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Milankovitch cycles and palaeoproductivity in the mid-Cretaceous at Demerara Rise, ODP Leg 207

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Characteristic patterns of orbital cycles are present in pre-Neogene sediments, but the climate forcing that produces the observed lithologic variation are still poorly understand. We present an interpretation of cycle patterns in mid-Cretaceous (Albian to Turonian) organic rich sediments from Demerara Rise (ODP Leg 207, equatorial North Atlantic). The sediments shows decimeter to meter scale alternations between carbonate- and organic-rich sediments. Pelagic carbonates are the dominant carbonate-rich lithology at the deep water sites (ODP Sites 1257 and 1258). There is a positive correlation between cycle thickness (sedimentation rate) and carbonate content in these sections, indicating that the cycle pattern is generated through variation in carbonate production. In contrast, planktonic foraminiferal packstones are abundant at the other sites, they are attributed to either current or wave induced winnowing in relatively shallow water. The packstones are the dominant carbonate-rich lithology in the lower part of the sequence at Sites 1259-1261 but decrease in frequency higher in the sequence due to continued subsidence; they persist longer at the two shallowest sites (Sites 1259 and 1261) than at the intermediate waterdepth site (Site 1260).The packstones show a variable correlation between carbonate content and cycle thickness, which is attributed to variable interplay between carbonate rain rates and subsequent removal due to winnowing. We conclude that the packstone layers are time equivalent with deposition of pelagic carbonates in deeper water. Strong eccentricity/precession bundles are inferred to represent an atmospheric and/or oceanic circulation signal, which controlled upwelling intensity and surface water productivity. Winnowing within carbonate rich levels implies that general circulation, and thus any upwelling, was the most vigorous during deposition of carbonate rich levels, which ul-

timately implies that organic rich sediments are primarily related to enhanced anoxia.