



What role does crustal heterogeneity play on continental break-up; the interplay of a foldbelt, rift system and ocean basin in the South Atlantic

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Although extensively studied, two key questions remain unanswered regarding the evolution of the southern South Atlantic. Firstly, where is the Cape Foldbelt (CFB) in offshore South Africa? The CFB is part of the broader Gondwanian Orogeny that prior to South Atlantic rifting continued into the Ventana Foldbelt of Argentina but to date its location in the offshore part of South Africa remains enigmatic. Secondly, the conjugate rift basin to South Africa is the Colorado Basin in Argentina but why does it trend east-west despite its perpendicular orientation to the Atlantic spreading ridge? Current plate models and structural understands cannot explain these fundamental questions.

We use newly acquired deep reflection seismic data in the Orange Basin, South Africa, to develop a new structural model for the southern South Atlantic. We characterise the geometry of the Cape Foldbelt onshore and for the first time correlate it into the offshore. We show that it has a north-south trend immediately to the north of the Cape Peninsula but then has a syntaxis (Garies syntaxis) that results in a change to an east-west orientation. This forms the missing jigsaw piece of the Atlantic reconstruction as this is directly beside the restored Colorado Basin.

When considered within the pre-break up structural configuration our observations imply that prior to the main phase of Atlantic rifting in the Mesozoic there was significant variation in crustal geometry incorporating the Orange Basin of South Africa, the Colorado Basin and the Gariiep Belt of Namibia. These faults were active during Gondwana rifting, but the Colorado rift failed resulting in the present day location of the South Atlantic.

Not only do our results improve our understanding of the evolution of the South Atlantic ocean, they highlight the importance of differentiating between early rift evolution and strain localisation during the subsequent rift phase prior to seafloor spreading.