AUTHIGENIC MARL-CHALK RHYTHMICITY IN PLIO-PLEISTOCENE BLACK SEA SEDIMENT

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Two calcium carbonate-rich Plio-Pleistocene sequences totaling 330 m in thickness occur in the Black Sea. These Chalk units are characterized by hundreds of rhythmically deposited, cm-to dm-thick marl-chalk couplets marked by varying amounts of carbonate and organic matter contents. The carbonates in the marls and chalks of units are invariably microcrystalline low-magnesian calcite. Covariant increases in carbonate and organic carbon contents and the del-13C values of the carbonate fraction, from the basal marl to the overlying chalk in all the couplets, indicate that the carbonate phase in these rhythmicities is a direct result of authigenic inorganic precipitation from the water column. This interpretation is further supported by the appreciable lack of biogenic and detrital carbonate in the sediments, the presence of bioturbation features, and petrographic and geochemical considerations which discount deposition of the couplets under different stages of diagenetic alteration. Bedding thickness considerations and the del-13C-carbonate demonstrate that the rhythmicity recorded by marl-chalk couplets is reflective of periodic fluctuations in primary biological productivity and terrigenous flux into the basin. Covariant changes in 13C and 18O contents across the couplets in both Chalk units signify common causative factors controlling the variations. The observed variations in the degree and direction of the isotopic covariance document the response of the aquatic system to short-term perturbations in climate, and the extent of influence of primary biological productivity in modulating th del-13C content of the dissolved inorganic carbon pool, quite independent of the variations in del-18O caused by periodic fluctuations in the ev