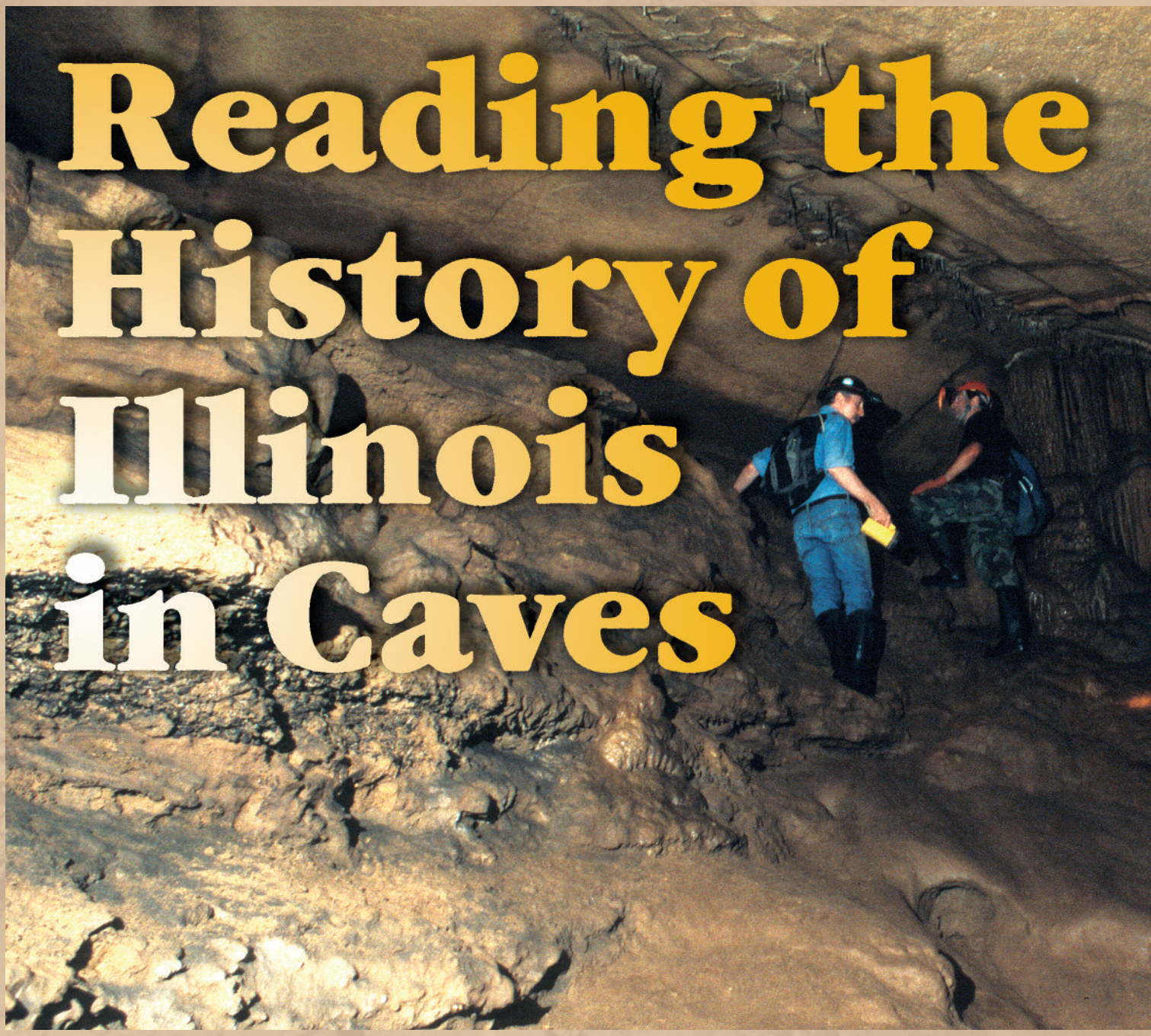
A series of feature articles will examine the diverse careers within the Depart
This month, learn of the work of Illinois State Geological Survey geochemist

Reading the History of Illinois in Caves



As the team of scientists wend their way through the blackness, 100 feet below the surface of southwestern Illinois, they couldn't help but notice the icy water of the underground stream inching higher and higher up their legs and robbing the heat from their bodies. All eyes strained in the dim light to see where their next step would be. Suddenly, one of the novice cavers stepped off a submerged shelf in the cave stream and disappeared beneath the churning, inky black water. Undaunted by his subterranean baptism, the scientist sprang from the depths with the velocity of an aquatic mammal, hoisted himself from the frigid water, and continued on. Immediately, he was greeted with a high five; he would soon be a seasoned caver.

Led by Sam Panno, senior geochemist with the Illinois State Geological Survey, scientists that include Brandon Curry and Keith Hackley (ISGS) and Craig Lundstrom (University of Illinois) are finding evidence of historic and prehistoric events that took place both on the surface and in the subsurface of Illinois.

The scientists have determined that these caves began forming 150,000 years ago as the near mile-high Illinoian glacier, which covered most of Ice-Age Illinois, began melting its way back

ment of Natural Resources.
Sam Panno.

Career Track

Sam Panno holds Bachelor of Science degrees in Biology and Geology and a Master of Science degree in Geology. Prior to joining the Illinois State Geological Survey in 1988, Panno held positions as a mine geologist in Utah, as a geochemist at Brookhaven National Laboratory in New York, and as a hydrogeologist-geochemist with a consulting firm assisting the U.S. Department of Energy with their High-Level Nuclear Waste program in Washington, D.C.

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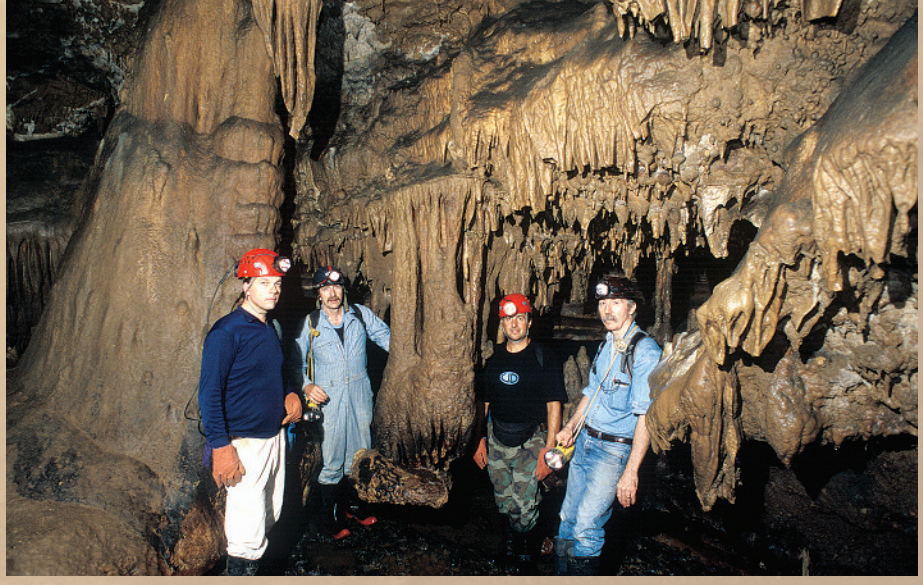
Sam Panno (left) and a visiting scientist examine stalagmites growing on thick sediments deposited adjacent to the cave stream in Illinois Caverns.

(Photos by Joel M. Dexter © Illinois State Geological Survey.)

toward the North Pole. At that time, icy water from the melting glacier began gushing down fractures in the limestone bedrock and following horizontal pathways known as bedding planes. As the rock slowly dissolved, the waters eventually created caves up to 30 feet in diameter with cascading rivers running through them.

Panno and his team have been exploring these caves and collecting stalagmites and sediments which have been recording the changing climate



Keith Hackley (second from left) and Sam Panno (far right) explored Illinois Caverns with visiting scientists.

and other events that are taking, and have taken, place on the surface for tens of thousands to more than 100,000 years. Such information on historic climate change is important if we are to understand the rapid climate changes we are experiencing today.

On a recent trip, Panno caught a glimpse of stark whiteness in the blackness and clambered over wet, slippery rocks to investigate. In the dim light of his headlamp lay a field of small, snow-white stalagmites that looked as though someone had ladled vanilla icing over each.

These were unusual features, even for a cave, and using radioactive dating techniques, the scientists soon discovered that these formations most likely grew as a result of a series of enormous earthquakes that uprooted formidable oak trees, caused landslides, reversed the flow of the Mississippi River, and terrorized the early settlers of southern Illinois and the surrounding states.

The time was the winter of 1811 and 1812, and at least four of the earthquakes were as large, or larger, than those generated by the San Andreas Fault that periodically devastate coastal cities of California. The 1811-1812 earthquakes were generated by the New Madrid Seismic Zone whose tremors are felt every several hundred years. The stalagmite information offers a new technique that can be used to gauge the time between historic earthquakes in our area and help predict when the next earthquakes may hit our more developed, more densely populated towns and cities.

After eight hours of caving, the wet, cold and tired scientists trudged their way to the surface and out a gated entrance that protects the cave and its delicate formations. The team took their mud-streaked notes and samples to their laboratory and teased out even more information from the subterranean archives of the caves.

Although the caves of Illinois contain a wealth of information, they give it up grudgingly and scientists are still learning how to read the texts that were written in stone so long ago.

Sam Panno (far left), Keith Hackley (second from left) and two visiting scientists explored Illinois Caverns looking for evidence of earthquakes in the cave formations.