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Origin of Large Antithetic Rollovers in the Lower Congo Basin: the Role of Conjugate Strike-Slip Shear Zones

The mechanisms that favor the development of antithetic versus synthetic rollovers, during gravity spreading above salt, have not yet been identified. We present here a model for the formation of large antithetic rollovers within the Lower Congo Basin.

In the upslope domain, synthetic rollovers are present in, both, the Kwanza and Lower Congo Basins, whereas antithetic rollovers are restricted to the Lower Congo Basin. The Kwanza Basin exhibits less extension compared to that observed in the Lower Congo Basin.

To explain this difference between Kwanza and Lower Congo Basins, we use an analogue experiment performed using silicone putty and sand to represent salt and sediments, respectively. At the end of the experiment, the sand is removed giving a direct image of the top silicone surface (equivalent of top salt in nature) and the basal geometry of rafts.

The model displays three structural domains, parallel to the slope direction. A central domain is characterised by a high spreading rate and salt structures perpendicular to the slope direction. Two lateral domains are characterised by low spreading rates and curved salt structures. Antithetic rollovers are only located in the central domain. Lateral variations of spreading rates are accommodated by conjugate strike-slip shear trending at 45° to lateral boundaries, which tend to join each other downslope, creating a V shape. Conjugate senses of shear are compatible with the concave upslope curvature of the antithetic rollovers.

This experimental pattern directly compares to the structures observed in the Lower Congo Basin. Implications are discussed.