Terra Firma

EPS Newsletter

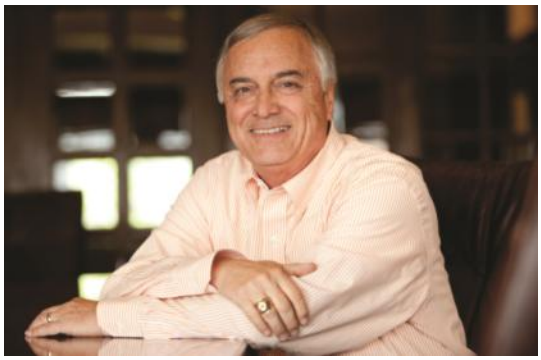
Fall 2013

Department of Earth & Planetary Sciences
COLLEGE OF ARTS & SCIENCES

Inside this issue:

SEC Professor of the Year

EPS professor **Harry "Hap" McSween** has been named the Southeastern Conference (SEC) Professor of the Year. This award honors one SEC faculty member from among the 14 SEC universities whose record in research, scholarship, and service places him or her among the elite in higher education.



"We are honored that Hap won this top award in our conference," said Chancellor Jimmy G. Cheek. "He is a stellar representative of our university and what it means to be an extraordinary scientist, teacher, and researcher."

McSween is a Chancellor's Professor and Distinguished Professor of Science. He is a leading expert on the composition of Mars and a co-investigator on several NASA Mars missions. He is a recipient of the National Academy of Sciences' J. Lawrence Smith Medal, and he is a fellow of the American Association for the Advancement of Science.

"He is passionately committed to the success of this institution," said Theresa Lee, dean of the College of Arts and Sciences. "We are a better community because Hap McSween is among us."

McSween also recently became Vice President/President-Elect of the Geological Society of America (GSA). GSA is an organization of more than 25,000 geologists from all over the world.

McSween has been named the EPS Best Teacher seven times. UT awarded him the Alexander Prize, for excellence in teaching and research, and the College of Arts and Sciences College Marshal, the highest college honor bestowed upon a faculty member.

Strong Hall News

The architectural design of Strong Hall, the future home of EPS, is progressing rapidly. Drs. McSween, Engel, Fedo, and McKay are meeting bi-weekly with an architectural group which specializes in designing science buildings. EPS will get about 2½ floors of the 7-story structure. The plans preserve a few key elements (mainly arches and entrances) from historic Strong Hall, the first women's residence hall at UT. These are imbedded in a state-of-the-art scientific education and research building, providing facilities that are second to none. Interactive displays, mosaics and artwork throughout the building will reflect the theme "Earth, Life and Time," particularly in the central atrium. We want to see Strong Hall become a

EPS Head discusses design with architect.

center where scientists, students, and the community come together for public lectures and special events. Alumni support will play a key role in realizing these dreams. We plan to start a campaign soon, with a range of donor recognition opportunities available. Construction should begin in Summer 2014, with completion by Fall 2016. It is an exciting time to be a UT Vol!

Faculty Update: From Labs to Lectures

From Senior Lecturer Bill Deane

I am honored to be the first Senior Lecturer in EPS. Senior Lecturer is a new, formal job position the University created last year to allow Lecturers to progress during their stay at UT. My wife likes to tell me that I have the "Senior" part down pat. I was originally hired to run the X-ray Lab in SERF, not to teach. Kula Misra and I spent many long hours puzzling through the complexities of running the X-ray fluorescence spectrometer (XRF). I came to realize that creating a useful calibration was an art as much as science. The most interesting sample I ran on the XRF was provided by Larry Taylor. It was the last sample collected on the surface of the Moon by the crew of Apollo 17. They collected dust off of the moon buggy. So the sample did not come from a single site but was an amalgamation of three days' worth of driving across the dusty lunar surface.

In May of 2004, Claudia Mora rushed into my office and asked if I would like to teach Geology 101. I enthusiastically replied yes and asked when I would start. She answered, "Three days. You need to start creating your lectures." For the next five weeks I frantically composed my PowerPoint lectures, sometimes finishing the lecture just before class. The class went very well, but the aftermath was a bit too interesting. It seems that staff cannot teach, and the UT administration was in a state of shock.

In 2006, I agreed to become the TA Czar with the proviso that I also lecture. I started with 101 (I already had the lectures) and later added 103. This summer, Chris Fedo asked me teach 104, Planetary Geology. I assumed it was for the spring semester, but no, it was for this fall. I am now back into full-time lecture-creating mode.

I joined EPS in September 2002. This is the most interesting job I have ever had. I never plan to retire.

Faculty Update: Isotopes and Beyond

From Assistant Professor Anna Szynkiewicz

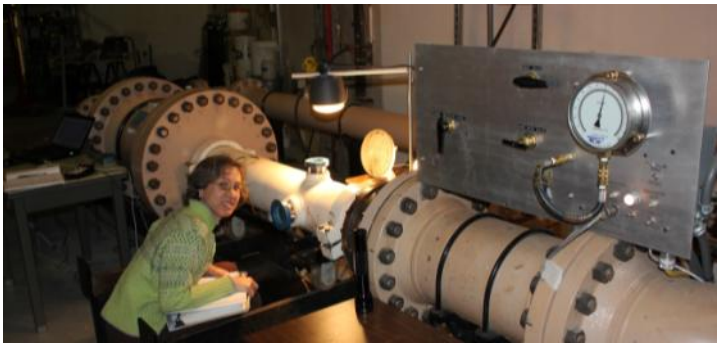
I am the new Stable Isotope Geochemistry faculty member in EPS. After receiving my PhD from the University of Wroclaw in Poland, I was a postdoctoral fellow in Indiana University, Bloomington, and University of Texas at El Paso.

My research is interdisciplinary and integrates areas of stable isotope geochemistry, hydrogeology, environmental studies, and planetary geology. I mainly use sulfur, carbon, oxygen and hydrogen isotopes as tracers to study water-rock interactions and anthropogenic impacts on the environment. My earliest research focused on the characterization of human impacts on freshwater environments in Poland, related to acid rain in mountain and lake ecosystems. But since arriving in the US in 2005, I have become interested in sources of water salinity in the American Southwest and Northern Mexico. For example, I have been investigating the inputs of fertilizers into the semi-arid Rio Grande in the Chihuahuan Desert and the sources of saline intrusions in coastal aquifers of the Gulf of California in the Sonoran Desert. With funding from NASA, I have begun using sulfur and

oxygen isotope tracing to study the hydrological system of terrestrial active volcanoes as analogues for understanding sources of sulfur-bearing minerals on Mars. My lab will use chemical and isotope analyses of water and sediment samples to quantify modern and historical deposition of sulfur compounds in Valles Caldera, New Mexico. Final results will be used to model sulfur inputs from volcanic activity and water-rock interaction on Mars.

Research: Titan

Associate Professor **Devon Burr** is studying the surface geology of Titan, Saturn's largest moon. Like a terrestrial planet, Titan has both a solid surface and an atmosphere. Titan's substantial atmosphere enables volatile cycling, although at 94K, this volatile is methane instead of water. So on Titan, the rivers are liquid methane, and the crust is water ice. Aeolian (wind-driven) processes create extensive dunes in Titan's low latitudes. The composition of the sand is not water ice eroded from Titan's crust, but solid hydrocarbons that apparently coalesce from aerosols in Titan's hydrocarbon-rich atmosphere.



Burr prepares to observe sediment behavior through the blue-rimmed viewing ports of the Titan Wind Tunnel.

To understand fluvial processes on Titan, graduate students **Richard Cartwright** and **Sarah Drummond** helped Burr analyze the morphologies created by the methane river drainages, as imaged in synthetic aperture radar (SAR) images collected by the Titan Radar Mapper onboard the Cassini spacecraft. Results show that half of the drainages on Titan are rectangular, having a high percentage of near right-angle bends and junctions. Rectangular drainages imply control of the flow by tectonic structures or their topographic by-products, such as ridges and troughs. This finding provides some of the first evidence for wide-spread tectonic processes on Titan. These results were recently published in *Icarus*.

To understand the atmospheric implications of the aeolian dunes, Burr and her colleagues are conducting experiments in a high-pressure wind tunnel at the NASA Ames Research Center Planetary Aeolian Laboratory. This wind tunnel was originally constructed to simulate Venusian conditions, and its refurbishment for simulating Titan conditions has been no easy task. Experimental results show that the minimum wind speeds required to move aeolian sediment on Titan are significantly different than suggested by previous models. These unexpected results from the Titan Wind Tunnel will provide information for modeling sediment and atmospheric behavior on Titan and other Solar System bodies.

Research: Banded Iron

Professor **Christopher Fedo** has been working with PhD student **Latisha Brengman** and a colleague from the Swedish Museum of Natural History to understand a peculiar rock type called banded iron formation (BIF). This iron- and silicon-rich sedimentary rock precipitated from ocean water 3.8-1.8 billion years ago. BIF has the potential to capture ocean conditions, such as water temperature, and reveal the sources of iron and silicon in the rock.

A 2.7 billion year old banded iron formation near Temagami, Ontario, Canada. Purple and light gray layers formed from precipitation of quartz adjacent to sea-floor hydrothermal vents. Dark gray bands are made of the iron-rich mineral magnetite.

The iron in BIF has been mined for more than a hundred years. Until recently, little attention has been paid to its quartz. With NASA-supported research funding, the Fedo lab has been investigating the origin of quartz layers within BIF by examining rocks from Greenland, Zimbabwe, and Canada.

The Fedo lab uses the isotopic composition of silicon in the quartz layers to determine the source of the silicon and to extrapolate the timing of major events in Earth's history. There is a trend in the silicon isotopes that was thought to suggest a gradual cooling of the oceans between about 4 and 2 billion years ago, from just below boiling to more modern temperatures. However, Fedo's work indicates that the trend is a composite of unrelated stories. Samples more than about 3 billion years old show that silica originated from super-hot, sea-floor vents. Younger samples show that the silicon in the oceans washed off the continents. This change may signal the time when continents grew from insignificant bumps to a size more comparable to what we see today.

GeoClub News

The success of graduate students in EPS is greater than ever. Eight PhD students graduated in the last academic year, along with 17 Masters students. More than 40 students presented at 14 different conferences. At least 22 students published papers in 18 different journals. A majority received generous amounts of financial aid in the form of competitive fellowships and departmental awards, many of which are alumni-funded. These types of assistance are invaluable to our students, as they allow access to new technology and travel opportunities.

Over the summer, many grad students had scientific experiences outside the scope of their normal research. **Joy Buongiorno** assisted a biodiversity and evolution course for the Tennessee Governor's School of Science and Engineering. **Sarah Keenan**, **Kathleen Brannen**, **Terri Brown**, and **St. Thomas LeDoux** worked with researchers from across the country to inventory the biota of several Tennessee caves as part of a state wildlife initiative. Sarah also collaborated on researching the symbiotic relationship between cave crayfish and a group of worms.

*EPS graduate students, **Kathleen Brannen**, **Terri Brown**, and **Sarah Keenan** inventory a TN cave with other researchers.*

GeoClub has undergone some notable changes. The undergraduate and graduate organizations were combined, to increase interaction and mentoring between EPS grads and undergrads. There are two new offices: an Undergraduate Outreach Coordinator and a Field Trip Coordinator. The GeoClub hopes to expand its field trip and social schedule considerably; we began with a very successful Fall Welcoming Party this year.

Alumni Focus

Peter Knappett (PhD Geology 2010)

I came to UT in 2005 to work with **Larry McKay** and **Alice Layton** on microbial transport, survival, and detection. As part of my doctoral research, I tested a new method for concentrating viruses and bacteria in ground water samples in rural Bangladesh. The appalling conditions there motivated me in my work. Issues like poverty, women's and worker's rights, and political corruption made me appreciate how public policy is influenced by scientific research in countries at different stages of development.

***Knappett** meets with doctors in Columbia; he helped launch an initiative to advise people where to obtain arsenic-free drinking water.*

To ensure my ability to continue influencing policy, I sought a faculty job at a major R1 university. I started applying in the middle of my PhD and continued through my post-docs in Munich and at Columbia University. As I progressed, I became better at sensing who I needed to impress and whether they were impressed or not. I am grateful to the preparation that EPS provided, including Larry McKay's course on Academic Careers. I'm now a tenure-track faculty member in Geology and Geophysics at Texas A&M University.

East Tennessee Petroleum Geology

Dr. Robert Hatcher's efforts to increase EPS involvement in the East Tennessee oil and gas industry are starting to pay off. Several of our alumni work in this field, including **Mike Hoyal (BA 1979)**, at the Tennessee Department of Conservation, and **Phillip Derryberry (MS 2011)**, who works for a regional oil & gas company. **Jim Bruner** of **Planet Energy** has made a substantial donation to the Swingle Graduate Fellowship endowment, and another regional company, **Miller Energy Resources**, has entered into a Graduate Fellowship gift agreement. The agreement currently provides tuition and a stipend for **Vade Scruggs**, an MS student working on the subsurface geology of part of the Cumberland Plateau.

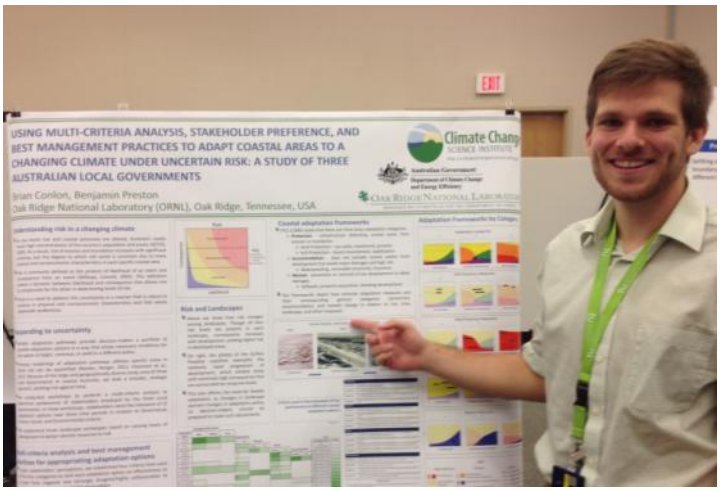
Environmental Studies

Professor **Mike McKinney** joined EPS in 1985. He has been involved in the Environmental Studies program, now part of EPS, since it began in the mid-nineties. The program started with just a handful of students. That number has grown steadily over the years; there are now more than 70.

McKinney has been the keystone of the ES program since he became director in 2001. He has advised every ES student in the program since then. All students are required to do an internship or scientific research. Of the 25% or so that choose research, McKinney supervises most of their projects.

Undergraduate researchers in the McKinney Lab are expected to present papers at conferences, and they do an outstanding job. For instance, **MacKenzie Hodges** received the Best Zoology Paper award in 2012 for her poster on endangered land snails, at the Tennessee Academy of Science.

The McKinney Lab is currently researching freshwater mollusk reintroductions in Tennessee. The Pigeon River lost much of its mollusk diversity through years of pollution by a paper mill. Now that the water is cleaner, the Tennessee Wildlife agency is trying to relocate freshwater clams from the Clinch River to the Pigeon River. If clams are not placed strategically, they are blasted downstream when dams are opened. Unsurprisingly, such stresses are detrimental to the health of the clams. The McKinney Lab is mapping habitats to find the best places to locate reintroduced clams. Students are also monitoring clam health by checking their heavy metal levels.



***Brian Conlon**, a senior in environmental studies and German, is one of fifty students nationwide who have been awarded the Udall Scholarship. This award recognizes students committed to careers related to the environment, tribal public policy, or Native American health care. Conlon participated in workshops and a rigorous case study during Scholar Orientation in August in Tucson, AZ. After graduation, Conlon intends to pursue a higher degree in environmental policy and research renewable energy. He is shown here presenting a poster on climate change adaptation policy at the ORNL Poster Show.*

This year, EPS gave out the first **Martin T. Katzman Family Scholarship** to Environmental Studies students **Sarah Flower**, **Alyssa Schroder**, and **Jesse Weber**. The Katzman fund was created in memory of Martin T. Katzman by his wife, Arlene, and was transferred to our department this year, after the merger of Geology and Environmental Studies into a single major. We're delighted that Mrs. Katzman's generous gift is allowing us to support such outstanding students.

Undergraduate Geology News

EPS undergrad student **Erica Allen** volunteered her time this summer to lead a Cub Scout troop on a trip to visit the Gray Fossil Site, about an hour and a half northeast of Knoxville. Many large vertebrate fossils have been discovered at this Late Miocene fossil site, including red pandas, short-nosed bears, alligators, and ground sloths. Several fossils from the site are displayed at the McClung Museum. The troop visited the dig site, in what was an ancient sinkhole, and participated in a guided dig with the paleontologists who work there. They also toured the museum and viewed many of the fossils that have been discovered at the site. Outreach to local groups such as this is an important step in creating the next generation of geologists.

*EPS undergrad **Erica Allen** leads a Cub Scout troop on a visit to Gray Fossil Site in Gray, TN.*

Alumni Gossip

Prof. McKay called **Gil Boyd (BS 1951, MA 1955, former geology instructor)** several times this year to thank him for his gifts to the Walls Endowment and to tell Gil about finding some of his 1950's geology textbooks in the EPS attic. It's amazing how much geoscience has changed over the past 60 years (plate tectonics, early Earth history, etc.), while other parts of our science remain very constant.

Larry Benson (MS 1963) is now retired; he met with UT faculty and development staff in August. He had just returned from the Concours d'Elegance Classic Car Show at Pebble Beach golf course. He was a judge for the classic Lamborghini competition, which required months of preparation and study. Larry lives on Tellico Lake, south of Knoxville, and has his own collection of classics, including a Lamborghini.

T.W. Garrett (MS 1973) dropped by the EPS office this summer, while he was in town for a meeting of the Rocky Mountain Elk Foundation. This group is involved in reintroducing elk to East Tennessee. His wife, Claire, met with development director Michelle Geller, to work on a graduate fellowship agreement.

Deborah Belvin dropped by EPS recently. When Deborah's husband, **Mark Belvin (BA 1973, MS 1975)** was a student here, she worked as a cook at the Geology field camp, near Dayton, TN. She has great memories of cooking in a very primitive kitchen and swimming in the blue hole spring, because they did not have showers at field camp. Their daughter, Kristina, is a high school senior; she's considering the Geology and Environmental Studies program at UT.

Paul Thompson (BA 1980) dropped by the department office to say hello. He was here for the UT-Georgia game (a heartbreaking loss in OT) and is working for Laredo Energy in Houston.

Tim Davis (PhD 1993) has moved from Apache Petroleum Company to Marathon.

Tracy (nee **Campbell, BS 2003**) and **Mark Pollock (MS 2003)** are still in Denver. Tracy is working for NG Trails Illustrated, and Mark is continuing his work for AMEC, Inc., while expanding his expertise in GIS.

Shawna Cyphers (BS 2004, MS 2009) ran into Prof. McKay at Reagan airport. Shawna works for a company that is investigating subsurface carbon sequestration. She was very interested in the related research that **Mike Gragg (MS 2012)** recently published from his thesis.

David Teal (BS 2005) actually finished his MS in August 2011 (in the last newsletter, we said he hadn't finished, yet). He now teaches Earth and Space Science full-time at Bedford North Lawrence High School, just south of Bloomington, Indiana.

Trisha Johnson (MS 2005) is working for the Department of Environmental Quality in Utah. She and her husband, Brandon, are the proud parents of a baby girl, Morgan Marie.

Steve Welch (MS 2005) continues working at ExxonMobil in Houston but has expanded his duties this year to fatherhood, as well. Adelaide Marie Welch was born August 20; dad and mom (Amy) are both enjoying their new challenges!

Meg (nee **Howard**) and **Quintin Overocker** (both **MS 2006**) moved to Illinois. Meg continues to work in the environmental industry, and Quintin is Associate Registrar at Illinois Wesleyan University. Quintin published his first novel this year, entitled "Bad Ground."

Cara Thompson (MS 2006, PhD 2011), is a faculty member in geology at Santa Monica College. Her husband, **Craig Hardgrove (PhD 2011)** is a postdoc at Arizona State University and works on the Mars Curiosity mission.

Grant Mincy (BS 2007, MS 2012) works for the nonprofit group Clean Water For North Carolina.

Alyssa Bell (MS 2007) completed her PhD in paleontology at the University of Southern California in September. She now works at the Natural History Museum of Los Angeles County.

Hannah Johnson (BA 2009, MS 2013) stayed at UT to finish her BS in EEB (2010) and then entered the MS program in Geology. She finished in August.

Kelli Harrelson (BS 2010) works at Brown and Caldwell. She is now married and has a daughter, Charlotte Elizabeth Jones.

Eric Hogan (MS 2011) has been working as a geoscientist at ExxonMobil's Exploration Company in Houston, Texas. He married Emma in October.

Noah McDougall (BS 2011) finished his MS at the University of Arizona. He now works for BP.

Emily Napier (BS 2011) continues to work for Brown and Caldwell, Inc., in Nashville.

Peter Robertson (BS 2011) is finishing his MS at Purdue University; he starts work at Chevron in January.

Andrew Beck (PhD 2011) is a postdoc at the Smithsonian. His research includes expeditions to Antarctica to search for meteorites.

Alumni News

The Houston-area alumni held another great event on May 4th, with the Reconnect Fun Day. The event was hosted by **Mike Allison (MS 1984)** and his wife Mary, at their home in New Caney, TX. About 40 adults (including 3 UT faculty) and 10 children participated in a day of great food, fellowship and fun. Events included model rocketry, swimming, fishing, Frisbee golf, a slide show on UT's role in the Mars Science Laboratory Mission, and a demonstration of **Dr. Moersch**'s quad-copter. This device is used at UT for low altitude remote sensing, but it's a lot of fun, and I expect several of our alumni will soon have their own quad-copter. Attendees included **John King (MS 1960)**, **Jim Hersch (MS 1978)**, **Tom Roberts (MS 1978)**, **Randy Kissling (BA 1979, MS 1981)**, **Chris Heine (MS 1986)**, and **Mike Kozar (MS 1986)**, as well as recent grads **Emily Goodman (BS 2005, MS 2007)** and **Patrick Schuneman (MS 2006)**.

Bosiljka Glumac *exits Tounj Cave in Croatia.*

Bosiljka Glumac (PhD 1997) received the EPS Accomplished Alumni Award on November 21. She came to UT in 1991 as her home country of Yugoslavia (now Croatia) plunged into civil war. She chose UT because of a great graduate assistantship and the opportunity to become one of Prof. Ken Walker's "bankers" (carbonate, of course). Taking courses and TA-ing kept her busy, and fellow graduate students provided fun distractions as she struggled to adjust to being in the US and dealing with news from home. She persevered and appreciated all the support and encouragement she received to carry out independent field and laboratory research. Bosiljka was offered a job at Smith College in Northampton, Massachusetts the day after her PhD defense. She is now a full professor of geosciences there, and she strives to nurture, challenge, and inspire students as UT did for her. She lives with **Tony Caldanaro (MS 1994)** and their two children, Alex (10) and Yelena (8).

Giving Opportunities

The Department of Earth and Planetary Sciences acknowledges the generous financial support of our alumni and friends. Your contributions, no matter what size, play a critical role in supporting the academic achievement and research of students and faculty. We hope that you will continue to remember us when deciding on your charitable giving. Suggested areas for contributions include the

EPS Enrichment/ Professor's Honors Fund.

This fund is our primary discretionary account. It supports departmental activities such as

- Teaching,
- Research,
- Field/Conference Travel,
- Student Awards.

If you have specific philanthropic goals, you may wish to consider one of EPS's other funds, a few of which are listed here.

To contribute online, please visit

eps.utk.edu

and click on

Contribute to a big idea. Give to EPS.

The EPS Enrichment Fund will be selected for you.

George D. Swingle Graduate Fellowship Fund
Otto Kopp Undergraduate Research Fund
Don W. Byerly Field Camp Scholarship Fund
Ryan Edwards Memorial Scholarship Fund

If you would like more information about any of these funds or would like to start a new fund or bequest, please contact the department head at lmckay@utk.edu (865-974-5498) or Michelle Geller in the Office of Development at mgeller@utfi.org (865-974-3816).

To mail your donation to EPS, make your check payable to **The UT Foundation,** with a note indicating the fund to which you would like to contribute.

THE UNIVERSITY of TENNESSEE KNOXVILLE

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Tell us about yourself! Let us know about your new job, recent accolades, etc.

Walker Update

The Ken Walker Endowed Professorship was set up in 2003 to honor Ken's outstanding career. Dr. Linda Kah is the current Walker Professor.

Ken Walker retired in 2007, after 33 years of full-time service and 6 years in phased retirement. He was a faculty member in EPS and spent 10 years as Department Head. He also served 10 years as Assistant Vice Chancellor for Research, Associate Vice Chancellor for Research, and Assistant and Associate Vice President for Research. When Ken retired in 2001, he had supervised more PhD students to completion of their degrees than any other member of EPS up to that time. He also supervised numerous MS students. Many of his graduate students are now working in the petroleum industry in research, exploration, or production positions.

*Thao Nguyen and **Ken Walker** visit the Great Wall of China.*

Ken and his partner of 19 years, Thao Nguyen, have lived in Pompano Beach, Florida, since December of 2006. They love the Fort Lauderdale/Miami area; it provides a very enjoyable cultural experience. They take 2 or 3 cruises a year and travel regularly in the States. Ken returns to the Knoxville area once or twice a year to visit his 3 daughters and 7 grandchildren.