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TITULO DE LA PONENCIA

Geochemical Assessment of Late Jurassic to Early Cretaceous Oxygenation and origin of the organic matter in the Proto-Caribbean Basin: Evidence from Sierra de los Órganos, Western, Cuba

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Resumen

PALABRAS CLAVE

Oceanic Anoxic Event (OAE), Ocean deoxygenation, Weissert Event, biomarkers, marine organic matter, photic zone anoxia, Cretaceous, Proto-Caribbean Basin, Sierra de los Órganos, Cuba.

CONTENIDO DEL RESUMEN

The Proto-Caribbean Basin developed after the breakup of Pangea which started in the Late Triassic and the Early Jurassic and evolved from passive margin to complex deep foreland basins accommodating various depositional conditions. This study documents redox variations in the Sierra de los Órganos, northwestern Cuba, from the Late Jurassic to Early Cretaceous, encompassing the San Cayetano Formation (Middle Oxfordian siliciclastics) and the Guasasa Formation (shallow to deeper limestones) composed of the San Vicente (Kimmeridgian–Early

Tithonian), El Americano (Late Tithonian), Tumbadero (Berriasian), and Tumbitas (Early Valanginian) members, plus the Pons Formation (Early Valanginian–Albian). Analyses include total organic carbon (TOC), total inorganic carbon (TIC), stable carbon and nitrogen isotopes (δ^{13}Corg, δ^{15}Norg), major, biolimiting, and redox-sensitive trace elements (RSTEs), petrography, SEM-EDS, and biomarkers. In the San Cayetano Formation, dominance of short-chain n-alkanes (<nC19) indicates microbial–phytoplanktonic sources, with few terrestrial biomarkers. Moderate TOC (~4 wt%) and elevated RSTEs (V, Ni, Mo, U) suggest intermittent dysoxic–anoxic settings. In the Guasasa Formation, TOC peaks (~15.5 wt%) coincide with more positive δ^{13}Corg (up to −25.5 ‰) and strong Al–Li (r = 0.98) and P–Ti (r = 0.99) correlations, implying terrigenous nutrient influx under low-oxygen conditions. Biomarkers show short-chain n-alkanes with medium- to long-chain homologues (C_{25}–C_{31}) and plant terpenoids, reflecting marine–terrestrial contributions. A 30 m section at La Lata Quarry captures the Guasasa–Pons transition. The lower 4 m feature carbonaceous marlstones (TIC 44.7–77.3%; TOC 3.5–10.8%) interbedded with micritic limestones (TIC > 90%; TOC ~2.3%). Here, δ^{13}Corg averages −27.3 ‰, with a 1.7 ‰ excursion to −25.6 ‰ and concurrent trace-element enrichment. Microscopy shows low bioturbation (BI < 2), isotropic micritic fabric, microbial traces, phyto debris, and pyrite framboids in organic-rich intervals. Biomarkers exhibit short-chain n-alkanes (C_{12}–C_{17}), plus medium (C_{18}–C_{24}) and long-chain (C_{25}–C_{34}) fractions; intermittent isorenieratane and crocetane suggest photic-zone euxinia and possible anaerobic methane cycling near the Weissert interval. From 4 to 30 m, micritic limestones (TIC ~70–90%; TOC ~2–4%) alternate with fewer marlstone layers. Planktic foraminifera (Leupoldina cf. cabri, Globigerinelloides ferreolensis) indicate an age up to the early Aptian. Two additional δ^{13}Corg excursions (~3.8 ‰ at ~10 m and ~3.9 ‰ at 24.1 m and 27 m), with milder trace-element enrichments, suggest further deoxygenation episodes (possibly Faraoni and OAE1a). Recurrent isorenieratane and elevated RSTEs denote repeated dysoxia–anoxia. Overall, these findings record repeated dysoxic–anoxic deposition, especially in the earliest Cretaceous, likely driven by increased terrestrial input that stimulated productivity and favored organic-matter preservation. Evidence of photic-zone euxinia and trace-element enrichments points to strong water-column stratification, facilitating carbon burial during critical Early Cretaceous intervals.

REFERENCIAS BIBLIOGRÁFICAS

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