Geophysical Research Abstracts
Vol. 12, EGU2010-4338, 2010
EGU General Assembly 2010

The Deep Structure of the South Atlantic Kwanza Basin - Insights from 3D Structural and Gravimetric modelling

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Three dimensional geological models constrained by potential field data have proven to be powerful tools for the investigation of areas where conventional seismic surveying fails to deliver satisfactory results. Especially in basins containing thick sedimentary and/or evaporite layers, the detection of crustal structures such as synrift halfgrabens or basement highs is considerably enhanced by potential field data. Knowledge on the distribution and configuration of crustal structures is inalienable for the reconstruction of the tectonic history of a continental margin. In this study, we present results from 3D gravimetric modelling of the Kwanza Basin offshore Angola accomplished to investigate the formation of the basin in response to the opening of the South Atlantic. Although the post-rift evolution of the Kwanza Basin is well studied, little is known about the basins early history. This is mainly due to the missing knowledge of its crustal structure owing to the masking effect of an up to 3 km thick salt layer, which seismically obscures the underlying basement. To get an insight into the deeper structure of the Angolan margin we combined 3D structural, isostatic and gravimetric modelling. 2D seismic reflection data was used to determine the structural setting and the configuration of the stratigraphic units in the sedimentary part of the basin, whereas its crustal structure was constrained by isostatic and gravity modelling. The resulting geological model confirms and extends previous observations, and adds new details to the hitherto dim picture of the Kwanza Basins crustal architecture. In addition, it raises new questions on the volcanic or non-volcanic origin of the margin, and the potential of transfer faults to dissect the latter into independently evolving tectonic segments.