# *Geophysical Society of Pittsburgh*

*Proudly Presents Tuesday, April 5th , 2016*
*At*
*Cefalo's Restaurant, Carnegie, PA*

## Unsupervised Neural Analysis of Seismic Attributes to find the "Sweet Spots" in your data – with Conventional and Unconventional Case Histories
### Deborah Sacrey

**Abstract:**. Interpretation of seismic reflection data  involves powerful multiple-CPU computers, advanced visualization techniques, and  generation of numerous seismic data types and attributes.  Even with these technologies at the disposal of interpreters, there are additional techniques to derive even more useful information from our data.  Over the last few years there have been efforts to distill numerous seismic attributes into volumes that are easily evaluated for their geologic significance and improved seismic interpretation.  Seismic attributes are any measureable property of seismic data. They can be measured at one instant of time or depth or over a time or depth window. They are  measured on a single trace, on a set of traces, or on a surface - all interpreted from the seismic data.  Commonly employed categories of seismic attributes include instantaneous, geometric (coherency, curvature), amplitude accentuating (relative acoustic impedance, sweetness, etc.), AVO, spectral decomposition, and inversion.  Principal component analysis (PCA), a linear quantitative technique, has proven to be an excellent approach to  understand which seismic attributes or combination of seismic attributes have interpretive significance.  PCA reduces a large set of seismic attributes to  indicate  variations in the data.  The combination of seismic attributes contributing to these variations quite often relate to geologic features of interest.  PCA, as a tool employed in an interpretation workflow, can help determine meaningful seismic attributes.  In turn, these attributes are input to self-organizing map (SOM) training. SOM, a form of unsupervised neural networks, has proven to be an excellent method to take many of these seismic attributes and produce meaningful and easily interpretable results. SOM analysis reveals the natural clustering and patterns in  data and has been beneficial in defining stratigraphy, seismic facies, DHI features, and sweet spots for shale plays.  With modern visualization capabilities and application of 2D color maps, SOM routinely identifies meaningful geologic patterns.  Recent work utilizing SOM and PCA has revealed geologic features that were not previously identified or easily interpreted  with the seismic data.  The ultimate goal in this multi-attribute analysis is to enable the geoscientist to produce a more accurate interpretation and reduce exploration and development risk.

**Biography:**

 Deborah is a geologist/geophysicist with 39 years of oil and gas exploration experience in the Texas and Louisiana Gulf Coast and Mid-Continent areas of the US.  She received her degree in Geology from the University of Oklahoma in 1976 and immediately started working for Gulf Oil in their Oklahoma City offices.

She started her own company, Auburn Energy, in 1990 and built her first geophysical workstation using Kingdom software in 1995. She helped SMT/IHS for 20 years in developing and testing the Kingdom Software. She specializes in 2D and 3D interpretation for clients in the US and internationally. For the past three years she has been part of a team to study and bring the power of multi-attribute neural analysis of seismic data to the geoscience public, guided by Dr. Tom Smith, founder of SMT.

Deborah has been very active in the geological community.  She is past national President of SIPES (Society of Independent Professional Earth Scientists), past President of the Division of Professional Affairs of AAPG (American Association of Petroleum Geologists), Past Treasurer of AAPG and is now President of the Houston Geological Society.  She is also a DPA Certified Petroleum Geologist #4014 and DPA Certified Petroleum Geophysicist #2.  She belongs to AAPG, SEG, PESA (Australia), SIPES, Houston Geological Society, The South Texas Geological Society and the Oklahoma City Geological Society (OCGS).

*Please RSVP using the PayPal link on the Geophysical Society of Pittsburgh website at: www.thegsp.org*
*Cost: $35 Members, $40 Non-members ($20 for Students). Meeting Location: 428 Washington Ave, Carnegie, PA 15106*
*(412) 276-6600. Note the significant detour warning on page 2 of the newsletter.*

*April 5th , 2016 Agenda*

*5:00 pm Social Hour (Beer and Wine) sponsored by*

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*6:00 pm Dinner Buffet*

*7:00 pm Lecture – Sponsored by*

GEOPHYSICAL INSIGHTS
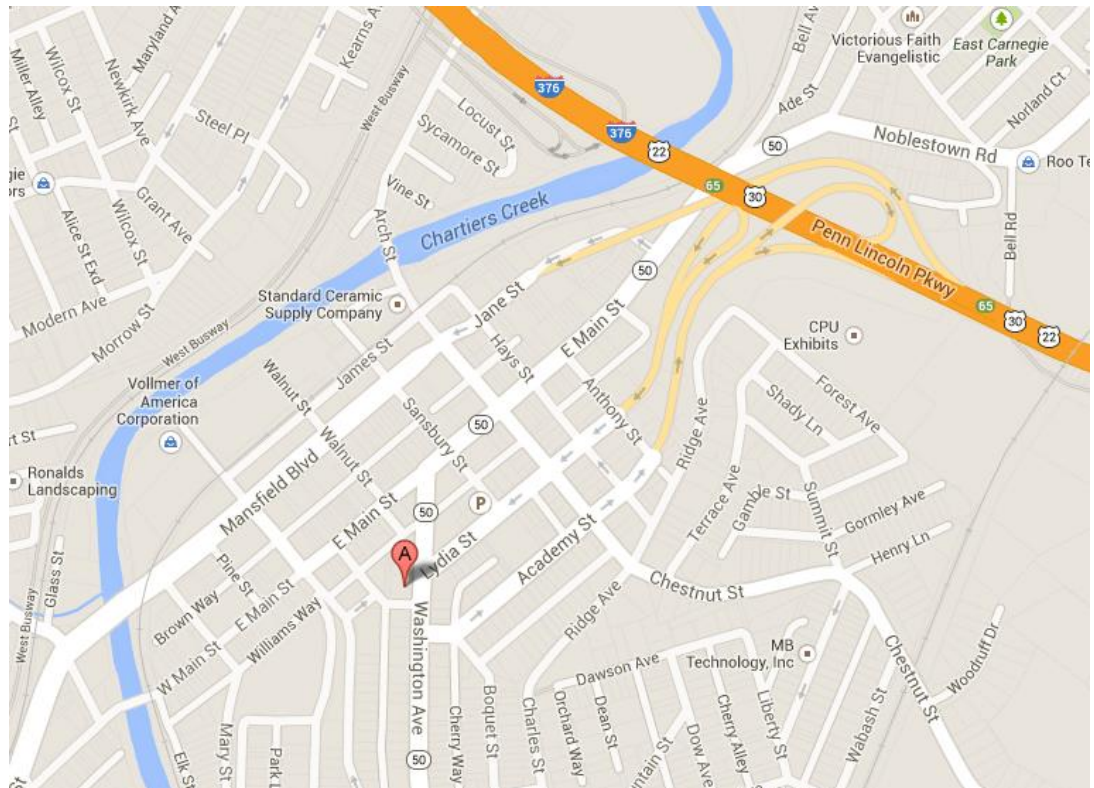
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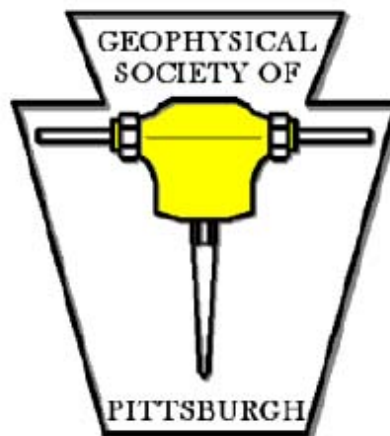
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