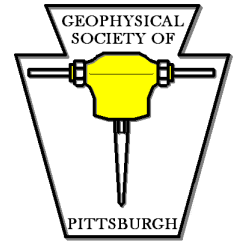


Geophysical Society of Pittsburgh



Tuesday, December 6th, 2011 Lecture:

Closure Stress Gradient Estimation of the Marcellus Shale from Seismic

Joel G. Starr, EQT

Abstract:

The closure stress is the stress needed to hold open a fracture in rock once it has been created. Understanding closure stress is important when developing a gas shale like the Marcellus in the Appalachian Basin. It determines the existence of stress barriers, the extent of the expected drainage area, the type of proppant needed, etc. As such, it affects the completion design and drilling targets. Closure stress is commonly assumed to be equivalent to the minimum horizontal stress and can be calculated using the uniaxial stress equation. This equation has several parameters and has been expanded to account for tectonic strain and anisotropic tectonic strain (Theircelin and Plumb, 1994). However, the goal of this paper is to simplify this equation and limit the parameters to something that can be estimated readily from seismic data. This paper makes the case that in the Appalachian Basin, estimating Poisson's ratio is sufficient to understand the changes in the stress gradient of the Marcellus shale relative to the surrounding layers both vertically and laterally.

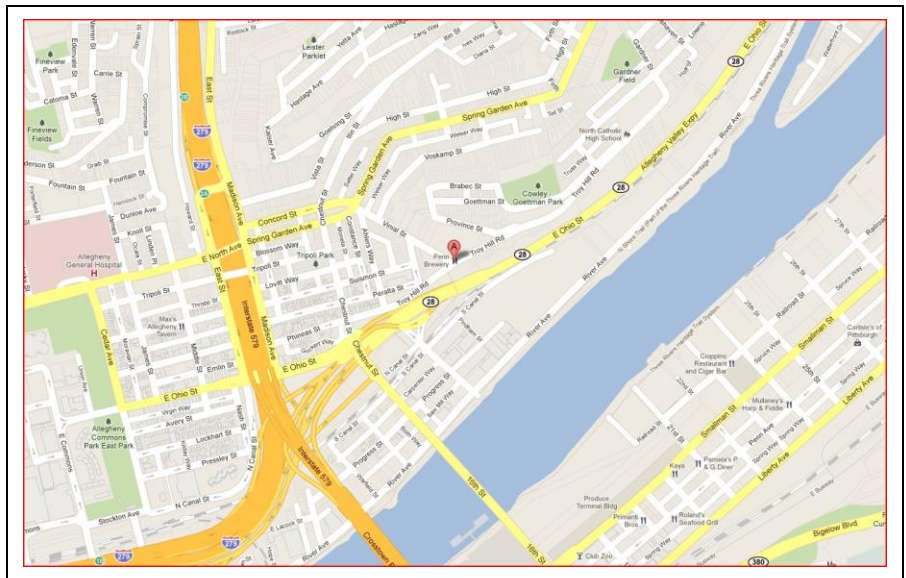
Biography:



Joel Starr is the Exploration Geophysicist for EQT Production in Pittsburgh PA. He received a B.S. in Geology from Juniata College in 1985 and an M.S. in Geophysics from the University of New Orleans in 1990. He has worked in the Gulf of Mexico, South America, North Sea, Arabian Gulf and West Africa. Joel contributed to the development the Ocean Bottom Seismic acquisition technique in the early 1990's as well as several methods for processing multi-component data. He holds five patents and several publications in the SEG and EAGE.

We are pleased to announce that this month's lecture will be held at the Penn Brewery Restaurant located at:

Penn Brewery Restaurant (Eisenhalle Room)
800 Vinial Street
Pittsburgh, PA 15212, United States
(412) 237-9402



**Please RSVP using the PayPal link on the Geophysical Society of Pittsburgh website at: www.thegsp.org
Cost for this month's meeting is \$35.**

December Lecture Details:

5pm Social Hour

We are pleased to announce that this month's social hour is proudly sponsored by
Geophysical Pursuit, Inc.



Hors D'oeuvres

- *Side of Smoked Salmon with Pumpernickel, Cream Cheese, Chopped Eggs Red Onions, and Capers*
- *Penn Pilsner Beer Cheese and Crackers*

Beers on Tap

- ❖ *Pale Ale*
- ❖ *Penn Gold Lager*
- ❖ *Penn Dark*
- ❖ *Penn Light*

6pm Dinner Buffet

- *Wiener Schnitzel*
- *Black Forest Chicken (breaded chicken breast with ham and Beer cheese mustard sauce)*
- *Grilled Vegetable and Penne Pasta Alfredo*
- *Hot German Potato Salad*
- *Rice Pilaf*
- *Fresh Green Beans with Red Peppers*
- *Tossed Green Salad with Ranch, Italian and Balsamic Dressing*

Dessert

- *New York Style Cheesecake*

7 pm Lecture

Geophysical Society of Pittsburgh 2011-2012 Lecture Series:

September 6th: Is there a Place for Non-seismic Exploration in Unconventional Resource Plays

October 4th: The Value of Seismic Data in the Marcellus Shale Play

November 1st: Practical Seismic Petrophysics: The Effective Use of Log Data for Seismic Analysis

December 6th: Closure Stress Gradient Estimation of the Marcellus Shale from Seismic

January 10th: Rank-Reduction-Based 5D Trace Interpolation

February 7th: Microseismic Technology in Fracture Detection

March 6th: VSP Imaging Technology used for Assisting in Geosteering in Shale

April 3rd: Microseismic Frac (Passive Seismic) Monitoring

May 1st: Prestack Depth Migration (PSDM) for Onshore Applications



The GSP October Lecture: The Value of Seismic Data in the Marcellus Shale Play.

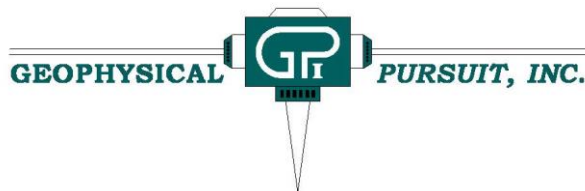
Photo: Bill Harbet

We would like to thank our 2011-2012 Corporate Sponsors:

SILVER

GOLD

BRONZE



~~~~~  
**2011-2012 GSP OFFICERS**

- |                          |                     |                                                                                |          |
|--------------------------|---------------------|--------------------------------------------------------------------------------|----------|
| • <i>President:</i>      | Ed Andrews          | <a href="mailto:eandrews@EXCOResources.com">eandrews@EXCOResources.com</a>     | EXCO     |
| • <i>Vice President:</i> | Craig Eckert        | <a href="mailto:ceckert@eqt.com">ceckert@eqt.com</a>                           | EQT      |
| • <i>Treasurer:</i>      | Jim Wigal           | <a href="mailto:jwigal@abartaenergy.com">jwigal@abartaenergy.com</a>           | Abarta   |
| • <i>Secretary:</i>      | Anthony Steenbergen | <a href="mailto:ASTEENBERGEN@talismanusa.com">ASTEENBERGEN@talismanusa.com</a> | Talisman |

~~~~~  
Your Dues and Sponsorship in Geophysical Society of Pittsburgh go toward:

- *Outstanding Monthly Lecture Series*
- *SEG Distinguished Lecturers*
- *Annual Scholarship Awards*
- *Annual Golf Outing*
- *Short Courses*

Please contact Jim Wigal
(jwigal@abartaenergy.com) for
Sponsorship opportunities.

~~~~~  
**Calendar:**

- *November 15-17 DUG East - Pittsburgh Pa*
- *December 14 Annual Joint GSP / SPE / PAPG Holiday Party, Cefalo's Restaurant, Carnegie, PA*
- *January 10, 2012 GSP Meeting - Rank-Reduction-Based 5D Trace Interpolation, Stewart Trickett, Fugro-Kelman*



P-A-P-G  
Pittsburgh Association of  
Petroleum Geologists  
An AAPG Affiliated Society  
[www.papgs.org](http://www.papgs.org)

Society of Petroleum Engineers