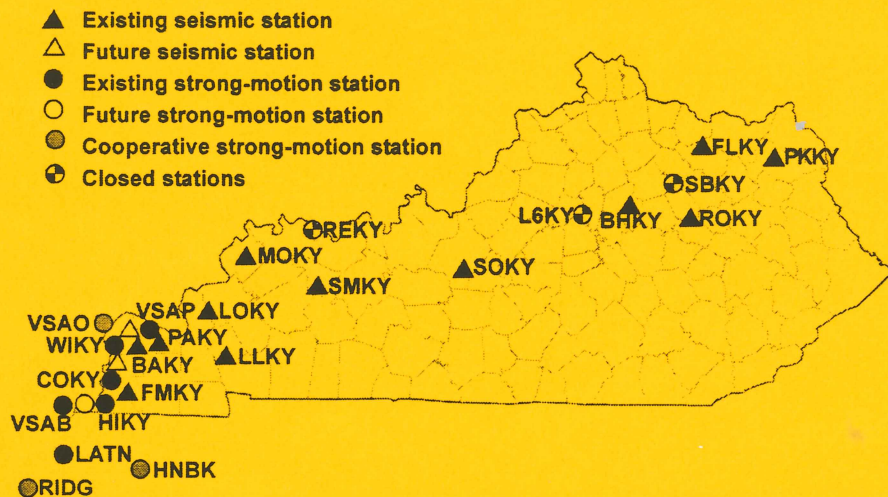


# ROUND UP 2001

## Kentucky Seismic and Strong-Motion Network



Department of Geological  
Sciences  
University of Kentucky

## DIRECTORY

Department of Geological Sciences  
University of Kentucky  
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John Kiefer  
Gerald Weisenfluh

### Professor

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Susan M. Rimmer

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Mary Spencer

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Bruce R. Moore  
Lyle V.A. Sendlein  
Ron L. Street  
John Thrailkill

### Assistant Professor

Kevin R. Henke, visiting  
Shelley Kenner  
Edward Woolery

### Adjunct Faculty

Donald Chesnut, Jr.  
James C. Cobb  
James S. Dinger  
James A. Drahovzal  
Cortland Eble  
Stephen Fisher  
Uschi Graham

\* Joint with Agronomy



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Timmons Associates  
PO Box 50606  
Jacksonville Beach, FL 32240

James K. Vincent  
Lock Raven 301  
3520 NW Hartford  
Owensboro, KY 42301

Harry M. Whitman  
1261 Tishoff Dr.  
Lexington, KY 40502

Ralph O. Wilson II  
Box 5044  
Evansville, IN 47715





## LETTER FROM THE CHAIRMAN

Dear Friends of the Department,

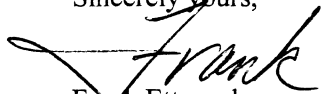
On the behalf of the Department, I would like to extend greetings to all the members of our geologic community. This year we can report once again real progress on some of the challenges that have faced the Department in previous years. One of those problems has been the small size of our regular faculty, and in recent years it has become even smaller due to retirements, death and transfer. This year we brought on two new faculty members, Dr. Shelley Kenner, a theoretical seismologist, and Dr. Ed Woolery, a practical seismologist. Both of these faculty also bring with them engineering experience – Shelley in mechanical engineering and Ed in civil engineering. Together with an engineering geologist and seismologist at the Kentucky Geological Survey, we are building a strong team to deal with Kentucky's seismological hazards and to compete for available research funds. In addition, we are currently searching for an environmental geochemist to establish a state-of-the-art, stable-isotope-ratio mass-spectrometer lab, which will give us expanded research capabilities in environmental and more traditional aspects of geology. We will also probably be able to search in the succeeding year for yet another position.

Another challenge facing the Department has been the lack of adequate teaching and research infrastructure. However, this year our needs have been very high among University and College priorities, and we have replaced and added to our teaching equipment, and two of our teaching rooms will undergo major renovations. In addition, we were able to replace another one of our aging vehicles with a new van for travel into the field because of extra monies generated by a night course taught by one of our adjunct professors, Dr. Steven Greb. Moreover, because of grant brought in by Dr. David Moecher, our microprobe will be upgraded this year, and the Department is still very much in the running for a collaborative, EPSCoR/NSF, infrastructural improvement grant that will provide the mass spectrometer noted above. We should know in the next two months about the final outcome of this proposal.

Of course, good students and the money to support them are also necessary parts of a successful program, and this year we were very successful in recruiting 11 high-quality, graduate students into our program, and we now have 35 undergraduate majors. The support for these students has also grown in the last year. The Brown-McFarlan Fund was formally endowed this year with a major contribution from Bill and Blessing Brown; Elizabeth Haynes, a former student in the Department, initiated the endowment on a fund to support field travel for students; and the Ferm Graduate Student Support Fund was matched by the State and formally endowed this year. Again, we owe much of this financial support to the alumni, emeriti, and friends of the Department. On a not so happy note, one of our best known professors, Dr. Nicholas Rast, passed away in late August, but not before we were able to honor him with a superb retirement dinner and celebration in April. Nick leaves behind a tremendous legacy in contributions to the field of geology, to the Department, and in his many students, and we are in the process of establishing a memorial fund to honor him.

As you can gather, a lot of good things are under way in the Department, and we would appreciate any ideas you may have on how to build a stronger, more effective Department. Hence, your support in terms of ideas, advocacy, and student aid (see pages 20-21) continues to be critical for our future development. We look forward to your continued input.

Sincerely yours,



Frank Ettensohn  
Professor and Chair



## ANNOUNCEMENTS

### E-MAIL ADDRESSES

The alumni directory now includes e-mail addresses. Please send yours if it is not in the directory.

### CO-OP PROGRAM

The co-op program (matching students with summer and/or part-time jobs) needs help to identify available jobs, and the requirements for staffing them. A similar search for qualified and interested students is underway in the Department. Contacts for the program are:

for the Advisory Board

Stephen B. Sullivan  
1508 Cherokee Rd..  
Louisville, KY 40205  
Telephone 502-587-2641

for the Department

Frank R. Etensohn  
101 Slone Building  
Lexington, KY 40506-0053  
Telephone: 859-257-3758

If you know of a job opportunity (or a possibility of one), please contact Steve or the Department. We hope to provide some meaningful work experience for our students, and to provide employers with some enthusiastic young geoscientists as temporary workers. The potential for mutual recognition of future full-time opportunities is also present.

## DEPARTMENT NEWS

### GEOLOGICAL SCIENCES

#### 2001 ALUMNI WEEKEND AT UK

##### 2001 Alumni Weekend and Hudnall Symposium

The 2001 Alumni Weekend was held on Friday, April 20, through Sunday, April 22. This year's program coincided with the Hudnall Symposium on tectonics in honor of Professor Nick Rast's pending retirement. The weekend started on Friday with a field trip across the spectacular Carboniferous section of eastern

Kentucky and Pine Mountain. The symposium took place in the W.T. Young Library auditorium. This year's topic was *Appalachian crust and mantle deformation as viewed in 2001*.

Professor John Dewey of University of California, Davis, presented the Brown-McFarlan Lecture as the keynote address Saturday morning. The Department's spring banquet (renamed the Rast Fest for the occasion) was held in the University of Kentucky Faculty Club on Saturday evening, with Professor Jim Skehan of Boston College as master of ceremonies. We invited members of the campus community and 37 distinguished scientists from western Europe and North America, several of whom (from as far away as Ireland and England) were able to participate. More than 90 guests attended the banquet.

#### 2002 ALUMNI WEEKEND

Because The Department is one of the hosts for the 2002 Southeastern/North-central Geological Society of America Sectional Meeting from April 2-6 in Lexington, we decided to move our annual Alumni Weekend to the Fall to coincide with 2002 Homecoming which will be the weekend of October 12, 2002. Look for information in the late summer.

#### JOHN C. FERM GRADUATE STUDENT FUND

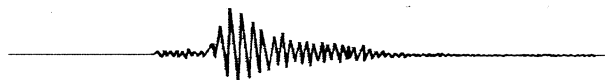
As many of you may remember, last year we were working hard to get \$50,000 in contributions and pledges so that we could get the fund matched by the state Research Challenge Trust Fund. By this time last year, we had only collected \$42,000, but by last spring, contributions and pledges exceeded the necessary \$50,000. So the fund has now been matched by the state with a total of \$108,000, and of course this does not include all the pledges yet to come. This fund will be used to support field-related, graduate research. The Department thanks the family and friends of John Ferm, whose idea it was to establish the fund, as well as John's family and friends, our alumni, our faculty and students whose contributions made this memorial to John a reality.

#### NICHOLAS RAST MEMORIAL FUND

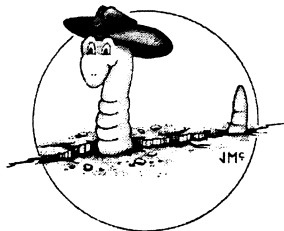
At the suggestion of Nick's family, the Department is in the process of also establishing a memorial fund to honor Nick and his many contributions to the Department. We would also like to have contributions to this fund matched by the state as well, but the deadline for this year's RCTF is the end of December, 2001, and we did not think that we could collect

\$50,000 so fast. So, it is our hope that there will be another state RCTF in the coming year, during which we will mount a major drive to collect \$50,000 to establish a memorial fund for Nick Rast. An obituary detailing some of Nick's life and contributions is included later in the *Round Up*. The web address for the tribute to Nick given by Professor Jim Skehan, S.J. at his retirement dinner is at <http://www.uky.edu/AS/Geology/dept./skehan.html>.

## KENTUCKY SEISMIC AND STRONG-MOTION NETWORK



The KSSMN, operated jointly by the Department of Geological Sciences and the Kentucky Geological Survey since the early 1980's, is the 3<sup>rd</sup> largest seismic network in the central United States. The size and continued growth of the network have made day-to-day data management issues a tremendous challenge. Recently, however, the KSSMN has undergone a major hardware and software upgrade that will give users unprecedented data management and processing capabilities. The hardware update includes a new 64-channel continuous digital data acquisition system, which not only accommodates the current 10 weak-motion station configuration, but also gives the network enormous expansion capability. The most exciting part of the recent upgrade, however, is in the software. We have installed and are successfully operating the "Earthworm" data management and processing algorithm. The Earthworm is the recognized national standard for integrated earthquake data manipulation; it will allow us to collect, analyze, and report earthquake events in near-real time. Therefore, we hope to be displaying real-time seismograms on the KGS and Department websites in the very near future. The local and national exposure gained from this state-of-the-art system will be very beneficial to the Department, the KGS, and the University.



## ALUMNI NEWS

### John C. Aitken, B.S. 1977

I am currently the logistics/quality manager for Olan Plastics, Inc., in Canal Winchester, Ohio.

### Anderson, Eric, M.S. 1996

Am teaching physical science, geology, and math at Alice Lloyd College in Pippa Passes, Kentucky. The first semester was rough—a constant scramble to catch up. I plan to return to school in the fall to study rocks again.

### Bob Baird, M.S. 1981

After finishing a Ph.D. in tectonics at Virginia Tech, I moved to Richmond and worked for the Virginia Department of Environmental Quality (DEQ). After a couple of years, I moved to a private consulting firm, and then briefly back to the DEQ to help revise some policies and procedures. Finally, I started my own environmental consulting firm in 1995, and called it simply enough, Environmental Consulting, Inc. Most of the work is in petroleum storage tank leaks and Phase I Environmental Site Assessments, although I have done some ISO 14000 recently. In 1998, a friend and I became interested in direct NASDAQ stock trading, known as day trading, and ended up writing a book, *Electronic Day Trading to Wind*, published by John Wiley and Sons in 1999. Another friend and I are in the process of putting together a recording studio to record our own material and eventually open it to the public. My wife, Martha, is still putting up with me after all these years. My daughter, Kym, is now grown and married and just had our second grandchild; and my son, Ron, graduated high school in 2000, and is trying to start a band while deciding his futures. I was happy to come back and visit the faculty and classmates in 1994 and 2001 alumni conferences.

### Leslie Berry, B.S. 1967

Independent since 1990; assembling lease blocks for wildcats primarily in East Texas Basin; also in western Kentucky, southern Oklahoma aulacogen, Arkansas-Louisiana-Texas area. I'm 58 and active and have three grown children.

### Michael Bourque, B.S. 1975

I am a senior staff geologist of Shell Deepwater

Services. I have been with Shell for 24 years exploring all over the world. My wife, Marsha, is also a petroleum geologist, currently with GeoKnowledge, a Norwegian company. My daughter, Veronica started high school this year. My interest in geology turned into an insatiable appetite when I attended U.K. Thank you.

**Donald Brice, M.S. 1985**

I am currently managing the environmental diligence group for URS (formerly Dames and Moore) in Cincinnati, Ohio. My duties over the past two years have strayed farther and farther from hard hydrogeology to more and more administrative tasks and editing. My family and I have lived in southeast Indiana for the past 10 years. The children are growing up fast (9, 7, and 6), and free time seems to be a thing of the past. It's ironic that you only seem to have free time when you have nothing important to spend it on.

**Charles W. Fawns, B. S. 1959**

After graduating from U.K., I worked at Texas Instruments (Geophysical Services, Inc.) for eight years. I went back to school at SMU and completed a Masters in social psychology in 1975. I will be retiring at the end of July, 2001, from the Dallas County Sheriff's Department where I have been Director of Inmate Programs for the jail system. In August, 2001, my wife and I are retiring to Taos, New Mexico.

**Donald Fullerton, B.S. 1958, M.S. 1961**

Geological consulting in the mining industry. Therefore, I am retired. Trying to keep up with the growing grand kids. This is harder than consulting!

**Thomas B. Griswold, Ph.D. 1978**

I am still working for Brighton Environmental in Frankfort, Kentucky, mostly doing UST-related cleanups. I am also teaching and studying martial arts as I have been for 20 years now. My wife, Debbie, and I were married in 1999 and life is very sweet!

**Elizabeth A. Haynes, M.S. 2000**

My family and I have moved to Colorado, and I have taken a position as staff geologist with Harding ESE in Denver Colorado.

**Gary W. Jacobs, M.S. 1983, Ph.D. 1986**

I am still working as an exploration geologist in Qatar. The work is very interesting and challenging. This part of the world has fantastic carbonate sequences. The area has been blessed by mother nature with perfect

source rocks, outstanding reservoirs, excellent sealing rocks, and the right geological timing; all leading to the accumulation of tremendous amounts of hydrocarbons.

The challenging part is like in most of the world; all the easy stuff has been found. I'm working hard to try and develop stratigraphic plays which are much less tested here, but more difficult to pin down. I was fortunate in November to go on a carbonate field seminar offshore Belize. It was run by one of Chevron's carbonate consulting specialists, Tony Lomando. We studied four modern isolated carbonate platforms. It was very interesting that despite their overall similarities in terms of setting, how different they were in sediment type and facies distribution. The devil is always in the detail. A hurricane passed through about a month prior, and we were able to see it's affect on the geology. We spent a lot of time snorkeling and swimming. It reminded me of when I was a graduate student on the field trip to San Salvador in the Bahamas.

**Ron Mackey, B.S 1970, M.S. 1972**

I continue to work in the "oil patch." I am the co-owner of Venture Resources, Inc., which operates wells in Kansas. We have expanded our business into the service area and now have a well service company with five work-over rigs and two vacuum-water trucks. Linda and I purchased our second home in Sarasota, Florida, in 1997 and enjoy two or three months of warm weather in the winter fishing, picking up fossil sharks' teeth, and sea kayaking.

**Michael R. McCann, M.S. 1977**

Senior Geologist for VIACOM (formerly Westinghouse). Managing groundwater monitoring for five superfund sites in the Bloomington, Indiana, area.

**Robert D. Money, B.S. 1986, M.S. 1991**

I am managing the Louisville branch office for Environmental Resources Management (ERM). My wife, Marigail, and I have two wonderful children, Alex (5) and Grace Ann (2).

**Don Prater, B.S. 1993**

I'm still looking after explorations for Addington Enterprises. We finally had a small coal boom and couldn't be busier! I've been spending time in east and west Kentucky, West Virginia, Virginia, Indiana, Illinois, and Tennessee...working eight days a week!!! Loving it! However, I still find time to make it to all the home football games. Go Cats!



**Peter E. Price, B.S. 1969, M.S. 1978**

I am consulting on geological and resource projects involving remote sensing and geographic information systems. No field work in exotic places this year. With a more predictable schedule, I was able to teach cartography and GIS at North Harris College last fall. A major milestone for the Prices was the graduation of our oldest son from the University of Texas at Dallas. He is working in information technology and reaping the rewards of the boom in his field.

**Paul Douglas Rucker, B.S. 1983**

Currently employed as Project Geologist with SRW Environmental Services, Inc., in Cincinnati, Ohio. I am responsible for the oversight of numerous environmental assessment and remediation projects. I am a registered professional geologist in four states.

**Rodney K. Rymer, M.S. 1982**

Currently working as a senior asset geologist for Energy Partners, LTD, in New Orleans, Louisiana. My wife of 21 years, Eydie, and I have two children, Arthur and Regan.

**Nicholas Sirek, B.S. 1993, M.S. 1995**

I'm now working as a hydrogeologist in Knoxville, Tennessee for IT Corporation. Currently working on site investigations and remedial action plans for final decommissioning (military base realignment) of former DoD military ammunition plants (TNT and associated by products in soil and groundwater). IT is always looking for talented geologists to join the team, so if you know anyone (student or alum) that needs an inside track, have them contact me at 312 Directors Dr., Knoxville, TN 37923, 865-690-3211, 2330, or e-mail me at [Nick.Sirek@theitgroup.com](mailto:Nick.Sirek@theitgroup.com). I loved the new web site and even recognize some of the places in the pictures!

**William A. Spies, B.S. 1975, M.S. 1977**

It is hard to imagine that I have been working in the petroleum business for almost one quarter of a century. Presently, I am working for Hunt Petroleum Corp. as an area geologist with the Gulf Coast Region engaged in oil and gas exploration, development, and acquisitions within south Louisiana. With higher oil and gas prices, I believe more emphasis will be directed toward finding hydrocarbons rather than purchasing them

**James K. Vincent, B.S. 1957**

Still engaged in oil and gas exploration in the Illinois

Basin and consulting on underground gas storage.

**IN MEMORIAM**

This year the department received word of the passing of the following alumni and friends. We are saddened by the loss of these friends, and we extend our sincere sympathy to their families.

John Buckner

Sidney S. Goodwin, October 17, 1995

William G. Haag, 2000

William Ison, May 9, 2000

Nicholas Rast, August 28, 2001

**Nicholas Rast**

Nicholas Rast, Ph.D., F.G.S., former Hudnall Professor of Geology at the University of Kentucky, 74, passed away peacefully on August 28, 2001, at the University of Kentucky Hospital of complications arising from earlier surgery. He was born in Teheran, Persia (Iran), on June 20, 1927, to Nikolai Alexandrovich Rast of Riga, Latvia, and Elizabeth (nee Bielgonodsky) Rast of Samara, Russia, who had fled to Persia during the Bolshevik Revolution. His father was a university professor and economist for the Anglo-Iranian Oil Co.

He completed primary education in Nemasi, Teheran, secondary education in Shapour, Shiraz, and earned a diploma in industrial chemistry at the Technical Institute in Abadan, Iran (1947). In 1948, he placed first in competition for training in Great Britain and was soon enrolled in University College, London, where he earned a B.Sc. in geology with honors in 1952. He earned his Ph.D. in geology at the University of Glasgow, Scotland, in 1956. His first academic appointment was as assistant lecturer at the University of Glasgow from 1952-1954. Subsequently, he was appointed assistant lecturer and lecturer at University of Wales (Aberystwyth) (1954-1959), as well as lecturer, senior lecturer, and reader in geology at the University of Liverpool (1959-1971). During his time in Britain, he received several honors including Lyell's Fund from the Geological Society of London, the Geological Society of Liverpool Medal, and the Royal Society Visiting Professorship at the National University of Mexico. He was a Fellow of the Geological Society of London and of the Geological Society of America.

In 1971, he joined the University of New Brunswick, where he served as Chair of the Geology Department for eight years. He moved south in 1979, accepting the Hudnall Chair of Geology at the

University of Kentucky, one of very few endowed chairs in the University at the time; he also served there as Chair of the Geology Department for eight years from 1981-1989. He retired as Professor Emeritus in June, 2001.

Dr. Rast was married twice and was preceded in death by his daughter Marie Johnson of Norwich, England. His earlier wife Audrey and their son Nicholas, a Doctor of Music, also of Norwich, England, survive him. In addition, he is survived by a brother, his wife Diana of Lexington, Kentucky, by their children, Alexander Douglas, Chief Engineer of Inficom, a computer firm in Seattle, Washington, Elizabeth Amanda Morgan, a social worker in Seattle, and Andrew Oleg Orlando, a student at the University of Kentucky, and by two grandchildren, Alicia Marie Morgan and Jason Paul Morgan of Seattle, Washington.

Dr. Rast's outstanding career has for the most part followed the Caledonian-Appalachian mountain belt from western Europe and England, to maritime Canada and New England, and finally into the central and southern Appalachian Mountains, work which has gained him national and international acclaim. His ability to integrate all aspects of geology and his wide experience throughout the mountain belt made him a major contributor in understanding the Caledonian-Appalachian mountain belt at a time when mountain belts were first being explained in terms of plate tectonics. In addition to tectonics, his breadth of knowledge also allowed him to make significant contributions in the fields of structural geology, seismology, igneous and metamorphic petrology, and regional geology. In short, he had a versatility in many aspects of geology on a worldwide basis that is uncommon in most geologists today. Hence, he has very aptly been called a "renaissance man" and "maverick" in the field. He published more than 115 articles in international journals and professional books and has several more in press; many of these are seminal works on the Caledonian-Appalachian mountain belt, the intrusion of magmas, the formation of metamorphic garnets, and the mechanics of boudinage. In addition, Dr. Rast has a record of major service to the field of geology and education. He has been an editor or on the editorial staff of five international and national journals; he has served on numerous committees, panels, and advisory boards for universities as well as national and international geologic associations; he has been the recipient of many grants; and he was a widely sought lecturer, convener and field-trip leader.

Dr. Rast's personal life was just as lively, interesting and varied as his professional career. He was a gourmet cook with a particular passion for Russian and Persian cuisines and was the author of popular newspaper columns on wines in Liverpool, England, and Fredericton, New Brunswick. Moreover, he had an amazing ability to find the best restaurants in any area of the world, even though he had never been there before. He enjoyed entertaining his friends and gained a reputation as an engaging conversationalist. He was also fluent in several languages and could be both an acerbic critic and a jovial host. An avid reader with wide-ranging tastes, Dr. Rast especially relished books dealing with the history of Russia and the Middle East, as well as writings on the conflicts of the twentieth century, most notably the two World Wars and the more recent Gulf War. However, he was just as likely to be found reading poetry or listening to a symphony by one of his favorite classical composers. Chess was his delight.

Whatever Nick pursued, he pursued in depth, with intensity and enthusiasm, and nowhere was this more apparent than with his teaching and friendships. Knowing Nick was always an adventure and a provocative, learning experience. Although Nick leaves behind a major legacy for the geologic profession, perhaps his most lasting legacy will be the students, friends and family that he influenced so greatly. Memorials in his memory may be made to the Department of Geological Sciences, University of Kentucky, where a memorial fund is being established to support the graduate education and geological research that were so much a part of his life.

## STUDENT NEWS

### DEGREES AWARDED

#### BACHELOR OF SCIENCE

Michael C. Ashcraft  
William L. Brab  
Jeffery M. Crevier

Andrea L. Houghman  
Jamen L. Mohan  
Jason M. Merlo

## MASTER OF SCIENCE

**Christopher Berg**, 2001, M.S., Oxygen isotope and major element systematics in multiply-deformed rocks: Assessment of isotopic and major element equilibrium.

Advisor: David P. Moecher

**Brian S. Cook**, 2001, M.S., Lateral compression within a lateral ramp in the Pell City thrust fault, Appalachian Thrust Belt, Alabama.

Advisor: William A. Thomas

**Julie Kasl**, 2001, M.S., The nature and origin of the Devil's Hollow Member, Lexington Limestone, central Kentucky.

Advisor: Frank R. Etensohn

**H.E. Lisa Jewell**, 2001, M.S., The origin of the Cane Run Bed, Lexington Limestone, central Kentucky.

Advisor: Frank R. Etensohn

**G. Steve McDowell**, 2001, M.S., A P- and SH-wave seismic reflection investigation of the Wolf Island Fault, southeastern Missouri.

Advisor: Ronald L. Street

**Steven B. Wood**, 2000, M.S., Ground-response analysis of the near-surface sediments in the Memphis, Tennessee, metropolitan area.

Advisor: Ronald L. Street

## GRADUATE STUDENT RESEARCH

**German Bayona** (B.S., Columbia—Bogota; M.S., New Mexico State), Ph.D. dissertation: Controls on Middle to Late Ordovician (Taconian) synorogenic deposition in the southeasternmost part of the North American craton (Laurentia). Supported by National Science Foundation, Petroleum Research Fund and Geological Society of America research grant.

Advisor: William A. Thomas

**Margaret C. Brewer** (B.S., Hunter; M.S., Kentucky) Ph.D. dissertation: The Bessemer transverse zone in Alabama, structure and stratigraphy. Supported by USGS EDMAF and Petroleum Research Fund.

Advisor: William A. Thomas

**W. Brent Garry** (B.S., William & Mary) M.S. thesis: Raiders of the Lost Mushwad: Geologic

mapping of the Ashville 7.5-minute quadrangle, Appalachian Thrust Belt, Alabama. Supported by U.S. Geological Survey EDMAF

Advisor: William A. Thomas

**E. Lee Gatterdam** (B.S., Furman)

M.S. thesis: Reactions of trichloroethene with pyrite.

Advisor: Alan E. Fryar

**Shane Goodnight** (B.S. Western Kentucky)

M.S., thesis, Stable Isotope Composition of Kerogen Concentrates from Devonian-Mississippian Black Shales.

Advisor: Susan Rimmer

**Walter Johnson** (B.S., Louisville)

M.S. thesis: Stratigraphy of the Ste. Genevieve-Girken contact in western Kentucky.

Advisors: Frank R. Etensohn

**Steven Juszczuk** (B.S., Queens; M.S., Texas Christian)

Ph.D. dissertation: How do the late Paleozoic structures within the Southern Oklahoma aulacogen relate to the late Paleozoic structures of the Ouachita-Marathon orogenic belt? Supported by the Southeastern Section of the Geological Society of America research grant.

Advisor: William A. Thomas

**Ravi Kanda** (B.Tech, Indian Institute of Technology, M.S., University of Cincinnati)

M.S. thesis: A mathematical model of frictional melting on the asperity scale.

Advisor: Kieran O'Hara

**Jen Klein** (M.S., Texas A&M)

Ph.D. dissertation: The Effects of Mire Type and Depositional Environment upon Coalbed Methane reservoir Properties in the Olmos Formation, South Texas.

Advisor: Susan Rimmer

**Danita LaSage** (B.S., Eastern Kentucky; M.S., Alaska—Anchorage)

Ph.D. dissertation: Natural attenuation along a first-order stream receiving contaminated ground-water discharge.

Advisors: Alan E. Fryar and Susan M. Rimmer

**Charles Mason** (B.S., Morehead, M.S., George Washington)

Ph.D. dissertation: Ammonite biostratigraphy of the

Lower-Middle Mississippian Borden Formation.  
Advisor: Frank R. Ettensohn

**Matt Massey** (B.S., Tennessee, Knoxville)  
M.S. thesis: The metamorphic history of the  
Hayesville Fault in the vicinity of the Blue Ridge  
Parkway, western North Carolina.  
Advisor: David Moecher

**J. Todd McFarland** (B.S., Kentucky)  
M.S. thesis: Sediment fluxes through a karst-conduit  
system in the Inner Bluegrass.  
Advisor: Alan E. Fryar

**Abhijit Mukherjee** (B.Sc., M.Sc., Calcutta)  
Natural attenuation of trichloroethene and technetium-  
99 within Little Bayou Creek, McCracken County,  
Kentucky  
Advisor: Alan E. Fryar

**Michael P. Solis** (B.S., Alabama at Birmingham)  
M.S. thesis: Tectonic controls on Ordovician through  
Mississippian facies patterns, near Ellisville and  
Spring Garden, Alabama.  
Supported by USGS EDMAP.  
Advisor: William A. Thomas

**Alexander Stewart** (B.S., Cincinnati)  
M.S. thesis: Seismite horizons in the Tanglewood  
Buildup, Lexington, Limestone.  
Advisor: Frank R. Ettensohn

**Karen Exton Thompson:** (B.S., Eastern New  
Mexico)  
M.S. thesis: Ground-water flow in the Ledbetter Creek  
watershed, Calloway County, Kentucky.  
Advisor: Alan E. Fryar

#### **NEW GRADUATE STUDENTS**

Thomas Becker (M.S. Lehigh )  
Jeff Crevier (B.S. Kentucky)  
Matthew Dahlem (B.S. Wisconsin, Oshkosh)  
Shane Goodnight (B.S. Western Kentucky)  
Ravi Kanda (M.S. Cincinnati)  
Jennifer Klein (M.S. Texas A&M)  
Abhijit Mukherjee (M.S. Calcutta)  
Michael Shultz (B.S. Ohio)  
Micheal Solis (B.S. Alabama, Birmingham)  
Donald Surles (Louisiana, Monroe)  
Clay Wilcox (B.S. West Virginia)

#### **TEACHING ASSISTANTS**

Thomas Becker  
Jeff Crevier  
Matthew Dahlem  
Shane Goodnight  
Jennifer Klein  
Matt Massey  
Todd McFarland  
Abhijit Mukherjee  
Michael Shultz  
Michael Solis  
Alex Stewart  
Donald Surles  
Clay Wilcox

#### **RESEARCH ASSISTANTS AND FELLOWS**

German Bayona  
Brian S. Cook  
W. Brent Garry  
Ravi Kanda

#### **STUDENT AWARDS**

**Geological Society of America Research Grant**  
Todd McFarland

**Graduate School Research Grants**  
Todd McFarland

#### **Brown-McFarlan Fund**

German Bayona  
Tara Lee Campbell  
Brian Cook  
Brent Garry  
Lee Gatterdam  
Lisa Jewell  
Julie Kasl  
Jason Lambert  
Todd McFarland  
Susie Taha  
Tina White

#### **Hudanall Scholarship in Field Geology**

Shannon Blackburn  
Michael Caudill  
Winston Cinnamon  
Robert Jewell  
Jason Lambert  
Sarah Mardon  
Charles Maye  
Casey Mobley  
Chadwick Parish

Tanaporn Sakulpitakphon  
Lee White  
Jennifer Wilson  
James A. Wimberg

**National Geological Society of America Research Grant**

German Bayona

**Pirtle Fellowship**

Chris Berg  
Ravi Kanda  
Jennifer Klein  
Danita LaSage  
Matt Massey  
Todd McFarland  
Clay Wilcox

**Tarr Award (Sigma Gamma Epsilon) - outstanding graduating senior**

Andrea Holbrook

**Pirtle Award - outstanding junior showing promise in geology**

Kristin Toth

**Student Internships**

Tanaporn Sakulpitakphon  
Robert Jewell

**TA's of the Year**

Brent Garry  
Lee Gatterdam  
Karen Thompson

**STUDENT PRESENTATIONS**

*Bayona, G., and Thomas, W. A., Implications of a palinspastic map for the stratigraphic and tectonic framework of the Alabama-Georgia Appalachian thrust belt: Geological Society of America Abstracts with Programs, v. 33, no. 2, p. A-18. Southeastern Section Meeting, Geological Society of America, Raleigh, North Carolina, April, 2001.*

*Campbell, Tara L. and Andrews, William M., Application of GIS to assessing coal resources in the Western Kentucky Coal Field, Southeastern Section Geological Society of America, Raleigh, North Carolina, April, 2001.*

*Jewell, Lisa H., and Ettensohn, Frank R., Nature and*

*origin of the Cane Run Bed, Lexington Limestone, central Kentucky, Kentucky Academy of Science, Lexington, Kentucky, December, 2000.*

*Jewell, Lisa H., and Ettensohn, Frank R., Origin of deformation in the Cane Rund Bed, Middle Ordovician Lexington Limestone, central Kentucky, Southeastern Section Geological Society of America, Raleigh, North Carolina, April, 2001.*

*Kasl, Julie M., and Ettensohn, Frank R., The nature and origin of the Devils Hollow Member, Lexington, Limestone, central Kentucky, Southeastern Section Geological Society of America, Raleigh, North Carolina, April, 2001.*

*Lambert, Jason R., Ettensohn, Frank R., Holbrook, Andrea L., and Stewart, Alexander K., Understanding bryozoan bioherms in the Tanglewood and Grier members, Lexington Limestone (Middle Ordovician), through modern small patch-reef analogues, Southeastern Section Geological Society of America, Raleigh, North Carolina, April, 2001.*

*Lambert, Jason R., and Ettensohn, Frank R., Possible modern analogues to bryozoan bioherms in the Tanglewood and Grier members, Lexington Limestone, central Kentucky, Kentucky Academy of Science, Lexington, Kentucky, December, 2000.*

*Mason, Charles E., and Ettensohn, Frank R., Tectonic control of Sunbury (Kinderhookian) and Borden (Osagean) deposition in northeastern Kentucky, Kentucky Academy of Science, Lexington, Kentucky, December, 2000.*

*Thomas, W. A., and Bayona, G., Three-dimensional palinspastic restoration of the unmetamorphosed Appalachian thrust belt in Alabama and Georgia: Geological Society of America Abstracts with Programs, v. 33, no. 2, p. A-5. Southeastern Section Meeting, Geological Society of America, Raleigh, North Carolina, April, 2001.*

*Bayona, G., Thomas, W. A., Finney, S.C., and Repetski, J. E., Flexural uplifting and forebulge migration as reflection of collisional tectonism: An example from the Alabama promontory, southeastern USA: American Association of Petroleum Geologists, 2001 Annual Convention Official Program, v. 10, p. A14. AAGP Annual Meeting,*

Denver, Colorado, June, 2001.

*Brewer, M. C., and Thomas, W. A., Lateral connectors in part of the Bessemer transverse zone, Alabama Appalachians: Geological Society of America Abstracts with Programs, v. 32, no. 7, p. A-234. Geological Society of America Annual Meeting, Reno, Nevada, November, 2000.*

*Garry, W. B., A vision for a planetary field camp for aspiring lunar and Martian field geologists. Geological Society of America Annual Meeting, Reno, Nevada, November, 2000.*

*Jusczyk, S. J., Regional correlation of the Paleozoic stratigraphy of the Ouachita salient, and implications for tectonic history. Rocky Mountain and South-Central Section Meeting, Geological Society of America, Albuquerque, New Mexico, April, 2001.*

*Jusczyk, S. J., Along-strike variations in structural style across the Ouachita Mountains: Effect of weak layer vs stiff layer ratio and major detachment surfaces. Rocky Mountain and South-Central Section Meeting, Geological Society of America, Albuquerque, New Mexico, April, 2001*

*Ravi Kanda, A two dimensional asperity-scale frictional melting model. American Geophysical Union, San Francisco, California, December, 2001.*

*LaSage, Danita and Fryar, Alan, Discharge of contaminated ground water into a first-order stream, McCracken County, Kentucky. 45<sup>th</sup> Annual Midwest Groundwater Conference, Columbus, Ohio, Oct. 2000.*

*Thompson, Karen E. and Fryar, Alan E., Ground water flow in the Ledbetter Creek Watershed, Calloway County, Kentucky. 45<sup>th</sup> Annual Midwest Groundwater Conference, Columbus, Ohio, Oct. 2000.*

## FACULTY NEWS

### Frank R. Ettensohn

This proved to be another unusually busy year for me. From August to January, Nick Rast and I completed the final editing of our GSA Special Paper,

entitled *Ancient Seismites*, which should appear early next year. This will be the first geologic book devoted to seismites, or soft-sediment deformation generated by earthquakes and tsunamis. The twelve papers we assembled here were based on an earlier GSA symposium on the subject, which we convened in 1998. Although this kind of deformation has been known for some time, it has been largely misinterpreted as gravity-driven mass movement. The twelve papers in the volume use modern analogs from different situations to establish the preeminent characteristics of seismites and how to use these characters for distinguishing seismites from similar features produced by other causes. Although not included in the volume, Lisa Jewell completed her MS thesis on the Cane Run Bed, one of the most prominent seismite horizons in the Lexington Limestone. A current student, Alex Stewart, is now working on other seismite horizons in the Tanglewood Member of the Lexington Limestone. Another student, Julie Kasl, although not working on seismites, also finished her thesis on the Devils Hollow Member of the Lexington Limestone, showing that it originated as series of carbonate beaches that accreted onto structurally related Tanglewood shoal complexes.

Another activity that began in the fall of last year and continued throughout the school year was work on an EPSCoR/NSF proposal for infrastructural improvement of research. Although the proposal began as an individual proposal that I submitted on behalf of the Department for a stable-isotope-ratio mass spectrometer, it was merged with other proposals from elsewhere in the University and in the state. The geology proposal was merged with one by Gail Brion in Civil Engineering and Alan Fryar in the Department to equip an environmental geochemistry lab. After many review panels, the merged proposal was selected for the inception of funding in 2002, but we are awaiting decisions on the status of final funding.

This year I also continued my work in training local middle- and high-school teachers in the earth and environmental sciences with Jim Krupa in biology and Truman Steven in science education through a two-year Eisenhower grant, my third such grant. This year our theme was uniformitarianism and the use of modern analogs in carbonate geology to understand Paleozoic carbonates in Kentucky. As a result, we took 25 teachers to the Bahamas for a week during Spring Break to show them the modern analogs and then developed the ancient analogs in the



Paleozoic of eastern and central Kentucky during the summer. It was a fantastic experience for the teachers and will continue through the current year.

As soon as I finished the summer experience for the teachers, I took off with 15 students and two teaching assistants for summer field camp in Colorado. As Dave Moecher was on sabbatical, I did the camp this year. Some alumni are surprised, but we are still doing field camp in the Gunnison-Crested Butte area, and much of our mapping is still done on Cement Creek. Of course, we no longer do eight weeks of camping, but stay mostly in the dormitories at Western State College. Some of you may remember all of the camping equipment and the tent city that we set up every year. We still maintain much of that equipment in Colorado, but we will try to dispose of most of it next summer – perhaps in some type of a giant garage (or barn) sale.

I think that the main highlight of the year for me and many of our students and faculty was the combined alumni weekend/retirement celebration that we held for Nick Rast. Of course, it was followed about five months later by Nick's untimely death, which was and still is a real low point for me, having worked very closely with him on several projects over the last two years. Nonetheless, his retirement celebration was probably the best such event that we have ever held, with more than 90 attendees, some coming from as far away as Europe to honor Nick. I think that it was an especially good time for Nick with many of his colleagues and former students attending, and I am glad that we were able to do this while Nick was still with us. We will be putting together a memorial volume in his honor and establishing a fund in his honor to support research and graduate study.

#### **Alan E. Fryar**

This past year was capped by my promotion to associate professor with tenure. I am grateful to my colleagues and students for their support. We're still studying ground-water flow and reactions in the northern Gulf Coastal Plain, the Inner Bluegrass, and the High Plains of Texas. With former student David Butler and colleagues from the Department of Agronomy, I published the second paper on our work at the Paducah Gaseous Diffusion Plant (PGDP). (Good news: in soils and sediments from around PGDP, we found types of microbes that have degraded the contaminant trichloroethene [TCE] at other sites. Bad news: we did not observe any significant degradation of TCE in batch cultures,

which may be an experimental artifact.) Danita LaSage completed the field work for her Ph.D. on contaminant transport and fate along Little Bayou Creek downstream of PGDP. Danita is now a visiting assistant professor in the Department of Earth Sciences at Eastern Kentucky University. Abhijit Mukherjee, a new M.S. student from the University of Calcutta (India), will pick up where Danita left off by conducting tracer tests to examine volatilization and dilution of contaminants within the creek. Andrea Hougham, who received her B.S. in May, completed her independent study of TCE sorption to sediments from Little Bayou Creek, and Lee Gatterdam is finishing experiments on reactions of TCE with pyrite. Andrea will begin an M.S. in chemical oceanography at the University of Rhode Island this fall, while Lee will start work with a local consulting firm in Lexington. Karen Thompson, who has taken a position with the Kentucky Water Research Institute in Frankfort, is finishing her modeling of ground-water flow in the Ledbetter Creek watershed, which empties into Kentucky Lake in Calloway County. For the second year in a row, the GLY 585 (Hydrogeology) class helped Karen by measuring water levels and gaging flow in April (and again, we were fortunate to have good weather and a great group of students). Working with staff from the KGS, Todd McFarland is characterizing sediment transport during storm flow through the Blue-Hole Spring ground-water basin in Versailles.

I also continue to coordinate the departmental seminar series, help organize Alumni Week-End, and teach our introductory environmental geology course (GLY 110). Our seminar series culminated on Alumni Week-End with the Hudnall Symposium on Appalachian tectonics. This symposium, which honored the career of Professor Nick Rast, drew 12 speakers (from institutions as far afield as the University of Liverpool) and approximately 50 attendees. Subsequently, 87 people filled a room in the Boone Faculty Center for the banquet and after-dinner presentations celebrating Nick. As usual, the week-end would not have been successful without the efforts of numerous students, faculty, and staff. There won't be an Alumni Week-End this coming spring—please join us instead for the joint meeting of the North-Central and Southeastern Sections of GSA in April! In the meantime, join us also for seminars (usually on Thursdays at 4 PM when classes are in session): see [www.uky.edu/AS/Geology](http://www.uky.edu/AS/Geology) for more details.

**Kevin Henke**

Dr. Henke teaches geochemistry (GLY 530), mineralogy (GLY 360), teaching methods (GLY 570) and introductory geology courses for majors and non-majors (GLY 110, 120, 160, and 220). His research interests include: the environmental geochemistry of mercury and other heavy metals, metamorphic petrology, and mineralogy. Currently, Dr. Henke is involved in research on the chemistry and stability of mercury and other heavy metal precipitates that result from the use of commercial water treatment products. The effective use of any commercial product requires basic information on the chemistry of the product and the chemistry and stability of the resulting precipitates. Dr. Henke has found that the chemical properties of several popular water treatment products are very different than the manufacturer's claims. Some of the commercial compounds actually produce previously unreported toxic by-products, including CS<sub>2</sub>, when they react with dissolved heavy metals.

**Paul D. Howell**

I'm enjoying a year on sabbatical, working mainly on uses of instructional technology for geoscience education. I'm presenting a workshop on that topic at GSA in Boston, sponsored by Houghton Mifflin Publishing Company of Boston. During Spring 2001, I authored and helped develop multimedia for a web page and CD-ROM to accompany the latest (third) edition of Stan Chernicoff's "Geology", a physical geology textbook. My current projects include sample materials for my own web-based intro geology text, and a pilot project for online geology training of UST professionals working for state agencies within EPA Region 4. I'm looking forward to implementing many of these new ideas into the courses I teach when I start back at UK in Fall, 2002.

**Shelley Kenner**

Having completed a year long postdoc at Caltech, I have now arrived at UK. While at Caltech, I worked on a number of projects. The first involves temporal clustering of major events over time-scales much longer than typical inter-event intervals. In places like the Basin and Range Province in the western United States, there is mounting evidence that major events occur in clusters with intra-cluster inter-event times of a few thousand years, while clusters are typically separated by a few tens of thousands of years. In particular, I have investigated the role of time-dependent deformation and postseismic stress transfer as a potential cause of this type of temporal

clustering. A second project which is currently underway involves the evolution of regional crustal stresses with time in response to the occurrence of repeated large earthquakes. This is interesting because, when modeling geodetically observed postseismic deformation rates, the assumed background stress level influences our interpretation of the original data. Another aspect of this project is the development of methods that use all available geodetic deformation data to correctly invert for the earth's material properties at depth, a problem which is highly dependent on the time and length scales of the original observations. Lastly, while at Caltech, I was able to learn how to apply InSar (Satellite Radar Interferometry) techniques to geodetic and tectonic problems. With this technique, a satellite makes a radar image of the earth's surface. When two such images are combined, a map of the deformation which has occurred in the time interval between the two images can be generated. This technique has a variety of applications, including the study of subsidence due to groundwater withdrawal, coseismic and postseismic deformation due to earthquakes, and damage assessment after natural disasters.

Additionally, during the last year, I have participated in numerous meeting and workshops. These included a workshop on stress transfer following the 1906 San Francisco earthquake sponsored by the Working Group on Northern California Earthquake Probabilities, a workshop designed to address the disparity between geodetic and geologic deformation rate estimates in the Basin and Range, the fall meeting of the American Geophysical Union, and various EarthScope workshops. EarthScope is a major multi-component, multi-agency earth sciences instrumentation initiative which includes seismometer, continuous GPS, and strainmeter installations (<http://www/earthscope.org>). The workshops are designed to identify subjects and processes to which the EarthScope facilities can be applied, along with relevant scientific issues and techniques. For more information on the EarthScope project

Now that I have arrived in Kentucky, work on the New Madrid Seismic Zone (located in the south-central United States) will also continue. The finite element mechanical model (previously developed with Dr. Paul Segall of Stanford University), which describes a mechanism for the generation of repeated intraplate earthquakes will be refined and made more realistic. In particular, the modeling results will be combined with longer time-scale simulations of the

evolution of stress in the North American craton. Funding from the United States Geological Survey's National Earthquake Hazards Reduction Program (USGS-NEHRP) has been obtained for this purpose. An important aspect of our modeling work in the New Madrid Seismic Zone has been the development of a class of models which is appropriate for intraplate tectonic regimes. In the last year, this has led to an expanded investigation of earthquake modeling in all non-plate boundary environments and, specifically, an attempt to understand the errors in interpretation that may result from the use of tectonically unreasonable model geometries. We find that, while commonly used earthquake modeling techniques are reasonably appropriate for localized plate boundary zones like the San Andreas Fault System in California, their applicability to diffuse plate boundaries zones (e.g. the Basin and Range Province) and intraplate regions (e.g. the New Madrid Seismic Zone) needs to be evaluated in much greater detail.

#### **David P. Moecher**

The first half of 2001 found my family and me on sabbatical downunder. We spent the better part of 6 months in tropical north Queensland, specifically at James Cook University in Townsville, Queensland. The sabbatical leave turned out to be everything it was intended to be (an opportunity to begin new research collaborations, a time to concentrate on a few specific research problems), and more. Words cannot begin to describe the beauty of the tropical savannas and few remaining expanses of rain forest along the northeast coast, the green islands in the Coral Sea, and the colors and diversity of fish inhabiting the Great Barrier Reef. Even the hundreds of photos and half dozen video cassettes we recorded wouldn't do the place justice. However, only four words are needed to describe the outback of Queensland: old, hot, dry, and red. We made two trips into the outback to collect samples of Proterozoic regional metamorphic rocks in the classic Mt. Isa/Cloncurry mining district, and the Georgetown Inlier. Several of our traverses would easily qualify as "death-marches" at any field camp. On our way down to "Oz", we spent ten days in New Zealand. Now *that's* an incredible land: volcanoes, rocky coastlines, snow-covered peaks, glaciers, and deep fjords. Although the scenery and geology were spectacular, it's the flora and fauna that were so different than North America. New Zealand has a relict Gondwana flora of fern trees and conifers that make the place look like a late Paleozoic forest. The

highlights of this trip were a hike up Mt. Ruapehu, an active stratovolcano that last erupted in 1996, and a hike on the Franz Josef glacier. We broke up our stay in Australia by spending a week in Bali, experiencing a non-western culture, snorkeling about coral reefs, and climbing Mt. Batur, another volcano. Stop by my office some time and I'll show you my slides from all these places.

Australia and New Zealand are great countries in which to travel. They are set up for "backpackers", with clean, inexpensive, well-run hostels strung out along the main tourist by-ways. Although it's a long way down there, it's well worth the trip. I would encourage students to consider a semester or year abroad in either country (although New Zealand, in my humble view, gives you more bang for your buck).

Graduate students Chris Berg and Matt Massey also had a sabbatical in Australia. They sat in on classes at JCU, worked on their theses, and got to see what graduate school was like in the Australian system. Chris Berg defended his master's thesis on the oxygen isotope systematics among minerals in polymetamorphic rocks, and has moved on to the Ph.D. program at UT-Austin. Matt Massey is working on the Hayesville fault in the Blue Ridge, in between rock climbing trips to the western U.S. and the Gorge.

#### **Kieran O'Hara**

I continue as Director of Graduate Studies and report that our graduate program is vibrant and growing in size and quality. The new graduate curriculum has finally been approved by the Graduate Council and it is on the books for this Fall. The new curriculum is more focused in key areas and is more flexible than the old one. It should revitalize our graduate course offerings and hopefully give a clearer identity to our program.

On the research front, I continue my studies of frictional melting in the crust. During the past year a new geothermometer was developed that allows the depth of frictional melting in the crust to be estimated. This geothermometer has applications to understanding the depth of earthquakes in the crust. Preliminary results were presented at a recent Penrose conference in London. NSF has recently recommended funding to test this geothermometer on natural samples in Colorado. My research assistant, Ravi Kanda, will work on this project.

### **Sue Rimmer**

This has been a very busy year, mostly spent regrouping after many years in the Dean's Office. I am currently working on Devonian shales, both here in Kentucky and up in western New York state. Shane Goodnight, an M.S. student, is separating kerogen concentrates from the Devonian shales of central Kentucky for stable isotope analyses (we're using a density gradient separation technique in collaboration with Jack Crelling at Southern Illinois University). Sarah Hawkins, an undergraduate in our department, is working on pyrite size distribution in these shales. These two projects should help us better understand environmental conditions during accumulation of the black shales.

The coal program is keeping us busy these days. Jim Hower coordinated the coal geology seminar last year, and this semester we are teaching organic petrology (to 13 students!) Next semester Jim and I hope to lead three of our grad students in an independent study project that will involve mine trips to do research in western Kentucky. New students in the program include Mike Shultz, a new M.S. student who will be working with Jerry Weisenfluh, and Jen Klein who will be working on a coal bed methane project with me for her PhD. Jim Hower also has two of our undergraduates working with him on coal projects out at the CAER, Tanaporn "Goe" Sakulpitakphon and Sarah Mardon.

In my spare time, I've been learning how to build web sites, and if you've visited our new web site recently (<http://www.uky.edu/AS/Geology/>) you may have some idea about what I've been up to. Keep checking back, there will be much more. I also welcome your suggestions for features you would like to see on the web site.

### **William A. Thomas**

This has been an interesting year, a good year, much of which centered on activities with graduate students.

In September, Germán Bayona (Ph.D. student), Nick Rast, and I represented the department at a GSA Penrose Conference in Edinburgh, Scotland, to discuss the Iapetus Ocean.

In November, I led the Annual Field Trip of the Alabama Geological Society to examine the Middle Cambrian Conasauga Formation, along with Ed Osborne (who did his MS with me at Alabama) and Ricardo Astini. The field trip focused on the large-scale tectonic setting of deposition of the Conasauga in the context of rifting of the Argentine Precordillera

from North American Laurentia. The limestones in the Conasauga are important aquifers, and many practicing hydrogeologists attended the trip and asked numerous questions. It is gratifying to help with specific applications of theoretical geology to real problems.

Later in November, GSA met in Reno, and I reported on the ages of basement rocks in part of the Precordillera. MS student Brent Garry presented a poster, and Maggie Brewer (Ph.D. student) reported on part of her dissertation research.

From early January through March, Brian Cook and Brent Garry were in Alabama doing field work on two projects supported by the USGS EDMAP program, which sponsors geologic mapping by graduate students. I was in Alabama for three field checks. After the first session in January, I traveled to Reston, Virginia, to serve my final time on the EDMAP panel. Good news from that, we have EDMAP funding for Mike Solis (MS student) to do his thesis field work in January-March, 2002. During other field visits in Alabama, I spoke about geology with a third grade class and two first grade classes at Vestavia Hills Elementary School (third-grade grandson and twin first-grade grandsons), but I missed Germán's presentation in the departmental seminar in Lexington. For the final field visit in March, Brian, Brent, and I were joined by Ed Osborne, who heads the mapping programs of the Alabama Geological Survey, and Peter Lyttle, who is the program director of EDMAP at USGS. Both Brian and Brent have nearly completed theses, and they have begun Ph.D. studies at Virginia Tech and University of Buffalo, respectively.

In April, at the meeting of the Southeastern Section of GSA, Germán and I presented three papers.

Also in April, the department celebrated the career and retirement of Nick Rast. It was my pleasure to participate in the symposium, along with friends from around the world. This was a wonderful tribute to Nick; and, as events have unfolded, it was most timely to honor him then.

In May, at a joint meeting of the South-Central and Rocky Mountain Sections of GSA in Albuquerque, Kent Nielsen and I organized a symposium in memory of our colleague, George Viele. George and I had worked together on Ouachita geology for many years, and we all miss him. I was especially gratified that Steve Juscuk (Ph.D. student) presented both a poster and a paper, and Jay Sims (UK MS) assisted Steve with his

transparency projection.

We did have some fun, as well. In June, Rachel and I took four of our grandsons (the Orr boys, ages 9, 7, 7, 4) along with their parents to Yellowstone, and we also visited Dinosaur National Monument and Craters of the Moon. I did make sure they learned some geology, including ripple marks on sandstones and collapse of lava caves.

My final year as Chair of the AGI Finance Committee has been an interesting one. Managing investments this year has required some creative thinking.

My teaching for the year included my graduate seminar in tectonics and sedimentation, as well as a section of physical geology. As always, I enjoyed teaching stratigraphy, using the book written by my UK classmate, Sam Boggs.

As the new year begins, several new students are on board, and we look forward to another interesting year.

#### **Edward Woolery**

In recent years the workload related to geologic hazards and environmental geology has increased at a higher rate than in the traditional areas of geology. This is not surprising, because as the nation's infrastructure begins to age, and the expanding economy and population force new construction into less desirable locations, geologic hazards become more problematic for the geological and civil engineer. As a consequence of these increasing demands, Ed and the Kentucky Geological Survey have initiated a research program that seeks innovative ways to mitigate the enormous losses associated with geologic hazards. Public education and awareness are also components of the program.

As part of the seismic hazard mitigation effort, the Dept. of Geological Sciences and KGS operate and maintain a joint seismic network consisting of twelve short-period seismometers and seven strong-motion accelerometers. Data from the network's strong-motion stations are used to understand how thick sequences of unconsolidated sediment affect (i.e., amplify) the propagation of seismic waves. The results provide engineers with credible design loads. The weak-motion stations are deployed and configured to assess structures in the deeper crust. Results from long-term observations could lead to an unambiguous northern boundary for the New Madrid Seismic Zone.

Ed's particular interests since returning to the university are the application of high-resolution

seismic refraction/reflection methods to problems in geotechnical engineering and near-surface geology. Currently he is the PI of a USGS-NEHRP grant to assess the timing and extent of neotectonic deformation in the Fluorspar Area Fault Complex of western Kentucky. Results from this study could have significant implications for the regional seismic hazards. He is also working with the Kentucky Cabinet of Health Services and Department of Energy (PI) to evaluate design ground motions for a hazardous waste landfill at the Paducah Gaseous Diffusion Plant. Ed will also be completing another USGS-NEHRP study (Co-PI) later this year that is characterizing the dynamic properties of deep sediment deposits in the central Mississippi River Valley. In addition to his efforts with the Department of Geological Sciences, he has also taught undergraduate soil mechanics and graduate earthquake engineering courses in the Department of Civil Engineering during the past year.

#### **ADJUNCT FACULTY.**

##### **James Drahovzal**

My primary task at the University of Kentucky is providing leadership to the Energy and Minerals Section at the Kentucky Geological Survey (KGS). The section is responsible for oil, natural gas, coal, and mineral research and service. We are just ending our first year in of a three- year research contract from the U.S. Department of Energy to investigate potential sites for carbon dioxide sequestration. This is a cooperative research project with the Kansas, Illinois, Indiana and Ohio geological surveys in a study entitled, "Midcontinent Interactive Digital Carbon Atlas and Relational Database (MIDCARB). In the study, we are identifying oil and gas fields, coal beds, black shales, mines, and saline aquifers that could serve as carbon dioxide sinks for major stationary sources of anthropogenic carbon dioxide in the Midwest. In related work, we are proposing a detailed geochemical study of the Devonian black shales in Kentucky as a possible future carbon dioxide sink.

The two-year Rome Trough Consortium project has been completed. In this industry and Department of Energy study we have been examining the geology and natural gas potential of this Cambrian graben in eastern Kentucky and parts of Ohio and West Virginia. Graduate student, Tina White is finishing her M.S. thesis work on the fault kinematics of this feature.

Personally, I continue to conduct research on the Cambrian and Precambrian rift basins of the eastern Midcontinent and the mapping of Precambrian basement. A group of us are defining the Proterozoic layered seismic sequences that underlie the Eastern Midcontinent. We are working on a joint paper that will come out next year and will present our current thoughts at a topical session at GSA in Boston this fall.

As an adjunct associate professor in the department, I participated on the committees of five M.S. and four Ph.D. candidates this year, chairing the committee for one of the M.S. candidates. Their research topics include goniatite biostratigraphy, geologic mapping, structural geology, seismic interpretation, and stratigraphy. During the year, two of the Department's undergraduate students and one of its graduate students have held student appointments with the Energy and Minerals Section at KGS. I continue to work on the Coosa Deformed Belt project in the Alabama Appalachians with Dr. Thomas.

Becky, my wife, and I continue to enjoy living in the Bluegrass and being a part of Department activities.

#### **Stephen Greb**

GLY 130, the dinosaurs and disasters class, continues to be a fun. This year we've added more bone replicas for class discussions, and thanks to Stephen Spielberg, we'll have yet another dinosaur movie to discuss in class. My research interests at KGS include coal-mining geology, coal-field depositional systems, Carboniferous basin analysis, and sedimentology. Field work this summer concentrated on examining the affects of accommodation on coals and depositional systems along the northern hingeline of the Central Appalachian Basin. Over the summer I co-lead a 5-day field trip through the central Appalachian basin for the 7<sup>th</sup> International Fluvial Sedimentology conference, which concentrated on the effects of Carboniferous accommodation. The trip was a great success. Its always fun to watch geologists from other countries get excited about the outcrops in the basin. This summer I also participated in several teacher and educational workshops, helped in the construction of a virtual earth-science class for the Kentucky Department of Education, and made numerous additions to the web-based Earth Science Education Network (<http://www.uky.edu/KGS>).

#### **James C. Hower**

Much of our research continues to be on the petrographic and chemical properties of fly ash. We are conducting studies of mercury and arsenic capture in fly ash and we are expanding our studies of the impact of co-combustion of tires on fly ash petrology and chemistry. An undergraduate student, Tanaporn Sakulpitakphon, is in her third year at the laboratory. Sarah Mardon, a senior in geology, started work in my laboratory in August 2001. Sarah will be partially supported on a grant from the National Coal Quality Inventory. The remainder of her support comes from a grant from CONSOL. Sakulpitakphon was also supported by CONSOL for the summer of 1999. I am continuing as editor-in-chief of *International Journal of Coal Geology*. The journal will publish a special issue in honor of John Ferm in the next year. Ari Geertsema took over as director of the Center for Applied Energy Research in February. Ari comes to us following many years with SASOL in South Africa and, most recently, with CSIRO in Melbourne.

### **FACULTY RESEARCH SUPPORT**

#### **Kentucky Council on Post-Secondary Education**

A Kentucky-wide environmental approach to middle school professional development in the sciences, central Kentucky.

**Frank R. Ettensohn**

#### **Kentucky Council on Post-Secondary Education**

Understanding scientific process through modeling past and present causes in the earth, life, and environmental sciences.

**Frank R. Ettensohn**

#### **Kentucky Department for Environmental Protection.**

Laboratory investigations of abiotic attenuation of trichloroethene by soils and sediments

**Alan Fryar**

#### **Kentucky Department for Environmental Protection**

Natural attenuation of TCE and Tc-99 during seepage to and flow within Little Bayou Creek

**Alan Fryar**



**Kentucky DOE/EPSCoR**

Reservoir-watershed linkages: The effects of water level management on hydrology and water quality in hydro-electric reservoirs (Murray State University).

**Alan Fryar**

**UK Special Summer Faculty Research Fellowship, Office of the Vice President for Research and Graduate Studies**

Modeling of chemical evolution during ground-water recharge and flow, Southern High Plains, Texas.

**Alan E. Fryar**

**National Science Foundation**

Upgrade of the University of Kentucky electron microprobe.

**David P. Moecher**

**National Science Foundation, Petrology and Geochemistry**

Oxygen isotope systematics in polymetamorphic rocks: The effects of multiple periods of deformation and mineral growth

**David P. Moecher**

**Kentucky National Science Foundation EPSCoR Summer Research Program**

Undergraduate Research Opportunities in the Geological Sciences: A focus on Future Women Geoscientists

**Sue Rimmer**

**National Science Foundation**

POWRE:  $\delta^{13}\text{C}$  Heterogeneity in Devonian-Mississippian Marine Shales: Integration of Density-Gradient Centrifugation (DGC) and Organic Petrography into Isotopic Studies

**Sue Rimmer**

**U.S. Geological Survey**

Dynamic site periods in the northern Mississippi Embayment area of western Kentucky and southeastern Missouri.

**Ron L. Street**

**U.S. Geological Survey**

Shear-wave velocities of the post-Paleozoic sediments in the Memphis, Tennessee, Metropolitan area.

**Ron L. Street**

**National Science Foundation**

Redox conditions during co-seismic rupture- a Mossbauer study of frictional melts.

**Kieran O'Hara**

**National Science Foundation**

Testing a pseudotachylyte geothermometer.

**Kieran O'Hara**

**Petroleum Research Fund of the American Chemical Society**

Geometry and kinematics of lateral ramps in thrust belts: Keys to translation direction and three-dimensional balancing.

**William A. Thomas**

**U.S. Geological Survey, EDMAP**

Geological mapping in the Appalachian thrust belt in eastern Alabama.

**William A. Thomas**

**U.S. Geological Survey, EDMAP**

Geologic mapping in the Bessemer transverse zone, Appalachian thrust belt, Alabama.

**William A. Thomas**

**Kentucky Cabinet of Health Services/DOE**

Ground-motion evaluation at hazardous waste landfill, Paducah Gaseous Diffusion Plant.

**Edward Woolery**

**U.S. Geological Survey/NEHRP**

Geophysical assessment of Quaternary deformation in the fluorospar area fault complex.

**Edward Woolery**

**REPRESENTATIVE  
PUBLICATIONS**

This list provides examples of faculty and student publications; a complete list is available on request.

**Faculty - Bold**

*Students and former students – italics*

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Carr, T.R., White, S.W., Wickstrom, L.H., **Drahovzal, J.A.**, Seyler, Beverly, Rupp, J.A., 2001, Midcontinent Interactive Digital Carbon Atlas and Relational Database (MIDCARB): U.S. Department of Energy, National Energy Technology Laboratory, Proceedings of the First Conference on Carbon Sequestration, [http://www.netl.doe.gov/publications/proceedings/01/carbon\\_seq/1a4.pdf](http://www.netl.doe.gov/publications/proceedings/01/carbon_seq/1a4.pdf), 17p.

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**Greb, S.F.**, and **Weisenfluh, G.A.**, 2000, Mining geology of the Lower Elkhorn coal bed: Kentucky Geological Survey, ser. 12, Map and chart series 4.

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#### DEPARTMENTAL SEMINARS 2000-2001

##### **Geological Society of America/Association of Engineering Geologists, Richard H. Jahns Lectures**

Former manufactured gas plants, Allen W. Hatheway, Professor Emeritus, Geological Engineering, University of Missouri at Rolla.

Some new thoughts on the origin of the Lexington Limestone, east-central United States, Frank R. Ettensohn, Department of Geological Sciences, University of Kentucky.

The state of weather and climate in the Bluegrass, Tom Priddy, Cooperative Extension Service, University of Kentucky.

Tracking mercury from the mine to the power plant, James C. Hower, Center for Applied Energy Research, University of Kentucky.

A new supercontinent at approximately 1500 million years, John Rogers, Department of Geological Sciences, University of North Carolina—Chapel Hill.

“Coal balls” and the exceptional preservation of plant remains in ancient seams, Fred Siewers, Department of Geography and Geology, Western Kentucky University.

##### **American Association of Petroleum Geologists Distinguished Lecture**

Sequence stratigraphic variability in foreland basins: an example from the Cretaceous Western Interior Seaway of North America, Lee Krystinik, Krystinik Litho-Logic, Fort Worth, Texas.

Pseudotachylytes: The role of water and their depth of origin, Kieran O'Hara, Department of Geological Sciences, University of Kentucky.

A crash course in galactic dynamics, Isaac Shlosman, Department of Physics and Astronomy, University of Kentucky.

Understanding large scale, deep crustal processes by zapping tiny mineral grains with electron, ion, and laser beams, David Moecher, Department of Geological Sciences, University of Kentucky.

Isotope hydrology and dissolved magmatic carbon flues of cold springs in the southern Cascade Range, Timothy Rose, Lawrence Livermore Laboratory.

Isotopic processes in quasi-closed system underground nuclear test cavities, Timothy Rose, Lawrence Livermore National Laboratory.

Oxygen-17 anomaly in terrestrial rocks, Huiming Bao, University of California, San Diego.

Ferric oxides and oxyhydroxides: Oxygen isotope systematics and paleoclimatic reconstruction, Huiming Bao, University of California, San Diego.

Controls on Middle to Late Ordovician (Blountian-Taconian) synorogenic deposition in the southeasternmost part of the North American craton (Laurentia), Germán Bayona, Geological Sciences, University of Kentucky.

Oxygen isotope systematics in multiply-deformed rocks, Chris Berg, Geological Sciences, University of Kentucky.

**Geological Society of America Birdsall-Dreiss Distinguished Lectures in Hydrogeology**, Cosponsored by the Kentucky Water Research Institute, 1.) The permeability of continental crust, and 2.) Land subsidence in the United States, Steve Ingebritsen, U.S. Geological Survey, Menlo Park, California

Scientific advances derived from groundwater tracer studies, Joseph Ray, Groundwater Branch, Division of Water.

Using GIS to develop a new physiographic map of Kentucky, William Andrews, Kentucky Geological Survey, University of Kentucky.

Earthquake site effects, soil classification, and near-surface shear-wave investigations, Edward Woolery,

Geological Sciences, Kentucky Geological Survey. Quaternary-age fault reactivation in the Fluorspar Area Fault Complex of western Kentucky: preliminary evidence from shallow SH-wave reflection profiles, Edward Woolery, Kentucky Geological Survey.

Energy Policy: Should the public care? Toward a new national energy policy: What are the implications for Kentucky? G. Warfield Hobbs, American Association of Petroleum Geologists.

Sedimentation in bottomland hardwoods downstream of an east Texas dam, Jonathan Phillips, Department of Geography, University of Kentucky.

The nature and origin of the Devils Hollow Member, Lexington Limestone, central Kentucky, Julie Kasl, Geological Sciences, University of Kentucky.

Origin of deformation in the Can Run Bed and its implications, Lisa Jewell, Geological Sciences, University of Kentucky.

#### **Association for Women Geoscientists Distinguished Lecture**

Catastrophic gas release from Lake Nyos, Africa: from disaster response to hazard mitigation, Michele Tuttle, U.S. Geological Survey, Denver, Colorado.

Capacity for trichloroethene sorption: Little Bayou Creek, Andrea Holbrook, Geological Sciences, University of Kentucky.

School of hard Knox: what I learned about field mapping, and how I learned to love chert, Brian Cook, Geological Sciences, University of Kentucky.

#### **DEPARTMENTAL FUNDS**

Several important Departmental funds continue to be supported by contributions from alumni and friends of the Department. The special uses of these funds are as follows:

##### **Brown-McFarlan Fund**

- student research grants; student prepares proposal

- including itemized budget
- student travel to professional meetings to present papers
- McFarlan Lecture (annual seminar)

#### **The John C. Ferm Memorial Graduate Student Fund**

- a new fund in honor of John C. Ferm to support graduate student research in the field

#### **The GEOFund**

- (endowed by contributions: will be used when endowment reaches \$100,000. )
- a recent endowed fund to provide long-term Departmental needs

#### **Geology Development Fund**

- enhancement of Departmental programs in teaching and research through improvement of equipment and facilities

#### **Geology Support Fund**

- support of the Departmental seminar program
- equipment for enhancement of instruction
- support for initiation of special programs

#### **Geology Museum Fund**

- operation of the Hudnall Geological Sciences Museum

#### **Glenn Rice Memorial Fund**

- undergraduate research grants, to support senior theses

#### **Wallace W. Hagan Scholarship Fund**

- (endowed by contributions)
- undergraduate scholarship, for a student in field-oriented geology

#### **Haynes Field-Trip Support Fund**

- to support student travel on field trips.

#### **Nicholas Rast Memorial Fund**

- to support research and graduate study in the Department

In addition to the funds supported directly by alumni contributions, the Department of Geological Sciences has other funds supported by endowments from alumni and annual corporate contributions. These funds and the purposes are:

#### **Hudnall Scholarship Fund**

- (endowed by James S. Hudnall)
- scholarships for participation in the summer field course

#### **Pirtle Scholarship Fund**

- (endowed by George W. Pirtle)
- undergraduate scholarship for outstanding junior (\$1,000 per year)
- graduate fellowship (approximately \$2,000 per year as summer stipend plus tuition)

#### **Chevron Fellowship**

- graduate fellowship

#### **Chevron Support Fund**

- support for student research
- equipment for instruction and/or research

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