Sequence stratigraphy and quantitative sea-level history of Miocene-Pliocene carbonate systems: A global perspective based on outcrop and subsurface data.

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I propose using the pinning point method to construct quantitative sea-level histories for Miocene-Pliocene carbonate-dominated systems in the Caribbean to provide an objective and rock-based quantitative evaluation of magnitude, scale, and timing of sea-level fluctuations. I will concentrate on outcrop and subsurface data from the Cibao Valley (Dominican Republic) and Ponce area along the south coast of Puerto Rico. Data on sequence boundaries, facies and depositional environments (especially those that developed at or near sea level), chronostratigraphy, and paleotopography will be integrated to identify and quantify ancient positions of sea level (pinning points) through the stratigraphic successions. Pinning points will be used to construct quantitative relative sea-level curves for each of the study areas. Biostratigraphic and strontium isotope data will be collected and integrated to provide chronostratigraphic calibration for comparison of each curve from this study with other curves already constructed for equivalent carbonate systems in SE Spain. A comparison of timing and magnitude of fluctuations on the curves will give quantitative information on the global, regional, or local controls on sequence development and facies distribution in each area. For example, where timing of rises and falls match on all curves, a eustatic element is identified. Regional and local controls on relative sea level will be indicated where rises and falls on the curves do not coincide in time, magnitude, or numbers. These regional and local controls can be evaluated in a quantitative sense due to the quantitative nature of the sea-level data combined with chronostratigraphic age-control.