

Wednesday, November 29, 2017

Petroleum Club of Houston • 1201 Louisiana (Total Building)  
Social Hour 11:15 a.m.  
Luncheon 11:45 a.m.

Cost: \$35 Preregistered members; \$40 non-members/walk-ups

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.

Pre-registration without payment will not be accepted.

Walk-ups may pay at the door if extra seats are available.

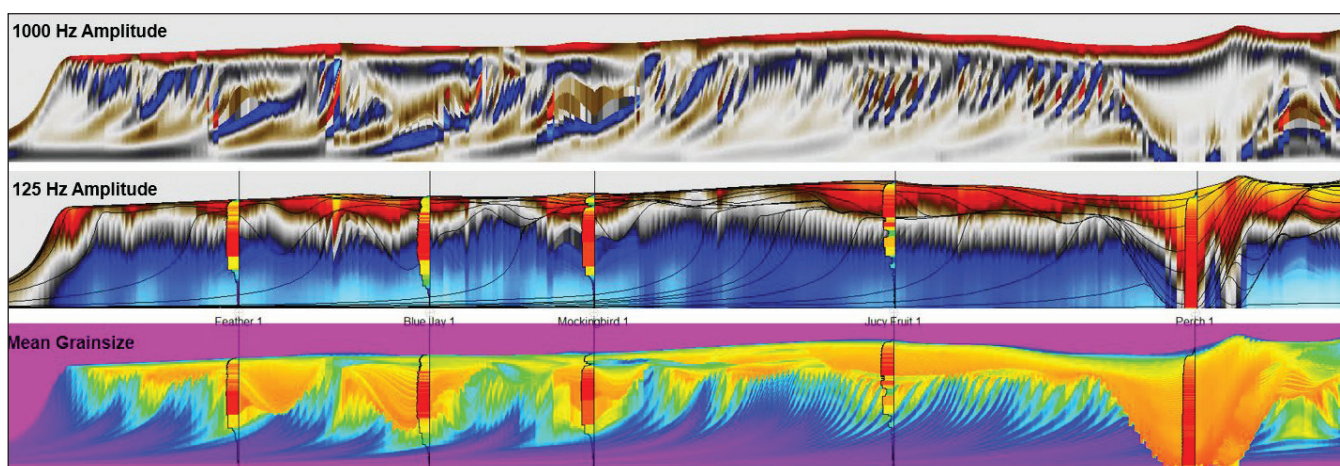
If you are an Active or Associate Member who is unemployed and would like to attend this meeting, please call the HGS office for a discounted registration cost. We are also seeking members to volunteer at the registration desk for this and other events.

## HGS General Luncheon Meeting

Lisa Goggin, Tao Sun, Maisha Amaru,  
Ashley Harris, Anne Dutranois,  
Andrew Madof  
Chevron Energy Technology Company

HGS General Luncheon Meeting

# 3-D Volumetric Interpretation with Computational Stratigraphy Models



*Seismic and property backdrops: how does well density and seismic frequency influence your interpretations?*

Seismic sequence stratigraphic approaches rely upon the basic assumption that seismic reflections represent time-equivalent surfaces. Many studies demonstrate that tracked seismic reflections reveal apparent morphological forms of depositional systems but these studies seldom address how seismic reflections, impedance contrasts and formation boundaries relate. Formation and fluid boundaries create scale-dependent seismic responses. We should expect that as vertical and lateral facies changes occur and seismic frequency degrades the impedance and seismic amplitude responses will also be altered. Complex relationships between facies and seismic response can create reflections that are discordant with geologic time. Recognizing how seismic response relates to lateral and vertical facies changes is critical to understanding whether seismic reflections accurately reveal the geomorphologic form of time-equivalent geologic surfaces.

To investigate whether seismic reflections accurately capture geomorphology stratal boundaries and test how frequency content in seismic volumes changes reflection response we utilize computational stratigraphy to generate 3D geological

depositional models that are transformed into scalable seismic analogs. Honoring the physics of depositional process and grain transport a scale model of a fluvially-dominated delta was created. The depositional model is converted into seismic volumes of various frequencies (1D convolutional approach) and the resulting seismic reflections are compared to known positions of time-equivalent depositional/erosional surfaces and facies from the synthetic model. At all tested seismic frequencies we observed reflections discordant with known time-synchronous events from the model. The observed discordance often worsened with frequency loss and occasionally resulted in amplitude responses that were discordant with facies trends in the model. This result suggests that the assumption that seismic reflections are time-synchronous boundaries in the subsurface requires further investigation. We conclude that scale and seismic frequency are critical components of sequence stratigraphic classification and should not be overlooked in our quest to classify our interpretations. ■

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### Biographical Sketch

**DR. LISA RENEÉ** Goggin developed an early interest in chemistry, a love of outdoor activities and a penchant to collect rocks led to a pursuit of advanced degrees in geology and chemistry. An opportunity to sit a well as a mud-logger during her undergraduate years gave her a passion for finding oil and gas and after completing multiple internships



in the oil industry. She completed her PhD in Geology in 1999 at Indiana University after joining Chevron in 1997. Lisa has served as an exploration and development geologist, described

and interpreted cores, led field schools and taught seismic interpretation and visualization techniques to teams around the globe. She is currently a Senior Staff Research Geologist and a team member of new technology and applied geologic workflows designed to bridge the gap between low-resolution data and high-resolution modeling. She is a proven Oil Finder and received several patents and currently has numerous additional patent applications on file at the US Patent office. She is an enthusiastic speaker and leader who is passionate about sharing technology and ideas. Her Professional associations include: Registered Professional Geologist (ASBOG), member of AAPG, GSA, HGS, Sigma Xi & Sigma Zeta Honor Societies and is currently serving on the Board of the National Cave and Karst Research Institute.