

RARE EARTH AND TRACE ELEMENTAL CHARACTERISTICS OF LIMESTONE OF THE ALBIAN ASU RIVER GROUP, MIDDLE BENUE TROUGH, NORTH CENTRAL NIGERIA

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Abstract

Fifteen representative limestone samples were collected from the exposed strata of the Albian Asu River Group limestone within the Middle Benue Trough, North Central Nigeria and analyzed geochemically. The observed large variations in Σ REEs' content (12.22 to 142.53ppm) may be attributed to contamination with terrigenous particulates having shale like REE abundance coupled with post-depositional early diagenetic processes. The limestone samples show small variations in Eu anomalies (Eu/Eu*: 0.41 to 0.71). Positive Eu anomalies were observed in the limestones which may be due to the presence of plagioclase feldspar. Variations in Ce anomalies in these limestones may be due to mixing between sediment components and a seawater end member. It was observed in the limestone that, the large-ion lithophile elements Rb and Ba show depletion compared to Upper Continental Crust (UCC) but are similar in concentration to Sr; while the ferromagnesian trace elements Co, Ni, Cr and V and the high field strength elements (HFSE) Zr, Y, Nb, Hf, Th and U were depleted with respect to the UCC, which could be due to their lithological variations. REE patterns and La/Sc, La/Co, Th/Co, Th/Cr, Cr/Th, and Th/Sc ratios suggest that the terrigenous materials present in the Middle Benue Trough were derived mainly from intermediate to felsic rocks and the positive correlation of Al_2O_3 with Th, Sc, REE's suggest that the presence of terrigenous materials can be considered as the dominant source of REE's and not the presence of biogenic calcite. The limestones show positive values of Mn* and low V/(V+Ni) ratios (0.43-0.84) suggesting that they were deposited under mixed oxic and anoxic, conditions which can be explained as a transition from anoxic to oxic conditions.

Keywords: Rare Earth Elements, Trace elements, Limestone, Asu River Group, Middle Benue Trough