

Richter Predictor: Identify Pre-cursors to Induced Seismicity and Casing Deformation

Thomas de Boer
ShearFRAC Ltd.

Thursday, April 2, 2026, 9 a.m. Central Time



Thomas de Boer is a Senior Engineering Data Scientist at ShearFRAC Ltd. His presentation will be at 9:00 Central Time on Thursday, April 2, 2026. The topic is “Richter Predictor: Identify Pre-cursors to Induced Seismicity and Casing Deformation.”

Abstract

Hydraulic fracturing operations in unconventional reservoirs can induce a range of subsurface deformation behaviors including casing deformation, fracture-driven interactions (FDIs), and induced seismicity, that pose material risks to well integrity and surface infrastructure. This presentation presents a field-validated, real-time analytics framework that leverages surface pressure data to detect and classify precursory signatures of these events.

At the core of the system is a proprietary signal decomposition method that extracts and characterizes nonlinear, nonstationary acoustic energy components from wellhead pressure. By interpreting the signal in terms of its evolving micro-scale resonant energy content, the system is capable of distinguishing subtle differences between stages that would appear identical at the macro scale. This architecture allows for real-time processing of incoming data for classification of high signal energy periods associated with subsurface deformation processes.

Field trials in the Permian Basin, Eagle Ford, Montney, and Duvernay formations have shown the system’s predictive capacity, with high-risk intervals identified hours before microseismic detections or caliper-confirmed deformation. This approach transforms surface pressure from a passive measurement into an active geomechanical sensing tool, enabling operators to move from post-event diagnostics to real-time forecasting and proactive risk mitigation. This enhances field development economics, improving social license to operate and reducing impacts due to Governed traffic light systems or damage to subsurface infrastructure.

Biography

Thomas de Boer is a Senior Engineering Data Scientist at ShearFRAC Ltd, specializing in the application of data science to complex engineering challenges. He holds a MASc and is currently pursuing a PhD at the University of Toronto, where his research focuses on AI/ML architectures for analyzing hydraulic fracturing signals. His work centers on the development of early warning systems for operational hazards such as induced seismicity and casing deformation. With over five years of experience in building and deploying advanced data science pipelines, Thomas has a strong track record in geospatial and geomechanical data integration, real-time analytics, and large-scale data lake architectures. He also likes the art of home distillation.