Effect of well locations and numbers on characterization of TOC in a shale gas reservoir

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In the field of resource exploration, more subsurface data can provide higher resolution characteristics of subsurface. Total organic carbon (TOC) content in shale reservoirs is one of the important geochemical properties for exploration. The spatial distribution of TOC content can be estimated using well logging data. Given the high cost of subsurface exploration, however, the number of wells for logging is limited. The object of this study was to evaluate the effect of well locations and numbers on characterization of TOC content in a shale gas reservoir. The spatial distribution of TOC content in the Woodford shale formation of Seminole county, located on Cherokee platform, central Oklahoma was estimated using well log data through 3D geologic modelling and sensitivity analysis. The well log data used in this study were obtained from the Drillinginfo. SKUA-GOCAD (Geological Object Computer Aided Design) developed by Paradigm was used for 3D geologic modelling. The number and location of wells were selected using different data collection strategies for sensitivity analysis. As the number of data used for the modelling decreased, the uncertainty of the estimation increased. The uncertainty of estimation changed with well distribution used for the modelling. The findings of the study suggest that an optimized data selection strategy can reduce the uncertainty of spatial TOC content distribution in shale gas reservoirs.