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Groundwater resources of the aquifers of the northern Central African Republic (Ouham Province). First hydrogeological investigations in a changing environment.

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Groundwater is a key factor in the socio-economic development of African societies. This is particularly true for the Lake Chad Basin countries for which groundwater is the main water resource for both drinking water supply for population and agriculture, whether small or large scale. The Central African Republic (CAR) occupies a strategic place in the Lake Chad Basin since most waters feeding the different tributaries of the Chari River, which is the main water source of the Lake Chad, are originating from its territory. Indeed, the Northern CAR and particularly the Ouham Province, at the head of the whole Chad endoreic watershed, benefits from favourable rainfall conditions. Unfortunately, very little hydrological and hydrogeological information is available for this area which has never been investigated in terms of geochemical and isotope characterisation. The only available spares technical and scientific investigations over the area are dating from the 1960's. Unfortunately the Lake Chad basin has undergone strong climatological evolutions since the 1970's and hydrological information needs to be updated.

The objectives of this study are to characterise groundwater from the Ouham Province in order to better appreciate the hydrogeological processes taking place in the recharge area of the Southern Lake Chad Basin. Isotope hydrology combined with geochemistry of groundwater has now proven being the best approach in under-documented territories to have a first diagnostic on the dynamics and quality of available resources.

In this purpose combined hydrogeochemical and isotopic investigations (18O, 2H and 3H of the water molecule) have been launched to constrain groundwater origin, recharge processes, quality, residence time and anthropogenic fingerprint on aquifers. After two sampling campaigns it was possible to draw a general pattern of the hydrogeological and hydrochemical conditions in the region.

The Ouham province is mostly composed of Precambrian substratum rocks. Only the Northern edge, neighbouring the Chad Republic, is made of surface Tertiary formations of the Continental Terminal. This geological duality is clearly reflected in the geochemistry of groundwater, but despite an increase in the population and in the agricultural activity the overall quality is still good apart for a few wells located in the close vicinity of human settling, and already strongly influenced by nitrate contamination. The isotopic signature of groundwater is clearly modern and identical to the one of local rainfall, and very close to the regional water line of Bangui (GNIP-IAEA). Tritium data are mostly similar to the modern rainfall input but a few wells and boreholes tend to indicate the existence in the underground of slow-dynamic groundwater. In the end, and considering the local amount of rainfall (1500mm/year) the quality of the groundwater potential as a good quality water supply resource is confirmed, and indications towards the possibility of a development of the exploitation are provided.