Hydrogeochemical evolution of ground water along the Butajira-Ziway transect, Central Main Ethiopian Rift.

BIRUK TESHOME DESTA[1]

[1] Earth Science Department, Bahir Dar University, Ethiopia. (brookktes@gmail.com)

The hydrogeochemical evolution of ground water is analyzed in central Main Ethiopian rift on the basis of major elements and trace elements analysis. The analysis was carried out on the water samples collected from cold spring, well water, hot spring and Lake waters. The result shows that there is different hydrogeochemical phase in the escarpment and rift water. The analysis indicate that the rift floor well water, hot spring and Lake water is characterized by high total dissolved solids (TDS), fluoride and sodium. The major elements such as Ca and Mg are the dominant feature for ground water from escarpment areas.

Characterization of the geochemistry of rare earth elements (REE) has been used to understand water-rock interactions. Lanthanum (La) concentration of ground water ranges from 0.0088145 µg/l to 13.95805 µg/l along Butajira-Ziway transect. Cerium (Ce) concentration of the ground water also ranges from 0.002196532 µg/l to 9.89699422 µg/l along the transect. Ordinary normalized REEs patterns of some water samples such as Bui spring (cold spring), Tulugudo springs (hot springs), well water from Bui town and Ziway Lake water shows Light Rare Earth Elements (LREE) enrichments and Heavy Rare Earth Elements (HREE) depletion occurs with Europium (Eu) negative anomaly.

This is due to ground water and Lake waters inherit the property of felsic rocks through water rock interaction. The Eu negative anomaly probably arises because many crustal rocks were produced by intracrustal partial melting. The residues of those melts were rich in plagioclase, hence retaining somewhat more of the Eu in the lower crust, and creating a complimentary Eu depleted upper crust. Ordinary Chondrite normalized REEs patterns of well water from Inseno town shows that slight LREEs depletion and HREEs enrichment with Ce^{4+} negative anomaly. In this sample REEs pattern of the well water shows close to the property of basaltic rocks which is LREEs depleted and HREEs enriched.

This shows that this deep well (Inseno well) water highly interacts with basaltic rocks. A negative Ce anomaly is consequence of Ce being in the +4 oxidation state.