Geotimes

a publication of the American Geological Institute | v. 31 n. 9 | September 1986

This landslide occurred in April 1983 along the bluff of the Illinois River in central Illinois. It measured 27 to 30 m from crown to toe and was about 67 m wide. Flowage of saturated materials near the toe is evident. Clear cutting of the forest along the bluff in the 1960s and 1970s during installation of power lines disturbed the hillslope configuration, destroyed the slopes and tree-root support system, and allowed increased infiltration of water through the grassed slopes into the loess and glacial materials overlying Pennsylvanian shale and siltstone units. Water collecting at the top of the shale surface probably increased pore-water pressure and reduced cohesion of the overlying glacial deposits, thereby causing the failure. The Illinois State Geological Survey has recently completed a state-wide inventory of landslides, which will be updated periodically. (Photo by Myrna M. Killey, Illinois State Geological Survey, Champaign, Ill.)

Staff: Publisher, Marvin E. Kauffman (AGI's executive director). Managing editor, Sharon F. Marsh. Production editor, Cathy M. Petrini. Staff editor, Gail F. Papa. Staff writers, Janet W. Crampton and Louise V. Jacobsen. Advertising, Nick Claudy. Circulation, Margaret Singer. Intern, Lisa Buzzelli.
Address: 4220 King St., Alexandria, Va., 22302. Telephone: 703/379-2480.
Closing dates: Space for display ads must be reserved 2 months before the date of issue; for example, the deadline for the May issue is March 1. Copy for classified advertising would be accepted until March 15.
Editorial matter: News items, articles, and photos on a contributing basis are welcome. However, following standard practice, we cannot return an unsolicited manuscript unless it is accompanied by a postage-paid envelope.
Geotimes (ISSN 0016-8556) is published monthly by the American Geological Institute, 4220 King St., Alexandria, Va., 22302. Type set by Byrd Press, 5408 Port Royal Road, Springfield, Va., 22151. Printed by Byrd Press, 2901 Byrdhill Road, Richmond, Va., 23261. Second-class postage paid at Alexandria, Va., and at additional mailing offices.
Subscriptions: $18 a year. Subscriptions mailed outside the United States, $4 extra. Single copies, $1.75 each.
A member of the Society of National Association Publications, Washington, D.C.
Postmaster: Send address changes to *Geotimes*, 4220 King St., Alexandria, Va., 22302-1507.

Left, at the opening session, AAPG president, William L. Fisher (left), University of Texas, Austin, gave the Human Needs Medal to Eugene F. Reid, president, Sunburst Exploration Inc., Santa Barbara, Calif. Reid has been active in AAPG, and has advised academic institutions for 25 years. (Photo by Louise V. Jacobsen)

Right, Peter A. Rona, National Oceanic & Atmospheric Administration, Miami, was given the Francis P. Shepard Medal for Excellence in Marine Geology by the Society of Economic Paleontologists & Mineralogists. (Photo from National Oceanic & Atmospheric Administration)

Forgotson Jr, director, School of Geology & Geophysics, University of Oklahoma, Norman, and treasurer, Anthony Reso, research geologist, Tenneco Oil Co., Houston.

In his presidential address William L. Fisher, State Geologist of Texas, said, 'The cycle we have just experienced was sharp—steep on the upside, with some good, but too much inflation, too much waste, and too many inefficiencies. The cycle was steep on the downside, a collapse of major proportions, and with it a loss of critical production capacity in the U.S. and elsewhere, an inefficient and disastrous reduction of oil and gas activity worldwide, not to mention the massive personal tragedy of professional unemployment and acute underemployment. And perhaps worst of all, the debilitating anxiety of an uncertain future.'

A report by the Select Committee on Future Petroleum Geologists was given by its chairman, Robert R. Berg, Texas A&M. According to the report, petroleum geologists face cyclical employment and should increase their education and training. Berg concluded, 'Oil and gas will continue to be the economic foundation of the modern world for many years, and geologists will continue to be employed in exploration and production. Employment opportunities will be cyclic, but they will be there.'

Meeting with AAPG in Atlanta was the Society of Economic Paleontologists & Mineralogists, whose members elected H. Edward Clifton, U.S. Geological Survey, Menlo Park, Calif., as the 1986-87 president. Clifton succeeds Orrin Pilkey, Duke University. Other SEPM officers: president-elect, William W. Hay, of the University of Colorado, Boulder; vice-president, Roderick W. Tillman, consultant, Tulsa; secretary-treasurer, Robert W. Scott, AMOCO Production Co., Tulsa; councilor for sedimentology, Harry E. Cook, U.S. Geological Survey, Menlo Park, Calif.; councilor for paleontology, Molly F. Miller, Vanderbilt University, Nashville; editor of *Journal of sedimentary petrology*, Norman D. Smith, University of Chicago; editor of special publications, Barbara H. Lidz, Miami Beach; co-editors of *PALAIOS*, Esther R. Magathan, Denver, and Léo Laporte, University of California, Santa Cruz.

At the SEPM awards dinner, the William H. Twenhofel Medal for Excellence in Sedimentary Geology was given to Franklyn B. Van Houten, professor emeritus at Princeton University. Peter A. Rona, National Oceanic & Atmospheric Administration, Miami, was awarded SEPM's Francis P. Shepard Medal for Excellence in Marine Geology for his studies of hydrothermal venting in the Atlantic Ocean. Honorary memberships were awarded to Earle F. McBride, University of Texas, Austin; James A. Peterson, University of Montana, and Robert H. Shaver, Indiana University, Bloomington. SEPM activities included poster sessions, short courses and field trips.

AAPG will meet next year June 7-10, in Los Angeles.

in Denver

Black shales in ocean targeted for drilling

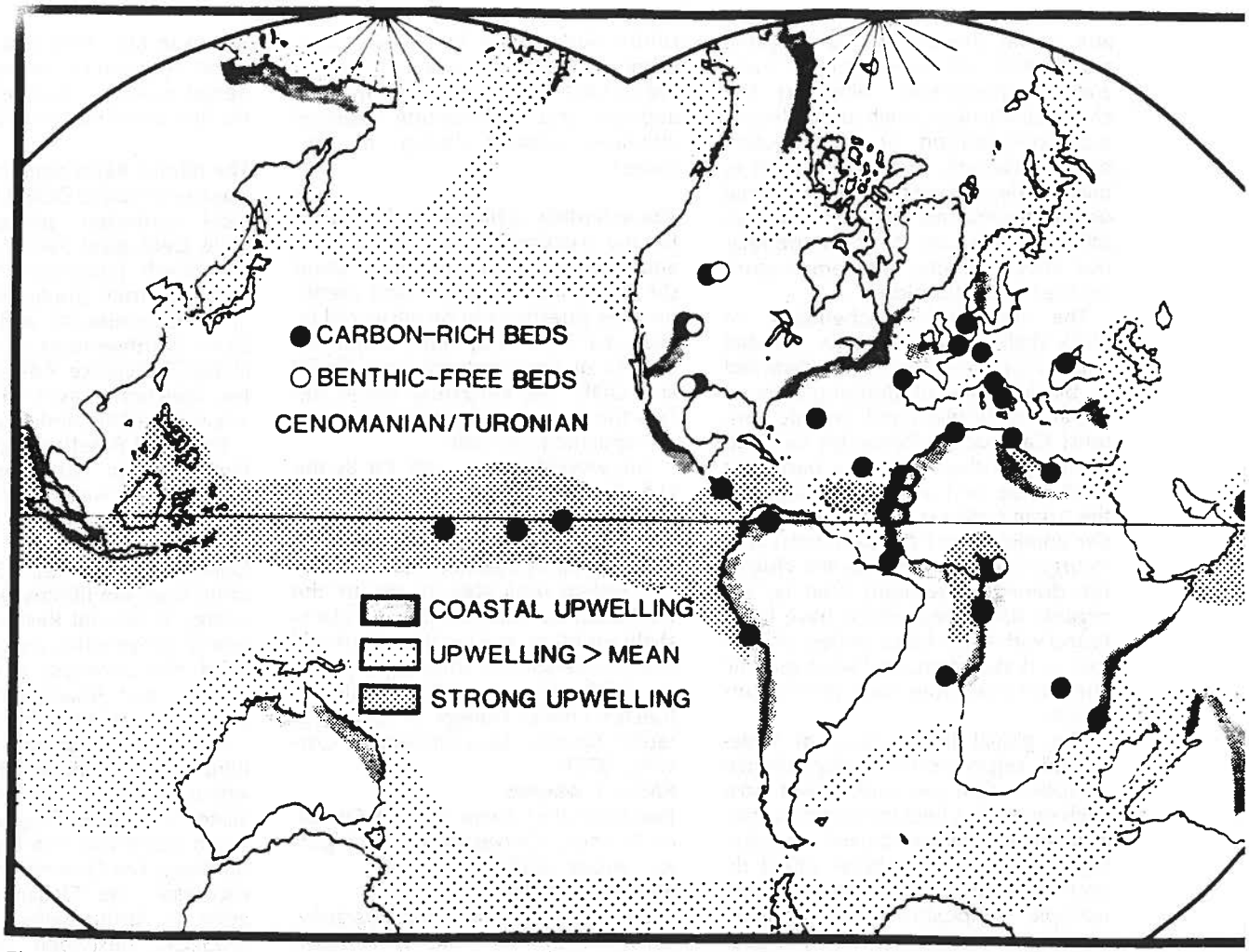
In Cretaceous time, 144 to 66 million years ago, black shales rich in organic carbon were deposited in deep ocean basins around the world. Explaining those widespread episodes is one of the most perplexing challenges facing paleoceanographers. In its 15 years, the Deep Sea Drilling Project identified and defined major questions about the problem. The Ocean Drilling Program could answer them.

Black shales may have important economic potential in addition to their scientific significance. That potential could be evaluated by choosing good places for future ocean drilling with the *JOIDES Resolution*, ODP's scientific research ship. As part of the process of selecting ODP sites, an interdisciplinary workshop was held last December in Denver to assess what is known about the composition, distribution and origin of black shales, and to examine analytical techniques and propose specific drilling approaches that could resolve the questions about their deposition.

Most of the 45 scientists who attended the workshop were from the U.S., but a few came from abroad. They represented U.S. and international academic, industry and government interests. Their disciplines spanned the wide variety needed to talk about black shales.

The scientists are recognized in their fields and have written about black shales. Some have investigated modern marine sediments rich in organic carbon; exchanging information about modern and ancient sediments was helpful.

The workshop began with 6 topical summaries and time for questions and discussions. Michael A. Arthur (University of Rhode Island) gave a



This map shows continents in mid-Cretaceous time, about 91 million years ago. Circles mark places where geologists have found sediments rich in organic carbon deposited during the Cenomanian/Turonian oceanic anoxic event. Stippled areas are regions of predicted upwelling, based on the global climate model of Eric A. Barron. (Map by Michael A. Arthur, Seymour O. Schlanger and Hugh C. Jenkyns)

global perspective on the relationship between age and distribution of Cretaceous black shales. He outlined some of the major questions facing researchers in the field. Brian E. Tucholke (Woods Hole Oceanographic Institution) focused on the geologic and paleontologic setting of black shale deposition in the North Atlantic Ocean, where more drilling that recovered Cretaceous black shales has been done. William Sliter (U.S. Geological Survey, Menlo Park, Calif.) summarized the biostratigraphic record and its adequacy in black-shale sequences. He suggested that zonation using multiple microfossil groups could yield temporal stratigraphic resolution of 1 to 1.5 million years in some time intervals of the mid-Cretaceous.

Philip A. Meyers (University of Michigan) and Walter E. Dean (U.S.G.S., Denver) discussed depositional environments and sources of organic matter. They compared the usefulness of various techniques for studying organic and inorganic geochemical features in black shales and explained how they interpreted the evidence. Finally, Alfred G. Fischer (University of Southern California) reviewed possible origins and implications of Milankovitch cycles of climate change, their influence on sediment deposition, and the apparent ubiquity of such cycles in strata that contain black shales. He pointed out the potential of the cycles as fine-scale time-stratigraphic tools.

The summaries set the stage for the next day, when the scientists split into groups working on major problems in biostratigraphy, sedimentation processes, and geochemistry of black shales. The groups outlined further study, proposing places to drill, analytical and drilling techniques, and analyses of existing and new core materials. On the last day, they reassembled to consider and amplify each group's recommendations and to rank suggested drill sites.

The scientists identified 5 problems as foremost among the regional and global questions about black shales that could be studied through ODP.

The timing and distribution of black-shale deposition: Can the episodes of sediment enrichment with organic carbon be timed exactly? Is it possible to correlate the episodes within individual basins and from one ocean basin to another? Is the concept of globally synchronous oceanic anoxic events valid, or does such an idea apply only to the Cenomanian/Turonian event 91 million years ago? What is the paleodepth range in each basin in which black shales were deposited? What relationships do widespread beds rich in organic carbon have to sea level, tectonic events, and global climate change?

The role of organic productivity vs preservation (anoxia vs rapid sedimentation) in the origin of black shales: Are they coupled in some way? Can we set definitive criteria to distinguish between them? In particular, we need to evaluate the hypothesis that surface biologic productivity was low during much of Cretaceous black-shale deposition in the North Atlantic. We also need to examine the effects of changing sedimentation rate on organic carbon preservation.

The organic geochemistry of black shales: Can we distinguish sources

and initial preservation of organic matter from the overprints of early and late diagenesis? What are the chemical changes, such as stable-isotope composition or organic-compound structure, in organic matter in black shales during progressive burial or with thermal maturation? How rapidly do they occur? What are the relative effects of time and temperature on organic maturation?

The inorganic geochemistry of black shales: What patterns of metal and sulfur enrichment are observed in black shales of differing depositional environment and organic content? Can such information be used to interpret the origin of a particular black-shale unit and to say whether the organic matter was preserved under anoxic water? Do sediments rich in organic carbon provide the clue to the dolomite problem? That is, are organic dolomites, which have been found with some black shales, ubiquitous and abundant, and what specific chemical conditions favor their occurrence?

The global implications of widespread organic-carbon depositional episodes: Can we understand how such episodes affect the carbon cycle, atmospheric carbon-dioxide concentration and climate? What effect do they have on ocean chemistry and isotopic compositions of carbonate and organic carbon and on the geochemical cycles of trace elements and sulfur? Are certain biotic extinction events related to oceanic anoxic events? Are certain stratiform mineral deposits and hydrocarbon reserves ultimately created during the episodes?

The scientists achieved the goals set for the workshop. They synthesized and discussed data from DSDP about the black-shale problem and identified key questions to be answered by more drilling and by multidisciplinary studies of core material from DSDP and ODP. The workshop report details the highest priority regional and site-specific proposals.

The workshop was paid for by the U.S. Science Advisory Committee of the Joint Oceanographic Institutions Inc. J.O.I. is a consortium of 10 U.S. oceanographic institutions.

Scientists not able to go to the workshop but interested in the black-shale problem, can get the report and submit site-specific drilling proposals to ODP through J.O.I. Write to JOIDES Office, College of Oceanography, Oregon State University, Corvallis, 97331.

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in southeastern Illinois

Hole into basement to explore Earth's crust

Throughout Phanerozoic time, the center of deposition in the Illinois Basin has been at or near the intersection of the Reelfoot Rift, Rough Creek Graben, Cottage Grove Fault System and Wabash Valley Fault System. When a deep hole is drilled there, scientists can explore crustal processes that resulted in deposition of 400,000 cubic km of sediment in the Mid-Continent region of the North American plate.

In April, 124 geologists, geochemists, geophysicists and drilling engineers met in Champaign, Ill., to consider the scientific and economic significance of the proposed Illinois Basin Ultradeep Drillhole. They represented 7 state geological surveys, the U.S. Geological Survey and 3 other federal agencies, 30 universities, and 11 oil-industry and consulting firms. They drafted a science plan, to be included in a later formal proposal, that explains what could be learned from drilling the hole and outlines experiments and expected results.

In April 1985, a deep hole in the Illinois Basin (then called the Illinois Superdeep Drillhole) was among 32 drilling possibilities proposed at a meeting in Houston sponsored by Deep Observation & Sampling of the Earth's Continental Crust Inc. (September 1985 *Geotimes*). DOSECC was set up in May 1984 as a private nonprofit corporation to run the Continental Scientific Drilling Program of the National Science Foundation.

The Illinois Basin deep-hole proposal was presented to DOSECC by J. James Eidel (principal geologist, Illinois State Geological Survey), Thomas C. Buschbach (chairman, New Madrid Seismotectonic Study, Nuclear Regulatory Commission) and Laurence L. Sloss (Northwestern University). The DOSECC Science Advisory Committee selected it as 1 of 14 meriting scientific refinement in a workshop.

Eidel and Buschbach convened the Illinois Basin Ultradeep Drillhole workshop. It was sponsored by DOSECC, hosted by the Illinois State Geological Survey and held at the University of Illinois. Support also came from the Illinois Department of Energy & Natural Resources, the Argonne Universities Association Trust Fund, the University of Illinois Campus Research Board, and the Illinois Environmental Protection Agency.

Morris W. Leighton, chief of the Illinois survey, began the workshop with a short history of the Continental Scientific Drilling Program. He compared CSDP with the highly successful Deep Sea Drilling Project and its successor, the Ocean Drilling Program. G. Arthur Barber, President of DOSECC, described DOSECC and CSDP. Frank Stehli (University of Oklahoma), chairman of the DOSECC Science Advisory Committee, talked about the status of U.S. continental scientific drilling and said I.B.U.D. was 1 of 2 U.S. ultradeep drilling targets far along in planning. Eidel reviewed ultradeep targets in the region, including those suggested by the Science Advisory Committee at the Houston meeting.

Proprietary seismic-reflection data for the region worth about $500,000 were shown by Norman Hester (consultant; now Indiana State Geologist), Allan Bertagne (Companie Générale Géophysique, Houston) and Tom Parsons (United Seismic Brokers Inc., Houston). The data provided previously unavailable information on rift-bounding structures, faulting in the fluorspar area, and seismic layering north of the Shawneetown-Rough Creek Fault System at depths of 10 to 11 km. W. John Nelson (Illinois State Geological Survey) has made a new interpretation of the rift-bounding structures.

After the opening session, the scientists separated into groups to talk about tectonics and structure; basement age, composition and evolution; basin analysis; rock mechanics; hydrogeology, brine geochemistry and the environment; hydrocarbon