The Arabian-Nubain Shield from a mid-Cryogenian continental arc to Ediacaran post-collisional appinite-high Ba-Sr monzogranite suite: Evidence from the South Um Mongul Area, NED, Egypt

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The south Um Mongul area is covered by dacite (773±6.9 Ma), hornblende gabbro (603±3.5 Ma) and monzogranite (558±4.6 Ma). The dacite chemistry is comparable to high-K I-type granitoids and its trace element patterns show negative Nb anomalies and enrichment in LILE, Th and U over HREE and HFSE, which indicates a subduction-related tectonic setting. The high La/Yn_{cn} (7.2-30.9)), Nb/Yb (2.63-4.41) and Th/Yb (2.07-3.04) ratios of the dacite are analogous to continental rather oceanic arc systems. Its low Sm/Yb ratios (1.84-3.13) support the primitive nature of the crust beneath the continental arc and derivation of the magma from a lower crustal source devoid of garnet. The trace element patterns of the post-collisional suite show subduction-related geochemical signature. However, the gabbro is characterized by Th/Ta ratios (3.4-14.5), which indicate its formation in a within-plate tectonic setting. Thus, the subduction geochemical signature is probably inherited from a previous subduction event. Both the gabbro and monzogranite are characterized by high Ba (404-590 and 936-1590 ppm, respectively) and Sr (611-708 and 624-793 ppm, respectively) contents, which are reminiscent of the Caledonian appinite-high Ba-Sr granite assemblage. They formed through an Ediacaran slab break-off process. Then, asthenospheric upwelling caused partial melting of lithosphere previously metasomatised by subducted slab hosting carbonate sediments impregnated with hydrothermal barite. Melting of such lithosphere led to the formation of the gabbro. The monzogranite in the area was formed by partial melting of the lower crust, which was induced by underplating of the mafic magma. The high Sm/Yb (2.94-4.19) ratios of the monzogranite may indicate the presence of garnet in the melted amphibolitic lower crust