

# **EVOLUTION OF “TRES HOMBRES” - A LARGE MID-CRUSTAL DOME STRUCTURE WITHIN THE NORTHERN BEAGLE SUB-BASIN WESTERN AUSTRALIA: AN INTEGRATED GEOPHYSICAL INVESTIGATION**

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The Tres Hombres structure is a large enigmatic, mid-crustal structural feature that underlies the Permian – Late Jurassic mega-sequences of the Northern Beagle Sub-basin, Western Australia. Originally identified on regional 2D seismic lines, the Tres Hombres structure has now, for the first time, been fully imaged by high quality, deep record, modern 3D seismic data. The area is also covered by modern gravity and magnetic datasets which were acquired together with the seismic survey. Seismic mapping reveals a dome-like structure with a diameter of more than 30km, and with vertical relief of over 5km. This paper integrates seismic and potential fields datasets to explore the origins of this intriguing structure.

Potential mechanisms considered for the emplacement of this feature include; basement cored compression, reactivated extensional basement faulting, remnant Palaeozoic topographic relief, salt-related diapirism, or plutonic/igneous intrusive activity. The actual mechanism responsible for the evolution of the Tres Hombres feature has important implications for adjacent and overlying petroleum systems within the Beagle Sub-basin – in particular trap timing, and thermal history.

Detailed mapping of the new 3D seismic dataset enables structural and stratigraphic restorations to be generated, which provide valuable insights into the timing of the Tres Hombres feature. Variations in the thicknesses of overlying sequences show the influence that this structure had on the stratigraphic evolution of the basin. Gravity and magnetic datasets have also been integrated into this study. These datasets provide valuable controls on potential lithologies within the core of Tres Hombres, which in turn have important implications as to the origin of this structure, and relationships to the tectonic evolution of the Beagle Basin.