An Insight into the Southern Extension of the Egyptian Golden Triangle and its Potentiality for Mineral Occurrences Related to Shear Activity

Mohamed Badawi
Miskolc Egyetem, Miskolc, Hungary

The Mubarak-Barramiya shear belt is a post-accretion nappe assemblage that extends in ENE-WSW direction alongside the southern boundary of the Egyptian Golden Triangle (EGT) that was announced in 2017 as an economic zone, amounting to 75% of reserves of Egypt's mineral resources—particularly of iron, gold, copper, and phosphate. This belt, which crosscut the main fabric in the Central Eastern desert, has been extensively intruded by multiphase magmatism, from syn-orogenic to post-orogenic granitoids, that is aligned with the NW-SE Um Nar shear zone and its prolonged shear activity. This regime, particularly sheared contacts of granitoids, has the potential to enrich precious base metals, i.e., orogenic gold occurrences and rare earth elements in the granitic pluton, or trigger hydrothermal mineral alteration to precipitate along quartz veins developed related to the master shear array. These veins form along extensional fractures as a result of post-amalgamation transtensional (i.e., the master shear array and related Riedel shears and tensional fractures) shearing, as a transition from transpressional (i.e., the master shear array and related P-shears, S-C fabric, and asymmetric folds) terrane accretion in response to Um Nar's shearing activity. Consequently, we applied an integrated approach to predict the potential mineral alteration localities that includes integrating detailed fieldwork (structural measurements and petrographic-oriented samples), remote sensing, and aeromagnetic data. Several data processing techniques, including false color composites (FCCs), band ratios (BRs), principal component analysis (PCA), minimum noise fraction (MNF), and decorrelation stretch (DS) are applied to ASTER, Sentinel 2, ALOS PRISM, and orientation entropy heat map (CET). The structural network of this fracture system greatly enhances the permeability within these Neoproterozoic rocks, allowing the precipitation of various potential mineral deposits as quartz veins due to the passing of hydrothermal fluids. These outcomes may be significant to broaden exploration further to the south of EGT.