



Contribution of remote sensing and geochemistry approaches to identify hydrogeological interconnections between Sminja and Oued Rmel Aquifer System (SORAS) (North-eastern Tunisia)

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ABSTRACT

The Sminja–Oued Rmel aquifer system, located at Zaghouan region, is exploited for irrigation and meeting the drinking water demands of agglomerations. To identify the lateral communications between the Sminja and Oued Rmel aquifer system, two approaches were applied: geochemistry and remote sensing. The chemical analyses of waters of the two aquifers show a predominance of sodium and calcium cations and chloride and bicarbonate anions. An enrichment of sodium and chloride from upstream to downstream of each aquifer was found. A raise of sodium and chloride concentrations were founded from upstream to downstream for each aquifer. A similar chemical composition of the water samples located in the west part of Oued Rmel aquifer and waters of Sminja aquifer was identified. This proves, through mixture phenomenon, the importance of communication of waters of the Sminja to the Oued Rmel aquifer. The lineaments mapping was developed by processing Landsat ETM+ satellite data with several techniques (color composition, principal component analysis and filtering) and using computer softwares such as Envi, ArcGis and PCI Geomatica. The analysis of lineaments map pulled out a total of 13 hydraulic fractures which allow the hydrogeological interconnections between both aquifers. The statistical analysis of lineament patterns using directional rosettes and the lineament density map showed a predominance of ESE–WNW faults.

Keywords: Geochemistry; Hydrogeological interconnections; Remote sensing; Landsat ETM+; Sminja–Oued Rmel aquifer system

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