

A Fresh Look at Pore Pressure Prediction: Using ‘Play-Based Pore Pressure Prediction’ to Identify Successful New Play Concepts

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ABSTRACT

‘Play-based Pore Pressure Prediction’ is a new concept that considers overpressures and pore pressure prediction as a being fundamentally similar process to the ‘play-based exploration’ approach commonly used to search for hydrocarbons. For overpressures to exist, the right set of conditions needs to occur in the right order and timeframe. Just like a hydrocarbon play, overpressures need a source (generation mechanisms), reservoir (the overpressured formation) and seal (ability to maintain overpressures over geological time). Current pore prediction methods do not consider overpressure over the geological timespan of a basin, and commonly result in overpressures being encountered in unexpected formations and depths, or at greater magnitude than anticipated, and has resulted in many drilling incidents.

Play-based pore pressure prediction involves undertaking regional to prospect scale pore pressure analysis, in a similar holistic manner to how prospects are generated during hydrocarbon exploration. The process involves using basin-scale geology to establish likely overpressure mechanisms and formations (akin to identifying sources, reservoirs and seals); determining timing of overpressure generation throughout burial history, and; identifying major events causing overpressure transfer or dissipation (akin to hydrocarbon generation, charge analysis and trap development). Regional concepts are used to develop models to determine the likely locations and magnitude of overpressure (akin to hydrocarbon fairways and plays). Finally, regional learning’s are applied at the prospect scale to select the best methods to predict pressures for planned wells.

The real innovation, and added benefit, of this new and novel approach is that ‘play-based pore pressure prediction’ can also be used to identify successful new exploration plays. Herein, I present an example of ‘play based pore pressure prediction’ from the Malay Basin that was used to improve drilling safety, and developed a new play type that has subsequently resulted in 3 successful discoveries.