

On the Rocks



A Newsletter of the Michigan Basin Geological Society

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www.mbgs.org

January 2003

EVENTS

January 8, 2003: Speaker Larry Lake will talk on "Using Simulation Models to Predict Uncertainty." (This meeting is hosted by the SPE).

February 12, 2003: MBGS Meeting.

May 11-14, 2003: AAPG 88th Annual Meeting Salt Lake City, Utah. The theme is: "Energy-Our Monumental Task".

September 6-10, 2003: Joint Technical Conference; "Taking a Closer Look", 2003 AAPG Eastern Section Meeting - 2003 SPE Eastern Regional Meeting, Pittsburgh, Pennsylvania. Abstracts due March 1, 2003. See aapg-spe-2003.org.

Geological Survey Websites:

ODNR website at: <http://www.ohiodnr.com/geosurvey>

Michigan DEQ at: <http://www.michigan.gov/deq>

Indiana Geological Survey at: <http://igs.indiana.edu>

Wisconsin Geological Survey at: <http://www.uwex.edu/wgnhs>

Ontario Geological Survey at: <http://www.mndm.gov.on.ca/MNDM>

MBGS-SPE Meeting

January 8, 2003

Location: Holiday Inn (South)
6820 S. Cedar St., Lansing, MI.

Schedule: 5:00 to 6:00 PM Social Hour
6:00 PM Dinner
Presentation after dinner

Cost \$30.00/member \$10.00 Student (includes dinner)

Topic: "Using Simulation Models to Predict Uncertainty"

By
Larry Lake

The University of Texas at Austin

MBGS Dinner Meeting Reservation

Name _____

Number attending _____ Society _____

Enclosed Registration Fee _____

Please make your check out to the SPE and return to Frank Kuri by January 6, 2002

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University Talks and Seminars Websites

Western Michigan University
www.wmich.edu/geology/SeminarGeos.html

Michigan State University,
www.glg.msu.edu/news/lectures.html

University of Michigan, Turner Lecture Series
www.geo.lsa.umich.edu/announce/turner02b.html

Michigan AIPG Section website: www.aipg-mi.org.

MEETING CANCELLATION POLICY

Monthly meetings will be automatically cancelled whenever the National Weather Service issues a "Storm Warning" for the Lansing area. If driving conditions are poor but a "Warning" has not been issued please contact any member of the Executive Committee for the status of the meeting.

MICHIGAN BASIN GEOLOGICAL SOCIETY PUBLICATIONS

Historical CD #1: Nine out-of-print publications from 1949 through 1965 and 1998, Devonian to Silurian Rock Fieldtrips to MI, WI, IL and Ontario, 2000, \$15

Historical CD #2: Four out-of-print publications from 1947, 1959, 1983 and 1991, Northern Devonian and UP Fieldtrips in MI, 2001, \$10

Historical CD #3: Six out-of-print publications from 1947, 1959, 1983 and 1991, Northern Devonian and UP Fieldtrips in MI, 2001, \$12

Special Price - Historical CD #1, #2 & #3, \$30

Stratigraphic Lexicon for Michigan, 2001, prepared by MBGS and published by DEQ, 56 pp., chart, \$2.65 picked up or \$4 mailed, Can be ordered from MBGS or Geological Survey Div. of the DEQ

Price Includes postage, handling and any applicable sales tax. Orders for publications should be prepaid in U.S. Funds and addressed to:
MBGS - Publications
c/o Dept. of Geological Sciences
206 Natural Sciences Building
Michigan State University
East Lansing, Michigan 48824-1115

MBGS Mug and Jacket Sale

The Michigan Basin Geological Society is offering mugs and jackets with the society logo for sale. The mugs are \$5.00 each. The jackets are \$60.00 each plus postage. Please contact Dan McGuire at: Phone (517) 772-5219, Fax (517) 772-7021, or danmcguire@sensible-net.com. Remember to include the correct size of the jacket and the quantity of each item. Checks should be made out to the MBGS.

Using Simulation Models to Predict Uncertainty (Just Because We Can Run Millions of Cells Doesn't Mean We Should)

Larry W. Lake
The University of Texas at Austin

Abstract

Risk assessment and management have always been at the core of hydrocarbon producing endeavors. Yet to date nearly all risk assessment has been qualitative and so-called quantitative risk assessment remains a new and potential fertile area of application. Much current practice in estimating hydrocarbon recovery is based on numerical simulation of flow through reservoirs. It has become axiomatic that incorporating more data into such models leads to greater confidence in its predictions. This statement has not been proven to be true, and, indeed, cannot be true in all cases. Furthermore, incorporating more data into a simulation model is not easy because "data" comes in all forms, covers a disparity of volumes of investigations, and many times becomes available only while the resource is being produced. This presentation deals with that portion of risk assessment known as uncertainty estimation.

The purpose of this presentation is threefold; to

1. Review the types of data needed in reservoir simulation input. This review will focus on the petrophysical flow properties such as permeability, and relative permeability.
2. Put forward a basis for determining when additional data will be beneficial. The best estimation procedure will be the simulation run (or suite of simulation runs) whose mean is equal to the true value (unbiased) and whose variability is minimal (precise). Determine what the true value is, then, is the challenge here.
3. Review the use of simplified models in predicting reservoir performance. Simplified models have a long, pre-simulation history in hydrocarbon prediction. These models are far less general than simulators, but can do a reasonable job of predicting field-wide performance. They are excellent in confirming the primary producing mechanism in many fields. Because of their simplicity, simple models are well suited for predicting uncertainty.

The presentation concludes with speculations about the benefits of the various types of data on predictions of uncertainty and with how a combination of detailed simulation and simplified modeling might be used to estimate uncertainty.

Biography

Larry W. Lake is a professor of the Department of Petroleum and Geosystems Engineering at The University of Texas at Austin and director of the Enhanced Oil Recovery Research program. He holds B.S.E and Ph.D. degrees in Chemical Engineering from Arizona State University and Rice University. He has been at UT for 20 years where he was department chairman from 1989 to 1997 and held the Shell Distinguished Chair and the W.A. (Tex) Moncrief, Jr. Centennial Endowed Chair in Petroleum Engineering. He currently holds the W.A. (Monty) Moncrief Centennial Chair in Petroleum Engineering.

Lake has served on the Board of Directors for the Society of Petroleum Engineers (SPE) as well as on several of its committees; he has been an SPE distinguished lecturer. Dr. Lake is a member of the National Academy of Engineers and won the 1996 Anthony F. Lucas Gold Medal of the SPE. Dr. Lake has published widely and frequently conducts industrial and professional society short courses in enhanced oil recovery and reservoir characterization. He is the author or co-author of more than 100 technical papers, 2 textbooks and the editor of 3 bound volumes.

The distinguished lecturer for January will be speaking on uncertainty with particular application to reservoir simulation. While there are many among our usual attending group who will never directly perform simulation or be involved with a simulation project, the idea of using simple models to help define uncertainty and the impact of uncertainty on fine-tuning analytical models are topics that confront us all in the oil and gas business. Or, in other words, uncertainty can cause us to work long and hard to diminish its effects but at the end of the day we perhaps would have been better off to grasp the uncertainty and forge ahead, or at least to use quicker, more simplistic models to get comfortable with the relative degree of uncertainty. We feel that we must be more precise and more often "correct" in our analytical results – we may feel that the public, or our companies, or our bosses, expect that of us, especially as technology "advances", but... can we effectively incorporate advances in knowledge, in data, and in technology to really overcome or "cheat" uncertainty so as to become more infallible?

ANNOUNCING

A PRELIMINARY REPORT ON THE GIS CONVERSION OF THE TOWNSHIP OIL- AND GAS-WELL LOCATION MAPS

The Petroleum Geology Group of the Ohio Department of Natural Resources, Division of Geological Survey is pleased to announce the release of the *History of Ohio's oil- and gas-well location maps and their conversion to digital form*, by James McDonald, Larry Wickstrom, and Christian Steck. This paper was originally published in the 1997 Ohio Geological Society Technical Symposium and gives a summary of the conversion of the township oil- and gas-well location maps to a geographic information system (GIS). Approximately 220,000 oil-and-gas-well locations were digitally captured from over 1,300 township well-location maps. Currently, the authors are working on a more extensive final report of the project, which is scheduled to be published. In the meantime, this paper provides the details concerning the GIS conversion of the township oil- and gas-well location maps.

The paper can be downloaded for free in Adobe's Portable Document Format (PDF) from the ODNR website at: <http://www.ohiodnr.com/geosurvey>. A print-on-demand copy of the paper may be purchased from the Survey for \$1.00 plus applicable tax and handling. The paper also is available on 3.5" floppy disk for the same price. Orders must be prepaid. To order the paper contact:

ODNR, Division of Geological Survey
Geologic Records Center
4383 Fountain Square Drive
Columbus, OH 43224-1362

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