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High frequency cycles (parasequences) in the Edwards Group, Central Texas

The term “parasequence” refers to a shoaling-upwards succession of genetically related beds bounded by marine flooding surfaces; thus the boundaries are taken at an abrupt change from progradation to rapid transgression and water deepening. In carbonates, it is common that the early beds (or laminae) of a parasequence are characterized by deepening-upwards (retrogradational) conditions, and the term “high frequency cycle” (HFC) is preferred. HFC boundaries are defined as occurring at the turn-around from base-level fall to base-level rise. HFCs may be allocyclic or autocyclic, and may be grouped into HFC sets (comparable to parasequence sets). Since marine flooding surfaces occur in shallow water environments, parasequences are (strictly speaking) only identifiable in shallow marine facies, while HFCs may be identified in a wider range of environments.

Excellent outcrops of Cretaceous carbonates (Edwards Group) along Interstate Highway 10 between San Antonio and Fort Stockton, Texas, display both HFCs and HFC sets in facies representing peritidal to shallow shelf conditions. Characteristics of the marine flooding surfaces and sediment packages with increasing distance from the shore zone are compared. Dolomite geometry (sabkha dolomite, penecontemporaneous lagoon floor dolomite and reflux dolomites) changes with increasingly distal location, as does bioturbation type and early lithification at cycle boundaries. HFCs become increasingly well developed in the distal areas to the west, and are capped by caprinid biostromes or grainstone shoals.