

The mineralogy and geochemistry of Hadayib ring complex, South Eastern Desert, Egypt.

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The Hadayib ring complex has a poorly defined ring nature and includes two superimposed ring structures. It is built up essentially of alkali granite, alkali quartz syenite, alkali syenite, trachy andesite, trachyte and pyroclastics. All the rocks are supersaturated in silica and alumina. The volcanics and their pyroclastic equivalents, probably represent remnants of a former volcanic cone, occur as roof pendants and rafts.

The rocks of Hadayib ring complex have an alkaline affinity and show a wide range of chemical compositions, particularly in terms of SiO_2 (57%-71%), Al_2O_3 (12%-18%), total iron as Fe_2O_3 (4%-12%) and CaO (0.4%-4%). These compositional variations could be explained by fractional crystallization, which has played a major role in the evolution of the Hadayib ring complex alkaline suite. The fractionation process involves feldspars, pyroxenes, amphiboles and apatite with feldspars playing the fundamental role.

The trace element signature of the Hadayib ring complex, especially the enrichment of the HFSE (Zr, Nb and Y), resembles those of many anorogenic alkaline suites. The low Y/Nb ratio (0.85, on average) characterizes alkaline suites, which are derived from fractionates of a mantle derived magma. The emplacement of rocks has taken place in two successive stages. The first stage has an intermediate composition and a cumulate nature. It is characterized by positive Eu anomalies, high Sr and Ca abundances, and relatively low HFSE contents. In contrast, the second phase is acidic characterized by negative Eu anomalies, low Sr and Ca concentrations, and by the enrichment of HFSE contents.