Title: Pressure Prediction and Hazard Avoidance through Improved Seismic Imaging – SEAM Phase III

Presenters: Peter Pangman, SEG Advanced Modeling Corporation (SEAM)
            Michael Fehler, Massachusetts Institute of Technology (MIT)
            Martin Traugott, Independent Researcher

High quality seismic data is required for improving the quality of pre-drill pressure predictions. Such data is also critical for assessing shallow hazards. Improved predictions are essential for designing safe and cost-effective well plans. However, a significant barrier to improving the current state-of-the-art in pressure prediction has been the lack of an accurately calibrated benchmark seismic dataset, tied to wells, which together can be used to test evolving technologies and methodologies.

The proposed SEAM Phase III research consortium will provide two such industry benchmark datasets: one for deep subsalt pressure challenges and one for shallow hazards. These “industrial strength” seismic simulations will be acquired with the latest advances in anisotropic elastic modeling code. The datasets will be oversampled to enable investigations of how advanced seismic acquisition approaches and enhanced data processing technologies could lead to improved extraction of relevant velocity information.

The datasets will be simulated on a highly realistic earth model constructed to include a range of typical deep pressure and shallow hazard anomalies, to be determined by consortium members. Well log and lab data, both public access and proprietary, will be used to establish rock, pressure and geophysical properties. Geomechanical and basin modeling effects will be considered. The model will be created by modifying and extending the existing SEAM Phase I Deepwater Subsalt Gulf of Mexico model (35 km x 40 km x 10 km) parameterized on a 20 m x 20 m x 10 m grid with a comprehensive suite of geological and elastic parameters. Geologists, petrophysicists and geophysicists will be involved in the model design.

The datasets will be used to evaluate evolving technologies for predicting pressure and shallow hazards. Improved estimates of bed normal Vp will be the primary focus. Other approaches involving shear velocity and density will also be considered. A proposed methodology for quantifying risk and uncertainty in pressure predictions, including geophysical and pressure transform ambiguities, will be developed. This methodology, the model and the simulations will provide fertile ground for ongoing industry and academic research into improved pre-drill pressure prediction and hazard avoidance.

The scope of the SEAM proposal and the deliverables will likely be modified and improved based on suggestions from participants at this workshop and participants in the research consortium.

Please direct inquiries to seam@seg.org.