



## **Late Ediacaran volcano-sedimentary successions of southern Sinai (Egypt): tracing the evolution from late- to post-collisional volcanism and its relation to A-type rocks**

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The Late Ediacaran post-collisional volcano-sedimentary successions exposed in southern Sinai (Egypt) represent the last stage of magmatic activity associated with assembly of the northernmost segment of the Neoproterozoic Arabian-Nubian Shield. To clarify the age and tempo of post-collisional activity, three volcanic successions from southern Sinai were selected for the present study: the Sahiya, Iqna Shar'a and Meknas volcanics. They comprise a series of intermediate to silicic volcanic flows and their pyroclastic rocks. New zircon U-Pb dating by SIMS of the lava flows from the three successions yielded ages ranging between ca. 619 to 600 Ma. Combined with field evidence and the geochemical data, the obtained SIMS zircon ages enable us to recognize two phases of volcanic activity in southern Sinai at ca. 619-615 Ma and 606-600 Ma. Both age groups were found within the more northerly volcanic successions at Iqna Shar'a and Meknas and in both these sequences the younger phase unconformably overlies the older phase. Only the older ages, ca. 615-619 Ma, were found in the Sahiya volcanics, exposed at the southern tip of Sinai. The ages of the youngest calc-alkaline volcanics in the study areas are similar to or slightly younger than the earliest phases of alkaline volcanism in southern Sinai, indicating coeval extrusion of calc-alkalic and alkalic A-type rocks. This observation corroborates similar observations documenting cogenetic calc-alkalic and alkalic plutons in the surrounding areas in southern Sinai. Geochemically, the volcanic rocks of the three successions display large silica variations and are mostly medium- to high-K calc-alkaline rocks. The first phase, from ca. 619-615 Ma, observed in all three volcanic suites, comprises basaltic andesite, andesite and dacite, whereas the second phase, from ca. 606-600 Ma and observed only in the northern volcanic suites (Iqna Shar'a and Meknas), comprises dacite, rhyodacite and rhyolite. In the Sahiya succession basal andesite and dacite have characteristics of low-silica adakitic rocks. The evolved rhyolites of the second phase have characteristics that are transitional to alkaline, A-type magmas but this is attributed to extensive fractionation and does not require a change in the tectonic regime. Although their eruption in a post-collisional setting, the Sahiya, Iqna Shar'a and Meknas volcanic suites all display geochemical fingerprints of subduction influence, interpreted to reflect remelting of previously formed arc material ca. 750-650 Ma in age. The formation of Late Ediacaran post-collisional lavas and tuffs in southern Sinai can be understood as a consequence of upwelling of hot asthenospheric material during thinning of the previously thickened lithosphere, leading to partial melting of mafic lower crust. The presence of inherited zircons indicates crustal contamination during evolution of the volcanic successions. Our results indicate that the studied volcanic successions correlate with the Dokhan volcanics of the northern Eastern Desert of Egypt. The earlier volcanic sequence also compares well with 625-600 Ma calc-alkaline plutonic rocks in the north Eastern Desert and Sinai, whereas the younger volcanic phase displays geochemical similarities with 610-585 Ma alkaline plutonic rocks in the north Eastern Desert and Sinai.