Groundwater reserve and aquifer buffer capacity in weathered hard rocks of Africa- comparison of results obtained in Benin, Burkina Faso and Uganda
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Lawson Fabrice Messan Amen, COTONOU, Benin

lawson.amen@yahoo.fr

Vouillamoz Jean-michel, IRD UGA CNRS G-INP – UMR LTHE, GRENOBLE, FRANCE

Koïta Mahamadou, Fondation 2iE, OUAGADOUGOU, BURKINA FASO

Soro Dimitri, Fondation 2iE, OUAGADOUGOU, BURKINA FASO

Yalo Nicaise, Université d'Abomey-Calavi Institut Nationale de l'Eau, Abomey-Calavi, Benin, COTONOU, BENIN

Owor Michael, Makerere University, KAMPALA, UGANDA

Okullo Joseph, Makerere University, KAMPALA, UGANDA

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Quantifying groundwater storage is important to estimate the capacity of aquifers to buffer changes in climatic and anthropogenic conditions (e.g. increasing pumping rate, change in rainfall and land-use, etc…). However, the buffer capacity of aquifer is poorly known notably in hard rock areas which cover about 40% of the African continent. This study aims at improving the quantification of groundwater storage and aquifer buffer capacity in three African countries- Benin, Burkina Faso and Uganda. We used the last development in the application of the Magnetic Resonance Sounding (MRS) geophysical method [1] to carry out a total number of 73 measurements in several hard rock groups (i.e. 45 in Benin, 21 in Burkina Faso and 7 in Uganda). The interpretation of the MRS measurements reveals that the storage is almost the same in the three countries, i.e. from 580 to 700mm in average. The higher storages are found in the gneisses and migmatites formations with 50% of the values ranging in-between 320 and 700mm. The storage of granitoids is lower, i.e. 70 to 140mm for 50% of the values. We also found that the storage of volcano-sedimentary rocks is almost zero even if the water content is as high as 5%, i.e. groundwater is mainly undrainable. Finally, we estimated the buffer capacity as the ratio of the storage to the aquifer annual discharge, and we found 3 to 6 years for the gneiss and migmatite aquifers. REFERENCE - [1] Vouillamoz, J.M., Lawson, F.M.A., Yalo, N., Descloitres, M., 2014. The use of magnetic resonance sounding for quantifying specific yield and transmissivity in hard rock aquifers- The example of Benin. J. Appl. Geophys. 107, 16–24.