



# *Geophysical Society of Pittsburgh*



*Proudly Presents*  
**WEDNESDAY, May 7th, 2013**  
*At*

*Grand Concourse, Pittsburgh, Pennsylvania*

## **Kink Band Genesis in the Appalachian Basin: A Structural and Geomechanical Interpretation** **Mr. Scott Wessels, Statoil**

**Abstract:** The prolific Marcellus Shale occurs within the Appalachian Plateau detachment sheet that overlies a Silurian salt décollement. The internal structures of the detachment sheet have been variously described as folds, reverse faults, and thrust-cored anticlines. Using 3-D seismic data and geosteering analysis we show that the dominant internal structures are reverse kink bands.

Available 3-D seismic reflection data show that deformation is characterised by large asymmetric salt pillows and by structures with a reverse sense of offset. The reverse structures have a bimodal population of dips, with modal values of 60° and 20°. Geosteering analysis provides further structural definition. Marcellus development begins with a single vertical pilot followed by a number of nearby laterals; geosteering analysis correlates the gamma ray log recorded in the pilot hole with the gamma ray recorded in the laterals allowing construction of detailed cross sections through the wells. Using this technique, shallowly dipping structures imaged on seismic are identified as thrusts, whereas steep reverse structures correspond to monoclines with no break in structural continuity. We therefore identify the steep reverse structures as reverse kink bands.

Thrusts are typically foreland-verging, occur at various levels in the stratigraphy, and form simple planar ramps that occasionally pass downwards into kink bands. The kink bands dip both towards the hinterland and the foreland and invariably extend down to the salt décollement. A series of different strata provide detachment surfaces that limit upward kink band growth and appear to reflect the kink bands. The scale of the kink bands is very variable and is controlled by the occurrence of the detachment levels and hence by the mechanical stratigraphy. The largest kink bands extend up to the present day surface level where they are observed as zones with dips of up to 70°.

Routine integration of seismic and geosteering analysis combined with improved structural understanding can significantly improve placement of laterals, which in turn reduces costs and improves well performance.



**Biography:** *Scott Wessels is a young geoscientist who was born and raised in Wichita, Kansas. He earned his Bachelor's degree in Geology from Kansas State University in 2007 and a Masters degree in Geology from the University of New Orleans in 2010. After his time in the Big Easy, he joined Microseismic Inc. in Houston, Texas to become a processing and research geophysicist. He continued there until 2012 when he began at Statoil in Houston as a geophysicist in the Marcellus Shale asset. He has been devoted to the startup of the company's operated position in West Virginia and Ohio. He also has remained engaged with the many ongoing microseismic projects within the company. Scott is an avid homebrewer and is currently working on making the perfect IPA. He is also currently building a start-up software company in his spare time.*

**Please RSVP using the PayPal link on the Geophysical Society of Pittsburgh website at: <http://thegsp.org/>  
Cost \$40 non-members, \$35 members, (\$20 for Students). Meeting Location: Grand Concourse, 100 West Station Square, Pittsburgh, PA, 15219, 412.261.1717**



## ***Wednesday, May 7<sup>th</sup> Meeting Menu***

### ***5:00 pm Social Hour***

*This month's social hour is proudly sponsored by*

**[Tideland Geophysical](#)**

### ***Beverages:***

*Beer, Red & White wine, and a Selection of Non-Alcohol Alternatives*

### ***6:00 pm Dinner***

### ***Dinner Choices (Made When Making Your On-Line Reservations):***

*Dynamite Mahi-Mahi*

*Petite Filet Mignon*

*Comes with Martha's Vineyard Salad and Cheesecake du jour*

### ***7:00 pm Lecture***

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

### **[Grand Concourse, Station Square](#)**

125 West Station Square  
Pittsburgh, PA 15219 USA  
800.859.8959

