

## Microbialite occurrences in the Cretaceous Codo Formation – Northeast Brazil

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Past exploratory efforts by Petrobras in the Parnaíba and São Luís basins generated most of the current geological knowledge of the area. Despite the effort, no significant hydrocarbons fields were discovered. The Parnaíba and São Luís basins are frontier areas. Their exploratory potential has drawn attention lately, mostly because of the Aptian-Albian Codó Formation, a correlative of the giant presalt discoveries offshore Brazil. The Aptian deposits corresponding to the Codó Formation in the Parnaíba basin [1] are of interest, not only because of their economic aspect (limestone and gypsum mining and potential for hydrocarbon generation), but also because they are the best outcropping record of the early stages of the opening of the Equatorial Atlantic Ocean. Despite their significance, only recently has this unit been more thoroughly studied regarding its sedimentological, stratigraphic and geochemical features, in order to characterize the paleoenvironment and to reconstruct the paleohydrological conditions of deposition. These studies led the interpretation of the paleoenvironmental conditions being of a closed anoxic hypersaline lacustrine environment, as shown by the eastern outcrop belt of the basin, and a *sabkha-salt pan* complex exposed on the southern border. In both areas, the Aptian sediments are organized in upward shallowing cycles deposited in successive periods of expansion and contraction in a lacustrine basin or saltpan [2]. The biostratigraphic zoning of the Codó Formation, based on ostracods and palinology, has shown a neoaptian fauna typical of a lacustrine environment composed mainly of *Candona* e *Harbinia* [3] and by the biozone of *Sergipea Varriverrucata* [4]. The aim of this study is to improve the present knowledge of the geology of the Codó Formation, one of the best-known sequences in the Cretaceous of northeastern Brazil. Major efforts will be concentrated on the development and use of new geochemical and nanotechnological approaches to study the microbialite section of the carbonate rocks, which are part of this formation. In addition, modern environmental settings will be used as analogues to better interpret the microbial influence on the ancient carbonate formation, as well as the microbial structures preserved in the sedimentary rocks. The outcome of our investigations will improve our knowledge of the relationships between the present day models, with both biotic and abiotic processes occurring in the Proto-Atlantic (Aptian). In a broader context, understanding the genesis of the Codó Formation will add information concerning the tectonic processes leading to the separation of South America and Africa, during the Cretaceous.

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