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Integrated electric and magnetic pore fabrics of the Nubia sandstones in south Egypt

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The present study provides a comparison between the electric and magnetic pore fabric techniques. The study has been carried out on the Nubia sandstones which constitute the main strategic aquifer in south Egypt. Discrepancies between both techniques were attributed to the fact that the magnetic pore fabric technique has the ability to detect and define accurately the pore volume distribution in 3-D, whereas the electric pore fabric technique has the ability to detect the shortest paths for the electric current/fluid flow. While the magnetic pore fabric is a bulk property, the electric pore fabric technique is a transport property.

Both the magnetic and electric pore fabrics refer mostly to slightly and moderately anisotropic fabrics. The integration between both techniques revealed two main directions for fluid migration, swinging to the N and the E directions.

Two limitations of the electric pore fabric technique could be raised out from the presence of some clay minerals which give rise to pseudo pore electric fabric, and from the highly porous nature (> 25 %) of the studied rocks causing the studied rocks acting like a homogeneous media. Therefore, interpreting the obtained electric pore fabric must be carried out in care for the highly porous and clayey rocks.

However, the electric pore fabric technique is weighed by the 3-D permeability measurements which showed directions closer to directions of the electric fabric lineation than directions of the magnetic pore fabric lineation.