

A Modern and Precise Workflow for Monitoring of Pore Pressures at Boreholes

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Abstract

Historically, the energy industry, has been fueled by innovation. As new digital technologies come to market, there is significant excitement over the next stage of improvements in the well construction and delivery process. These improvements are eagerly being measured by metrics such as a reduction in well cost, improvements in safety, and increased efficiencies within drilling operations.

What is perplexing though, particularly for offshore drilling, is that the application of the latest technology in automation, digital twins, drilling analytics, have not led to a significant improvement in well performance, reduction in drilling days, or impact on non-productive time.

It is largely accepted that understanding the subsurface is a primary factor to well delivery and efficiencies in drilling. Therefore, by extension, having an accurate understanding of the pore pressure, elastic properties, and geomechanical behavior must be the largest risk to understand. What we often see is that pore pressure and geomechanical workflows only account for 10% of the well delivery process, which is typically applied to more well engineering aspects, casing design, drilling analytics, and digital twins.

Whilst these are all great improvements, it does raise questions about what are the key factors that underpins these problems? After all, blindly applying 'digital solutions' or simply throwing data at the problem and then applying analytics is unlikely to improve these metrics.

One intriguing area, and the purpose of this paper, is to take a pragmatic approach to the digital pore pressure/fracture gradient (PPFG) well planning process, one that is underpinned by workflow. This paper explores the steps that are currently taken in the planning process and explores those that can be improved to allow expert knowledge from different stakeholders such operation geologists, drilling engineers and asset geoscientists to be effectively communicated throughout the entire value chain.