

Honeycomb Structures in the North Falkland Basin?

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Abstract

The North Falkland Basin, a Mesozoic-aged sedimentary basin, located 40 km north of the Falkland Islands, is a rift system comprising a series of offset depocentres. The northern part of the basin has a half-graben geometry with the depocentre-controlling faults located on its eastern margin. The main depocentre, the Eastern Graben has a proven petroleum system hosting stratigraphic and combined structural-stratigraphic traps (Liz, Zebedee, Sea Lion, and Isobel/Isobel Deep discoveries). In the shallow section overlying both this significant sedimentary basin, there are a selection of unusual features observable on 3D seismic data. The features were initially attributed as sub-seismic polygonal faulting, but after more detailed investigation they appear to be very similar to honeycomb structures observed in the Great South Basin of New Zealand. These structures are observed at time-depths of ~680 - 760 ms twt (60-150 ms twt below seabed) and cover an area of 1,400 km². They appear as densely packed oval to polygonal depressions. The depressions appear to be limited stratigraphically, and occur within two reflectors. The depressions are typically 450-650 m across and have time-depths of 20 ms. Previous authors have attributed the formation of these types of structures to diagenetic processes. Immediately above the honeycomb structure, there is a series of pockmarks that may be related to gas or fluid expulsion from the honeycomb structures. The depths at which they are found and the evidence of fluid expulsion suggests this could be due to the opal-A/CT transition. This contribution will provide a detailed discussion of the morphology of these structures and their relationship to the overlying fluid expulsion structures, as well as suggesting possible mechanisms for their formation.