

# Oklahoma Geology Notes

A NEWSLETTER OF THE OKLAHOMA GEOLOGICAL SURVEY

The University of Oklahoma MEWBOURNE COLLEGE OF EARTH & ENERGY

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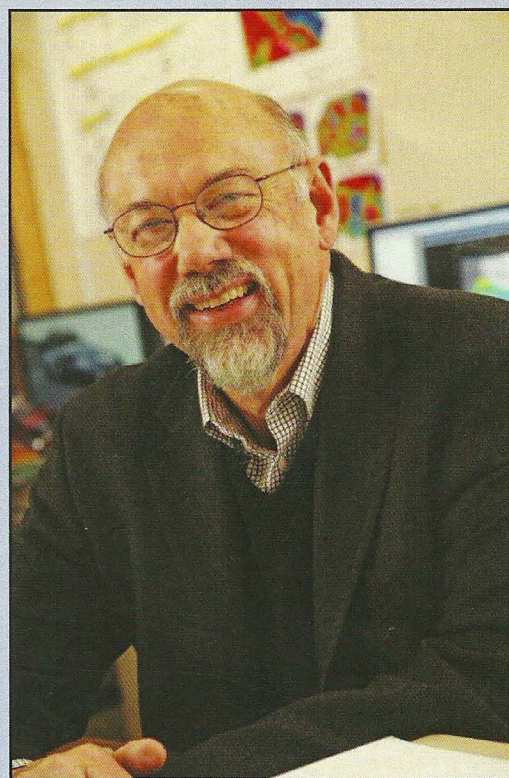
*This issue of the Notes is dedicated to retiring Director G. Randy Keller*

## From the Director

When I came to OU in 2006, I looked forward to working with the folks I knew: Ken Johnson, Ken Luza, Jim Lawson, Jock Campbell, and Neil Suneson. However, it never crossed my mind that I would end up being the OGS Director. Dr. Mankin's sudden retirement set a series of events in motion that, to my surprise, resulted in this job being mine. I am totally serious in saying that it has been a distinct privilege to serve as the OGS Director for the past seven years. There certainly have been some bumps in the road, and we have lost Dr. Mankin, Jim Lawson, and Dr. Luza. However, everywhere one looks, there is progress thanks to the efforts of the staff, fresh new faces, and the support of OU, industry, and funding agencies.

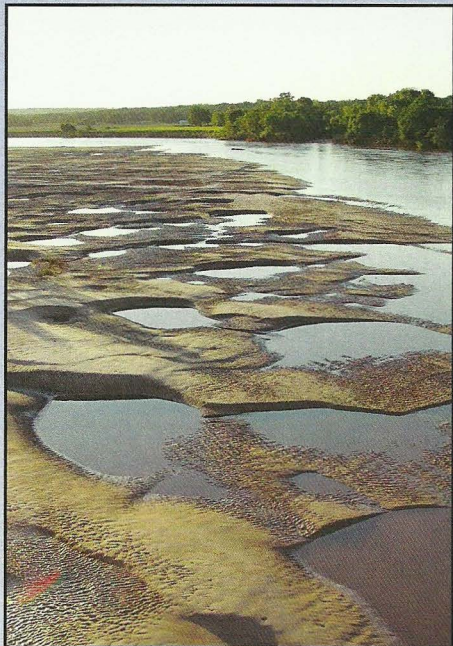
The staff of the OGS has expanded significantly, many students are being supported, and our research profile is broad and deep. The OPIC facility is greatly improved thanks to new roofing, new instruments and equipment, and viewing space that is heated, cooled, and well lit. Usage of the facility is at an all-time high. The seismic network is greatly expanded and improved, and Austin Holland is now a scientific celebrity. We have become thoroughly digital so that our research and service efforts can be preserved, disseminated easily and cost effectively, and updated as new results and information roll in.

I have made many friends in the Oklahoma geological community, and I do not intend to completely disappear, but I will work hard to stay out of the way of the new director. I have great faith that the staff will keep things going in a very positive direction. I plan to finish several research efforts, publish some papers that have been shelved, and spend a lot more time with my family, especially the five grandkids.



*Dr. G. Randy Keller, Oklahoma Geological Survey Director and State Geologist, and Professor and Edward Lamb McCollough Chair in Geology and Geophysics, Mewbourne College of Earth and Energy, University of Oklahoma.*





## Contents

|  |   |
|--|---|
| From the Director                        | 1 |
| OGS Director G. Randy Keller is Retiring | 3 |
| From Dean Larry L. Grillo                | 5 |
| From Dr. Douglas Elmore                  | 6 |
| From a Former Student                    | 7 |

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### Director:

G. Randy Keller

### Editor:

Sue Britton Haralson

### Layout:

Jefferson C. Chang

### Reviewed by:

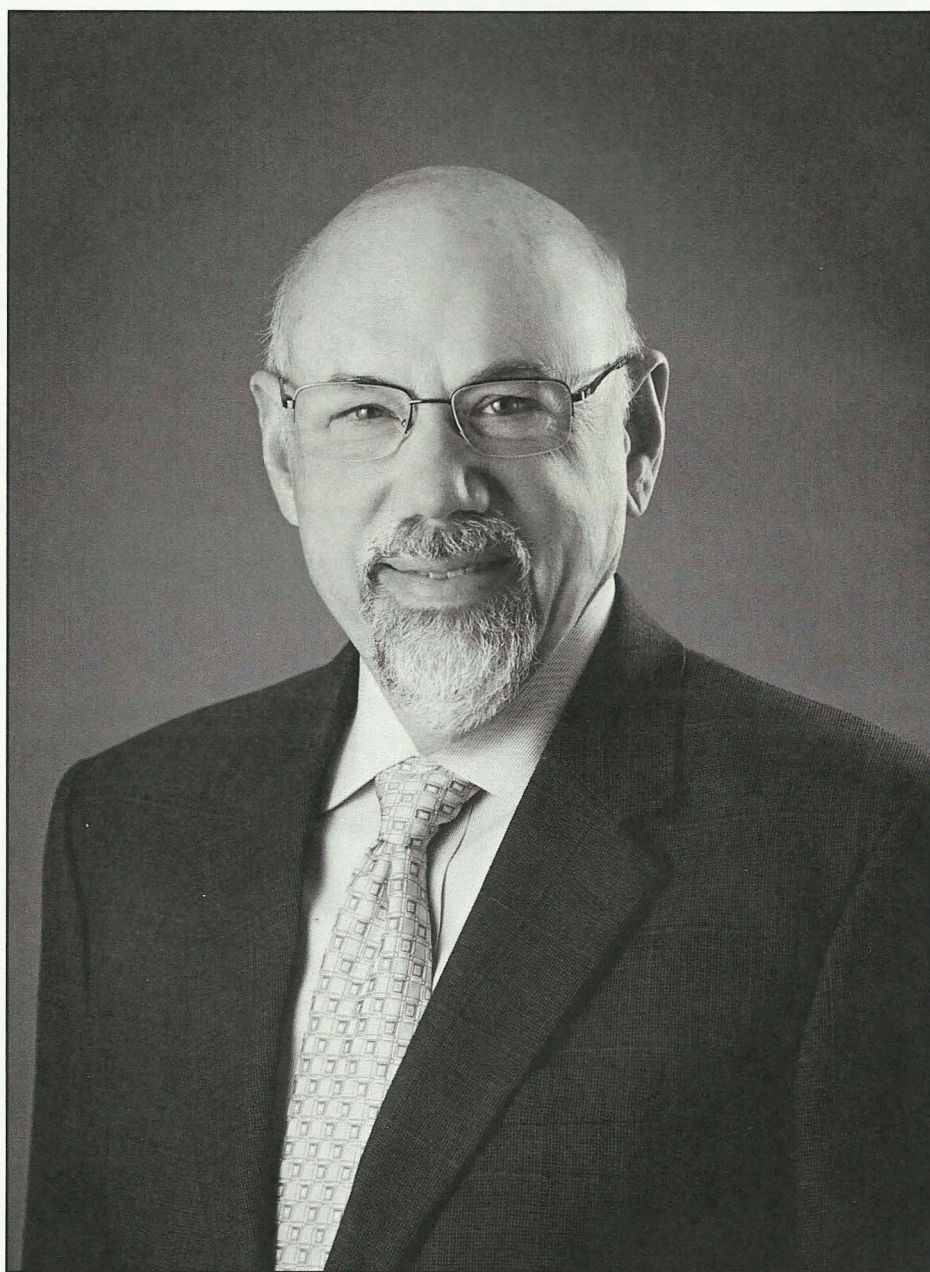
Shanika Wilson

Julie Chang

Jim Anderson

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## G. Randy Keller, OGS Director 2009-2014



### Oklahoma Geological Survey Mission Statement:

*The Oklahoma Geological Survey is a state agency for research and public service located on the Norman Campus of the University of Oklahoma and affiliated with the University of Oklahoma Mewbourne College of Earth and Energy. The Survey is chartered in the Oklahoma Constitution and is charged with investigating the state's land, water, mineral, and energy resources and disseminating the results of those investigations to promote the wise use of Oklahoma's natural resources consistent with sound environmental practices. The Survey is not a regulatory agency.*

*Created by the Oklahoma Territorial Legislature in 1890, the University of Oklahoma is a doctoral degree-granting research university serving the educational, cultural, economic and health-care needs of the state, region and nation. The Norman campus serves as home to all of the university's academic programs except health-related fields. The OU Health Sciences Center, which is located in Oklahoma City, is one of only four comprehensive academic health centers in the nation with seven professional colleges. Both the Norman and Health Sciences Center colleges offer programs at the Schusterman Center, the site of OU-Tulsa. OU enrolls more than 30,000 students, has more than 2,400 full-time faculty members, and has 20 colleges offering 163 majors at the baccalaureate level, 166 majors at the master's level, 81 majors at the doctoral level, 27 majors at the doctoral professional level, and 26 graduate certificates. The university's annual operating budget is \$1.5 billion. The University of Oklahoma is an equal opportunity institution. [www.ou.edu/eo](http://www.ou.edu/eo)*



# OGS Director G. Randy Keller is Retiring



◀ Julie M. Chang  
OGS Geologist IV



Connie G. Smith ▶  
OGS Public Information  
Coordinator

**D**r. G. Randy Keller is getting ready to retire. Again. He retired in 2006 after 30 years at the University of Texas at El Paso (UTEP), where he was chair of the Department of Geological Sciences for 17 years and held the L.A. Nelson Professorship for 13 years. If you are imagining retirement as a relaxing time reading in a comfortable chair, that is not the Randy Keller style of retirement.

After his retirement in 2006, Randy immediately took a position at the University of Oklahoma (OU), where he became a Professor in the ConocoPhillips School of Geology and Geophysics (CPSGG) and holder of the Edward Lamb McCollough Chair in Geophysics. But being Randy Keller, he soon took yet another position, becoming Interim Director of the Oklahoma Geological Survey in October of 2007, and then dropping the “interim” status in January of 2009. He has held a joint appointment in the OU ConocoPhillips School of Geology and Geophysics and the Oklahoma Geological Survey ever since, and he will retire at the end of 2014... again, retire Randy Keller style.

When asked what he will do after his retirement, he says he will play with his grandchildren, golf once a week, and find time to exercise. Inevitably, he also says he will stay scientifically active and maintain connections at OU and the OGS; he will graduate students who are currently working on their advanced degrees; he will work on publishing 20 student theses that are currently unpublished; and he will do a little consulting and some adjunct service at the University of Houston and probably Rice University as well. As for relaxing... anyone who knows him will smile or laugh at this concept.

## Improvements to the OGS

Randy's boundless energy and enthusiasm for life and science are reflected in his time with the Oklahoma Geological Survey. Randy has made many improvements during his seven years as director of the Survey. According to Randy, his biggest success has been hiring new staff members. A little under a dozen new scientific and professional staff members were added to the team during his tenure.

Randy greatly improved the infrastructure at the OGS, including upgrading telephone systems and equipment for staff members; getting new computers, printers, plotters, and software where needed; and remodeling the main office and staff offices with new paint, carpet, and furniture—a project that had been 24 years in the making.

With his encouragement, almost all OGS publications and maps became available online, with no charge to download them.

Under Randy's direction, vast improvements were also made to the Oklahoma Petroleum Information Center (OPIC) in the areas of building improvements, new equipment, and increased staff. Building improvements include constructing two climate-controlled rooms, each around 5700 square feet, used for core layout; and replacing 6 out of 10 roofs, 20 columns of shelving racks, and 42 columns of pallet racks (in process). New equipment includes a wide-aisle order picker, which is a lift used to pull core from shelves; an electric forklift; a fumeless lift that is ideal for delivering core to the layout area; a milling machine, which is used to extract plugs from core; and a core gamma scanner, which reads and charts the gamma radiation in core. Three new staff members and multiple students were hired at OPIC during Randy's time as director.

Randy, along with Dean Larry Grillot, has worked hard to integrate the Oklahoma Geological Survey into the newly established Mewbourne College of Earth and Energy (MCEE) at OU. Because



Randy and OGS Staff, 2014



Randy is also a Professor in the ConocoPhillips School of Geology and Geophysics, the OGS became much more interactive with the School. OGS staff members taught courses and advised students, and the Survey has hired many student workers.

The OGS was very fortunate to have a geophysicist take the helm at what proved to be just in the nick of time. Oklahoma had averaged about 50 located earthquakes a year since the mid 1970's, with approximately three of them felt by the public each year. Coinciding with Randy's arrival at the OGS, these numbers began to increase. After the death of OGS seismologist James E. Lawson, Randy hired Austin Holland in 2010 to help as the numbers of seismic events increased even more.

Randy has been a big proponent of maintaining and expanding the seismic network in Oklahoma. During his tenure at the OGS, six new permanent seismic stations were incorporated into the network; sixteen temporary stations were placed; and many older stations were upgraded. Another eight permanent stations and two temporary stations are nearing completion, and the remaining older stations are scheduled to be upgraded.

### **Career Achievements**

Randy has traveled the world in connection with his research. He has been to 26 different countries, including Canada, Mexico, China, India, Korea, Kuwait, Egypt, Kenya, Tanzania, Ethiopia, Australia, Russia, UK, Germany, Norway, Ireland, Poland, Czech Republic, Slovak Republic, Hungary, Austria, Switzerland, Italy, France, Denmark, and Belgium. Spain is still on his bucket list! While traveling, he has made many friends in these countries and stays in contact with them. He has a keen memory for people and places and can tell stories about grocery stores in Russia as easily as he can recount the details of seismic work done in China. When you ask Randy what are the outstanding achievements from these travels, he smiles and immediately says, "The people!" Along with his fascination with the Earth and its movements and processes, he connects readily with people and seems at ease wherever he travels. His favorite trips have been to Kenya in the Great Rift Valley, which he describes as the classic example of a rift valley.

Throughout his career, Randy has been a prolific author and editor. He has published more than 280 peer-reviewed articles; 26

research project reports; 21 maps; 12 major project summaries and discussions; and has edited five books and special volumes.

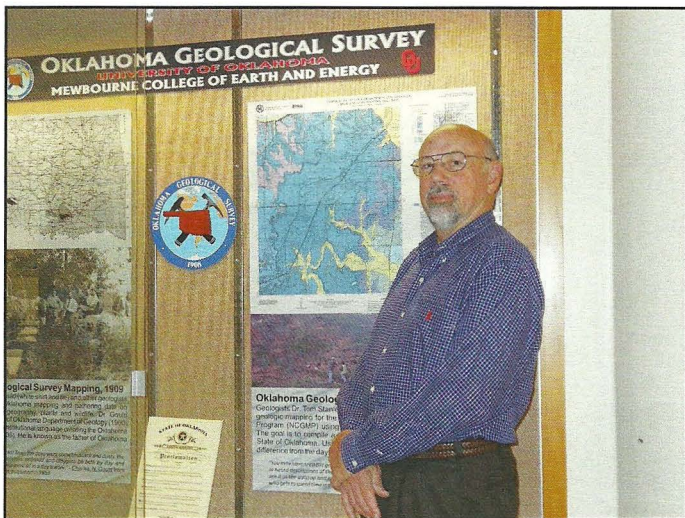
Randy has received multiple awards for his work, including the A.I. Levorsen Memorial Award from American Association of Petroleum Geologists (1976); "Best of AAPG" presentation at SEG convention (1980); MAGSAT Scientific Investigation Team Group Achievement Award from NASA (1984); Distinguished Achievement Award in Research from University of Texas at El Paso (1985); Distinguished Educator Award from Southwest Section AAPG (1998); Service Award from West Texas Geological Society (1998); G.P. Woollard Award from Geological Society of America (Geophysics Division) (2002); Grover E. Murray Memorial Distinguished Educator Award from American Association of Petroleum Geologists (2006); and Outstanding Achievement in Research from University of Texas at El Paso (2006). Directed theses by R.L. Coultrip (1983) and Frederico Moreno (1995) were both chosen "Most Outstanding Thesis" within UTEP, and graduate advisee Amanda Rondot was named DeGoyler Presidential Scholar (2009). Additionally, Randy has been elected Fellow of the Geological Society of America (1991) and Fellow of the Royal Astronomical Society (1980). He was elected to Foreign Membership in the Polish Academy of Sciences (2005) and received an honorary life membership in the El Paso Geological Society (2006).

Teaching is a very important aspect of Randy's work as well. It is obvious to everyone that he loves teaching and that his students are very important to him. According to Randy, his proudest achievement in his career is the 106 graduate students who have finished their M.S. or Ph.D. theses under his direction and the scientific papers that their efforts have produced. He forms life-long connections with his students and takes great pleasure from their successes.

Everyone at the OGS would like to extend our best wishes to Randy upon his retirement!

### **Acknowledgements**

The authors would like to thank Gene Kullmann, Austin Holland, and Shanika Wilson for contributions to the article and Neil Suneson and Jim Anderson for reviewing.



*Randy in front of the OGS display showing the State of Oklahoma Geologic Map Day, October 19th, 2012.*



*Randy in China with colleagues, 2009.*



## From Dean Larry R. Grillot



**Larry R. Grillot, Dean**  
*Mewbourne College of Earth & Energy,  
University of Oklahoma*

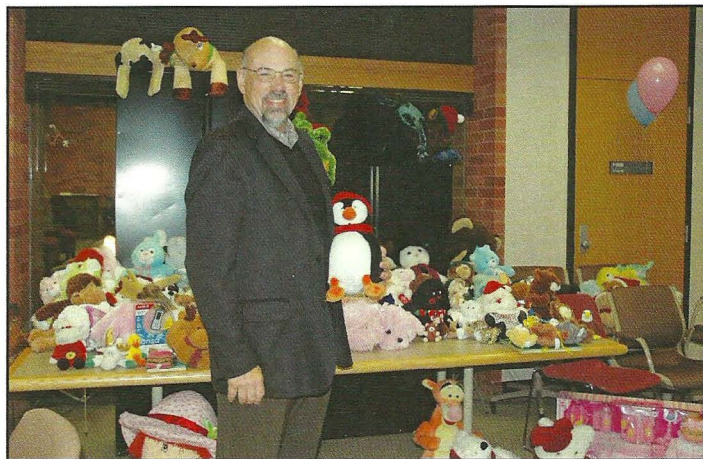
I would like to take this opportunity to personally thank Dr. Randy Keller for his service to the Oklahoma Geological Survey and the ConocoPhillips School of Geology and Geophysics, both within the Mewbourne College of Earth and Energy, and to the University of Oklahoma.

Randy joined OU in 2006, coming to us from the University of Texas at El Paso as Professor and Edward Lamb McCollough Chair in Geophysics in the ConocoPhillips School of Geology and Geophysics. Randy is recognized as a leader in the area of solid earth geophysics, and during his career has played a key role in establishing or revitalizing geophysics programs at the University of Kentucky, University of Texas at El Paso and the University of Oklahoma. He has also served in a variety of professional service activities, including Associate Editor of the following journals: *Geophysics*; *Geophysics Journal International*; *Journal of Geophysical Research*; and the *Geological Society of America Bulletin*, to name a few. He has also received numerous professional awards and other recognition as a result of his work in research and education.

We were fortunate when Randy agreed to be named Director of the Oklahoma Geological Survey after serving in an interim capacity after the retirement of Dr. Charles Mankin. He brought not only his experience and knowledge to the OGS, but his desire to help move the organization forward.

During his time as Director, Randy has provided strong leadership and a passion to see the OGS excel as a state agency for research and public service. Through his leadership, the OGS has re-built its capability in earthquake seismology, both upgrading the Oklahoma seismic monitoring network and adding key staff positions in earthquake seismology. He has also overseen significant improvements in the Oklahoma Petroleum Information Center to now include two high-quality rock core viewing areas and new equipment for handling and analyzing cores to accommodate the increased demand for these services. While serving as Director of the Oklahoma Geological Survey, Randy has continued to teach geophysics in the ConocoPhillips School of Geology and Geophysics and supervise graduate students.

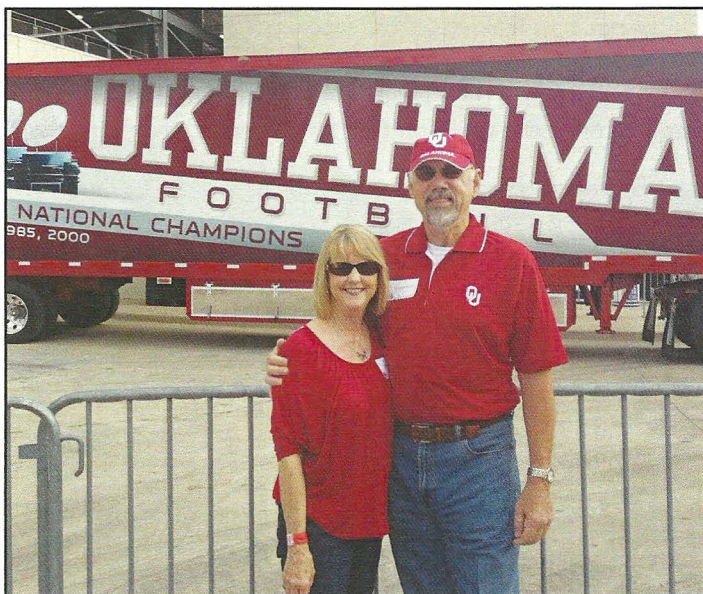
While I congratulate Randy on his retirement, I also recognize that he will be missed. This is not only due to his professional expertise and experience, but also as a colleague and someone who has treated people with respect and tried to "do the right thing." It is my privilege to consider Randy a friend, and I wish Randy and Joyce all the best in their retirement.



*Randy at the Teddy Bear Tea, 2007.*



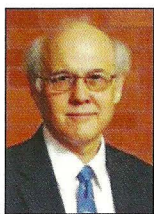
*Randy triggering an active seismic source, 2007.*



*Joyce and Randy at an OU-Texas game.*



## From Director R. Douglas Elmore



**R. Douglas Elmore, Director**  
*ConocoPhillips School of  
Geology & Geophysics,  
University of Oklahoma*

**D**r. G. Randy Keller joined the ConocoPhillips School of Geology and Geophysics (CPSGG) faculty in July of 2006 after we lured him away from University of Texas at El Paso (UTEP). He was appointed the Edward Lamb McCollough Chair in Geology and Geophysics. At the time, the geophysics program in the school was seriously understaffed, and one of Randy's first objectives was to help increase the number of geophysics faculty. The program was built up over the next few years.

Randy's research and teaching interests are very broad. They focus on geophysical applications and include a range of techniques such as seismic, gravity, and magnetic measurements. He also works at different scales. He has been particularly interested in studies of the structure and evolution of basins and deeper features in the lithosphere. Randy is a strong advocate for integrating geophysical with geological data. He has also been interested in using geophysical methods to study groundwater resources, earthquake hazards, and characterization of sites for sensitive facilities. He has been very involved with Geoinformatics as well and is interested in the development of geophysical databases, techniques that foster data integration, software tools, and Web services.

Randy has been an important contributor to our geophysics program in terms of courses taught and students supervised. Randy taught the following courses in our program: Gravimetric and Magnetic Exploration (Non-Seismic Exploration), Advanced Non-Seismic Methods, Modeling and Inversion, Tectonics and Sedimentation of Rift Basins, and undergraduate Global Geophysics. He has been the advisor for twelve M.S. and eight Ph.D. geophysics students. He has also served as a member on many graduate student committees and school committees.

Randy has also been a prolific publisher. He has published one book and edited three books. He published over 250 papers, including 67 since coming to OU, twenty maps, and numerous

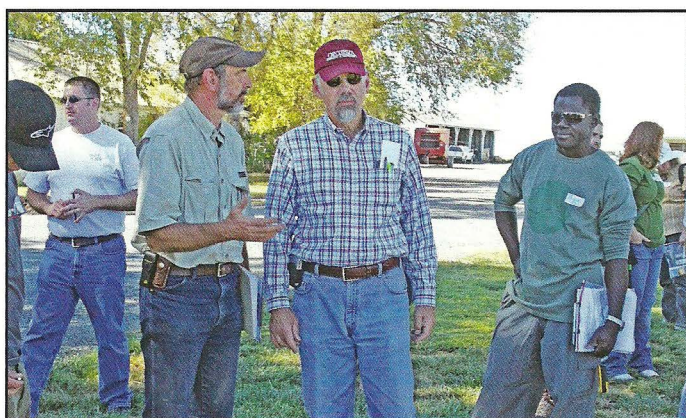
published reports and abstracts. Many of his publications were with his students. He has also published with several different faculty members in the school. In terms of external funding, he has received over \$2,471,000 through CPSGG and \$651,650 through the OGS since coming to OU.

He has also been very active professionally, including the founding editor of *Geosphere*. He has also been an associate editor for *Geophysics*, *Geophysical Journal International*, *Studia Geophysica & Geodetica*, *Journal of Geophysical Research*, and *Geological Society of America Bulletin*. He has also served on many other professional committees, advisory boards, and steering committees.

In 2007 he was named the interim director of the OGS, and in January of 2009 he became the Director of the OGS while maintaining a half time position in CPSGG, where he continued to teach and supervise graduate students.

Randy is a member of many professional societies including the American Geophysical Union, Royal Astronomical Society (Fellow), Geological Society of America (Fellow), Seismological Society of America, Society of Exploration Geophysicists, American Association of Petroleum Geologists, American Association for the Advancement of Science, El Paso Geological Society (Life Member), European Geoscience Union, Society for the Advancement of Chicanos and Native Americans in Science, Oklahoma City Geological Society, and the Geophysical Society of Oklahoma City.

Randy has received many awards, including: A.I. Levorsen Memorial Award from the American Association of Petroleum Geologists (1976); MAGSAT Scientific Investigation Team, Group Achievement Award, NASA (1984); Distinguished Achievement Award in Research, UTEP (1985); Elected Fellow, Geological Society of America (1991); Royal Astronomical Society (1980); Southwest Section AAPG Distinguished Educator Award (1998); West Texas Geological Society's Service Award (1998); G. P. Woollard Award from the Geological Society of America (Geophysics Division) (2002); Elected to Foreign Membership in the Polish Academy of Sciences (2005); AAPG Grover E. Murray Memorial Distinguished Educator Award (2006); Honorary Life Membership – El Paso Geological Society (2006); and the Outstanding Achievement in Research from UTEP (2006).



*Randy overseeing a seismic survey in Burns, Oregon, 2008.*



*Randy and colleagues analyzing data from the High Lava Plains Project, 2008.*



## From a Former Student



**Ben Drenth, Geophysicist**  
*Crustal Geophysics and Geochemistry  
Science Center, USGS Denver, Colorado*

There are many ways that Randy can be described from a graduate student's perspective: thrives on chaos, patient, big picture thinker, serial abuser of Power-Point, approachable, gives you enough rope to hang yourself, good sense of humor, and of course extremely well-funded. (It's no wonder he's had more than 100 successful grad students!) However, as I pondered different ideas of what to say in honor of his retirement, my mind kept coming back to his generous nature. My personal story of his generosity is what I will relate here.

Randy helped get my professional career going before I even started graduate school. I first met him while an undergrad intern one summer at UTEP. By that time I had already decided that I was interested in geophysics, specifically doing geologic interpretation work. Randy was well-known as an ideal graduate advisor for such things, and he strongly encouraged me to come to UTEP for my graduate work. I hesitated to commit for much of my senior undergrad year, mainly because I'm from the Upper Peninsula of Michigan (think extreme upper Midwest in terms of culture and weather) and knew that El Paso would be a huge shock to my system. But Randy and a couple of colleagues cooked up a plan that sealed the deal for me. He offered to share me with some excellent geophysicists at the USGS in Denver, to interpret recently acquired aeromagnetic data at Big Bend National Park. This is a highly unusual arrangement in the modern world of graduate work, because few other advisors would have been able or willing, either financially or in principle, to support a grad student to work on someone else's project. So I proceeded to interpret the USGS Big Bend magnetic data for my Master's

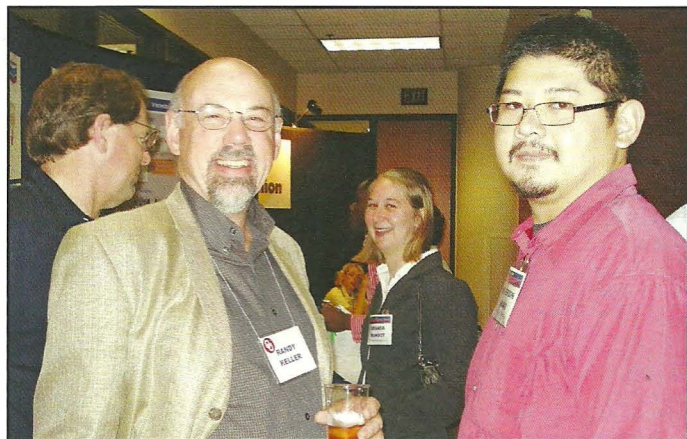
work at UTEP. In spite of this being a subject of only passing interest to Randy, he supported me while I spent summers in Denver and the rest of the year in El Paso (with many long weekends at Big Bend). Anytime I wanted to go to GSA or AGU, he was happy to pay my way.

The full scope of Randy's generosity wasn't driven home until I applied to Ph.D. programs outside of UTEP. I mostly wanted to live somewhere else, in spite of having an excellent relationship with Randy, and I wanted to continue doing similar geophysical interpretation work with my USGS colleagues. In spite of my desire to leave, Randy was highly supportive of my applications. However, it quickly became clear that while the other schools wanted me as a Ph.D. student, they were most definitely not willing to share me with the USGS. If I left El Paso, the USGS career path I had started would die. So I decided to stay at UTEP for my Ph.D. work, with an increased appreciation for just how special Randy's generosity was.

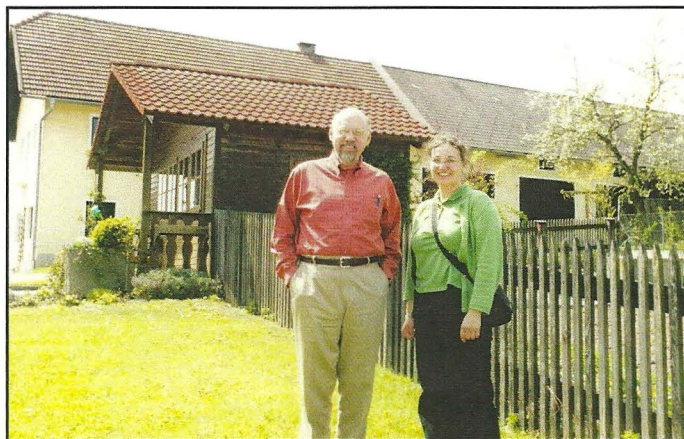
Later that year Randy decided to uproot and go to the University of Oklahoma, and I was delighted when he offered to take me along to complete my Ph.D. I found OU to be a great school and a great place for me personally. A key reason for this was that Randy allowed me to go back and forth between OU and the USGS and work on research projects of mutual interest. Like Randy's other students, I was a bit dismayed when he took on the OGS Director position. But like always, he thrived on chaos and continued to be an effective graduate advisor. Today I'm enjoying a fun research career in geophysics at the USGS, thanks to Randy as much as anyone else.

On behalf of Randy's past and present grad students, I congratulate him on his retirement and wish him the best while spending more time with his lively family in Houston!

I know that Randy will continue working on the projects that interest him the most, and I look forward to future collaborations and meetings.

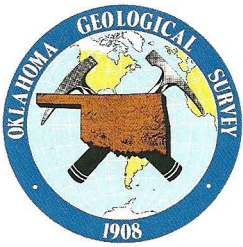


*Randy with Ph.D. student Jefferson Chang, 2007.*



*Randy and former Ph.D. student Eva-Maria Rumpfhuber in Austria during the ALPASS seismic experiment, 2005.*





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