

Neotectonic control over groundwater in the State of Rio de Janeiro, Brazil

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The interpretation of structural lineaments from field work, remote sensing, and linear magnetic anomalies, showed that the State of Rio de Janeiro has been submitted to uplift and exposure of crustal blocks along normal faults related to the reactivation of pre-existing discontinuities having the following strikes: N40°-60°N, N70°-80° and N40°-60°W. These strikes represent neotectonic lineaments that delimit tectono-structural compartments, bounded by high-angle normal faults. The uplift of these blocks, attributed to a Mesozoic-Paleogene tectonic event, was controlled by flexures observed in Precambrian crystalline rocks. As these rocks were already consolidated, there developed new sub-horizontal fractures with approximate strikes of N50°E, N50°W, N75°E, N15°W, and N10°E, the surfaces of which are locally concave upwards, or downwards, giving rise to structural highs and lows of paramount importance for the circulation and storage of groundwater. As these discontinuities represent fractures, their strike directions are contained in the high-angle faults. The combination of disjunctive structures of high-angle and ruptile character with the approximate strike directions N50°E, N50°W and N75°E, is responsible for the recharge of the fissured aquifers on structural highs, that together with the sub-horizontal fractures, related to the relief of load, constitute a medium of great hydrological conductivity. This causes an increase in groundwater flow in direction of the structural lows, the axes of which strike N50°E, and subordinately N75°E, generating ideal conditions for the formation of aquifers.