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Characterization of Sandstones from the Água Grande Formation, Recôncavo Basin, Bahia, Brazil, using NMR and EM

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Petrophysical Characterization of Sandstones from the Água Grande Formation (Recôncavo Basin, Brazil) Using NMR and Electrical Conductivity Measurements

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Introduction

This study aims to characterize sandstones from the Água Grande Formation, located in the Recôncavo Basin, Bahia, Brazil, using Nuclear Magnetic Resonance (NMR) and Electrical Conductivity (EC) techniques to evaluate key petrophysical properties, such as porosity, permeability, saturation, and petrofacies. Reservoir rocks' storage capacity and production potential are closely related to these parameters, which are traditionally assessed through well logging and laboratory tests. However, NMR and EC have gained prominence by providing more accurate and robust estimates that complement conventional data.

Method and/or Theory

Outcrop samples from the Água Grande Formation—an important reservoir unit in the Recôncavo Basin—were analyzed. NMR measurements were conducted using the MARAN Ultra device (Oxford Instruments, modified by SpecfitLab), and EC measurements were performed with the ARS200 system (Core Laboratories), both at the Petrophysics Laboratory (LaPetro – IGEO/UFBA). The petrophysical properties obtained were compared to well log and laboratory data to evaluate the consistency between methods and understand the influence of surface conditions on the results.

Results and Conclusions

The results show a good correlation between NMR and EC data and the parameters obtained through conventional methods, validating the use of these techniques in reservoir rock characterization. The integrated approach enabled observing petrophysical behavior at different depths, even though the samples were subject to surface pressure and temperature conditions. It is concluded that the combined application of NMR and EC is an effective tool for integrated reservoir characterization, offering valuable support for exploratory and development studies in sedimentary basins.