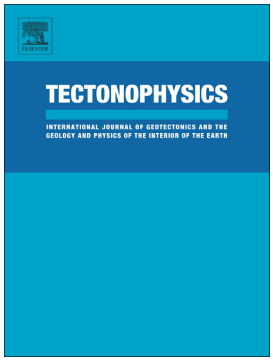

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INITIATION, EVOLUTION AND EXTINCTION OF PULL-APART BASINS: IMPLICATIONS FOR OPENING OF THE GULF OF CALIFORNIA

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ABSTRACT

We present a model for the origin, crustal architecture, and evolution of pull-apart basins. The model is based on results of three-dimensional upper crustal elastic models of deformation, field observations, and fault theory, and is generally applicable to basin-scale features, but predicts some intra-basin structural features. Geometric differences between pull-apart basins are inherited from the initial geometry of the strike-slip fault step-over, which results from the forming phase of the strike-slip fault system. As strike-slip motion accumulates, pull-apart basins are stationary with respect to underlying basement, and the fault tips propagate beyond the rift basin, increasing the distance between the fault tips and pull-apart basin center. Because uplift is concentrated near the fault tips, the sediment source areas may rejuvenate and migrate over time. Rift flank uplift results from compression along the flank of the basin. With increasing strike-slip movement the basins deepen and lengthen. Field studies predict that pull-apart basins become extinct when an active basin-crossing fault forms; this is the most likely fate of pull-apart basins, because basin-bounding strike-slip systems tend to straighten and connect as they evolve. The models show that larger length-to-width ratios with overlapping faults are least likely to form basin-crossing faults, and pull-apart basins with this geometry are thus most likely to progress to