

Stratigraphy of Architectural Elements and Implication for Hydrocarbon Exploration in Kora Volcanic System, Taranaki Basin, New Zealand

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ABSTRACT

The Kora Volcanic System is an example of an ancient “fossil” episode of volcanism within a sedimentary basin. Kora volcano is currently buried by more than 1000 m of sediments in the offshore Taranaki Basin of New Zealand. This andesitic submarine stratovolcano is part of a belt of more than 25 buried Miocene volcanoes aligned NNE, and interpreted to have formed as an intra-arc system developed in response to subduction of the Pacific Plate along the Hikurangi margin. The term “volcanic system” is used in this study to describe the set of interrelated elements that form a complete magmatic-sedimentary complex (i.e. the pre-magmatic sedimentary strata deformed by magmatism, the intrusive and eruptive part of the volcano, and the sedimentary strata that buried it). The interaction between magmatism and sedimentation can create a range of petroleum plays at different stratigraphic levels, controlled by the stages of magma emplacement, edifice construction, degradation and burial of the volcanic forms. Volcanic systems buried in sedimentary basins are being increasingly targeted during oil and gas exploration globally. In this study, we used a rich dataset of wells and seismic reflection data (2D and 3D) from the offshore Taranaki Basin to delineate the fundamental building blocks (i.e., architectural elements) of the Kora Volcano and enclosing sedimentary strata. The results are compared to outcropping volcanic systems worldwide and demonstrate the local impacts of volcanism on the evolution of the host sedimentary basin and petroleum system associated.