PBS-SEPM NEWSLETTER

November 2016

"We are like a judge confronted by a defendant who declines to answer, and we must determine the truth from the circumstantial evidence."

— Alfred Wegener

Inside this issue:

President's Column

As we enter into November here in West Texas, the word 'change' has been at the forefront of my mind. From the seasonal changes of leaf colors, cooling temperatures, and shorter days to the daily rises and falls of commodity (and stock) prices, to monumental changes like electing a new President of the United States, 'change' is certainly the common theme of late. While I recognize a few of these changes may bring anxiety to some, I am also reminded of the good that change can bring—certainly that is the case with PBS-SEPM.

As you know, PBS-SEPM has changed much behind the scenes in the last few months—relying on dedicated volunteers to efficiently and effectively carry out its many functions and services to our membership. With the luncheon talks running smoothly at our new venue, we are now changing our focus to two important tasks to further strengthen our educational impact: (1) facilitating our upcoming core workshop in March 2017 taught by **Dr. Bob Lindsay**, and (2) reviewing and updating the Robert L. Read Jr. Memorial Fund and Wendell J. Stewart Scholarship.

The core workshop is significant for many reasons. First, it allows many new to the basin (or those wishing a refresher) to draw upon PBS-SEPM Honorary Life Member, Dr. Bob Lindsay's vast knowledge of carbonate depositional systems and Permian Basin geology. Second, this event will be the primary 'fund raiser' for our society—something we have not had in ~2 years. Details will be provided in the next newsletter, but please mark your calendars and plan on attending this core workshop next March.

Given PBS-SEPM's focus on educating the geologic community and supporting the science of geology, it has become clear that two of our key initiatives for aiding these efforts needed to be updated. The Robert L. Read Jr. Memorial Fund needs to be rewritten so that it becomes more aligned with our educational focus as well as better honor the memory of Robert L. Read, Jr. The Wendell J. Stewart Scholarship requires updating to match historical practices for financing these scholarships as well as better define the candidate selection criteria to honor its original intent.

Because of the sensitivity and future impact of these two important initiatives, we are pleased to announce that PBS-SEPM Honorary Life Member, **Dr. Fred Behnken**, has agreed to lead the committee to update these documents and present them to the Board for final approval.

A few quick reminders:

- Luncheon talks have returned to the traditional 3rd Tuesday slot, and we will continue to meet at the Carrasco Room of Midland College. Early sign-up by noon Nov. 10 (phone, e-mail, or website) locks in the $20 price—a savings of $10.
- Membership drive ($20/year) is ongoing, and you have several options to renew. Please see our website.

Thanks for your continued support of PBS-SEPM. Looking forward to seeing you on November 15th!

Cory L. Hoffman

PBS-SEPM President 2016-2017
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Midland, TX 79704

Mark Your Calendars! [PBS-SEPM luncheons at Carrasco Room, Midland College]

NOVEMBER 2016

- **8: WTGS** Luncheon: (11:30am-1pm), Speaker: Dr. David Ferrill, SW Research Institute, Title: Mechanical Stratigraphic Control on Fracturing, Eagle Ford Fm.
- **15: PBS-SEPM** Luncheon: (11:30am-1pm), Speaker: Dr. John Lorenz, FractureStudies LLC, Title: Natural Fracture Systems in the Spraberry Formation, Permian Basin
- **24:** Happy Thanksgiving!

DECEMBER 2016

- **14: WTGS** Luncheon: AAPG GeoLegends—Joe Gifford
- **20: PBS-SEPM**: **No Talk**
- **25:** Merry Christmas!

JANUARY 2017

- **10: WTGS** Luncheon: TBA
- **17: PBS-SEPM** Luncheon: (11:30am-1pm), Speaker: Dr. Dustin Sweet, Asst. Prof. Texas Tech, Title: Chronostratigraphic Evoluation of the Midland and Palo Duro Basins: The PABZT Project

PBS-SEPM Luncheon Talk – November 15, 2016

John C. Lorenz, Ph.D.

"Natural Fracture Systems in the Spraberry Formation, Permian Basin"

FractureStudies, LLC
Co-Author: Scott Cooper

Tuesday November 15, 2016 - Midland College, Carrasco Room, 11:30 a.m.

Abstract

Engineering tests in the 1950s and 1960s showed that Spraberry reservoirs in the Permian basin of West Texas generally have a strong, fracture-controlled, NE-SW maximum horizontal permeability trend, but fracture data from vertical and horizontal cores show that the Spraberry natural-fracture system has remarkable variability. Fracture patterns change both vertically and laterally, and fracture permeability is dynamic, changing with variations in reservoir pressure. Horizontal core from a US DOE project in the 1990s showed that at one location, the 1U Spraberry sandstone contains a partially mineralized, NE-SW striking set of extension fractures, where only 140 ft below, the 5U Spraberry sandstone contains a conjugate pair of NNE-SSW and ENE-WSW striking, un-mineralized, minimal-displacement, strike-slip shear fractures. Engineering tests indicate that units containing the conjugate fractures have less anisotropic drainage than units containing the set of parallel extension fractures. Moreover, they demonstrated that fracture-controlled permeability increased, and unexpected off-trend interference occurred, during injection into the underpressured reservoirs. Core from the interbedded shales is also naturally fractured but more heavily near the bottom than at the top of the shale beds. Examination of the natural fracture populations in more recent horizontal and vertical Spraberry cores has reinforced the conceptual model of strain partitioning, where extension fractures in one reservoir can be dynamically compatible with shear fractures in adjacent reservoirs. Parallel shear fractures can also form in isolation where a fault acts in place of the complimentary shear set of the ideal conjugate pair.

Biography

John has a background in, and has published on, sedimentology-stratigraphy, but for the last 31 years has focused on the origins, characteristics, and effects of natural fractures in hydrocarbon reservoirs. He has studied the interactions of fractures and in situ stresses in reservoirs on the North Slope of Alaska to North Africa, and points in between. John received a Ph.D. from Princeton University in 1981, and worked for Sandia National Laboratories in Albuquerque, NM (USA) for 26 years before becoming a consultant. He has been the Elected Editor of the American Association of Petroleum Geologists (2001-2004), and was the 2009-2010 President of AAPG.

"In rivers, the water that you touch is the last of what has passed and the first of that which comes; so with present time."

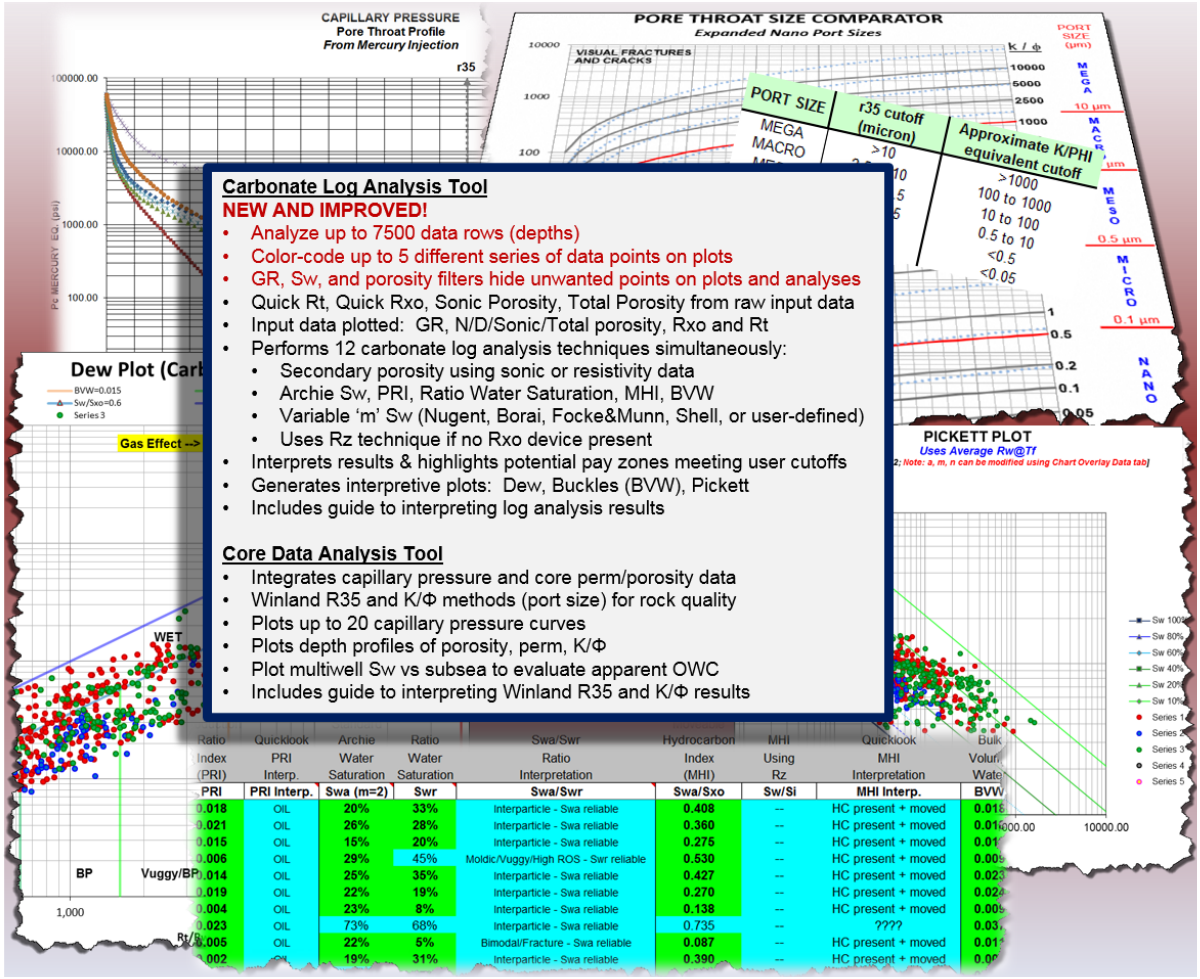
— Leonardo da Vinci (1452 - 1519)

"You cannot teach a man anything; you can only help him discover it in himself."

— Galileo Galilei (1564 - 1642) Italian physicist, mathematician, engineer, astronomer, and philosopher.

PBS-SEPM Publication
Carbonate Log Analysis Spreadsheet v. 4.0
By: Cory L. Hoffman

Designed for Microsoft Office Excel 2013



INTRODUCTORY PRICE: $40 *(all proceeds go directly to PBS-SEPM)*

- **Get 2 tools for 1 low price — spreadsheet includes carbonate log analysis AND core data analysis tools**
- **Flash drive contains current version (Excel 2013; v. 4.0) and previous version (Excel 2010; v. 3.2) of spreadsheet**
- **Price includes free upgrades within version class (v. 3, v.4, etc.) for each registered user**

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For additional information contact: **PBS-SEPM office** (432) 279-1360 or info@pbs-sepm.org.

PBS-SEPM Luncheon Talk – January 17, 2017

Dustin E. Sweet, Ph.D.

"Chronostratigraphic Evolution of the Midland and Palo Duro Basins: The PABZT Project"

Assistant Professor, Texas Tech University

Tuesday January 17, 2017 - Midland College, Carrasco Room, 11:30 a.m.

"An education isn't how much you have committed to memory, or even how much you know. It's being able to differentiate between what you do know and what you don't ."

Abstract

In 2011, a collection of biostratigraphic well reports covering over 126 counties in west Texas and New Mexico was donated to the Department of Geosciences at Texas Tech University. The PABZT project (Permian Basin Archival of Biostratigraphic Zone Tops) aims to digitally archive this collection in a sortable, online ArcGIS database, specifically recording depths to biostratigraphic (namely fusulinid) tops of over 7000 wells that were drilled between the early 1930's and early 1970's. Additionally, lithological data is being archived where reported. Biostratigraphic horizons included in the database so far range from the Ordovician Ellenburger Formation to the Leonardian, thus spanning most of the Paleozoic. Currently, data archiving has covered counties that span across the Midland and Palo Duro basins. Future goals of the project are to: 1) complete the archival of the biostratigraphic horizons from each county in the collection, 2) build a searchable, online, spatially manipulatable database for quick construction of specific biostratigraphic horizons within the greater Permian basin region.

Biography

Dustin received a B.S. Geology from Boise State University (2000), a M.S. Geology from Boise State University (2003), and a Ph.D. from the University of Oklahoma (2009), and has a passion for deciphering tectonic and climatic conditions from the sedimentary rock record. Recent projects have focused on the Late Paleozoic ancestral Rock Mountains, specifically the formation and configuration of the uplifts, the demise of the mountains and curious preservation of ancient landforms, and the climate state during their formation. Prior to joining Texas Tech University in 2011 as an Assistant Professor, he worked for 2 years as an exploration geologist at Chevron Energy Technology Company working the Lower Congo and Kwanza Basins in west Africa, Baffin Bay in west Greenland, and the northern Colombia margin.

"Chance favors the prepared mind."

- Louis Pasteur (1822-95) French chemist and bacteriologist.

PPDC Special Course Offering!

Natural Fractures in Hydrocarbon Reservoirs

Instructor: Dr. John Lorenz

**** November 2 day course ****

Petroleum Professional Development Center
Mailing Address: 221 N. Main
Midland, Texas 79701
432-683-2832; Fax: 686-8089
ONLINE REGISTRATION: **http://www.midland.edu/ppdc**

November 16-17, 2016	**8:00 am - 5:00 pm**	**$750, PBS-SEPM Members[1]**
Wednesday-Thursday	**Midland College PPDC Building**	**$850, Non-Members**
	Entrance: 105 W. Illinois Ave.	**1.6 CEU's**

Course Description:
This class is designed to provide the industry geologist and engineer with a working knowledge of fracture characteristics and variability as they affect production in hydrocarbon reservoirs. This is a hands-on, applied course in fracture interpretation, description, analysis, and effects. The two-day course starts with an exercise in which students assess samples of different types of fractured rock and core. We return to these samples half way through the course to show students the salient features that most missed earlier but can now recognize. Other exercises include assessing fracture strikes in oriented core, and assessing fracture distributions and intensities from core data. The class includes a self-study module using a teaching collection of 50 examples of natural and induced fractures in core.

Various types of fractures, including regional and structure-related fractures will be discussed, as well as the distributions of fractures in different lithologic and structural settings. The course will expose students to the characteristics of the most common types of fractures, how to measure and assess fracture populations, and their likely effects on reservoirs. Students will learn to distinguish natural from induced fractures in core, how to determine the reliability of a core-orientation survey, and how valuable fracture datasets can be collected from archived, incomplete, un-oriented core. The course includes examples from field and subsurface case studies, ***including examples pertinent to Permian Basin resource plays***. Fracture systems are highly variable, thus the course does not teach cookbook techniques but rather teaches the concepts needed to understand fracture systems.

Learning Outcomes:
Geologists who take this class will acquire an appreciation for the variety of characteristics of natural fractures. They will learn how to look for and measure subtle fracture characteristics in core, and to assess the important but complementary differences between cores and image logs. Students will learn how different types of fractures can affect permeability systems in reservoirs, and how to assess the potential for interaction between natural fractures and hydraulic stimulation fractures.

Instructor:
John C. Lorenz, Ph.D. John has a background in, and has published on, sedimentology-stratigraphy, but for the last 31 years has focused on the origins, characteristics, and effects of natural fractures in hydrocarbon reservoirs. He has studied the interactions of fractures and in situ stresses in reservoirs on the North Slope of Alaska to North Africa, and points in between. John received a PhD from Princeton University in 1981, and worked for Sandia National Laboratories in Albuquerque, NM (USA) for 26 years before becoming a consultant. He has been the Elected Editor of the American Association of Petroleum Geologists (2001-2004), and was the 2009-2010 President of AAPG.

Midland College is an Equal Opportunity Employer/Educator. Midland College is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award certificates and associate and baccalaureate degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4500 for questions about the accreditation of Midland College.

[1] Not a PBS-SEPM Member? Join PBS-SEPM ($20) and capture this discount! Online Membership: **http://www.pbs-sepm.org**

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Do you have an idea for an interesting luncheon talk? Have a core workshop you'd like to present? Have some suggestions on how PBS-SEPM can better serve the geologic community? Just click on the e-mail above & drop us a note, your PBS-SEPM Executive Board wants to hear from you!

"Science is facts; just as houses are made of stone, so is science made of facts; but a pile of stones is not a house, and a collection of facts is not necessarily science."

- Jules Henri Poincaré (1854-1912) French mathematician

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PBS-SEPM is grateful for the generosity of these fine corporate sponsors !

"No one is useless in this world who lightens the burden of it for someone else"

- Benjamin Franklin

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We're on the Web!
www.pbs-sepm.org

"..In reply, I can only plead that a discovery which seems to contradict the general tenor of previous investigations is naturally received with much hesitation."

Charles Lyell,
British Lawyer, Geologist,
(1797 - 1875)

PBS-SEPM is the Permian Basin Section of SEPM—the Society for Sedimentary Geology. However, you do not need to be a SEPM member or a geologist to join PBS-SEPM.

Our non-profit society relies entirely upon the efforts of dedicated volunteers to serve the geological community—primarily through educational events. These events include monthly luncheon talks, core workshops, annual field trips, and special geological publications. Additionally, we are involved on the college campuses—reaching out to future earth scientists through scholarships, discounted memberships, and offering full-time geology students the ability to participate in professional-grade field trips at little to no cost.

If you would like to join PBS-SEPM, you may visit our updated website (www.pbs-sepm.org) to learn more about us, download or fill out a membership form, and learn how to get involved.

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"Volunteering is an excellent way to provide meaning in your life and help give back to your local community."
Peter Muggeridge