



Hydrogeology and Chemistry Synthesis of the deep Boring of the Township of Abomey-Calavi, Benin

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Abstract

In the setting of the backing of the food in drinking water of the population of the cities of Abomey-Calavi, Sèmè and Cotonou biggest city of Benin, the General Direction of water (DG-Water) and the Society National of the Waters of Benin (SONEB) achieved many boring in the township of Abomey-Calavi. It is the biggest field of intensive catchment of Benin; but whose hydrogeology and chemistry is known little. During the year 2013, we sampled these boring and studied the hydrogeology of the township of Abomey-Calavi. These deep boring of about hundred meter on average, permit to appropriate water in the aquifer of the continental terminal. It is an aquifer of the sands (end to coarse) of wills and gravels with of the argil - sandy levels (red lateritic, gaudy, black or colorful). We mobilized water from 77 boring. The averages of the results of analyses by precinct permitted to make a synthesis of hydrogeology and hydrochemistry of the township of Abomey-Calavi. The water of boring of the township of Abomey-Calavi are possesses one feature chlorinated sodic potassic or bicarbonated sodic potassic.

Keywords: Hydrochemistry, hydrogeology, Abomey-Calavi, Benin.

Introduction

Water is an indispensable element for life and for the real and lasting socio-economic development of a country, it is therefore necessary to have a better knowledge on resources in water exist the information concerning especially: The vulnerability of resources to a possible factor, The necessary measures to develop, to manage and to protect resources.

In Benin the underground waters constitute a part important of the hydraulic heritage of the country, because of its relatively easy exploitation. The underground waters are traditionally resources in water privileged for the drinking water, because more safe from the pollutants that the waters of surface. In the targeted region, the underground waters were always a source important of provision in drinking water for the local populations and, for the watering of the animals and for the irrigation. The boring are the sources of most drinkable waters in the township of Abomey-Calavi. The present work is interested in hydrogeology and chemistry synthesis of the deep boring of the township of Abomey-Calavi.

Material and Methods

Setting of survey: The township of Abomey-Calavi is situated in the South part of Republic of Benin in the department of the Atlantic, between the latitudes 6°20'23.4 " and 6°42'6.6 " North and the longitudes 2°14'13.8 " and 2°25'7.8 " East. The township of Abomey-Calavi has a damaged relief. The main characteristic

features are: a gritty strip with coastal cords and a tray of earth of rod and depressions. The precipitations are raised relatively. They reach 100 mm of rain on average per month, either 1,200 mm per year. The setting of survey spreads on two big types of geological formations: The quaternary formations that are sandy deposits of the coastal cord, of the deposits lagoon made of clays and sand and deposits constituted alluvium of sand and clays. The tertiary formations as for them are essentially constituted of clay and sand of the continental terminal. One distinguishes three deep aquifer layers¹. The aquifer layer of the continental terminal to 120 m of depth; The aquifer layer of the Paleocene to 350 m of depth; The aquifer layer of the mastrichien to 1,500 m of depth. It is in the layer of the continental terminal that is appropriated water by the hydraulic boring.

Sampling and method of analysis: All the boring of the DG-Eau existing in the township of Abomey-Calavi before the starting of this survey in January 2013 have been sampled to have a general picture of the watertable of the continental terminal. We did to the total seventy seven withdrawals to the level of seventy seven boring for the physical and chemical analyses. We analyzed the survey has been led on seventy seven samples of water coming from the seventeen seven boring in the township of Abomey-Calavi. The following parameters were moderate: TDS, color, toughness, pH, electric Conductivity, temperature, alkalinity, calcium, magnesium, sodium,

potassium, total iron, ammonium, bicarbonate, chloride, sulphate, nitrate, nitrite, phosphate and turbidity. The methods of analysis of the samples of waters are the conductivity, the spectrophotometry and by the pH-metric. The diagram of

Schoeller and Berkloff presented under binary diagram shape used by Bensaoula and al in 2005 to study to determine feature of the waters of boring of Zouia in Algeria, has been used at the time of the present survey for interpret the results of analyses².

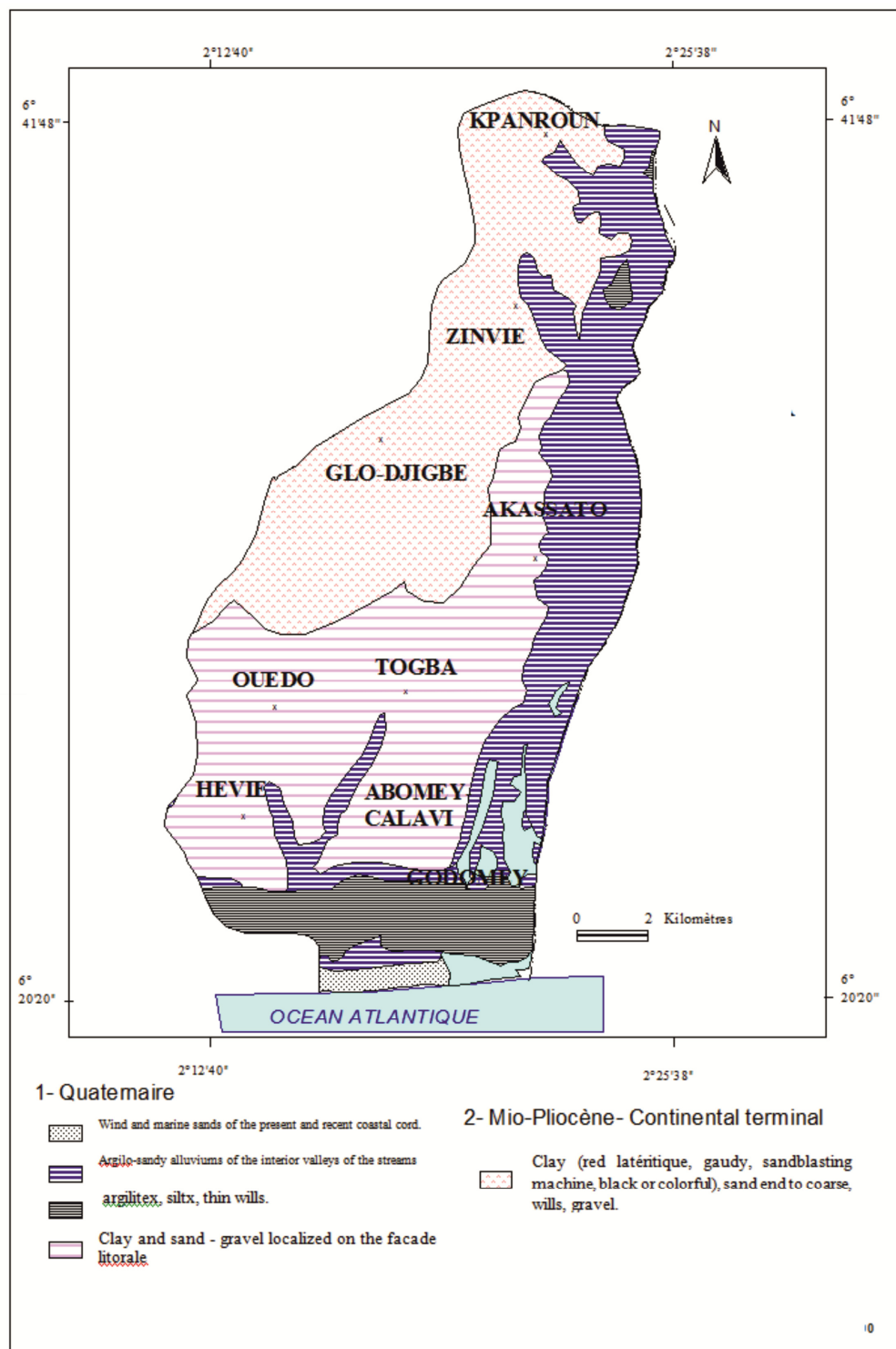


Figure-1
Geological card of the township of Abomey-Calavi

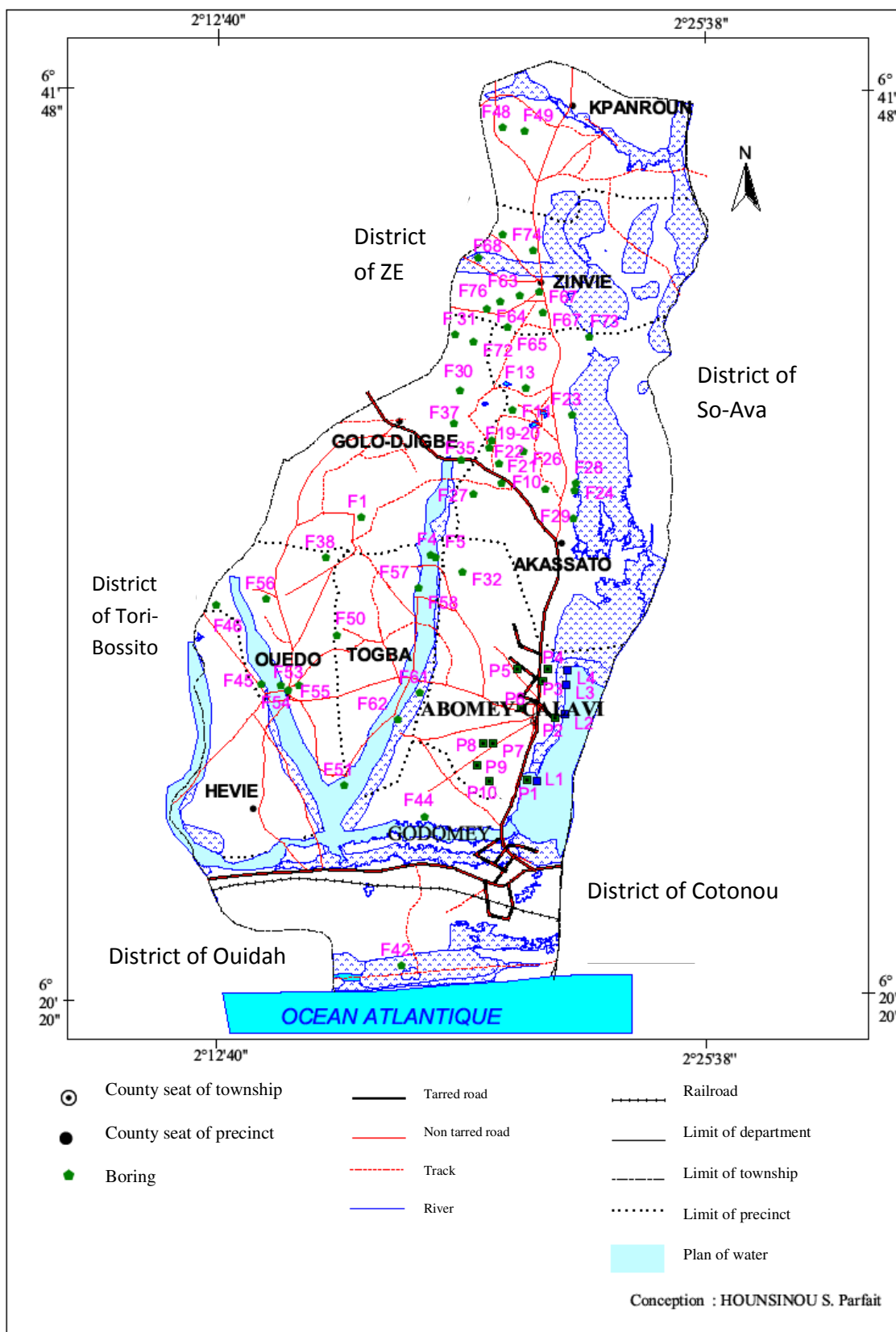


Figure-2
Sites of withdrawal of waters of boring

Results and Discussion

We have interpret the results from the representation, on diagram of Schoeller and Berkloff, of the major ions of the waters of boring (figure-3 to 12).

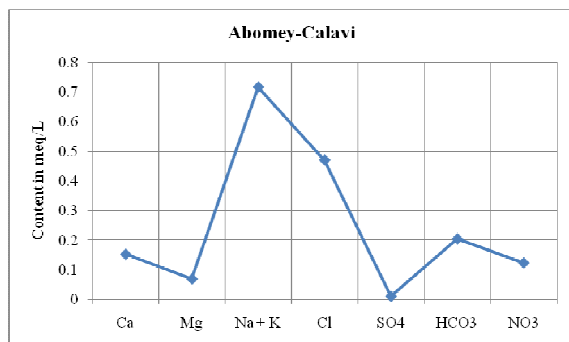


Figure-3

Representation, on diagram of Schoeller and Berkloff, of the major ions of the waters of boring of the precinct of Abomey-Calavi

The water of boring of the precinct of Abomey-Calavi possesses one feature chlorinated potassic sodic

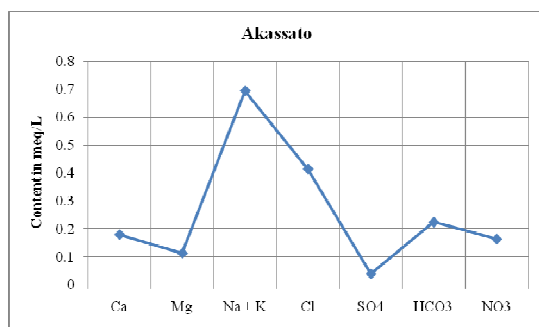


Figure-4

Representation, on diagram of Schoeller and Berkloff, of the major ions of the waters of boring of Akassato

The water of boring of Akassato possesses one feature chlorinated sodic potassic

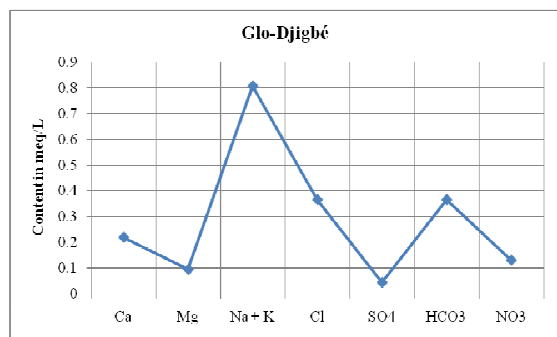


Figure-5

Representation, on diagram of Schoeller and Berkloff, of the major ions of the waters of boring of Glo-Djigbé

The water of boring of Glo-Djigbé possesses one feature bicarbonated sodic potassic.

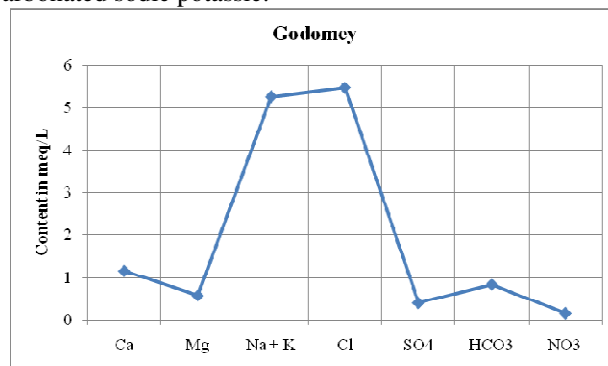


Figure-6

Representation, on diagram of Schoeller and Berkloff, of the major ions of the waters of boring of Godomey

The water of boring of Godomey has one feature chlorinated sodic potassic.

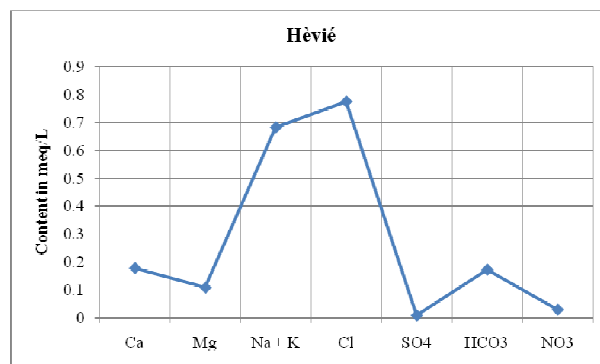


Figure-7

Representation, on diagram of Schoeller and Berkloff, of the major ions of the waters of boring of Hèvié

The water of boring of Hèvié has one feature chlorinated sodic potassic.

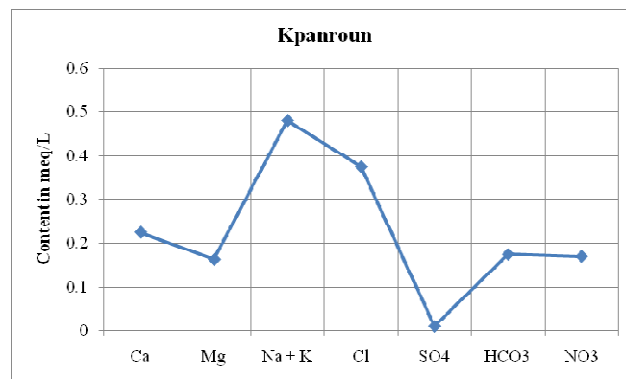


Figure-8

Representation, on diagram of Schoeller and Berkloff, of the major ions of the waters of boring of Kpanroun

The water of boring of Kpanroun has one feature chlorinated sodic potassic.

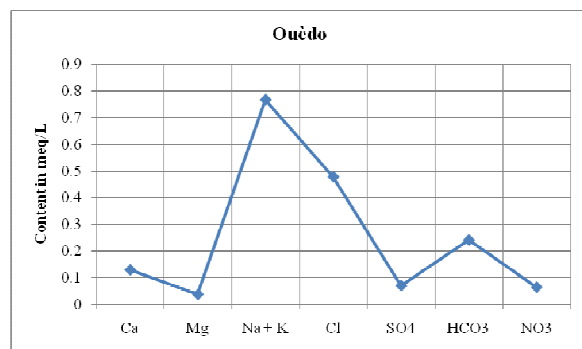


Figure-9

Representation, on diagram of Schoeller and Berkloff, of the major ions of the waters of boring of Ouèdo

The water of boring of Ouèdo possesses one feature chlorinated sodic potassic.

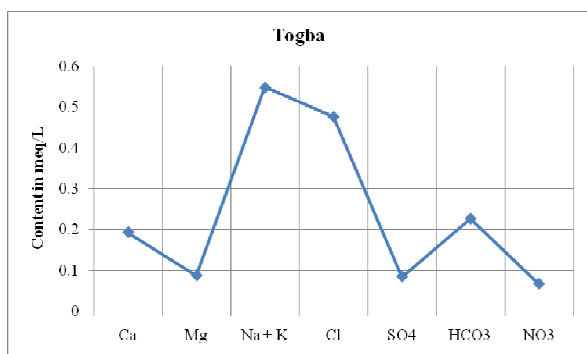


Figure-10

Representation, on diagram of Schoeller and Berkloff, of the major ions of the waters of boring of Togba

The water of boring of Togba possesses one feature chlorinated sodic potassic.

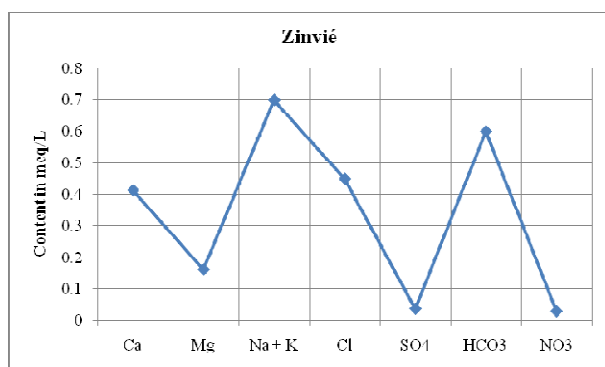


Figure-11

Representation, on diagram of Schoeller and Berkloff, of the major ions of the waters of boring of Zinvié

The water of boring of Zinvié possesses one feature bicarbonated sodic potassic.

Waters captured by the studied boring can be classified in two categories: The waters that possess one feature chlorinated sodic potassic and waters to feature bicarbonated sodic potassic.

The waters of boring to feature chlorinated sodic potassic that concerns the precincts of Abomey-Calavi, Akassato, Godomey, Hèvié, Kpanroun, Ouèdo and Togba. The boring of Abomey-Calavi, Akassato, Godomey, Hèvié, Ouèdo and Togba of by their proximity in relation to the Atlantic Ocean undergo an influence of this last that justifies feature chlorinated of their waters. Kpanroun is the precinct of the township of Abomey-Calavi, most distant of the sea but, the water of boring of Kpanroun to chlorinated one feature. It is due to a washing probable of formations geological salt marsh.

But the water of boring of the precinct of Kpanroun, the waters of boring of tous the precincts of the township of Abomey-Calavi that are distant of the sea, possess one feature bicarbonated.

Conclusion

To the light of the physical and chemical analysis results, it appears that waters captured by the boring are of feature chemical either bicarbonated is chlorinated. The waters of boring of the precincts near of the sea undergo the influence of this last and possess chlorinated one feature. Feature of the water of boring of the precincts moved away of the sea is due to a washing probable of formations geological bicarbonated or saline. It would be notably interesting to value the extent of the navy intrusion in the underground waters of the township of Abomey-Calavi. New investigations are led in order to be able to delimit the navy intrusion and the underground water salinization in the township of Abomey-Calavi.

References

1. Dégbey C; La qualité de l'eau de puits dans la commune d'Abomey-Calavi et les facteurs exogènes de sa pollution. Mémoire de fin de formation de DEA, Environnement et Santé Publique FLASH, UAC, Bénin, (2004)
2. Bensaoula F, Bensalah M and Achachi A, Etude des circulations d'eaux profondes dans les dolomies du Dogger de Zouia, Bordure occidentale des Monts de Tlemcen, nord-ouest algérien, *Bulletin d'hydrogéologie*, **21**, 16-32 (2005)
3. Bonnet P; Etude hydrogéologique de la plaine de Maghnia (Département de Tlemcen). Rapport Services des études scientifiques, non publié, (1966)