A peritidal evaporite environment in the Neoproterozoic of South Gabon (Schisto-Calcaire Subgroup, Nyanga Basin)

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Abstract:

The Neoproterozoic (~630 Ma) Nsc3 or SCIII Formation (Schisto-Calcaire Subgroup) of the Nyanga Basin is a muddy peritidal carbonate (dolomite) shelf succession that is exposed in the old Mouila quarry (Kéri quarry), South Gabon. Its 20 m-thick lower member is dominated by microbially laminated dolomites and domal stromatolites representing shallow subtidal to supratidal environments. Abundant pseudomorphs after gypsum and anhydrite relics indicate carbonate precipitation in sulphate-rich hypersaline environments. Dolomitization of the muddy microbial sediments probably occurred by the evaporite reflux of groundwaters. Silica precipitates constitute the ultimate diagenetic phase. Dolomites of the NSc3 Formation retain a pattern of oxygenic isotopic variation that reflects the depositional environment. Shallow subtidal microbialites and stromatolites record the lightest values ($\delta^{18}O = -5.1‰$) consistent with the isotopic values of Neoproterozoic marine waters whereas strongly dolomitized facies display heavier oxygen isotope values ($\delta^{18}O = -1.3‰$) with the heaviest values in subaerially exposed caps (enrichment of 3.8‰). Fungal hyphae and spores have been discovered in these upper parts.

The $\delta^{18}O$ pattern through the plurimetric recognized sequences (thicknesses from ~2 to ~6 m) suggests a constant exposure in a sabkha-like environment. Although the timing of the series is poorly constrained, the C-isotopic values of the Nsc3 carbonates with values of +2 and +3‰ approximate depositional conditions. Minor variations in C-isotopes have been observed.

The evolution of the succession from the stromatolitic Lower Member to the oolitic Upper Member of the Nsc3 Formation could record the progradation of a low-energy evaporitic tidal flat that migrated seaward from oolitic shoal crests.