



# *Geophysical Society of Pittsburgh*



*Proudly Presents Tuesday, March 7th, 2017*

*At*

*Cefalo's Restaurant, Carnegie, PA*

## **The Significance of Bedding Planes to Hydraulic Fracturing and Production**

**Marc Prince**

ESG Solutions

**Abstract:** Hydraulic fracturing is used to liberate hydrocarbons within unconventional resources; however, the heterogeneity in formations and the dynamics of the stress fields during multi-well completions leads to complexities in the process of estimating reserves that can be produced. Advanced processing of microseismic data offers an opportunity to understand the variations in growth as related to geological and completion-related factors, especially through integration of other datasets such as chemical tracer data. Spatial microseismic event distributions by themselves tend to yield significant overestimates of stimulated volume, but when advanced processing such as seismic moment tensor inversion (SMTI) is used, the connectivity of the fracture network and the openings and closures of the fracture network can be established.

We examine in detail two multi-well datasets from a major North-American shale play where the seismicity was recorded using vertical borehole-deployed arrays of geophones. Careful interpretation of the source mechanisms associated with the microseismicity reveals that the seismicity associated with the fracturing is frequently accompanied by horizontal fractures that are consistent with a bedding-plane slip process. In the first example, we examine two stages in adjacent wells which were treated under similar conditions but which exhibited variable production. In the second example, a comparison is made between two stages in the same well. Again, similar injection parameters were used for both stages, however proximity to previously stimulated stages and the activation of different fracture sets highlights the role of different fracture sets in effectively constraining the stimulation to the zone of interest.

By utilizing the identified fracture sets, their failure types, orientations and dimensions, we consider the role that pre-existing fractures, and particularly the activation of bedding planes play in constraining fracture growth and ultimately driving production within the reservoir. Knowledge of the dynamic processes of the reservoir during stimulation provides a unique tool to evaluate well and stage spacing on the effectiveness of the completion design.

**Biography:** Group Manager, International Business Development, ESG Solutions

Marc Prince is a senior geophysicist with more than 18 years of seismological related experience. Marc has spent the last 16 years at ESG where he has been involved in all aspects of microseismic project planning, field operations and data analysis. As Group Manager, International Business Development for ESG's global energy services division, he currently provides technical sales support to ESG's global projects as well as technical project design and guidance for data processing. Marc earned his B.Sc. in geophysics from the University of Waterloo and is a member of the SEG, SPE and EAGE.



Please RSVP using the PayPal link on the Geophysical Society of Pittsburgh website at: [www.thegsp.org](http://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.

## March 7th, 2017 Agenda:

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



6:00 pm Dinner Buffet

7:00 pm Lecture sponsored by:

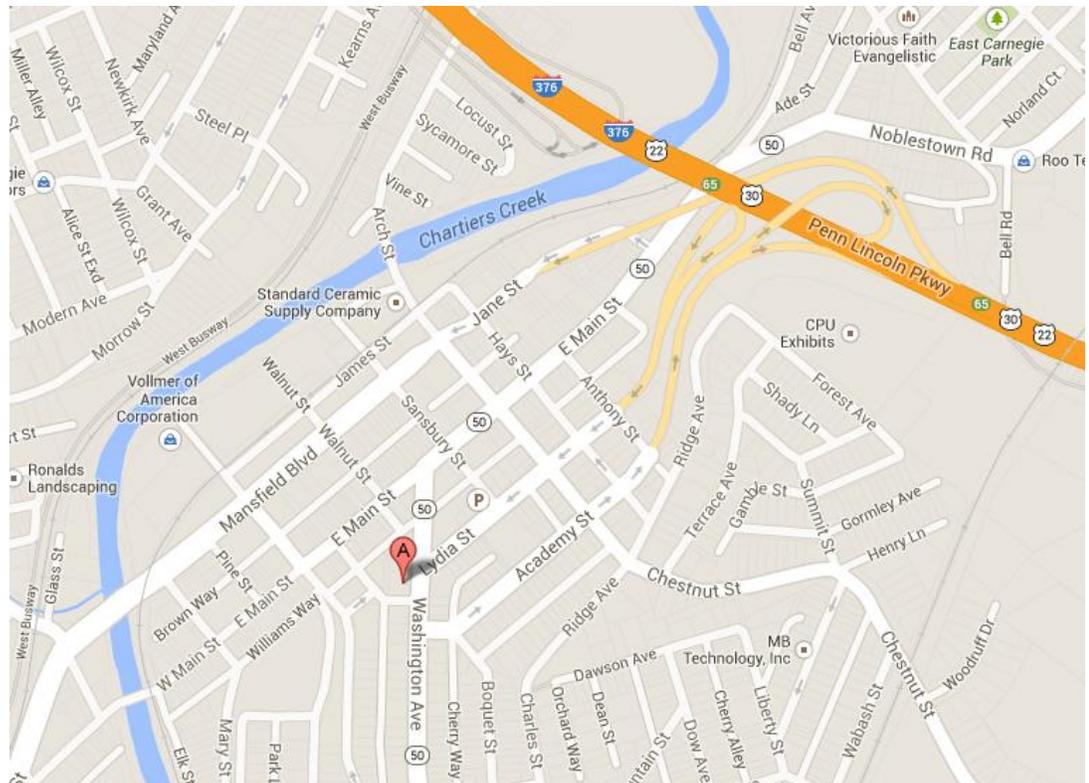


To receive CEU certificate from this lecture please email: [emily.mcclain@netl.doe.gov](mailto:emily.mcclain@netl.doe.gov)

This month's lecture will be held at:

[Cefalo's](#)

**Banquet & Event Center**  
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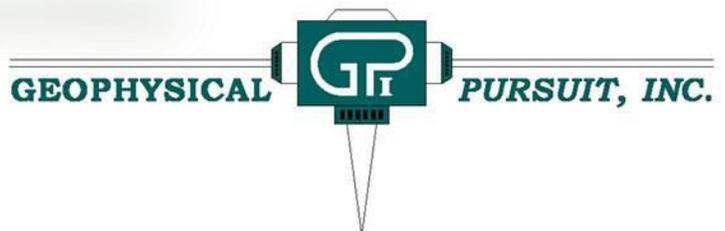
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