5.3   CHALLENGES IN MICROSEISMIC TECHNOLOGY FOR RESERVOIR CHARACTERIZATION AND MONITORING: A BRIEF REVIEW

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ABSTRACT

As the use of microseismic technology in reservoir monitoring and characterization has been steadily growing, this paper examines the challenges in detecting and locating microseismic events based on my years of experience in processing microseismic data in the Middle East as well as referred to relevant examples from literature. The microseismic events do help in understanding specific reservoir information such as the network of pre-existing planes of weakness within the reservoir that are not easily available through 3D active seismic. It also plays an essential role in hydraulic fracturing simulation where it can identify injection locations on target or that need to be adjusted. However, the key issue in the success of reservoir monitoring and characterization is the accuracy of detecting and localizing microseismic events within the reservoir. In fact, the accurate localization of microseismic events depends on many factors including array geometry, sensor orientation, picking correct arrivals, and accurate velocity models. One factor that most significantly impacts the accuracy is to detect arrivals of microseismic events due to the low signal-to-noise ratio. Specifically, microseismic energy recorded at surface array sensors has no observable arrivals due to a low single-to-noise ratio. In this paper, I review current challenges in the processing of microseismic events and, when possible, provide potential solutions.

KEYWORDS: Microseismic Technology, Reservoir Monitoring and Characterization, Processing Microseismic Events.