Black shale deposition and early diagenetic dolomite cementation during oceanic Anoxic Event 1: the Mid-Cretaceous Maracaibo Platform, North-Western South America

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Thin laterally continuous organic-rich dolomitic marlstones deposited in the extended Late Aptian Early Albian epicontinental sea of northern South America, are the proximal equivalents of thick hemipelagic black shale-ammonitic floatstone couplets, deposited in the distally stepped part of the Maracaibo Platform. The marlstones reflect the dynamic conditions resulting from orbital forcing mechanisms and can be genetically related to (1) minor sea-level changes, (2) proximal turnovers in marine productivity, and (3) sudden climate shifts affecting mid-Cretaceous shoaling upward shallow marine cyclicity. Therefore, they may well be linked to the multiple environmental perturbation events collectively referred to as OAE 1. The interstitial euhedral dolomite is medium crystalline, and exhibits unusual textural relations with framboidal pyrite and gypsum. The authigenic mineral assemblage also includes quartz, Ca-F apatite, and barite, which together with the chemical signals of dolomite point to an unsteady climate regime. Bulk-rock biomarker parameters, rare earth element geochemistry, and iron speciation data point to widespread photic zone anoxia and transient shallow marine euxinia by the time of deposition, with climatic instability driving the delivery of oxidized detritus from the hinterlands, and leading to a schizohaline redox stratified environment favorable to organic matter remineralization and dolomite precipitation.