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Estranged Neighbors: Independent Tectonic Evolution of the Onshore and Offshore Kwanza Salt Basins, Angola

Construction and restoration of a 360-km-long regional profile indicate that the Kwanza Basin actually comprises two discrete basins, which we term the Inner and Outer Kwanza Basins. The two basins are tectonically closed systems separated by the Central Platform, a synrift basement high on which Aptian salt is thin or absent.

The Inner Kwanza Basin, which corresponds roughly to the present-day onshore region, is an interior salt basin enclosed by basement highs. Contrary to the consensus of the last decade, we conclude that salt structures in the Inner Kwanza Basin, including the famed Quenguela turtle structure, formed by halokinetic processes with negligible lateral translation. The idea of a purely halokinetic development of the Inner Kwanza Basin harks back to models of onshore Kwanza Basin evolution developed by Fina geologists in the 1950's and 1960's.

The Outer Kwanza Basin, which lies beneath the offshore region, had a completely different tectonic history. It formed on an open continental margin and contains paired belts of extension and contraction, separated by a central zone of translation. Two phases of gravity-driven deformation affected the Outer Kwanza Basin. Seaward tilting caused by thermal subsidence led to Albian extension, translation, and buckling. Thinning of salt along the detachment probably terminated this phase of deformation. The system remained relatively stable until the mid-Miocene. Then, mild uplift triggered renewed seaward translation. Downdip shortening was accommodated almost entirely by seaward overthrusting of the Angola salt nappe since the mid-Miocene.