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Hydrogeological and isotopic study of surface water and groundwater in the Eastern Haouz Plain. Western Morocco

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The Eastern Haouz area, characterized by a semi-arid climate, is part of the Haouz plain. The basin is built over a broad synclinal between the High Atlas and the Jebilets mountains. The compilation of geological, geophysical and hydrogeological data shows that this area is straddling two major basins of western Morocco. Map of the river system and the piezometric map show the same division line of surface water and groundwater. This division line oriented NNW-SSE is evidenced by the rise of the basement constituted by Paleozoic schists that outcrop near Tamelalt. Thus we can distinguish two main directions of groundwater flow feeding two watersheds (Tensift and Oum Rabiaa rivers) and two large reservoirs in the region of Marrakech.

As a contribution to solve the water supply problem in the area, a hydrochemical study has been conducted, involving 40 groundwater samples for major ions and 20 stable isotope analyses. Hydrochemical results show the geological control on water quality. Samples from Paleozoic schists and Triassic sediments are relatively highly mineralisation and unsuitable for drinking as well as for irrigation. Conversely, groundwater from the alluvial plains is relatively less mineralised than other older geological formations; however, many of the samples are also non-potable. Apart of salinity problem, about 25% of the samples have higher nitrate content than the drinking water permissible limit. Stable isotope analysis show that groundwater recharge to the phreatic aquifer is controlled by local conditions.

The small difference in the isotopic content of river water and a group of groundwater samples is interpreted as the evaporation effect during the recharge. On the other hand, the group of samples with relatively depleted stable isotopic content shows faster recharge conditions and less water-rock interaction. Finally, another group of samples is relatively enriched in stable isotope content and confirm an increase during the recharge processes and higher soil-water interaction. This may be partially due to return flow from agricultural irrigation.