

## **Assessing GPR and Multi-Electrode Earth Resistivity Methods for High-Resolution Modeling of Stromatolites as Petroleum Reservoir Analogues: The case of Chapada Diamantina (Brazil)**

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### **Abstract**

Microbial carbonates (microbialites) have recently become systems of renewed interest for the oil and gas industry after discovery of more than 30 Billion Barrels of Oil Equivalent in pre-salt reservoirs of the Santos Basin (Offshore Brazil). These reservoirs include carbonate intervals of possible microbial origin. The Neoproterozoic columnar stromatolites bioherms of Chapada Diamantina have been successfully mapped by geophysical methods identifying high-resistivity zones and high-amplitude ground-penetrating reflectors. In contrast, the host rocks are marked by low to intermediate resistivity and ground-penetrating radar reflections that range from low amplitude to almost transparent. The aim of this research is elucidate the internal architecture of a well-exposed colonial stromatolite bioherms located at the Chapada Diamantina basin NE Brazil. Electrical resistivity tomography (ERT) and ground-penetrating radar (GPR) sections were acquired in order to parameterize their geophysical signatures. The results of the study show the detailed internal geometry of columnar stromatolites bioherms systems. This model could serve as an outcrop analogue for other stromatolite-related carbonate reservoirs worldwide. The interest of the present research is that recent exploration in the pre-salt lacustrine sections of offshore Santos Basin of Brazil suggests that microbialites and associated lacustrine facies form significant reservoirs.