An Emerging Quantified Sequence Stratigraphy and Relative Sea-Level History for Mixed Carbonate and Siliciclastic Tertiary Sequences, Puerto Rico

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Detailed analyses of outcrops and cores is resulting in a new quantified sequence stratigraphy and relative sea-level history for Oligocene through Pliocene carbonate and siliciclastic strata on the north coast of Puerto Rico. New strontium isotope data, collected from unaltered *Kuphus incrassatus* tubes, provides absolute age constraints and revise the chronostratigraphic position for: 1) Late Oligocene to Early Miocene (25.97+/-0.32 to 24.07+/-0.16 Ma) strata including the San Sebastian Formation, Lares Limestone and Montebello Member; and 2) late Middle Miocene (12.07+/-0.53 to 10.91+/-0.34 Ma) strata including the Cibao Formation, Aguada (Los Puertos) Limestone and Aymamón Limestone.

The absolute age data provide the basis for quantitative analysis of controls on the development of five major marine-dominated sequences. Of particular significance is the sequence boundary (SB2) that coincides with the top of the Montebello Member. SB2 is a subaerial exposure surface that shows about 200 m of total erosional relief as traced laterally for over 50 km. Importantly subaerial exposure associated with SB2 developed on top of subtidal marine carbonates, thereby indicating a significant relative sea-level fall of this magnitude.

Strata overlying the sequence boundary are characterized by an increase in costal plain siliciclastics (sourced predominantly from the N) alternating with shallow-marine carbonates that lap out against SB2 and fill erosional relief. The filling of erosional paleotopography and a return to predominantly shallow-marine carbonates (rare siliciclastics) occurred by late Middle Miocene time (uppermost Cibao strata). The absolute age data indicate that SB2 occurred in early Miocene time and may be correlative to similar-aged sequence boundaries identified in Haiti, Cuba, Dominican Republic and Windward Passage. This apparent age similarity and lack of evidence for major active faulting localized in Puerto Rico point to at least a regional control for SB2 formation. The apparent 200 m magnitude of relative sea-level fall indicates a significant regional tectonic component.

The results to date are part of our ongoing study to further constrain absolute ages, reconstruct paleotopography, determine environments and geometries of sequences, and ultimately quantify the local, regional and global controls on sequence development during a transition from greenhouse to icehouse climate.