NATURE AND DISTRIBUTION OF CLAY MINERALS IN HIGH NET TO GROSS DEEPWATER FANS: IMPLICATIONS FOR RESERVOIR QUALITY

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ABSTRACT

Predicting clay distribution relating to original flow processes poses significant challenges, but is important because fine-grains are the primary reason to reduced permeability in hydrocarbon reservoirs. This study specifically investigates clay mineral distribution within a volcaniclastic turbidite-hosted reservoir in Taranaki Basin, New Zealand. The aim of this study is to (1) investigate the nature and spatial distribution of clays and their controls on depositional processes in HNG systems; (2) to identify the types, textures, and fabrics of clay minerals within submarine channel and lobe complexes in HNG systems; (3) to form a predictive method for clay mineral distribution and zeolite alteration; (4) to test a new methodology of field spectroscopy for mineral identification. This study uses 195 points of field-spectroscopy data and traditional (thin section, XRD, SEM) analytical methods from 20 hand samples. The use of spectrometry for rapid clay mineral identification is tested towards improving the general workflow of characterizing reservoirs. Preliminary petrographical results indicate that textural fabric is very chaotic, suggesting a natural fractionation during transport. Results of bulk composition from XRD do not match with the minerals identified using the spectrometer. XRD analysis identified quartz, muscovite, and clinoptilolite, whereas the spectrometer identified chabazite and gmelinite. Clay-sized sediment will be separated to perform clay mineral identification to again compare with spectrometer results. Outcomes of this study can be used to infer similar patterns in other high net-to-gross fan systems with analogous mineral assemblages and facies architectures to shed light on heretofore unexplored trends in clay distribution within deepwater deposits.

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