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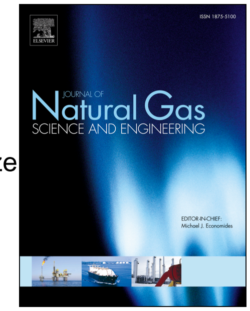

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Integration of microseismic data, completion data, and production data to characterize fracture geometry in the Permian Basin

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KEYWORDS: Hydraulic fracturing; microseismic events; Permian Basin; fracture geometry; fracture propagation

ABSTRACT:

Understanding how fractures propagate during multi-stage hydraulic fracturing enables better prediction for production and increases reserves. Fracture complexity due to fracture interaction makes it challenging to accurately quantify fracture geometry. Some solutions like proppant tracers and microseismic data acquisition may give a rough representation of fracture geometry, but they cannot provide complete information for fracture geometry without separate model verification. Through data synthesis from microseismicity, stimulation treatment, and production, calibrated models increase reliability in determining fracture geometry. The Permian Basin's unique lithology contains a high degree of vertical heterogeneity, accentuating the complexity that makes fracture modeling difficult. Microseismic data give gross fracture dimensions, including fracture height, length, and azimuth, and the direction of maximum horizontal stress while also providing a baseline for calibrating stimulation and reservoir simulators. Our stimulation model indicates that initiating fractures inside the Wolfcamp B2 formation results in propped height growth being contained by the Wolfcamp B1 and Wolfcamp B3 layers. Furthermore, the reservoir model also suggests that contributing reservoir volume