# Tectonic Controls on Carbonate Platform Evolution in Extensional Settings

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The tectonic history of extensional settings includes pre-rift, syn-rift, post-rift, and in some cases, inversion stages. Carbonate platforms are generally initiated during the late syn-rift to early post-rift stage but may continue to grow throughout the post-rift history of a basin, especially where siliciclastic influx is limited. Carbonate platforms are rare during pre-rift and inversion stages because there typically are no suitable flooded substrates for carbonate sedimentation.

Subsidence patterns are strongly fault-controlled during syn-rift stages. Fault scaling laws and rules for fault growth, spacing, and linkage/interaction are important. Footwall highs are common nucleation sites for carbonate platforms. Active fault displacements and related surface deformations during platform growth may control platform-margin locations, facies distributions across fault-bounded highs, siliciclastic-carbonate interactions (especially in fault-bounded depocenters), and internal stratal patterns within syn-rift platforms. Growth stratal patterns of syn-rift platforms are well-documented in carbonate platforms exposed along the flanks of the Red Sea, but are also well-imaged on seismic profiles from other extensional settings such as the South China Sea.

During post-rift phases, remnant rift topography may continue to influence the location and morphology of carbonate platforms until it is largely filled in and smoothed by prograding depositional systems. Along passive margins, long-term stratigraphic development within post-rift carbonate platforms is controlled by long-wavelength thermal subsidence, patterns of flexural onlap, and regional stretching-gradients. Marginal plateaus and transform margins represent special passive-margin settings where stretching-gradients and complex partitioning of extensional strain during syn-rift stages may continue to influence carbonate-platform development into very late post-rift stages (i.e., >100 Myr after the beginning of post-rift stage).