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## Hydrogeochemical Prospecting for Evaporate and Clay Deposits in Harrat ash Shaam Basalts, Jordan

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### Abstract

Volcanic rocks of different eruption phases cover the central northern part of Jordan and contain a variety of groundwater types with a wide range of salinities, plotting in different water compositions of Piper classification and on the dissolution, mixing, ion exchange or reverse ion exchange lines in Durov diagram. The different types show also variations in the isotopic compositions as a result of recent and historic recharge, evaporation, mixing with ground waters of different origins (recharge areas) and water rock interactions.

In this article these groundwaters are classified in different types and their genesis investigated. The results show that the major roles played in the genesis of the different water types are: water rock interaction with the aquifer matrix and with the deposits of enclosed lakes which formed in between the different volcanic eruption phases. Both mechanisms are playing the major role in the groundwater genesis of the area. Formerly, irrigation return flows were made responsible for producing the different groundwater types, but that assumption seems to be unrealistic as can be shown by the analyses of the genesis and evolution of the different groundwater types.

Through the study of the hydrogeochemistry of basalts of Harrat ash Shaam and its surrounding areas it was possible, on the example of Azraq clay and evaporate deposits, to refer the high salinity water with ion exchange reactions to buried clay and evaporates' deposits under the basaltic cover in Dhleil-Hallabat, Al Umari, Hazim and eventually Safawi areas. Such deposits may have big economic value.

The study shows that hydrogeochemical prospecting in such areas covered by different basaltic eruptions is a very useful tool in locating clays' and evaporates' types of mineral deposits.

Keywords: Harrat ash Shaam Basalts, Hydrogeochemical prospection, Evaporates, Clay minerals.

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