

# **A Holistic Model to Describe Charge and Retention History of the Northern Bonaparte Basin, Australia**

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The Northern Bonaparte Basin has proved to be a challenging region for exploration offering considerable promise but yielding more modest success. Despite more than two decades of exploration drilling and significant attention by the research community there continues to be contentious debate regarding the charge history and likely controls on hydrocarbon retention during subsequent periods of intense Neogene fault reactivation. Disparities between the predictions derived from basin models and the nature of hydrocarbon fill have led to contrasting charge models that often ignore hard observational data. Similarly, the number of theories put forward to describe the controls on hydrocarbon retention is varied, ranging from fault facilitated leakage controlled by either stress or strain related processes to fault independent controls related to regional water-washing effects. Despite this sustained effort there remains no widely held agreement or demonstrable validation for any of these proposed mechanisms that hold true for the region as a whole. This review seeks to highlight the limitations associated with previous models and to proffer a new unified model that more effectively honours the hard observational data. Key elements of this evaluation include a comprehensive examination of the charge history of drilled traps to provide validation of existing structural models proposed for the Northern Australian Margin and a more holistic approach to integrating the key datasets. The result is a coherent interpretation of the critical observations that produces a plausible exploration model that can be used to more effectively risk the remaining drilling opportunities in this prospective basin.