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Neoproterozoic Evolution and Najd–Related Transpressive Shear Deformations Along Nugrus Shear Zone, South Eastern Desert, Egypt (Implications from Field–Structural Data and AMS–Technique)[1]

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Abstract—The tectonometamorphic evolution of Nugrus Shear Zone (NSZ) in the south Eastern Desert of Egypt was reevaluated through an integrated study including field-structural work and magnetofabric analysis using Anisotropy of Magnetic Susceptibility (AMS) technique, complemented by detailed microstructural investigation. Several lines of evidence indicate that the Neoproterozoic juvenile crust within this high strain zone suffered an impressive tectonic event of left-lateral transpressional regime, transposed the majority of the earlier formed structures into a NNW to NW-directed wrench corridor depicts the northwestern extension of the Najd Shear System (NSS) along the Eastern Desert of Egypt. The core of the southern Hafafit dome underwent a high metamorphic event (M_1) developed during the end of the main collisional orogeny in the Arabian-Nubian Shield (ANS). The subsequent M_2 metamorphic event was retrogressive and depicts the tectonic evolution and exhumation of the Nugrus-Hafafit area including the Hafafit gneissic domes, during the origination of the left-lateral transpressive wrench corridor of the NSS. The early tectonic fabric within the NSZ and associated highly deformed rocks was successfully detected by the integration of AMS-technique and microstructural observations. Such fabric grain was checked through a field-structural work. The outcomes of the present contribution advocate a complex tectonic evolution with successive and overlapped deformation events for the NSZ.

Keywords: Nugrus Shear Zone, Najd Shear System, AMS technique, Hafafit gneissic domes

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INTRODUCTION

The Arabian-Nubian shield (ANS) is regarded as an accretionary orogen [31, 68], comprising several Neoproterozoic juvenile island arc terranes accreted on the westward Saharan Metacraton during a long orogenic cycle started with the breakup of Rodinia [50] and continued to the final amalgamation of Gondwana [13, 51, 59]. Numerous sutures and major high strain zones were formed across the ANS, whereas lateral escape tectonics or extensional and transpressional episodes were predominating near the closing of such orogeny [12, 49, 68]. In the ANS, the Pan-African orogeny is characterized by short periods of early collision and amalgamation, and long post-collision structural and magmatic activity [35]. According to [24, 48], the northern ANS was amalgamated and (or) sutured between 740 and 700 Ma, whereas the structural and magmatic evolution continued at least until the end of the Neoproterozoic. The extensional, compressional and wrench tectonics characterized the latter period of tectonic activity. A major regional structure formed was the Najd Shear System (NSS) [24, 48, 67, 70], which cuts across the entire Arabian Shield for about 1300 km (the Qazaz-Arika Shear Zone) and extended into the central Eastern Desert of Egypt [70]. It was regarded originally as a major strike-slip zone, although subsequent studies indicate a more complex and polydeformed tectonic history [24, 48].

The outstanding differences increased from north to south, in the correlation of granite and gneiss, metavolcanics and metasediments, and ophiolitic serpentinites led into the most acceptable division of the Eastern Desert of Egypt into the North Eastern Desert (NED), Central Eastern Desert (CED) and South Eastern Desert (SED) [69]. The NED consists mainly of granitoids with minor metavolcanics, metasediments and rare serpentinites, while the CED is domi-

[1] The article is published in the original.