Electrofacies classification using the self-organizing map approach with an example from the Algerian Sahara

Abdallah Sokhal (1), Zahia Benaissa (2), Sid Ali Ouadfeul (3), and Amar Boudella (2)

(1) department / Sonatrach, 08 Chemin du réservoir, Hydra, Algeria, (2) University of Sciences and Technology Houari Boumediène, Geosciences Faculty, BP 32, El Alia, Bab-Ezzouar, 16000 Algiers, Algeria, (3) Algerian Petroleum Institute, Geosciences and Mines, avenue du 1er Novembre, 35000 Boumerdes, Algeria

The characterization of electrofacies is essential for reservoir modeling. However, this is a process that depends on many variables, with errors and associated noise that interfere on visual interpretation.
In this paper, we propose an approach to characterize the reservoir properties of the Quartzite of Hamra formation. This method integrates geological and petrophysical data and compares them with the field performance analysis to achieve a practical electrofacies clustering.
The petrophysical data used are from Hassi Guettar field in Hassi Messaoud basin. The neutron porosity, gamma ray and density profiles were studied to classify the field's reservoir lithology.
An unsupervised neural network was employed based on the self-organizing map (SOM) technique to identify and extract electrofacies groups.
Based on the results of the SOM method, the target reservoir is classified into five electrofacies clusters (EF1-EF5) among which the EF1, EF2 and EF3 show the best reservoir quality. The EF4 indicates moderate reservoir quality, while the EF5 shows no reservoir quality.

Key words: Neural networks - Self-organizing map – Electrofacies – Porosity – Gamma ray – Density.