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Introduction: Leg 194 Postcruise Research Bibliography

Leg 194 drilling sampled the Marion Plateau carbonate platform complex, located between 18° and 23°S, seaward of the south-central Great Barrier Reef on the northeastern Australian continental margin. This area provided an ideal location to study the causes, magnitudes, and effects of sea level change on continental margin sediments as well as the complex interplay of sea level, strong seafloor currents, and changes in riverine input on carbonate platform evolution. Postcruise research papers listed below document the lithologic, paleoceanographic, and biostratigraphic research from two platform to slope drilling transects of the Marion Plateau. This research, as well as shipboard results, reveals that platform architecture was controlled by a series of complexly related factors that influenced the nature of biological assemblages and in turn controlled the evolution and eventual drowning of the biogenically constructed carbonate platforms. Leg 194 research made fundamental contributions toward quantification of Phanerozic sea level amplitudes and toward understanding of environmental factors that influence carbonate platform evolution and impact these biogenic structures.

A major Leg 194 contribution was quantification of the late middle Miocene sea level fall. This was estimated by reconstructing the paleobathymetry of the northern Marion platform top with respect to an upper middle Miocene lowstand ramp immediately adjacent to the platform margin. By overlapping the sea level range of both the deep-sea isotopes and the results from backstripping analysis, it was demonstrated that the amplitude of the late middle Miocene sea level fall was 45–68 m (56.5 ± 11.5 m). If an estimate for sea level variation using seafloor oxygen isotopic results is taken into account, the range of sea level fall is more tightly constrained between 45 and 55 m (50.0 ± 5.0 m). However, these sea level estimates were based on shipboard strati-

graphic data. Further stratigraphic analyses using strontium isotopes from the northern Marion platform top have indicated that a new age model must be considered and incorporated into the sequence interpretation used to develop the sea level calculation. This work is ongoing.

High-resolution seismic data collected for Leg 194 provide a quasi-three-dimensional view of Oligocene to Pliocene depositional sequences on the Marion Plateau. These geometries show that, unlike other carbonate systems, the morphologies of which are predominantly controlled by wind direction and the influence of this wind on surface current flow, the carbonate platform architecture observed on the Marion Plateau was strongly influenced by high-energy currents near the seafloor, similar to those that exist on the modern Marion Plateau. These currents inhibit sedimentation in the upcurrent position and form wide low-angle clinoforms in the downcurrent position, resulting in an asymmetric platform shape. It is also likely that strong currents were an important influence on facies distributions and the morphological development of the platforms over time.

Seismic imaging of Marion Plateau carbonate platforms identified a steep-sided platform geometry typical of tropical to subtropical carbonate platforms. Despite this, Leg 194 cores document cool subtropical faunal assemblages with the northern Marion platform dominated by a heterozoan assemblage consisting of red algae, bryozoans, and larger foraminifers and the southern Marion platform characterized by a photozoan assemblage. This demonstrates that platform morphology is not a unique indicator of the biota that have constructed the platform. The massive structures of the northern and southern Marion platforms are surprising considering the calcite-dominated biogenic sediments recovered. These sediments have lower diagenetic potentials than their aragonite-dominated counterparts in the tropical realm and therefore they can be reworked more easily and are less likely to cement into massive biogenic structures.

Facies differences between the spatially proximal (~150 km) northern and southern Marion platforms can not be explained by differences in ambient water temperature between the two locations but rather demonstrate the importance of riverine input of nutrients and sediment to the northern Marion platform as well as possible decreases in carbonate saturation at this location. Saturation differences could have originated with riverine influx, which caused an apparently "cooler" assemblage at the northern relative to the southern Marion platform. This facies difference is also likely to be a dominant influence on the drowning of the northern Marion platform despite the re-flooding of its surface near 11 Ma. Low rates of carbonate production characteristic of heterozoan assemblages along with strong seafloor currents and riverine influences meant that carbonate production on the northern Marion platform could not keep up with rising sea levels.

The six papers published in this *Proceedings of the Ocean Drilling Program* volume, in addition to those published in journals, books, and special publications, document the postcruise scientific results from Leg 194 drilling of the Marion Plateau carbonate platforms. In addition to the research papers on the following list, a continually updated bibliography of Leg 194-related citations is available online on the Ocean Drilling Web site (see "Leg-Related Citations" at **www-odp.tamu.edu/publications/194_SR/194TOC.HTM**).

SCIENTIFIC RESULTS CITATIONS

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Obrochta, S.P., and Hine, A.C., in press. Data report: Variations in bulk carbonate content, Hole 1198A, 14.52–41.13 and 67.42–100.12 mbsf. *In* Anselmetti, F.S., Isern, A.R., Blum, P., and Betzler, C. (Eds.), *Proc. ODP, Sci. Results,* 194 [Online]. Available from World Wide Web: <**http://www-odp.tamu.edu/publications/194_SR/010/010.htm**>. [Cited YYYY-MM-DD]

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