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Integration of geomechanical and mineralogical data for fracability evaluation in Utica shale play

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Utica shale extends across much of eastern US and as it possesses all the prerequisites of being a successful unconventional play, it has gained attention of the oil and gas industry. The high carbonate content of the target zone enables effective fracture stimulations, but the well performance along the Utica trend is variable; some strong producers are edged out by modest or low producing wells. Each well performance depends on how accurately horizontal drilling and multistage fracturing have been executed in the shale play. The efficiency of fracturing depends on many factors, but brittleness is one of the most important ones. However, there is no universally accepted indicator of brittleness.

In this study, an attempt has been made to characterize the Point-Pleasant interval of Utica play in eastern Ohio using surface seismic data. Considering the importance of brittleness and its association with mineralogical content of a formation, mineralogical BI was first computed. The available regional petrophysical modelling allowed us to determine the volumes of individual mineral existing in the Utica play. A mismatch between higher values of BI and PIPR (peak initial production rate) lead us to conclude that formation with higher brittleness is not always a good candidate for fracking. Fracability index (FI) was then used to get a somewhat better idea about favorable fracturing sweet spots. A reasonable match of higher FI values was noticed with higher PIPR which lent us the confidence in our workflow. Thereafter, mechanical properties were considered to identify the brittle zones based on the BI_{avg} . A resemblance was noticed in identifying the favorable zones for drilling based on FI and BI_{avg} .

Further, the computed TOC volume was brought into the analysis and it was concluded that the whole Point-Pleasant interval could be treated as organically-rich. Thus, zones with higher FI and BI_{avg} should be considered for further development in the area of study.