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Please fill in your abstract title.	A Seismic Insight to the Root Cause of Drilling Challenges in the Triassic Section in the Central Area of Saudi Arabia

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Abstract

Use of high-resolution 3D seismic data can illuminate many stratigraphic features that have implications for prospectivity and well placement. In this study, a variety of seismic attributes are utilized to characterize these geological features within the Triassic section that is operationally challenging in the central area of Saudi Arabia. These interpreted features were calibrated with well data to understand their geological nature. Our findings were incorporated into future well plans to avoid interpreted geohazard areas and to target potential prospective zones.

Mapping complicated stratigraphic features is challenging and therefore requires high-resolution seismic data to distinguish between undesirable artifacts and real signals related to geology. Seismic data was conditioned to remove the noise that can arise from both acquisition and processing. Several seismic attributes were run to highlight these features in both time and frequency domains. Several stratigraphic features were mapped such as channels and facies changes, along with identification of zones of karstification. In addition, seismic well ties were completed to calibrate our interpretations. Finally, rock-physics analysis and seismic forward modelling were conducted to geologically explain these interpreted features.

The mapped interpreted geologic features explain problematic well observations. Using spectral composition and color blending techniques revealed that there is a potentially complex channel system at the Triassic level. These interpreted channels correlate well with overpressure zones. Interpreted channels represent relatively porous intervals surrounded by tight facies, which could explain the abrupt pressure increase as soon as they were penetrated. In addition, possible karstification and sinkhole areas were mapped using coherence attributes. These karstification and sinkhole areas happened to be located in lost circulation intervals in some of the wells in this area. We utilized rock physics to extract geobodies and identify potential facies boundaries. These boundaries were then used for identifying potential stratigraphic traps.

This study demonstrates a workflow that integrates seismic attributes and well results to map subtle stratigraphic features within the Triassic section, where many operational challenges are commonly encountered. The mapped geological features potentially explain overpressure zones, lost circulation zones, and increased mudgas response. Also, potential stratigraphic traps were identified based on seismically mapped facies changes.