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Origin of Dissolve Ions in Groundwaters in the Northern Densu River Basin of Ghana Using Stable Isotopes of 18O and 2H

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ABSTRACT

Stable isotopes of oxygen-18 and deuterium content in groundwater, surface water and rainfall in the northern part of the Densu river basin were studied with the main aim of identifying the origin and sources of ions in the groundwater in the area. The conversion of stable isotopes to d-excess was also exploited as a complementary tool to understand the processes of recharge. A comparison of the isotopic data with the rainfall, Local Meteoric Water Line (LMWL) and Global Meteoric Water Line (GMWL) indicates that the groundwater in the study area is mainly meteoric with few groundwater and all the surface water showing an evidence of evaporation. The study has also shown that, mineral dissolution from the geology is the main factor controlling the chemistry of the groundwater with evaporation having a minimal effect. The d-excess values show that the groundwater has undergone dilution with the rainfall and this is observed from the decrease of the d-excess of the groundwater with increase in Oxygen-18. This observation also suggests a modern day recharge to the groundwater.

KEYWORDS

Dissolution, D-Excess, Meteoric, Primary Evaporation, Densu River

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