session. Stay tuned.

So there are new folks to meet and new things to see the next time you visit Socorro. Please make a point of doing so, and be sure to drop by and say hello while you're here.

Faculty Spotlights

Glenn Spinelli

Assistant Professor of Geophysics

Two years after arriving at NMT, I'm happy to introduce myself as an assistant professor in the geophysics group. I received my PhD from the University of California–Santa Cruz in 2002, then moved on to a post-doc at the University of Missouri. For the last two years, I was a visiting assistant professor with the hydrology group here in the EES department. Over the past summer, I made the transition from "visiting" to "staying" and from the hydrology group to the geophysics group.

My research is focused on marine hydrogeology, particularly fluid flow in subduction zones, heat transport, and sediment physical properties. My most recent work examines the role subduction zone fluids play in influencing seismicity and deformation along plate boundary faults. Being involved with this research means that I'm frequently straddling the frontier between geophysics and hydrology.

In an ongoing study, I am examining sediment dewatering in the Costa Rica margin subduction zone. Large amounts of opal and smectite in the subducting sediment release water during diagenetic reactions and affect fluid pressures along the plate boundary fault. Along-strike differences in fluid pressure on the fault correspond with along-strike differences in the locations of earthquakes and the amount of locking between the subducting and overriding plates. In the near future, I hope to cross the border from Costa Rica to study the fluid flow in the Nicaragua margin subduction zone. On the other side of the Pacific, I'm examining the sedimentation and thermal history of crust subducting off southern Japan.

This fall (2005), I'm teaching Practicum in Quantitative Methods for the third time. The course has evolved into a math and computer programming class with a wide range of earth science appli-

cations. Historically, the class was only for incoming hydrology graduate students. In its current form the class is populated by a mix of hydrology, geology, geochemistry, and geophysics students—it's a dynamic group, and I'm eager to have this diverse group of students work together on a variety of geoscience problems. For the last two spring semesters, I taught Hydrogeologic Processes. In spring 2006 I'll be teaching The Geophysical Earth (GEOP 308), and I'm looking forward to getting undergraduates excited about geophysics.

Gary Axen

Associate Professor of Geology

Hello! I am a structural geologist replacing Laurel Goodwin, who I'm sure that many of you were sorry to see leave NMT. I migrated from Los Angeles, and I am very pleased to be employed at a small technical university in an excellent department that covers an impressive breadth of earth sciences, and also to live in a friendly town with roughly the square root of the LA population—no more traffic jams and smog!

I chose geology as a career because of my love of doing science in the outdoors, and I am in academics because it allows me to leave the desk behind a few months per year. After receiving my BS and MS from MIT in 1980, I spent a year consulting with HydroGeoChem in Tucson, AZ (my home town), then a year lecturing at Idaho State University, and five years at Northern Arizona University. The latter years convinced me to stay in academics, so I returned to school and got my PhD from Harvard in 1991. I worked until 1995 at a Mexican federal government research institute and graduate school in Baja California (Centro de Investigación Científica y de Educación Superior de Ensenada, or CICESE for short). My job before moving to NMT was at UCLA.

My academic interests are in continental tectonics and fault mechanics. Most of my research has emphasized extensional tectonic settings, particularly the evolution of low-angle normal faults, which challenge many standard fault mechanical theories.

My research is strongly field based and typically is interdisciplinary. The general approach is to identify "natural laboratories" that allow testing of tectonic and mechanical hypotheses. Field work typically involves geologic mapping and structural analysis (i.e., of fracture systems related to faults), plus sample collection. I have worked closely with geochronologists, metamorphic petrologists, geophysicists, geodynamicists, sedimentologists, and other structural geologists.

Currently, I have two projects in oblique tectonic settings, where tectonic evolution differs from the classic "accordion" tectonics we see in cross sections. One focuses on the active oblique continental collision between Saudi Arabia and Eurasia, which is the youngest collision on earth and reveals early processes that are obscured in mature orogens such as the Himalaya. The other is the oblique Gulf of California—Salton Sea rift. Of particular interest is the evolution of strain partitioning among dip-slip and strike-slip fault systems. My students and I have enjoyed field areas in Nevada, California, Mexico, the Alps, and Iran.

Another interest is the methodology of dating fault rocks, such as frictional melts (pseudotachylyte) formed during seismogenic slip events, using the $^{40}Ar/^{39}Ar$ method. Most recently, we began a joint geophysical-geological effort using ground-based LIDAR to characterize the surface roughness of natural faults at scales ranging from centimeters to 100s of meters. These data will constrain a fundamental parameter important to many fault-zone processes such as frictional slip, seismic energy dispersion, and damage-zone and gouge evolution.

At NMT I will teach undergraduate structural geology, metamorphic petrology, and field geology. Graduate courses and seminars will be in fault mechanics, regional tectonics, and structural processes.

I also enjoy hiking, telemark skiing, mountain biking, rock climbing, river running (well, it's been a few years…), and hot springs, so Socorro seems like just the place for me! It's truly a pleasure to be here.

Enrique Vivoni
Assistant Professor of Hydrology

After a four-day, cross-country drive from Boston, my wife, Amapola, and I arrived in August 2003 to form part of the Department of Earth and Environmental Science, New Mexico Tech, and the Socorro community. Behind remained the concrete city, the long winters, and the never-ending pace of life; ahead lies a more peaceful existence in an oasis in the desert. We have enjoyed our two years in Socorro and NMT and have just welcomed our first child, María Camila Vivoni, to our family on August 3, 2005. That life has changed is an understatement.

My arrival to the hydrology program is part of an effort to expand the scope of our research activities and course offerings in surface hydrology, watershed processes, and land-atmosphere interactions. Prior to my arrival, I spent nearly ten years at the Massachusetts Institute of Technology (MIT) working with Professors Dara Entekhabi and Rafael Bras in the Department of Civil and Environmental Engineering. My graduate research varied from environmental fluid mechanics and hydrometeorology to distributed hydrologic modeling, geographical information systems (GIS), and remote sensing.

During these first two years, I have concentrated on building a strong research group in surface hydrology. Currently, six graduate students and one post-doctoral associate conduct research with me in a range of hydrologic topics, with a particular focus on semiarid watershed processes. Our approach is to synthesize hydrologic modeling, remote sensing, and field measurements to obtain new process understanding of precipitation, snow, runoff, soil moisture, and plant–water relations. Our work is ultimately used to understand extreme hydrologic events (e.g., floods and droughts) and to improve hydrologic models and observations.

An example can help highlight our research activities. During the summer of 2004, our research group participated in the Soil Moisture Experiment 2004 in Sonora, Mexico. We conducted a two-week field study over a topographic transect, where samples of rainfall, soil moisture, temperature, and other variables were obtained in different ecosystems. The summer monsoon in Sonora is especially strong and leads to the greening of a subtropical vegetation community. Our field data are unique for understanding land–atmosphere interactions and rainfall-runoff processes in semiarid complex terrain. We are currently using the data sets to understand precipitation and soil moisture variability, to validate remote sensing observations taken from aircraft and satellite sensors, and as a basis for distributed hydrologic modeling in the monsoon-driven mountain region.

Our research activities are also being used to improve classroom instruction. During my first two years, I have taught an ecohydrology seminar series, Surface Water Hydrology (HYD 412/512), Hydrometeorology (HYD 513), and an introductory hydrology course for the master of science teaching program. As part of this latter course, we have taken field trips to the Valles Caldera National Preserve and the Sevilleta National Wildlife Refuge where our research group has ongoing activities. The hands-on work in natural and human-impacted hydrologic systems has been an important educational experience for students. Similarly, my graduate courses have incorporated hands-on work with GIS and remote sensing data—a set of skills that are essential in current research and professional activities. This upcoming spring 2006, we are planning a new set of field-based laboratory sessions for the Surface Water Hydrology course that will further the integration of research and educational efforts.

To conclude, I am grateful for the opportunity to expand our hydrology program and bring new research and educational avenues to the department. Through field, modeling, and data analysis efforts, we are striving to become an internationally recognized research group in surface hydrology. I feel we are energized, motivated, and on the path towards this goal. More information about our efforts can be obtained through my web page. *(See Internet Links on page 16.)*

News and Notes

Alumni Activities and Fund Raising

Andy Campbell

At the October 2005 EES Faculty Annual Retreat, the department decided to create a "czar" to oversee alumni activities and fund raising. Andy Campbell was asked to take on this role. Campbell started this endeavor while he was department chairman by reinstituting *TECHtonics,* the departmental alumni newsletter. The purpose of *TECHtonics* is to keep in touch with our alumni. We all enjoy hearing from you, and we hope you like keeping up with departmental activities and changes. We welcome feedback on how your experience at NMT prepared you for work or further education. Last year's alumni survey brought us up to date on many of you.

Although the department has not been active in fund raising in the past, our new efforts will focus on raising funds for providing an enhanced educational experience for our students. There are many opportunities we would like to offer that our state funding will not cover. The initial major priorities will be to sponsor field trips, provide fellowships (graduate and undergraduate), fund student research grants, enhance student computing facilities, and provide more departmental social functions. We will be developing a list of fund-raising projects that we hope will catch your interest. Please keep us in mind when you think of charitable giving.

EES Alumna Receives Prestigious Award

Michelle Walvoord (MS Hydrology '99, PhD EES-Hydrology '02) received the GSA Subaru Outstanding Woman in Science Award for 2005 at the annual GSA meeting in Salt Lake City. In partnership with Subaru and in memory of Doris M. Curtis, the award is given to encourage women in the geosciences.

According to Jean Bahr, chair of the award selection committee, Walvoord's dissertation research on water movement in desert soils resulted in the discovery of unexpectedly large concentrations of nitrate in subsurface soils. This result, published in *Science* in 2003, caused a major rethinking of the nitrogen budget for desert environments with important implications for understanding desert ecosystems and predicting the response of these systems to global climate change or human activities such as irrigation.

Walvoord is currently a research hydrologist for the US Geological Survey in Denver, Colorado.

EES Faculty Awards

Geophysics professor Rick Aster received the NMT President's Faculty Award for 2005 in recognition and appreciation for his contributions and outstanding leadership role in bringing national academic distinction and recognition to New Mexico Tech. He received the award from President Lopez and the NMT Board of Regents on May 7, 2005 during a President's Club dinner.

Geochemistry associate professor William McIntosh was the 2005 recipient of the NMT Distinguished Research Award. McIntosh is also a volcanologist and geochronologist at the New Mexico Bureau of Geology and Mineral Resources and co-director of the NM Geochronology Research Laboratory.

Hydrology professor Fred Phillips received the Kirk Bryan Award for Excellence by the Geological Society of America at the 2005 GSA meeting. The award is given annually in recognition of outstanding contributions to the interdisciplinary field of Quaternary geology and geomorphology.

Books Recently Published by EES Faculty

Jan Hendrickx, professor of hydrology, and Bruce Harrison, associate professor of geology, co-wrote four chapters in the book **The Rio Chagres, Panama—A Multidisciplinary Profile of a Tropical Watershed**, published by Springer, Inc. They contributed to the book along with several international scientists to explain the physical and geological components of the Rio Chagres, the main

supply of water that keeps the Panama Canal running.

Geochemistry professor Kent Condie recently published **Earth as an Evolving Planetary System**, an overview of key topics and questions about the evolution of the earth's crust and mantle over the past four billion years.

Geophysics professor Rick Aster co-authored **Parameter Estimation and Inverse Problems** with Brian Borchers, a professor of mathematics at NMT, and Clifford Thurber, a geophysics professor at the University of Wisconsin–Madison. The book presents fundamental and practical issues associated with parameter fitting and inverse problems, as well as the basic theory of inverse problems.

Other Faculty Notes

Hydrology professor John Wilson resigned from the Board of Directors for the Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI) to lead development of a new CUAHSI community science agenda that will be presented to NSF leadership this winter.

Alumni News

Nathalie Nicole (Derrick) Brandes (BS Geology '99, MS Geology Dec '02) eclogite@pasty.com **writes:**
"This August (2005) I will begin my new job as a geology professor at Montgomery College, a small school north of Houston, Texas. I'm responsible for teaching the physical, historical, and environmental geology courses."

Paul T. Brandes (BS Geology '01) eclogite@pasty.com **writes:**
"I graduated from Michigan Technological University in May 2004 with a MS in Geology focusing on Precambrian ore deposits of Michigan's Upper Peninsula. In September 2004 I began working for Broadbent and Associates in Henderson, Nevada, as a geologist. My job with the company includes exploration for new industrial mineral deposits around the Las Vegas, Nevada, area."

Andrew Graves (BS Geology '01) darkjimson@hotmail.com **writes:**
"Currently working offshore on a TransOcean Drilling rig, Working as a lead mud-logger in deepwater. Off weeks drinking in the French Quarter in New Orleans. Drilling deepwater is crazy, the geology is simple, but the details complex. Working exploratory wells currently."

H. Kirk Jones (MS Hydrology '99) goldbug@comcast.net **writes:**
"I'm currently the Program and Laboratory Director for Pintail Nevada Gold Technology. We are working on new methods of enhanced precious metals recovery using biogeochemical mechanisms in spent ore heaps by maximizing leaching engineering with biological lixivients. Currently, we are in the process of taking this technology into the petroleum industry as well to enhance oil recovery as well as provide for renewable real-time production of natural gas."

Daniel J. Leiphart (MS Geology Dec '00)
dan_leiphart@anadarko.com **writes:**
"Married with two kids. Currently exploring for oil and gas in Anadarko's International Deepwater group."

Roseanna M. Neupauer (PhD EES–Hydrology Dec '00)
Roseanna.Neupauer@colorado.edu:
Roseanna recently left University of Virginia and took a faculty position at the University of Colorado–Boulder as an assistant professor in the Department of Civil, Environmental, and Architectural Engineering.

Internet Links

Find out more about topics covered in this newsletter by going to the following web pages.

NanTroSEIZE Project:
www.ees.nmt.edu/nantroseize

Integrated Ocean Drilling Program:
www.iodp.org

Harold Tobin:
www.ees.nmt.edu/tobin

Rob Bowman:
www.ees.nmt.edu/bowman

Glenn Spinelli:
www.ees.nmt.edu/spinelli

Gary Axen:
www.ees.nmt.edu/axen

Enrique Vivoni:
www.ees.nmt.edu/vivoni

NMT Surface Hydrology:
www.ees.nmt.edu/vivoni/shrg/pages

Geology/Geochemistry Program:
www.ees.nmt.edu/Geol

Philip Kyle:
www.ees.nmt.edu/kyle

El Defensor Chieftain article on Michelle Walvoord:
dchieftain.com/news/55709-10-26-05.html

EES Alumni:
www.ees.nmt.edu/alumni

Alumni Update Form

SEND US YOUR NEWS!!! Use the form below or online at
www.ees.nmt.edu/alumni/InfoForm.html

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Zip/Postal Code_____Phone _____

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Web page _____

Year Graduated _____

Degree/Major _____

Occupation _____

Company/Organization _____

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Mail to:
New Mexico Tech
Dept of Earth & Environmental Science
801 Leroy Place
Socorro, NM 87801 USA

Geology/Geochemistry News

By Philip Kyle, Professor of Geochemistry

The geology/geochemistry (G^2) group was delighted to welcome Gary Axen to the department in August 2005. Gary is a structural geologist and was an associate professor at UCLA prior to accepting our position. This returns the geology faculty back to full strength. Gary is into the swing of things and has just completed teaching the metamorphic half of the Ig/Met petrology class. In coming years we will move structural geology to the fall semester and petrology to spring. This will allow Gary time to work in the California and Nevada deserts in the winter months when temperatures are a little more bearable.

Administratively the department has been subdivided into three groups: geology and geochemistry (known as G^2), geophysics, and hydrology. Each of the groups had a group leader, and the coordinators often worked together as a "pseudo kitchen cabinet" reporting to the department chairman. A few years ago the structure of the undergraduate degrees changed to allow more integration of geophysics with geology/geochemistry, and we initiated the BS in Earth Science with geology, geochemistry, geophysics, and environmental geology options. (Incidentally we just approved a hydrology option). Logically it made sense for the G groups to integrate into a "super group," and this took place recently. Now there are only two groups in the department: G-cubed (G^3) and hydrology. Harold Tobin is "acting" head honcho of G^3.

Okay, for all you alumni who were undergraduates in the department who hated the foreign language requirement, it will soon be a thing of the past. A departmental committee is currently working on a major revision to the undergraduate curriculum. The committee started slowly, but now it is off and running, and we can only hold our breath and see what emerges. There have been tantalizing tidbits of a major reorganization of the 100- and 200-level classes. In the meantime the G^3 group made some small but significant revisions to the catalog and curriculum that will take effect in the 2006/07 academic year. Besides removing the foreign language requirement, we reduced the number of hours to graduate from 132 to 130 in line with many of the other science departments on campus. We now require all undergraduates to take CS 111—the introductory computer programming class. With the formation of G^3 and ongoing plans to come up with a unified undergraduate curriculum, we also merged all the undergraduate classes (those numbered through 400) under the same acronym. So it is goodbye to the geology, geochemistry, hydrology, and geophysics undergraduate classes. Now they are all listed as earth science. The most fun issue was choosing an acronym to use when listing the classes in the catalog. The G-cubers argued over EART, EARS, GEOS, ERTH, EES, and ERSC. So as the department is democratic, a vote was had and ERTH won out with eight votes, followed closely by EART (7), and in the distance was EES (2) and GEOS (1). So we thought ERTH it would be. Off Harold Tobin went to the Council of Chairs with the changes and, lo and behold, they voted to change it to EART. But at the Faculty Senate we got it changed back to ERTH. Such are the weighty issues that occupy our time. Graduate classes (500 up) are still in the four disciplines.

Penny Boston has brought a little color to the department in more ways than one. Recently she moved offices to be closer to the ladies room, or maybe to be further away from the geophysicists, or to be closer to the stair down to hydroid land on the second floor. Penny had her students paint her new office in multiple bright colors with big swirls, megastripes, and what looks like random patterns to me. After all her time down caves and being in the dark, we hope the color scheme brings a little more light to her life. As a fund-raising project, we should have tours with a nominal fee to visit Penny's kaleidoscope office. Maybe there's a hidden psychedelic past to Penny that she's expressing??