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Petrological and geochemical characteristics of the Shadli metavolcanics, Zabara area, Eastern Desert, Egypt

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The Zabara area in the central Eastern Desert of Egypt is built up of ophiolitic rocks (metagabbro and metabasalt associated with metasediments) and Shadli younger metavolcanics. The studied metasediments (metagreywackes and metamudstones) have a REE pattern characterized by slightly fractionated LREE, flat HREE and absence of an Eu anomalies. They have geochemical features similar to those of the oceanic island arc metasediments. The ophiolitic metagabbro and metabasalt are similar in their major and trace element contents and show a tholeiitic affinity. They are characterized by very low levels of K_2O, Nb, Zr and Rb and flat REE patterns. Low Mg#, Cr and Ni contents indicate a remarkably non primitive magma source. The REE modelling reveals that the ophiolitic metagabbro and metabasalt could be derived from 25% and 10% non-modal batch melting, respectively, of spinel lherzolite source followed by fractional crystallization of olivine, clinopyroxene and plagioclase.

The Shadli younger metavolcanics cover the entire spectrum from medium-k metaandesite to high-k metadacite and metarhyolite with calc-alkaline affinity. They are apparently not primitive melts, they are characterized by low Cr, and Ni contents with low and variable Mg#. The Shadli younger metavolcanics have slightly fractionated LREE and unfractionated, flat HREE. The coherent variation diagrams and close similarity in their incompatible element ratios and REE patterns suggest that the Shadli younger metavolcanics are comagmatic. The REE geochemical modelling reveals that the Shadli younger metavolcanics represent cogenetic fractionated sequence.

The studied metagabbro, metabasalt and Shadli younger metavolcanics have geochemical characteristics of both MORB and island arc tectonic environment. Rocks

that are transitional between those from MORB and island arc environments are common in a back-arc basin. Thus, the studied rocks were erupted in a back-arc basin rather than the island arc setting to which they are generally assigned.