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Controls on Grain-Size Patterns in Periplatform Carbonates: Marginal Setting vs. Glacio-Eustacy

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The importance of grain size as a fundamental property controlling other physically derived properties is well known. Recent grain-size studies on periplatform sediments of the Caribbean and western north Atlantic, have shown that grain-size variability is coupled with changes in carbonate-platform productivity and export in response to Pleistocene-Holocene glacio-eustacy. These findings showed that periplatform sediments are dominated by fine- grained material during sea-level highstands and coarser material during sea-level lowstands.

This paper addresses the question of grain-size patterns in periplatform settings and their relationship to glacio-eustacy. Furthermore, it considers whether these patterns are applicable to different types of margin settings (accretionary-erosional). Here, existing data (Pleistocene-Holocene) from the accretionary western leeward margin of Great Bahama Bank (ODP Leg-166) and new data from the erosional eastern windward margin (ODP Leg-101) are used.

The results show that the grain-size patterns of both margins are controlled by late Neogene sea-level fluctuations. The accretionary leeward margin sediments indicate the same grain-size pattern as previously described in the literature. However, the erosional windward margin shows a reverse pattern, with coarser sediments in interglacials and finer deposits in glacials. This proposes that the leeward margin grain-size pattern is controlled by the productivity-export mode of the platform. This is indicated by the platform-top derived fine muds, transported offbank, to form a thick sediment wedge on the low-angled slope during interglacials. In contrast, on the windward mar-

gin, the sediment flux pattern is controlled by the impact of mass transport processes. This is indicated by the increased occurrence of turbidites during interglacials that might be more frequent at this time because the steep-angled erosional slope is less apt for the deposition of excess fine material. This material is eroded and/or by-passes the slopes and is redeposited in the periplatform basin setting.