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Late Neogene Carbonate Platforms and Margins: Refined Quantification of Accumulation Rates

Margins of large carbonate platforms, isolated platforms, and atolls are dynamic settings that both generate and accumulate sediments. With the exceptions of modern platforms, the rates of accumulation are often poorly constrained due to unreliable subsurface age data. A compilation is presented here of late Neogene "ice house" platform and margin accumulation for the past 5 my. The rates are grouped according to platform type, sea-level effect, and subsidence-bathymetry (accommodation) control. The six categories of platform type are: 1) slow aggrading; 2) partially drowned; 3) fast aggrading; 4) atolls; 5) prograded margin; and 6) periplatform. Mean rates range between 10-20 m/my for slow aggrading and partially drowned platforms; to 20-30 m/my for atolls; to ~40 m/my for a current-dominated prograded margin; to between 40-90 m/my for prograded and periplatform systems.

The mean rates are primarily related to the influence of sea-level, and to a lesser extent, to regional subsidence. The shallow platforms and atolls are directly sea-level controlled, while the deeper margins are sea-level influenced. The shallow platforms have the lowest rate of accumulation (10-30 m/my) due to intermittent highstand flooding: a result of punctuated deposition and partly limited accommodation space. The deeper platform margins, below lowstand base level, are influenced by events on the shallow platform, related mainly to sediment production and offbank transport (but also slope erosion and redeposition). The prograded margin and periplatform accept large volumes of allochthonous sediment and can have periods of extremely high (150 m/my) accumulation separated by intervals of non-deposition, erosion, or sediment bypass.

These data should provide better calibration of reservoir models, their geometry and volume attributes, the formation of hiatuses and their associated diagenesis (sequence boundaries), and hopefully some predictability of porosity and stratal flow zones.