

Geophysical Society of Pittsburgh



*Proudly Presents Tuesday, January 8th, 2013
At
Penn Brewery, Pittsburgh, Pennsylvania*

Latest Developments in Seismic Waveform Attribute Analysis for Subsurface Structure and Facies Interpretation: Application to Central Appalachian Basin

by

Dr. Dengliang Gao and Mr. Tom Donahoe

Abstract: Traditional wiggle trace amplitude imagery is limited by its dominant frequency and low signal-to-noise ratio; while conventional seismic attributes, such as instantaneous phase, instantaneous amplitude and frequency are not sufficient to define spatial and temporal relations between faults and folds which are crucial in achieving the hydrocarbon exploration objective in sedimentary basins. This presentation provides a review of the latest developments in seismic waveform model regression (WMR) attribute analysis. The WMR method uses a waveform model as a reference to discriminate among seismic features based on a linear, least-squares regression analysis between the model and the data within an analysis window. By implementing customized waveform model schemes, the algorithm has the flexibility to characterize subsurface structure, facies, and reservoir properties. Preliminary test case studies in the central Appalachian Basin indicated that seismic waveform attribute analysis is effective in subsurface structure interpretation and fracture characterization. The improved structure imaging may be instructive in designing horizontal drilling orientations in the hydraulic fracturing process and in better understanding the relationship between subsurface structural features and hydrocarbon systems. These are fundamental to the success of future exploration for and production of oil and gas, both conventional and unconventional, in the Appalachian Basin.



Dr. Dengliang Gao received a PhD (1997) in geology and geophysics from Duke University, an MS (1994) in geology from West Virginia University, an MS (1986) and a BS (1983) in geology from Hefei University of Technology. He is faculty at West Virginia University (2009-present), and was an adjunct professor at University of Houston (2007) and a lecturer at Tongji University (1986-1991) (China). He worked at Chevron Energy Technology Company (2008-2009) as a staff geophysicist, Marathon Oil Company (1998-2008) as a geologist, and Exxon Production Research Company (1997-1998) as a Post-Doc fellow. He was the recipient of US patents (2005 and 2001), Achievement of Company Excellence awards (2001 and 2000), and Science and Technology Advancement awards (China's State Education Commission) (1994 and 1991). He was recognized as an outstanding Geophysics associate editor (2008 and 2007) and an outstanding Geophysics peer reviewer (2006). He served as the Geophysics Associate Editor (2006-present), as Co-chair the 31st Annual GCSSEPM Foundation Bob F. Perkins Research Conference (2011), and on the AAPG Publications Committee (2006-2009). He has extensive publications, including one AAPG Memoir 100 which received the AAPG foundation award (2012), one Geophysics "Bright-Spot" paper (2012), one Geophysics Today reprint paper (2010), two AAPG digital book publication series (2007a and 2007b), and two GCAGS Grover E. Murray Best Published Papers (2006a and 2006b).



Mr. Tom Donahoe is a associate geophysicist at Consol Energy's Indiana Pennsylvania office providing seismic analysis of 2D and 3D datasets for hydrocarbon production in the Utica and Marcellus plays of the Appalachian Basin and support efforts in the Illinois Basin. Mr. Donahoe's research at West Virginia University was 3D Seismic Attribute-Assisted Structural Interpretation for Hydrocarbon Exploration and Production: Southwest Pennsylvania, Central Appalachian Basin. Mr. Donahoe has a MS in geology from West Virginia University and a BS in physics from California University of Pennsylvania.

**Please RSVP using the PayPal link on the Geophysical Society of Pittsburgh website at: www.thegsp.org
Cost \$35 (\$20 for Students). Meeting Location: Penn Brewery, 800 Vinial St., Pittsburgh, PA 412.237.9400**

January 8th Meeting Menu



5:00 pm Social Hour

This month's social hour is proudly sponsored by
Geokinetics!

Beer on Tap:

Alt"er" Ego

Penn Dark Lager Beer, a European-Style Dark

Penn Gold Lager

Penn Pilsner

Also Available: Red & White wine

Hors D'oeuvres:

Side of Smoked Salmon with Pumpernickel, Cream Cheese, Chopped Eggs and Red Onions, and Capers

6:00 pm Dinner

Dinner Buffet

Schweinebraten

Smoked Bratwurst Sausages and Sauerkraut

Balsamic Chicken with grilled vegetables,

Beef Tenderloin Medallions with wild mushroom demi glaze,

Rice Pilaf, Fresh Green Beans with Red Peppers

Tossed Green Salad with Ranch, Italian and Balsamic Dressing.

Dessert: Apple and Cherry Pie

Coffee & Cream

7:00 pm Lecture

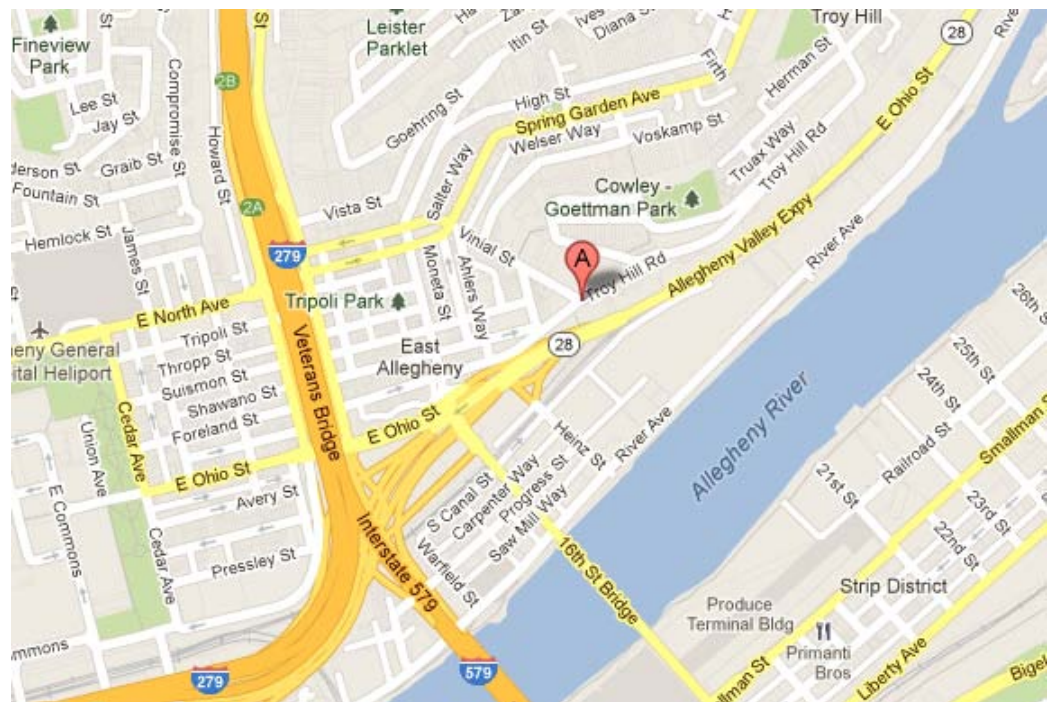
We are pleased to announce that this month's lecture will be held at :

Penn Brewery

800 Vinial Street

Pittsburgh, PA 15212 USA

412.237.9400



Geophysical Society of Pittsburgh Upcoming Lecture Series:

January 8th: Latest developments in seismic waveform attribute analysis for subsurface structure and facies interpretation: Application to Central Appalachian Basin, Dr. Dengliang Gao and Mr. Tom Donahoe - Penn Brewery, 800 Vinial St., Pittsburgh, PA 412.237.9400

February 5th: PreSeis Exploration Consultants, Inc. (tentative)

March 5th: Check Website for details

April 2nd: Check Website for details

May 7th: Check Website for details



Photo: Bill Harbert

News and Events from Geoscience Organizations



Solving Water Problems in Oil and Gas Production: New Technologies for Cost Savings and New Revenue Flows 26-27 February 2013 | Fort Worth, Texas

Water concerns are intensifying as issues around hydraulic fracturing, new regulations, drought, and surface water management continue to dominate the public. More information on this Workshop can be obtained at <http://www.aapg.org/gtw/fortworth2013/index.cfm>



The Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP) provides geophysicists, engineers, geoscientists and end-users from around the world an opportunity to meet and discuss near-surface applications of geophysics.



Top international E&P operators, service companies, and applied research personnel will gather to discuss the latest advances in Seismic-While-Drilling (SWD). The Abstract submission deadline is 15 February 2013. For more information see: <http://www.seg.org/documents/10161/7379860/GALV13-Call4Papers.pdf>

Pittsburgh Geological Society

The PGS Generally Meets on the 3rd Wednesday of the Month From September through May. More information is available at <http://www.pittsburghgeologicalsociety.org/>



P·A·P·G

Pittsburgh Association of
Petroleum Geologists

An AAPG Affiliated Society

www.papgrocks.org

The PAPG Generally Meets on the 2nd Monday of the Month From September through May. More information is available at <http://www.papgrocks.org/>

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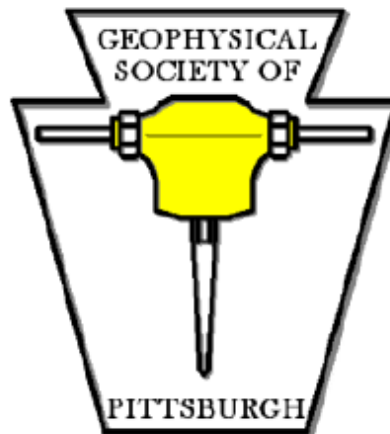


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