

Late Cretaceous volcanism in Taranaki Basin: Examples from Seismic Reflection Data

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ABSTRACT

Volcanoes imaged in the subsurface can influence key aspects of a region's petroleum prospectivity through modification of factors such as heat flow, structural development, reservoir/seal quality and distribution. Late Cretaceous volcanic centres associated with extension of the Zealandia continent and early rift basin evolution are known in several places onshore, and are being recognised increasingly in offshore areas as well. Petroleum exploration has targeted volcanic features, as evidenced by Kora-1 (Miocene oil discovery) and by the recent Romney-1 well in deep-water Taranaki. A good understanding of volcanic geological history, morphology, volcanoclastic paleo-environments and overall controls on potential reservoir/seal facies distribution and fluid migration pathways is clearly critical to improving the efficacy of future exploration of such plays.

Using 2D and 3D seismic data we have identified over 100 subsurface igneous bodies of varying age in New Zealand's northwestern province. In this poster we illustrate five of the largest and best-defined Cretaceous volcanic complexes by means of a seismic composite line tied to the Romney-1 and Tane-1 petroleum exploration wells and time horizon maps using all available openfile seismic data. The seismic imaging, horizon interpretation of stratal relationships and age control from the wells indicates that there were multiple stages of volcanic activity during Late Cretaceous. The latest active period being about 75-71 Ma and the largest of the volcanoes being 73-72 Ma in age and comparable in size to Ruapehu-Tongariro Volcano Complex (40x60 km). We also observe an age trend in volcanism from north (older) to south (younger). Our results provide new information on the timing, scale and geographic extent of likely Latest Cretaceous rift-related volcanism within the northwestern Zealandia.