



Geophysical Society of Pittsburgh



*Proudly Presents Tuesday, October 4th, 2016
At
Cefalo's Restaurant, Carnegie, PA*

Mapping Reservoir Stress Conditions using Hydraulic Fracturing Microseismicity

Orlando J. Teran

MicroSeismic Inc.

Abstract: Focal mechanisms, when computed for an entire microseismic catalogue, permit a rapid assessment of the stress states throughout the stimulated reservoir. The premise for this is that the fracturing potential depends on the frictional resistance to slip and ratio of shear to normal stress on the plane (determined by fracture orientation within the stress field). Previous studies using borehole images and laboratory techniques have demonstrated that the most hydraulically conductive fractures have the highest failure potentials.

In this talk we present a geomechanical analysis workflow using microseismic focal mechanisms to investigate the dynamic response of the reservoir during and after stimulation. Focal mechanisms are derived using full waveform fitting techniques, and the ambiguity in identifying the true fracture plane is resolved by simply choosing the nodal plane that aligns with the developing hydraulic fractures. A global stress inversion of the fracture plane solutions is done to estimate the orientations and relative magnitudes of the principle stresses. Friction laws are then used to constrain for each event a suite of geomechanical parameters (failure potential, dilation tendency, and excess pore pressure) in order to identify fracture populations likely to control fluid flow, those that required different stimulation pressures in order to contribute to flow, and the mechanical conditions that favored out-of-zone growth and reactivation of geohazards. The method is applied and discussed in the case of a microseismic event catalogue obtained during the stimulation of two horizontal wells landed in the Eagle Ford, where large variations in event densities as well as geohazards were observed. We will also show examples from other plays to demonstrate that this workflow is applicable to all plays.



Biography: Orlando's career as a geophysicist began 2 years ago at MicroSeismic Inc., where his role includes processing and analysis of microseismic data as well as developing tools for advanced microseismic analyses. Prior to joining MicroSeismic, he pursued a graduate degree in structural geology in Baja California, where he studied active faults and a modern earthquake rupture. Orlando has a Ph.D. in Geology from Centro de Investigacion Cientifica y de Educacion Superior, Ensenada, Baja California, Mexico, and a BA in Geology from Western State Colorado University in Gunnison, Colorado. He has also co-authored articles published in Science and Nature.

*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.*

October 4th, 2016 Agenda

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



6:00 pm Dinner Buffet

7:00 pm Lecture – Sponsored by:

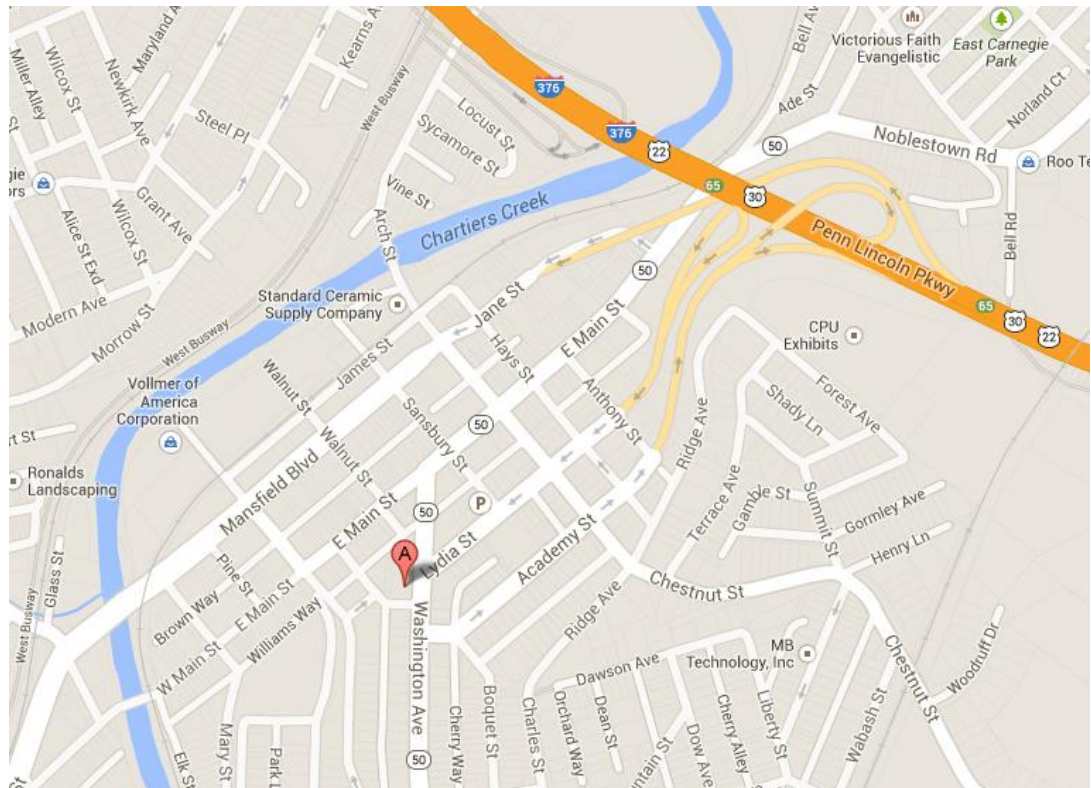


To receive CEU certificate from this lecture please email: emily.mcclain@netl.doe.gov

This months lecture will be held at :

[Cefalo's](#)

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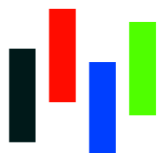
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