Structural Traps in the South Falkland Basin

Dave McCarthy[1], Thomas J. Dodd[1]

[1]British Geological Survey, Edinburgh, United Kingdom.

ABSTRACT

Subduction beneath the South American plate along the Magallanes–Fagnano Fault becomes dominantly strike slip along the North Scotia Ridge, whereby the Burdwood Bank, a continental block, has been accreted on to the southern margin of the Falkland Plateau. This resulted in the downwarping of the underlying Mesozoic shelf sediments, with reactivation and development of normal faults that displace both the basement and Cenozoic sediments. This accretion was accompanied by the development of a fold and thrust belt and foreland basin, the South Falkland Basin. The underlying Mesozoic sedimentary succession records a relatively complex history of rifting. The Falkland Islands rifted from Gondwana sometime in the late Triassic to early Jurassic accompanied with extensive volcanism. Initial displacement was accommodated by oblique extension of South America and clockwise rotation of the Falklands during the Middle Jurassic. South Atlantic opening initiated in the early Cretaceous, driving further oblique extension. The mid to early Cretaceous was relatively quiet tectonically with deposition on a passive margin not being interrupted until the Cenozoic. These multiple phases of deformation have led to numerous fault generations, and ultimately a number of structural trapping geometries in the South Falkland Basin. At least four generations of faults have been identified in the Mesozoic succession: a major E-W set; a crosscutting major NW-SE set; a minor E-W set with reactivation of the older E-W set associated with Miocene downwarping; and a fourth set of transpression related structures. Additionally, the fold and thrust belt presents a number of potential traps that have yet to be properly explored. This study draws on modern 2D and 3D seismic reflection data, integrated with recent exploratory well data, providing new insights into this array of structural trapping geometries in both the fold and thrust belt, and the underlying foreland basin.