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Integration of data science methods and tech: A case study in Montney shale gas resource, Canada

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Summary (All headings should be Arial 12pt bold)

Scientific methods applied to observations and measurements of any specific phenomenon in order to extract knowledge and insights for application and decision-making is referred to as the data science. The common data science methods include but not limited to feature selection, classification, regression analysis and clustering with a subset branch of spatial data science concerning the application of geo-statistics, variograms and interpolation methods for predicting and simulating the results of specific data science models. In order to prepare the data for application of statistical and geostatistical models, followed by effective presentation of the results tech systems are required. Tech in short for technology, is combination of data mining, database development, programming languages, presentation and implementation systems running on on-premise or cloud infrastructure.

Montney formation, a 280 meters thick zone, estimated at 449 trillion cubic feet of gas (TCFG) and 14.5 billion barrels of natural liquid gas (BBNLG), is a good example of unconventional reservoirs extending up to 57,000 square miles through the Alberta and British Columbia border. Productivity of the fractured horizontal wells is statistically analyzed in previous studies as a factor of completed lateral lengths, attempted completion stages, oil and, or gas production rates, frac spacing and the amount of fluid pumped. Application of geostatistical models to spatially simulate the geologic properties of shale gas formation is a topic of interest for many researchers though rarely studied for the Montney shale gas resource. Inverse distance weighting, kriging and multivariate interpolation are the mainly used spatial interpolation models.

Based on literature review, heterogeneity in the lithology of Montney formation was concluded as the main driving factor for linear correlation of well productivity to quantity of proponent used, quantity of fluid pumped, frac spacing, perforation clusters and frac stages. The results were concluded based on statistical data analysis and multivariate regression methods. Inverse distance weighting was concluded as the optimal interpolation method with high precision in spatial prediction.

This study is application of data science and geostatistical data science models to the well productivity data for the selected frac wells in Montney shale gas resource integrated with the technological requirements to effectively implement the simulated results

Results, Observations, Conclusions

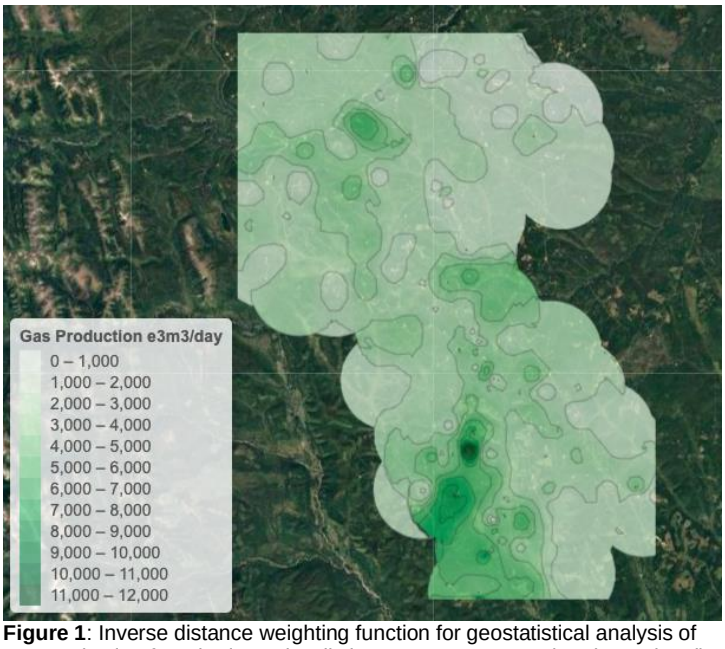

Figure 1: Inverse distance weighting function for geostatistical analysis of gas production from horizontal wells in Montney resource (* to be updated).

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