

Structural Constraints on the Evolution of the Neoproterozoic Jabal Gerf Nappe Complex (Southeastern Egypt), Arabian-Nub

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The Jabal Gerf mafic-ultramafic complex (? 40 km diameter) is the largest Neoproterozoic thin-skinned stacked ophiolitic nappe in the entire Arabian-Nubian Shield (ANS). It is situated in Gerf (Southeastern Desert/Aswan) tectonic terrane near the intersection between the NNE-trending Hamizana Shear Zone and the Allaqi-Heiani ophiolitic belt which decorates a segment of the Allaqi-Heiani-Sol Hamed-Onib-Yanbu Suture Zone. The complex comprises metaultramafic melange (locally highly sheared), island arc assemblage (mafic metavolcanics and volcanoclastic metasediments) and layered gabbros. This college is separated along WSW- (SW-) propagated thrust sheets and intruded by syn-to post-tectonic granitoids (sheared tonalite and granodiorite) and dykes. Superimposed and overprinting relations between structural fabrics encountered within this college reveal the effect of at least three phases of Neoproterozoic deformations (D1-D3). D1 formed very tight, intrafolial and transposed folds F1, with NW-SE (NNW-SSE) axial surfaces and NW-moderately-plunging axes (25o-35o N40o-60oW), non-penetrative axial planar foliations S1 (//So) and mineral lineation L1, which resulted from early NW- to NNW- oriented shearing and thrusting. D2 progressively overprinted D1 and was dominated by top-to-the-WSW thrusting and thrust-related folds F2, and penetrative crenulation foliations S2, which are mostly coincident with shearing planes of thrusts (i.e. S2=Sth), as well as mineral-, stretched-, pencil-like-lineations L2. F2 folding axes and L2 lineations are nearly coaxial plunging with axes (38o-42o N20o-25oW). D3 was attenuated phase, producing symmetric open folds with steeply plunging NE- (NNE-) axes F3, non-penetrative foliation S3 and kink axes L3. F3 and L3 are also coaxial, plunging 50o-55o N 25o-35oE. Following the D3, the Jabal Gerf mafic-ultramafic complex and granitoids were affected by a subsequent brittle phase D4 resulted in the formation of NNW-, WNW, NE-, NNE- and E-oriented right- and left-lateral-strike-slip faults. On the strain ellipse model, these faults represent an echelon second order Reidel shear (R1), conjugate Reidel shear (R2) and secondary synthetic shear (P), reflecting an activation of a horizontal principal stress from the SSE direction, most probably due to the movement along the Hamizana Shear Zone.

Keywords: Gerf Nappe, Neoproterozoic deformations, Allaqi-Heiani belt, Southeastern Desert, Arabian-Nubian Shield