



# SBGf Conference

18-20 NOV | Rio'25

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**Submission code: 6VG05DP895**

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## Stratigraphic Cycles and Facies Distribution of the Barra Velha Formation in the Southern Santos Basin (NW–SE Regional Section)

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### Introduction

In the pre-salt interval of the Santos Basin, the Barra Velha Formation (BVF) records, during the Aptian, a lacustrine environment highly sensitive to sedimentary, biological, and chemical processes. Its stratigraphic framework comprises both *in situ* and reworked limestones, reflecting a second-order transgressive-regressive sequence subdivided into three third-order intervals. The basal interval is marked by fine-grained facies, reworked deposits, and *in situ* shrub limestones, indicating a transgressive stacking pattern. The intermediate interval, enriched in clay minerals—mainly talc and stevensite—corresponds to the maximum flooding stage. The upper interval represents the regressive phase and consists of shallowing-upward cycles with fine sediments, reworked limestones, and *in situ* shrub facies. Recognizing this stratigraphic pattern is essential for understanding facies distribution, mapping reservoir bodies, constructing well correlation models, and interpreting the depositional evolution of the BVF.

### Method and/or Theory

This research aims to characterize the stratigraphic cycles of the Barra Velha Formation in the southern portion of the Santos Basin and to discuss its evolution and variations along a NW–SE section. The study integrates core data from six wells, conventional well logs, and a regional 2D dip seismic section in the depth domain. Limestones were classified into reworked and *in situ* facies based on a modified version of Dunham's classification

### Results and Conclusions

In lithological terms, the analyzed wells show a general predominance of reworked limestones over *in situ* carbonates. Preliminary results indicate that the stratigraphic framework of the Barra Velha Formation varies significantly along the NW–SE regional section. Wells located in structurally higher positions are dominated by boundstone, disaggregated boundstone, packstones, and grainstones, with subordinate amounts of reworked fine sediments. Chemical shrub facies are generally associated with fault zones, suggesting development under the influence of ascending heated fluids within the lacustrine system. In contrast, three wells in relatively lower structural positions are composed predominantly of fine sediments, followed by packstones and, locally, *in situ* facies. Mudstones are typically associated with talc/stevensite, spherulites, detrital minerals, and nodules.