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Deep Structure of the Kwanza Basin, offshore Angola

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Due to its specific rheological behaviour the presence of salt in the stratigraphic succession of passive continental margins strongly influences the structural evolution of the latter. Although it is known that salt tectonics are closely tied to regional deformation the interplay of both processes in the geological evolution of passive continental margins is still not well understood. In this study we present preliminary results from a project aiming to decipher the interaction of regional tectonics (i.e. subsidence, uplift) and internal deformation processes (= salt tectonic movements) in the South Atlantic Kwanza Basin by construction of a margin-wide, crustal-scale 3D structural model, and subsequent reconstruction of the deformation history.

The Kwanza Basin offshore Angola formed during the Early Cretaceous opening of the South Atlantic. After continental break-up restricted marine conditions caused the precipitation of evaporites during the Aptian followed by carbonate and finally clastic deposition from the Albian to the present. Numerous salt structures of different maturation and styles document intense deformation of the Kwanza Basin since rifting. It thus provides an ideal site to study salt mobilisation processes and their relation with regional tectonics.

A first simple 3D model of the Southern part of the basin providing insight into its present state configuration was constructed by the combination of structural and gravimetric modelling. 2D seismic reflection data was used to determine the structural setting and the configuration of the stratigraphic units in the sedimentary and upper crustal part of the basin, whereas its deep structure was constrained by gravity modelling. The resulting geological model suggests a strong segmentation of the continental crust of the Southern Kwanza Basin characterised by a chain of basement horsts and deep sedimentary troughs.