



## Geochemical modeling of groundwater in the El Eulma area, Algeria

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Received 24 February 2012; Accepted 29 May 2012

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### ABSTRACT

Multivariate statistical and geochemical modeling techniques were used to determine the main factors and mechanisms controlling the chemistry of groundwaters in the El Eulma area. Three major water groups resulted from the Q-mode cluster analysis. The samples from the area were classified as low salinity (Group 1), moderate salinity (Group 2), and high salinity waters (Group 3). Inverse geochemical models of the statistical groups were developed using PHREEQC to elucidate the chemical reactions controlling water chemistry. In a broad sense, the reactions responsible for the hydrochemical evolution in the area fall into three categories: (1) dissolution of evaporite minerals; (2) precipitation of carbonate minerals, quartz, kaolinite, and Ca-smectite; and (3) ion exchange.

*Keywords:* Q-mode cluster analysis; Water–rock interaction; Geochemical modeling; El Eulma area; Algeria

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