

Controls on the stratigraphic evolution of the Velkerri and Kyalla formations of the Beetaloo Basin (N.T., Australia)

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Shale plays' prospectivity and producibility are closely related to organic content, thermal maturity, porosity, permeability and brittleness of the reservoir intervals. All these parameters are themselves controlled by sedimentary facies, mineralogy and thermal history. Therefore, being able to conceptualise the geological controls on the stratigraphic architecture and resulting sedimentary facies distribution is paramount to properly assess the quantity of recoverable hydrocarbons in unconventional reservoirs.

The Northern Territory of Australia and its Beetaloo Basin presents a colossal potential for these unconventional hydrocarbons with primary targets located in the Mesoproterozoic Velkerri and Kyalla formations. In this basin, the challenges of unconventional resource exploration are exacerbated by age of the shales (ca. 1.4 Ga), complex geological history and the paucity of data to accurately map key elements of the petroleum system. The aim of this study is to improve our understanding of controls on the sedimentary heterogeneity (e.g. organic richness, mineralogy) in these Mesoproterozoic formations using stratigraphy and geochemistry.

Based on well data distributed along two basin-scale sections (N-S and E-W), we reconstruct the stratigraphic architecture of the Velkerri and Kyalla formations. We discuss regional controls, such as sediment provenance and paleogeography on the architecture. Lastly, by integrating geochemical data in the stratigraphic architecture we discuss the distribution of organic-rich intervals in the stratigraphic framework and its potential controls.