Geochemistry of ophiolitic metagabbros and younger granites around Wadi Arais, south eastern desert, Egypt

M. F. GHONEIM[1], E. M. LEBDA[2] AND M. Z. KHEDR[2]

[1]Geology department, Faculty of Science, Tanta University.
[2]Department of Biological and Geological Science, Faculty of Education, Tanta University at Kafr El-Sheikh.

The ophiolitic metagabbros (78.8 Km^2) are associated with ultramafic masses and geochemical studies revealed that, the studied metagabbros are derived mainly from tholeiitic with minor calc-alkaline magma. The mixed TH and CA magma series of the present rocks are similar to that developed in restricted back-arc marginal basin and similar to the ophiolitic class-I. The studied metagabbros belong to low Ti-ophiolite and fall mainly within oceanic gabbor field. The studied metagabbros are transitional between ocean floor and island arc and exhibit a back-arc marginal basin setting. These results confirm with the ophiolitic metagabbros of Eastern Desert, which exhibit a back-arc marginal basin setting. Spider diagrams of the studied metagabbros are enriched in both HFSE and LILE. Relative enrichment of Sr and Ba are pertaining to plagioclase, biotite and amphibole accumulation. In contrary, depletion of Ni and Cr suggest significant olivine and pyroxene fractionation.

The granitoid rocks in the present area (117 Km^2) possess field and compositional characteristics that justify considering them as Y.G. Petrochemical composition of the studied granites (IGUS) shows that, Arais granite falls mainly within alkali-feldspar granite, whereas Abu Bayt and Al-Hindusi granites have monzogranite to subordinate syenogranite composition. Arais granite is similar to G_{II} granite of Greenberg (1981), while Al-Hindusi and Abu-Bayt granite are similar to G_{III} (e.s: Fawakhier granite). The present granitic rocks are mainly peraluminous with slightly metaluminous compositions (Arais granite), originated from magma of alkaline to calc-alkaline affinity and of A-type. The studied Y.G formed favor formation under extensional probably post-orogenic granite setting and also similar to A_2 group of Eby (1992). The present granites have crystallization temperatures ranging from 650 C° to 685 C° at P^{H2O} = 5 Kb. and have been emplaced at depths from 20-30 Km. The studied Y.G show enriched LREE, depleted HREE and large negative Eu, Cr and Ni anomalies. The geochemical modelling of the examined rocks by using REE fractional crystallization model based on the lower crust parent magma of Taylor and Mclennan (1985). This model of monzogranite fractionation based on alternative genesis between partial melting and fractional crystallization process. It deduced monzogranitic melt is derived through 20% partial melting of lower crust followed by 60-80% fractional crystallization. Meanwhile, petrogenesis of Arais alkali-feldspar granite is derived through 55-75% fractional crystallization of monzogranitic parent melt.