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Genesis and petrology of Late Neoproterozoic pegmatites and aplites associated with the Taba metamorphic complex in southern Sinai, Egypt

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ABSTRACT

We present new fieldwork, petrography, mineralogy and geochemical data for late Neoproterozoic pegmatites and aplites in south Sinai, Egypt, at the northernmost limit of the Arabian–Nubian Shield. The pegmatites cross-cut the host rocks of the Taba Metamorphic Complex with sharp contacts and are divided into massive and zoned pegmatites. Massive pegmatites are more common, in the form of veins, dykes and masses of variable dimensions; strikes range mainly from E-W through NW-SE to N-S. Mineralogically, the massive pegmatites divide into K-feldspar-rich and albite-rich groups. Zoned pegmatites occur as lenses of variable dimensions, featuring a quartz core, an intermediate zone rich in K-feldspars and an outer finer grained zone rich in albite. All compositions are highly evolved and display geochemical characteristics of post-collisional A-type granites: high SiO₂, Na₂O+K₂O, FeO*/MgO, Ga/Al, Zr, Nb, Ga and Y alongside low CaO, MgO, Ba and Sr. They are rich in REE and have extreme negative Eu anomalies (Eu/Eu* = 0.03-0.09). A genetic linkage between the pegmatites, aplites and alkali granite is confirmed by their common mild alkaline affinity and many other geochemical characteristics. These pegmatites and aplites represent the last small fraction of liquid remaining after extensive crystallization of granitic magma, injected along foliation and into fractures in the host metamorphic rocks. The extensional tectonic regime and shallow depth of emplacement are consistent with a post-collisional environment.

