The high-precision record of Neogene sea-level changes in prograding carbonates along the Bahamas Transect

EBERLI, G.P. Comparative Sedimentology Laboratory, University of Miami, Miami, Florida, USA.

Cores from seven sites along a transect from top to the basinal portion of Great Bahama Bank (GBB) contain the sedimentary record and the timing of high and low frequency sea-level changes in the Neogene with an unprecedented precision.

High-frequency sea-level changes are recorded in the sediments along the entire transect. On the platform top these changes are expressed in shallow-water packages capped by exposure horizons. In the basin they are seen as marl/limestone alternations. Orbital precession is the dominant force for high-frequency sea-level changes on GBB throughout the Neogene. This finding is in odds with the stable isotope proxy that recognizes orbital obliquity as the dominant force.

Platform aggradation on the platform and alternating high (up to 20 cm/k.y.) and low sedimentation rates (<2 cm/k.y.) on the slopes record the longer-term sea-level changes. Bank flooding with concomitant shedding to the slope is alternating with periods of bank exposure with reduced shallow-water carbonate production, upper slope erosion and largely pelagic sedimentation in the basin. The longer-term changes coincide with progradation pulses that are imaged on the seismic data as depositional sequences. Bundling of the precessional cycles into the cycles of orbital eccentricity emerges as a mechanism to package the high-frequency cycles into the lower-order, seismically imaged sequence.

The ages of the 17 observed Neogene seismic sequence boundaries yielded an excellent correlation between sites, documenting the age consistency of the sequence boundaries and chronostratigraphic significance of the seismic reflections. The ages of the sequences along the Bahamas Transect provide a data set that, in conjunction with data sets from other margins, will eventually solve the question about global synchronous longer-term sea-level changes.