

Multifrequency electromagnetic method for the hydrogeophysical characterization of hard-rock aquifers- the case of the upstream watershed of White Bandama (northern Ivory Coast)
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In West Africa, for drinking water supply, we refer to the hard rock aquifers. In Ivory Coast, the population growth together with climate changes patterns make groundwater resources vulnerable. The upstream watershed of White Bandama, northern Ivory Coast, is located on a poorly known hard rock aquifer, especially for the precise geometry of the reservoirs. This poor knowledge, combined with a high heterogeneity and difficulties for the classical hydrogeological exploration methods, leads a lack of the exploited water resources. Further spatial knowledge of the aquifer geometry, is first required for the achievement of a sustainable management of this resource. To further investigate weathered hard-rock aquifer of White Bandana catchment, we coupled electromagnetic measurements to lithological data to refine the geometry of the aquifer and to better constrain the choice for future well locations. This study therefore presents a new hydrogeophysical approach to improve the knowledge of the regionally or locally important resources in a hard-rock aquifer by the use of the PROMIS frequency electromagnetic system coupled with lithologs from boreholes. The interpretation of the results leads to propose multi-layer models consistent with lithological structuring and geological discontinuities in place, and to the location of the aquifer and its geometry, roof and base interfaces. This method is efficient to improve hard rock aquifer characterization, as the results revealed good agreement between the soundings (1D), the resistivity section (2D) and the boreholes and geological structures. A detailed knowledge of the local aquifer geometry constitutes the first and crucial step before going further into a complete hydrogeological study.

