

Kentucky Cross Section

Earth Resources—Our Common Wealth

Winter 2012

Matt Crawford's landslide work attracting attention from local governments

In December, Matt Crawford of the KGS Geologic Hazards Section visited Bellevue, in Campbell County, where a hillside behind a row of condominiums slid into the homes after about 3 inches of rain fell over a few days. It was one of a growing number of landslide sites Crawford has visited, particularly in northern and eastern Kentucky.

"I got involved in this slowly at first by compiling a landslide inventory of sites all around Kentucky with data from a variety of sources," Crawford says. "I started visiting the sites to check the information I was putting into the database." Northern Kentucky has become a frequent destina-

tion for his visits, because of the high number of landslides in the region.

His field visits also help him to verify landslide locations using light detection and ranging (LiDAR) data provided to KGS by the Northern Kentucky Planning Commission. Crawford says LiDAR data, taken from aircraft, uses pulses of light or lasers to create very accurate terrain information. "It allows the creation of high-resolution digital elevation models," Crawford says, "and there are features in this data that can indicate landslide morphology not easily noted by simply looking at the terrain."

The data have helped him identify susceptible areas that may not have been a problem—yet. "It may have been a creeping slope with a scarp, flanks, and a hummocky sur-



Matt Crawford surveys damages to several condominiums in Bellevue, Ky. The hillside behind the homes suddenly slid after several days of heavy rain in early December.

face, but may not have caused a problem for anyone yet. But a big rain comes along, and those are the slopes that are go-

ing to be more susceptible to material sliding off."

LiDAR data aren't perfect, he adds. LiDAR may not detect some landslide-related

—Continued on p. 6

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Jackie Silvers retiring as administrative staff officer; Kati Ellis moving into the job



Jackie Silvers

When she retires from KGS at the end of March, Jackie Silvers will leave the same office she moved into when she first came to the Survey on May 1, 1996. And for the nearly 16 years she's been with KGS, she has done much the same job, overseeing budgets and all financial processes, grants management, payroll and personnel, and other administrative duties.

But that's not to imply that she's been bored or unenthusiastic about the job or the Survey. "It's just been a good, positive experience," Silvers says of her time at KGS. "The warm family atmosphere of KGS, where everybody really cares about one another, has been a nice environment to work in."

Silvers, who has a master's degree in telecommunications management and a busi-

—Continued on p. 2

Director's Desk

Historically, KGS research and service activities have centered on earth resources of the commonwealth for the development of fuels, minerals, and water supplies. Our legislative mandate directs us to conduct a continuing geologic investigation of the state for that purpose. Although resources are still the focus of Survey research, a number of recent projects and initiatives have an added emphasis on public health and safety. Geologists bring a unique perspective to these societal issues, and engagement with nontraditional audiences is beginning to add a new chapter to KGS history. New collaborations bring opportunities as well as challenges.

One of these new projects was a series of county land-use planning maps designed to provide guidance for developers and property owners about various issues related to geologic units in each county. These maps are a derivative of the geologic quadrangle maps that focus on lithology, and are translated into lay language for a nongeologic audience. These maps have attracted the attention of a diverse audience, from community planners to K-12 teachers.

Another example is the UK College of Public Health's investigation of the relationship between cancer rates in eastern Kentucky and arsenic measured in residents' toenail clippings. Because elements such as arsenic occur in the natural environment, understanding the

pathways of arsenic and other metals and elements is of critical importance. KGS has been assisting the cancer researchers in understanding the natural environments and in designing optimal water and soil sampling programs that ensure unbiased studies.

The occurrence of radon in homes and buildings in Kentucky has long been known, but the issue has recently received a lot of publicity. The UK College of Nursing is investigating the health effects of radon, and members of the KGS Geologic Mapping staff are collaborating with the College of Nursing to assess the geologic context of sample data. Although we know quite a bit about the mineralogy of radon, much more work could be done to better predict the areas with greater potential for radon occurrence.

Landslide hazards have been well documented in parts of Kentucky for decades, but new research will improve our ability to predict their occurrence and understand their costs to society. KGS has been investigating the geologic context of transportation maintenance costs to assist Transportation Cabinet officials with route planning and understanding the causes of high or repeated maintenance. We are also using recently acquired light detection and ranging (LiDAR) elevation data to detect and inventory preexisting landslides that may be susceptible to reactivation.



Jerry Weisenfluh

Finally, seismic hazard maps prepared by the U.S. Geological Survey have a direct bearing on Kentucky building codes and consequently the costs of construction and limitations for development. KGS seismologists have been working for a decade to convince the USGS to reduce the estimated hazard depicted on the map, which assigns the same hazard level to western Kentucky as southern California. This is a case of public safety taken to an extreme that is having an impact on the economic development in part of the state.

Each of these recent public health and safety activities opens new possibilities for research collaboration that will add to our knowledge about the geology of the state and how it affects the lives of Kentuckians. The challenges lie in communicating our understanding of earth materials and processes to stakeholders with different backgrounds and world views. ❖

Jackie Silvers retiring—continued from p. 1

ness background, was working for AT&T in 1996 when a friend told her about the job opening at KGS. She applied for the position and was hired, working first for Jim Hamilton, who headed the Administrative Section. About three years after she came to the Survey, she was promoted to manager of the section. KGS section heads and project managers learned to look for Silvers when they needed help on the latest project submission and management procedures or how to fill out the most recent iteration of a travel voucher.

And although she says she will miss the atmosphere of KGS when she retires, she plans to stay busy with hobbies and family. She says she is looking forward

to having much more time for reading, sewing, knitting, enjoying her 14- and 18-year-old granddaughters, and her three cats and dog. "It will be fun to have a different routine every day, but I'll really miss the people," she says.

As an added retirement bonus, her husband is retiring at the same time.

Kati Ellis, who has been at the Survey for nearly four years as a student, temporary worker, and full-time employee, will move into Silvers's position. Since January, Ellis has been learning all of the jobs Silvers has been doing.

A native of Nicholasville, Ky., Ellis attended Campbellsville University for two years with plans to teach high school mathematics. But her interests

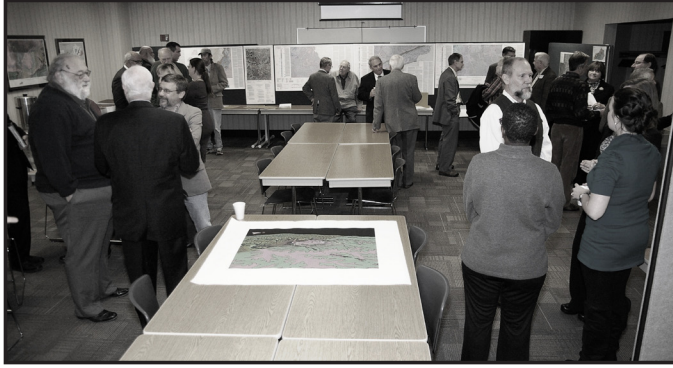
changed, and she finished her bachelor's degree in accounting at the University of Kentucky. She has experience in accounting and finances with several private businesses, and she will graduate from Sullivan University with an MBA in March.



Kati Ellis

—Continued on p. 6

KGS celebrates major mapping milestone for Kentucky



Some of the people who did the original field work and the cartography for the maps mingled with current KGS staff at a morning reception.



KGS Director Jim Cobb tells University of Kentucky President Eli Capilouto about the KGS maps displayed in the atrium during the celebration.

Retired KGS mappers, officials of State agencies, the University of Kentucky, and the U.S. Geological Survey helped KGS celebrate its mapping program last December 1. The occasion was the completion of all 25 maps in the 30 X 60 minute geologic map series (1:100,000 scale), all of which are now available to the public through the KGS Web site or for purchase at the Survey's Public Information Center. A symposium on geologic mapping, Celebrating Geologic Mapping for Science and Society, was held at the University of Kentucky Hillary J. Boone Center during the afternoon. ❖



USGS Deputy Director Suzette Kimball spoke about the cooperative mapping program, which created the 30 X 60 minute geologic maps.



Former mapper Wayne Newell, recently retired from the USGS, and Kevin Gallagher, USGS associate director of core science systems, examine map displays set up for the morning reception at the mapping celebration.

The participants gathered in the atrium of the Mining and Mineral Resources Building, under a 10 X 23 foot depiction of the "Geologic Map of Kentucky," created for the celebration.

Bob Fox still going strong after decades in the geology and energy business

Bob Fox's face is familiar at KGS annual seminars, lectures, and other activities. His geology career spans almost six decades, but geology was not his original career choice.

"I really wanted to be an aviator," he says. "The war ended just about the time I graduated from high school. I was 15, and I soloed shortly after I was 16." But the Parkersburg, W.Va., native, who now lives in Lexington, realized that experienced veterans returning from World War II would land the post-war aviation jobs.

He chuckles as he tells the story of his first solo flight, which took him over the campus of Marshall College (later University), where he later enrolled with an architecture major. After changing majors and earning a bachelor's degree in geology from Marshall and a master's at the University of Illinois, he started his career with Standard of California in 1953. But the next year, after one of his professors recommended that he visit Nelson Bunker Hunt about geologic reconnaissance work in Libya, life changed forever for Fox. He eventually worked in Libya, Pakistan, and the Netherlands for the Hunt enterprises. In 1955, a vehicle he was riding in detonated a World War II antitank mine in the Libyan desert, causing major damage to his left leg and foot. It was five days before he was rescued and eventually returned to the United States for surgery.

After he recovered, he returned to his career and made a major discovery. In

what Fox terms "a little story of the luck of geology," he conjectured that an embayment on Libya's Mediterranean coast would extend southeast across the flat desert plain above an oil reservoir, even though no surface expressions were visible. The Hunt companies obtained rights to drill in the area, and since November 1961, what became known as the Sarir Field has yielded more than 16 billion barrels of oil.

"I use the word 'serendipity' because most geologists who've been around a while know you can refine the structure, the stratigraphy, the migration of oil and gas and work all of these things," he says. "But the timing of them and how it all fits together is, in my view, serendipitous. And that's what happened."

Fox went to the Netherlands as the vice president of another Hunt family company in 1964, helping develop the first commercial offshore gas field in 1974. It has yielded more than 2 trillion cubic feet of gas. A decade later, he joined an exploration company in Edinburgh, Scotland, and eventually became president of its U.S. subsidiary until 1988.

Fox and his family had returned to Lexington in 1981, where he worked for the Hunt companies during the 1950's. He now operates TERM Energy Corp., working from his home with a field staff on 195 West Virginia gas and oil wells. He became acquainted with KGS during his first stay in Lexington, when Wally



Bob Fox

Hagan was state geologist. He turned to the Survey for well logs, which were much more difficult to find at the time. Fox still works with KGS staff on oil and gas projects and compliments KGS for what he calls "the incredible amount of data" that any layman or professional can access through the KGS Web services.

Fox isn't ready to retire yet. He says he and his wife, Lexington radio host Sue Wylie, go through five daily newspapers for their work, and he regularly travels to West Virginia to keep up with the oil and gas operations. He has been honored with a Lifetime Achievement Award from the Kentucky chapter of the American Institute of Professional Geologists and an honorary Doctor of Humane Letters from Marshall University. ❖

One seismic agreement with China extended, another one started



During his most recent visit to China in October and November, KGS Director Jim Cobb signed two cooperative earthquake research agreements. One extends the 2005 agreement with the Lanzhou Institute of Seismology for another two years and outlines research plans, calling for "deeper and wider cooperation for joint research and academic exchange." The other agreement was initiated with Fujian Province, on China's southeastern coast at the Taiwan Strait. The new agreement will exchange information and researchers, as well as perform risk assessment and earthquake monitoring. Cobb and Fujian Province Earthquake Administration Director Jin Xing signed the agreement on November 3 (left). The work related to this new agreement will begin later this year.

Zhenming Wang and Ed Woolery of the KGS Geologic Hazards Section also went on the trip to China late last year. They made presentations at the Lanzhou Institute and did field work. ❖

New Web site and videos provide information for water-well owners

More than half of Kentucky's households rely on groundwater as their sole source of drinking water, according to the National Groundwater Association, and property owners bear the responsibility for maintenance and safety of their wells. A new Web site, developed jointly by KGS and the College of Agriculture at the University of Kentucky, helps well owners with issues such as well maintenance and preventing contamination.

KGS hydrogeologist Glynn Beck, who does groundwater research out of the Survey's Henderson office, is involved in the development of the educational site. He is experienced in the use of downhole well cameras and provided videos from the cameras depicting several potential well problems.

"When you can show a well owner how the well is constructed or use a video or picture to explain potential problems or solutions, the payoff is priceless," Beck says. "The phrase 'a picture is worth a thousand words' is spot on for this purpose, and the Web site utilizes that adage to the fullest. Well owners can't ignore something that they can witness for themselves."

The Web site, "Kentucky Well Education" (www.ca.uky.edu/enri/downwell), explains the requirements of State

law relating to wells, provides several videos on well issues, and gives advice on having well water tested. "In Kentucky and other states, an increasing number of people are moving from urban areas to rural settings where they are responsible for things like water wells or septic tanks for the first time," Beck says. "We hope this Web site will give them important information about how their well is constructed, how to maintain it, and how to protect their drinking-water supply."

According to the Web site, nearly 95 percent of the rural population in the country drinks ground water. The site's organizers plan to add more video clips and to develop pages on geology and groundwater on the site.

Beck, who is active in the Southern Regional Well Camera Project, says a well camera is able to take the traditional well inspection beyond the above-ground view to deep inside the well. He says seven of the 13 states in the regional program (srwqis.tamu.edu), including Kentucky, are contributing videos. The videos will be incorporated into Southern



Glynn Beck trains Sam Dennis of Tennessee State University on use of a video camera in a domestic well in Murfreesboro, Tenn.

Region Well Owner Network workshops as educational tools for well owners.

With U.S. Department of Agriculture funding through that program, Beck has traveled to Arkansas, Texas, Louisiana, Tennessee, and Mississippi to train extension service staff and help them collect well videos. He is planning similar trips to Alabama and Louisiana this year. ❖

Thorleifson gives KGS distinguished lecture

An animated Harvey Thorleifson, director of the Minnesota Geological Survey, gave a lecture to a packed room on February 22 on diamond exploration and production. Thorleifson, who had previously worked for the Geological Survey of Canada and in the diamond business, was personally involved in research for the development of Canadian diamond mining. He took an audience of 140 people at the W.T. Young Library on the University of Kentucky campus on a tour of the history of diamond mining. He talked about the people and the companies involved in the effort to find diamonds in Canada, now the world's third largest producer of gem diamonds. Thorleifson spoke earlier in the day to a UK geology class and to two groups of KGS researchers. He is the president-elect of the Association of American State Geologists and a professor in the Department of Geology and Geophysics at the University of Minnesota. ❖



Two retired Survey employees die

Shirley Dawson, who worked for the Survey in the University of Kentucky office during the 1980's and 90's, died on January 10 in Lexington. Dawson was a staff support associate for the KGS Communications and Technology Transfer office, and did word processing for publications. She is survived by three sons, 10 grandchildren, six great-grandchildren, and three siblings.

A longtime employee of the KGS office in Henderson, Ky., Juanita Smith, died on February 9. Smith had worked for KGS from 1962 until her retirement in 2003. Her husband of 65 years, Edward, died in 2010. Survivors include two brothers, three grandchildren, and four great-grandchildren. Smith did secretarial and clerical work at the Henderson office. In 2010, she and her husband made a \$25,000 donation in both their names and the Survey's name to help complete the new Methodist Hospital in Henderson and to buy a baby grand piano for the hospital in memory of their son Randall, who died in 1996. ❖



Shirley Dawson



Juanita Smith

Landslides—continued from p. 1

features because of development and other changes to a landscape. But field visits have confirmed landslides at many of the 234 locations indicated by LiDAR data to be a possible risk.

Meanwhile, as local agencies and individuals hear about his work, he is getting more requests to visit landslide locations, including several Bellevue neighborhoods where homes have been damaged. Though local government and regional planning agencies have been considering whether to enact regulations relating to landslide susceptibility, Crawford says he limits his scope to geologic work. "Our job is to communicate what we know about geology, steep slopes, soils, and about activities that destabilize slopes," he says. ❖

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Jackie Silvers retiring—continued from p. 2

Like Silvers, she enjoys the Survey staff. "The main reason I'm here is the people," she says. Having already become familiar with the duties of her new job, she plans to stay active with the campus committees Silvers has served on, too.

She first came to the Survey as a student working with Ann Watson to check completion reports on oil and gas drilling logs. A year later, she began working with Silvers in the Administrative Section as a temporary employee.

She says she's looking forward to stepping into Silvers's shoes, especially because she's had a great mentor in Silvers. ❖

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