Accepted Manuscript

REE geochemical characteristics and satellite-based mapping of hydrothermal alteration in Atud gold deposit, Egypt

Amr Abdelnasser, Mustafa Kumral, Basem Zoheir, Muhittin Karaman, Pär Weihed

PII: S1464-343X(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.

REE geochemical characteristics and satellite-based mapping of hydrothermal alteration in Atud gold deposit, Egypt

Amr Abdelnasser[a,b,*], Mustafa Kumral[a,**], Basem Zoheir[b,c], Muhittin Karaman[a], Pär Weihed[d]

[a] *Geological Engineering Department, Faculty of Mines, Istanbul Technical University, Istanbul, Turkey*

[b] *Geology Department, Faculty of Science, Benha University, Benha 13518, Egypt*

[c] *Department of Mineralogy, Institute of Geosciences, Kiel University, Ludewig-Meyn Str. 10, 24118 Kiel, Germany*

[d] *Division of Ore Geology and Applied Geophysics, Luleå University of Technology, Luleå, Sweden*

** Corresponding author: abdelnasser82@gmail.com,** kumral@itu.edu.tr*

Abstract

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 gold-associated alteration zones. Three alteration zones are defined; zone 1 (sericite-kaolinite-quartz-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 K_2O 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.