



Fall 2014



Department of Earth & Planetary Sciences
COLLEGE OF ARTS & SCIENCES

Strong Hall Fundraising

Strong Hall is still the biggest news in EPS, as we enter into a new chapter of our department's 107-year history! The architectural design is complete, excavation has finished, and workers are installing pilings for the foundations. EPS expects to move into the building at the end of 2016 or early 2017.

EPS Department Head **Prof. Larry McKay** has been working with the College Development Office to establish the Strong Hall Fund. Our goal is to grow the fund to \$1 million in gifts or commitments by the time Strong Hall opens. The fund will help the department create world-class opportunities for our students and faculty. It will allow us to flexibly respond to a variety of urgent needs, including scholarships, student field trips, research, equipment, and faculty retention. Some of the gifts will be used for exhibits, including a rock garden and animated projection globe. The inaugural gift to the Strong Hall Fund was made last summer by **Bill Ross (BS 1960)**. In appreciation of his gift, one of the main undergraduate teaching labs in the new building will be named after him. Prof.



The designs for the new Strong Hall are complete, and construction is underway!

McKay is meeting with donors to develop recognition opportunities at a variety of giving levels, ranging from having donors' names appear on an Alumni Recognition Wall, to having a major classroom or laboratory named after them. For more information on departmental needs and recognition opportunities, please contact Prof. McKay at lmckay@utk.edu or 865-974-5498.

EPS Newsletter

Terra Firma

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Chancellor's Award Recipients

Professor Hap McSween, business manager **Melody Branch**, and PhD candidate **Latisha Brengman** were recognized at the 2014 Chancellor's Honors Reception in April.

Hap was selected as Macebearer. This is the highest faculty award at UT; it celebrates and honors a distinguished career and a solid commitment to students, scholarship, and society.

Melody received the Chancellor's Extraordinary Customer Service Award. Melody has served EPS for 37 years and is strongly committed to the well-being of our students and faculty. Her dedication has helped EPS develop a reputation for efficiency and reliability.



Professor Hap McSween, Melody Branch, and Latisha Brengman.

Latisha received a Chancellor's Citation for Extraordinary Professional Promise for her research on the formation of Proterozoic sedimentary rocks.

Congratulations to these extraordinary people. We are grateful that they have chosen EPS as their home.

Faculty Update: A Tale of Two Larrys

Professor Larry Taylor will be honored as a Fellow of the American Geophysical Union at the annual meeting in December, in San Francisco, CA.

My wife Dawn and I are avid travelers. Last summer we went to Reno to visit our old friend **Larry Larson** (L.T.) and his wife, Beth. L.T. was the economic geologist at UT from 1961 to 1975. His lab occupied the east end of the basement in our “about-to-be-renovated” building.



Two Larrys share memories: Prof. Emer. Larry Larson (University of Nevada, Reno) and Prof. Larry Taylor.

After UT, Larry moved to the Mackay School of Mines at the University of Nevada, Reno, where he served as Chairman and Professor of Economic Geology before retiring in 1997. L.T. says his greatest contribution to the geological sciences was being able to push, shove, squeeze, and cajole nearly 100 students through graduate school. He would welcome hearing from any of his old students and friends at **LTLPetrographics@yahoo.com**.

My excursion this summer was to South Africa. My wife and I visited a game preserve owned by postdoc **Geoff Howarth's** family. I can now say I've survived being bitten by both a female and a male lion (somewhat “tame”). I may be using up my nine lives, but I'm doing it in style!

I've reached the time of life when almost everyone my age is retired. Looking back on my life at UT, I am thankful to my students and postdocs, who have been responsible for our 40+ years of NASA/NSF funding and our >500 refereed publications. These many young scientists have kept the mental calories flowing in this elderly professor. But this success would never have been possible without Dawn's motherly, loving treatment of everyone in the lab. I would welcome correspondence from former students and postdocs at **lataylor@utk.edu**.

Faculty Update: The Next Adventure

Professor Ted Labotka has taught nearly every UT geology major over the last 32 years. He is also Director of the UT Governor's School and the Science Olympiad. Ted will retire in December 2014.

It is that time of life that comes to us all. My wife, Dana, took a position at the Illinois State Geological Survey in Urbana-Champaign, and I shall retire to the Prairies of Illinois to join her. I came to UT in the fall of 1982. I was part of a large group of faculty who all came at about the same time. Most have gone on to other things, and when I leave, Hap and Larry T. will be the last of the old guard.

The department has changed a lot since I came (it was the Department of Geological Sciences then). In the early days, we pigeon-holed ourselves into hard rock, soft rock, and no rock. We are now the Department of Earth and Planetary Sciences. We have five planetary scientists on faculty. We have a strong low-temperature geochemistry and microbiology group. The Environmental Studies Program joined our department. Our department is vibrant.

My own research interests evolved from studying metamorphic terrains and metamorphic fluid-rock interaction to doing experimental investigations of mineral-fluid reactions. I have been fortunate to have worked with great colleagues, both at UT and ORNL, and excellent students (9 MS and 5 PhD). I learned a lot from them as we tried to understand the petrology and geochemistry of metamorphic systems. It was a pleasure working with you all!



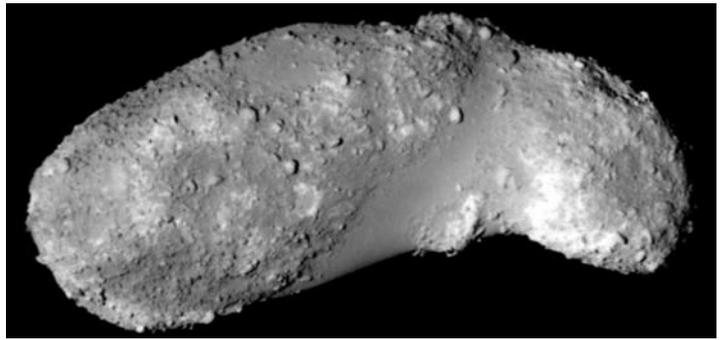
In looking over some old photos, I see that I have lost a lot of hair, including a long-gone mustache. The photo above is a recent selfie. I don't recognize that guy with the shaggy mane. I may be retiring from UT, but I intend to continue working with Larry Anovitz at ORNL, and my current graduate student, **Chad Novack**, has to finish his MS. So, I'll be around.

Research: Asteroids

Assistant Professor Josh Emery studies asteroid composition, but his recent focus has been on the physical properties of these “rocks in space.” Since asteroids have no atmosphere, one might expect them to be covered in regolith. Such a “rock blanket” forms as meteoroids continually bombard the surface. However, Emery’s research group is finding that asteroids have a variety of surfaces, from smoother than the Moon to extremely blocky.

Since direct imaging of asteroid surfaces using spacecraft is expensive, indirect methods for characterizing these surfaces are necessary. Emery’s group measures thermal flux emitted by asteroids to determine the thermal inertia (ability to resist changes in temperature) of the surface. Low thermal inertia implies a dusty surface, whereas high thermal inertia indicates a rough, blocky surface.

Recent graduate **Richie Ness (BS 2014)** used Spitzer Space Telescope data to discover one near-Earth asteroid with a higher thermal inertia than any previously known. Current PhD student **Eric MacLennan** developed a method for determining thermal inertias using data from the WISE infrared space telescope. All three of Emery’s current PhD students, **Eric, Mike Lucas** and



The near-Earth asteroid Itokawa demonstrates a variety of surfaces and thermal inertias. Small particles are abundant in the smooth central region (low thermal inertia), with large rocks near the ends (high thermal inertia).

Richard Cartwright, have received prestigious three-year NASA Graduate Fellowships for their research, an indication of the high quality of work being done in the Emery lab.

Emery is a member of the NASA OSIRIS-REx spacecraft mission team, due to launch in 2016. The spacecraft will fly to the near-Earth asteroid 101955 Benu, pick up a surface sample, and return it to Earth. The sampling mechanism can only pick up grains that are smaller than 2 cm, so the mission’s success depends on Emery’s thermal analysis! The spacecraft will reach Benu in 2018.

Research: Asteroids of the Sea

Assistant Professor Colin Sumrall works to understand the Earth’s past as recorded by echinoderm fossils (sea stars and their relatives). His current research has three facets. First, he is working to understand echinoderm diversity and evolutionary relationships through time. His group has nearly finished placing all major echinoderm groups into a single evolutionary tree. They have developed new ways to look at morphology and have re-described several echinoderm groups using consistent terminology.

These four fossil echinoderms have homologous elements of their skeleton similarly colorized. This allows us to accurately code their features for analysis.

- 1, Eurekablastus;
- 2, Pentremites;
- 3, Eumorphocystis;
- 4, Stephanocrinus.



Second, he is examining how biogeographic sampling biases affect our understanding of evolutionary patterns. Since fossils only form under very particular conditions, and sampling of rock has been uneven on a global scale, the fossil record is highly biased. Sumrall has helped describe the first edrioasteroid echinoderms known from Asia, South America, and Africa. We now know edrioasteroids were not merely inhabitants of warm, tropical, carbonate environments. The 14 taxa from North Africa occurred at 85-89 degrees paleolatitude and show diversity equal to that of well-sampled equatorial faunas.

Finally, Sumrall is working to reconstruct the internal anatomy of echinoderms. He and colleagues have been using a variety of techniques from serial sections to synchrotron X-ray phase-contrast microtomography to peer into specimens. They have been able to detect some internal structures, including respiratory structures, gonoducts, and tubular structures that appear to be the digestive tract. Our lab has recently purchased a 3D printer to render this internal anatomy.

GeoClub News

GeoClub hosts a variety of social events, to help keep our student body entertained. Last year's inaugural **Wiener Dog Race Night** was so amusing that GeoClub participated again this year. The race night is held between periods during Knoxville Icebears games, twice each hockey season. Dachshunds race the length of the ice to their owners at the other end. If your travels bring you to Knoxville during a Wiener Dog Race Night, don't miss it!

GeoClub still hosts its traditional events, too. Despite the unsettled weather, about 90 people gathered behind Ayers Hall for the **Fall Welcome Party**. The **GeoClub Chili Cook-off** was held at the Bearden Beer Market; Bob Hunter and Terri Brown won, beating nine other recipes. The **GeoClub Ski Trip** had 18 participants (grads and undergrads); they met for night skiing in Beech Mountain, NC. **GeoClub's Night at Smokies Baseball** included a pre-game, all-you-can-eat barbeque supper and a free ball cap.



Cam and the Degenerates (left to right): Peter Barry, Lulu Skiddoo, Tim Diedesch, Cam Hughes, John Pernet-Fisher, Michael Lucas, and Kyle White (Case Collins not pictured).

Of course, no year would be complete without the customary **Spaghetti Supper** event at Sassy Ann's. This great night of food and fun was highlighted by a rock 'n' roll music set performed by EPS's very own Cam and the Degenerates. The band performed 12 songs, including rock classics from Santana, The Doors, Pink Floyd, and more.

A Call for Help

As one of the "last standing" faculty members of the department, I was asked to compile a history of EPS. I am calling upon all alums and former faculty members to share any printable stories that reflect on our history. Anecdotal stories about faculty, fellow students, etc., are welcome, but I cannot guarantee that all stories will be recorded. I hope the annals of EPS will show the complete evolution of the department since it was formed by Prof. Gordon. I am also searching for a black 8" X 6"

Prof. Emer. Don Byerly

three-ring binder that would facilitate my compilation of our history. This was the log book for the UT field camp for over 50 years. Prof. Paris B. Stockdale started the notebook in the late 1930s at Ohio State's Field Camp near Dayton, TN, before he became head of the UT Geology Department. I'm hoping it has been saved from the trash. Please send any information you have to donbyerly@comcast.net.

Undergraduate Geology Field Camp

EPS requires that every geology undergraduate take an approved 5-week field course. Thanks to the generosity of our alumni and friends, every student receives financial assistance towards field camp. Most receive a **Bill Ross Field Camp Scholarship**, but each year, one student receives the prestigious **Don Byerly Field Camp Scholarship**, and several students receive **Knoxville**

Gem and Mineral Society Field Camp Awards. Many students choose camps in the US, but a few go to exotic locales. **Lena Vishni** is one student who traveled further afield. Here is her field experience in her words.

Field camp students measure and record the strike and dip of the folded sandstone in Little Karoo (Ladismith, South Africa).



"This summer, I attended field camp in South Africa, examining Proterozoic-Paleozoic sedimentary rocks. It was one of the best experiences I have had in my life. The course was engaging, challenging and definitely worth attending. EPS made the experience possible through financial assistance and by helping me acquire the background knowledge I needed to make the most of field camp. My courses in Earth Sedimentary Processes and Earth Structure and Geophysics were particularly useful. I am grateful to EPS for all the learning opportunities I have had, under the guidance of such amazing faculty and staff."

Environmental Studies

Andrew Steen is the newest assistant professor in EPS; he is also the new **Assistant Director of Environmental Studies**. Drew investigates what happens to organic carbon in aquatic environments after it is has been “fixed” by plants and phytoplankton. He studies how variations in microbial metabolisms help explain carbon fluxes between environments. His work relies on three disciplines: chemistry, to understand the chemical transformations of organic molecules in the environment; microbiology, to understand how microbial metabolisms catalyze those changes; and geology, to define the environment and time frame in which these reactions occur. His interdisciplinary background makes him ideally suited to help lead the ES program.

Drew is working with collaborators on an NSF-funded project to study how small inputs of fresh organic matter in coastal estuaries can “prime” the microbial transformation to carbon dioxide of unreactive, tree-

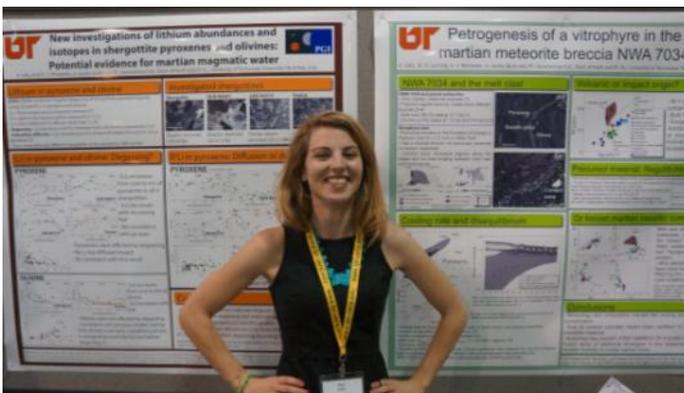
derived organic carbon. He is looking at the mechanisms by which microorganisms break down organic carbon in marine sediments. His samples include sediments from up to 500 m deep in the Baltic Sea, which were recently acquired by the International Ocean Discovery Project. He has also started measuring the rates and mechanisms of organic carbon degradation in East Tennessee rivers.

The **Environmental Studies Club** is a professional and social club that helps students network with their peers in ES and integrate with EPS as a whole. They have recently added outreach and service to their list of activities. For example, this fall they assisted with UT’s Zero Waste campaign during the week of the Alabama game. They organize at least one social trip per semester. This fall, they visited Tuckaleechee Caverns in Townsend, TN, and had a great time. They are now planning to camp in the Blue Ridge Mountains in North Carolina.



Andrew Steen samples permanently cold sediments in the Smeerenburgfjorden, Svalbard. Photo credit: Oskar Strom.

LPSC and More



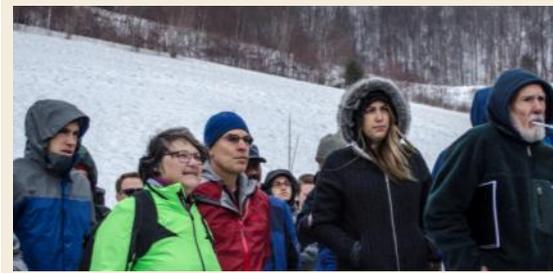
Arya Udry presented two posters at LPSC in March.

Conferences are important outlets for communicating scientific results, and our department is well-represented at them. Over 50 graduate students presented at 18 different conferences in 2013-14. At the Lunar and Planetary Science Conference alone, eight graduate students presented seven posters and three talks on topics as diverse as Vesta, Mars petrology, and remote sensing. It takes skill to convey information effectively in a 15-minute talk or a poster with limited space. Well done, students!

Honors for Hatcher

In March 2014, the **Geological Society of America** held a **Penrose Conference** in Asheville, NC, in honor of **Prof. Bob Hatcher’s** career. The conference focused on “Linkages and Feedbacks in Orogenic Processes,” to reflect the nature and breadth of Bob’s work in tectonics and mountain building. Penrose Conferences are designed to assemble small, interdisciplinary groups of people to address focused or rapidly-evolving topics in the geosciences.

In April, Hatcher was awarded the **Marcus Milling Legendary Geoscientist Medal** at the Annual Meeting of the American Association of Petroleum Geologists in Houston, TX. In addition, Bob’s former students started a **GSA scholarship fund** in his honor.



Snow and wind did not hinder the conference’s two-day trip through the Blue Ridge basement complex.

Alumni Gossip

Marc Norris (BS 1975) visited UT recently and met with Prof. McKay to reminisce. Marc is a VP at Pro2Serve in Oak Ridge, TN.

G. “Shan” Shanmugam (PhD 1978) is enjoying success in China. His 2012 book, *New Perspectives on Deep-water Sandstones: Origin, Recognition, Initiation, and Reservoir Quality*, was translated into Chinese in April. In May, he organized workshops for the China University of Petroleum, in Qingdao, and for the Yanchang Oilfield Research Institute, in Yan’an.

Sean Fitzgerald (BS 1988) is President of the Scientific Analytical Institute (SAI) Laboratory in Greensboro, NC, an environmental lab focusing on asbestos. Sean organized a technical session on asbestos for the recent GSA Annual Meeting in Vancouver.

Joe Jacobs (BS 2000) is on assignment in London for a couple of years. He works for the Anadarko Petroleum Corporation.

Billy Davis (BS 2002) is a free-lance environmental geology consultant and a professional fishing guide in Oak Ridge, TN. His uncle, Roger Bohanan (BS 1972, MS 1975) introduced him to Prof. McKay at the Alumni Board meeting in April. They caught striped bass together this summer.

Aaron Diefendorf (BS 2002) and his wife, **Emily (née Dienhart, BS 2002)**, are living in Ohio. Aaron has been an assistant professor at the University of Cincinnati’s Department of Geology for four years.

Tasha Dunn (MS 2005, PhD 2008) joined the geology faculty at Colby College in Maine in January.

Jeff Nettles (PhD 2007) is a scientist for MITRE in McLean, VA. This not-for-profit corporation runs federally-funded research and development centers. Jeff’s specialty is hyperspectral remote sensing.

Daniel Lewis (PhD 2009) spent a month this year working in Equatorial Guinea. He is a petrophysicist for Exxon Mobil.

Daine Wright (BS 2010, MS 2013) lives in Knoxville with his wife, Courtney, and 1-year-old son, Samuel. He is an ORNL post-grad working on user interface tools for the NASA terrestrial ecology data archive.

Peter Knappett (PhD 2010) received the GSA Hydrogeology Division’s Kohout Early Career Award at the annual GSA conference.

Greg Carlson (BS 2011) works in Oak Ridge for SCF, an environmental consulting firm. He works on contaminated site remediation across the country. Greg contacted EPS to let our students know about some entry-level geology positions in SCF, and he shared some stories about his service in the Marine Corps.

Andrew Beck (PhD 2011) has accepted a postdoc position at the Johns Hopkins Applied Physics Laboratory, working on the Dawn spacecraft mission.

Jackie Langille (PhD 2012) welcomed a new son, Morgan Emery Langille, in July.

Alumni Awards

While in Houston, TX, for the Reconnect Barbeque, Larry McKay (Head of EPS) gave out departmental Alumni Awards in front of a cheering group of alums.

Gil Boyd (BS 1951, MS 1955) was thrilled to receive the **Distinguished Alumnus Award**. Gil played football for UT in both Knoxville and Chattanooga. After finishing his master’s degree, He worked for the geology department in Knoxville, organizing the grad students who taught lab courses and working with **Prof. Jimmy Walls**. Then he joined the faculty at UT Martin, where he also served as head football coach. Gil left UT for a very successful career in oil and gas, but he continues to be a presence in the department and university. He served on the Board of Governors (now the Board of Development) and the Board of Visitors. He is a long-time donor and supporter.

T.W. Garrett (MS 1973) received the **Accomplished Alumnus Award**. T.W. had a very successful career in



T.W. Garrett, Emily Goodman, and Gil Boyd.

the oil and gas industry. He and his wife, Claire, recently established a graduate fellowship in EPS. **Emily Goodman (BS 2005, MS 2007)** received the Young Alumna Award. Emily is a senior geologist at Hess Corporation, working on deep water Gulf of Mexico exploration. Earlier this year, **Richard T. Mills (BA 1999)** received a Young Alumnus Award. Richard has a PhD in Computer Science and recently accepted a position with Intel.

Faculty Honors Lunch

In November 2013, EPS hosted a lunch for donors who have helped set up endowments in honor or memory of EPS faculty members. In most cases, a widow, son, or daughter of a former faculty member set up the endowment, but faculty have also played key roles in setting up funds, often with major donations of their own. Perhaps most inspiring is that many of our former students and colleagues also give generously to these funds, in appreciation of a mentor they worked with up to 40 years ago.

EPS currently has ten endowments honoring and memorializing our faculty. These funds are used for a variety of purposes, including professorships, scholarships, fellowships, undergraduate research, and discretionary spending. This is a remarkable record of commitment, and we would like to recognize all of the donors and fund organizers, including:

- The estate of **Prof. George Martin Hall**;
- The family of **Prof. Harry Klepser**;
- The colleagues of **Prof. George Swingle**;
- **Prof. Kula Misra** and his wife, Geeta;
- **Prof. Ken Walker**;
- Friends of **Prof. Jimmy Walls**, including **Gil Boyd**;
- **Prof. Don Byerly** and his wife, Sue;
- The family of **Prof. Otto Kopp**;



Michelle Geller (Development), Nancy Walls (widow of Prof. Jimmy Walls), Prof. Bob Hatcher, and Prof. Larry Taylor.

- **Prof. Larry Taylor** and his wife, Dawn;
- **Prof. Jimmy Walls** and his widow, Nancy.

We also thank the numerous alumni, colleagues, friends, and admirers who have made donations in honor and memory of our faculty. As EPS moves to Strong Hall in 2017, our opportunities and needs will expand. We look forward to your continued, generous support.

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 academic achievement and research by students and faculty. Suggested areas for contributions include:

Strong Hall Fund

This new general-purpose fund will allow the department to flexibly respond to urgent needs. This is our highest-priority fund, and special recognition opportunities are available for major gifts to the Strong Hall Fund.

Donors are also welcome to give to one of our other established funds, many of which are in honor or memory of former faculty or students. Priorities this year include:

Kula and Geeta Misra Fund (a general-purpose fund)
Otto Kopp Undergraduate Research Fund
Ryan Edwards Memorial Scholarship Fund

**To contribute online,
please visit eps.utk.edu.**

**Near the bottom of the webpage, click
*Contribute to a big idea. Give to EPS.***

***The EPS Enrichment Fund is selected by default.
To give to other EPS funds, select "Other," and
indicate the name of the fund.***

George W. Swingle Graduate Fellowship Fund
Don W. Byerly Field Camp Scholarship Fund

If you would like more information about any of these funds or would like to discuss a major gift or bequest, please contact Prof. Larry McKay, Head of EPS, at lmckay@utk.edu (865-974-5498) or Michelle Geller, College 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.

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Address & News

If you have any address or news updates, please send us your information by mail or email (addresses listed above).

Address Update:

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Address:

City, State:

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Email address:

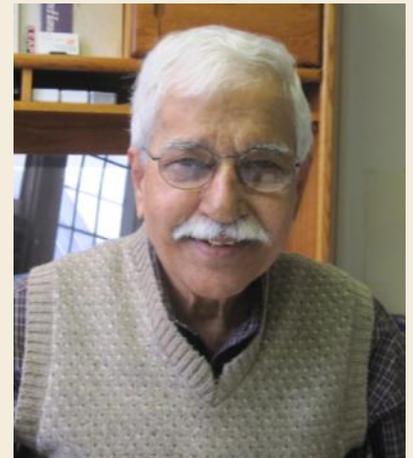
News Update:

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

Kula Misra Update

Professor Emeritus Kula Misra is known to almost every student who graduated from EPS between 1975 and 2007. He taught a variety of courses, including Physical Geology, Geochemistry, Economic Geology, and Environmental Geology. Kula also served as Associate Head of the department for 10 years.

Although Kula retired in 2007, he hasn't been idle. He is usually in his office three days a week, to work on papers and books or to prepare for classes. Kula misses teaching and enjoys guest lecturing in Economic Geology and Geochemistry courses, subjects which are central to his research interests. In 2012, he published the textbook, *Introduction to Geochemistry - Principles and Applications*. He is currently working on the second edition of his textbook, *Understanding Mineral Deposits*.



This year, Kula and his wife, Geeta, repurposed the Misra Reading Room Endowment to become a general-purpose fund, to support a variety of activities such as scholarships, travel, research, and more. In appreciation of their long-standing support for EPS, the main conference room in the new Strong Hall building will be named the **Misra Conference Room**.