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PII: \$1464-343X(18)30021-9

DOI: 10.1016/j.jafrearsci.2018.01.013

Reference: AES 3127

To appear in: Journal of African Earth Sciences

Received Date: 13 November 2017

Revised Date: 6 January 2018

Accepted Date: 19 January 2018

Please cite this article as: Abdelnasser, A., Kumral, M., Zoheir, B., Karaman, M., Weihed, Pä., REE geochemical characteristics and satellite-based mapping of hydrothermal alteration in Atud gold deposit, Egypt, *Journal of African Earth Sciences* (2018), doi: 10.1016/j.jafrearsci.2018.01.013.

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Abstract

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New geochemical data of the hydrothermal alteration zones associated with gold-bearing quartz veins at Atud mine are used for better understanding the ore evolution and exploration vectoring. ASTER and Landsat 8 OLI data are used to elucidate the distribution of goldassociated alteration zones. Three alteration zones are defined; zone 1 (sericite-kaolinitequartz-pyrite), zone 2 (quartz-sericite-albite-pyrite), and zone 3 (chlorite-carbonate-epidote ±pyrite). Sericite and hydrothermal quartz are confined to the mineralized quartz veins. Fe-OH and OH-bearing minerals are observed along NW- and NE-trending shear zones in the Main Atud mine. The association of gold-bearing quartz veins and sericite alteration is constrained by processing ASTER- and OLI-imagery data. The geochemical data of the ore-enveloping hydrothermally altered rocks are used to assess the behavior of the REEs during the mineralization process. Mild enrichment in LREE and significant enrichment in the HREE are associated with sericite in zones (1) and (2) alterations. Carbonate alteration (zone 3) is enriched in LREE and in immobile HREE. Moreover, LREE and Eu anomalies have negative correlated with the Alteration Index (A.I.) and K₂O index (K.I.) in zones 1 and 2, suggesting high mobility of LREE in K-rich hydrothermal fluids. On the other hand, HREE anomalies with increasing MgO index (M.I.) in alteration zone 3 may imply low solubility of these elements in alkaline solutions. Au anomalies linked to sericite/silica alteration is a rather meaningful vector for further exploration in the area.

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