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Sea-Level Magnitudes Recorded by Continental Margin Sequences on the Marion Plateau, Northeast Australia: ODP Leg 194

ODP Leg 194 drilled a series of eight sites through Oligocene-Recent carbonate dominated sediments that record the depositional history and past sea level variations of the Marion Plateau, northeast Australia. In addition to determining sea level magnitudes, Leg 194 drilling also addressed the following scientific themes: (1) the development of carbonate platforms in a current-dominated environment; (2) the development of subtropical carbonate platforms; (3) facies changes and the development of sequence stratigraphic units; (4) the record of Oligocene-Pliocene, third-order sea-level fluctuations; (5) the mechanisms and causes of fluid flow within pure carbonate and mixed siliciclastic/carbonate depositional environments; and (6) role of climatic and paleoceanographic change in the sub-tropical South Pacific and its influence on carbonate platform development.

The magnitude of the middle Miocene sea level fall was estimated by reconstructing the paleo-bathymetry of a carbonate platform with respect to a late middle Miocene lowstand ramp adjacent to the platform margin. This reconstruction predicts a eustatic fall of 86 +/- 30 m. Lithostratigraphic and biostratigraphic data obtained from the carbonate platforms from the Marion Plateau during Leg 194 reveal that platform architecture was controlled by a series of complexly related factors including sea-level change, bottom-currents, and biological assemblages. The cores document a cool subtropical fauna assemblage consisting primarily of red algae, bryozoans, and large foraminifers. Unlike other carbonate systems that are dominantly controlled by wind direction, the carbonate platform architecture observed on the Marion Plateau was strongly influenced by high-energy currents near the seafloor similar to those that exist in the modern environment.