1-Geological and topographical study of the original hills at the base of Fourth Dynasty Egyptian monuments of the Memphite plateau

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Abstract

Rock foundations of the Kephren and Kheops pyramids are examined in comparison with other Fourth Dynasty monuments: the Sphinx, Queen Kentkawes' monument and the Abu Rawash monument. This study is based on geological and topographical observations, photomontages and field measurements. The results, which are correlated with those of former studies, demonstrate the existence of natural hills used as substrata in the construction of the two great pyramids. The minimum volume of these hills can be estimated at 12% and 23% respectively of the volumes of the Kephren and Kheops pyramids. The use of worked rock hills appears to be a construction method under the Fourth Dynasty.

Author Keywords:

Original hill; Egyptian pyramids; Stratigraphy; Topography

KeyWords Plus: EVOLUTION

Reprint Address:

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Publisher:

SOC GEOL FRANCE, 77 RUE CLAUDE BERNARD, 75005 PARIS, FRANCE

Web of Science Categories: Geosciences, Multidisciplinary

Research Areas: Geology

Source:

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2- Pan-African magmatism: Geochemical evolution and uranium mineralization of granitoid rocks, Southeastern Desert, Egypt

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Abstract

Granitoid rocks of the Wadi Um Geir-Wadi Allaqi (WUGA) area represent a Neoproterozoic calc-alkaline magmatic episode in the Southeastern Desert of Egypt. The rocks range in composition from high-Ca (>1 wt%) metaluminous to low-Ca (<1 wt%) peraluminous granites. The former are compatible with a volcanic-are environment, whereas the latter are related to within-plate A-type granites. The WUGA granites are highly fractionated and enriched in Rb, Nb, Y, and REE except for Eu. with corresponding depletions in Mg, Fe, Ti, Ga, Sr, and Ba. BEE fractionation patterns and Eu/Eu* values decrease from high-Ca metaluminous granite (La/Yb-n = 2.46 - 4.68; Eu/Eu* = 0.32 - 0.73) to low-Ca peraluminous granite (La/Yb-n = 0.37 - 1.23; Eu/Eu* 0.01.2 - 0.032, respectively). Major-element modeling suggests that the granitic types are products of a single stage of crystal fractionation. The low-Ca peraluminous granite formed by extreme fractionation of the high-Ca metaluminous granite liquid, with plagioclase, K-feldspar, and biotite as the dominant fractionating phases.

Radioactivity in the WUGA, attributed to the presence of thorium and uranium, is associated with the younger granites, especially within shear zones, fault planes, and pegmatitic bodies. The accessory assemblage of peraluminous granites consists of monazite, xenotime (in low-Ca varieties), fluorite, garnet, apatite, zircon, tantalite, columbite, Th-orthosilicate (huttonite), umohoite, uranophane, beta-uranophane, and betafite-pyrochlore minerals. Metalumious granites contain allanite, titanite, apatite, zircon, minor monazite, and Th-orthosilicate thorite). The genesis of secondary U minerals is mainly attributed to the action of oxidized groundwater on previously corroded primarly U minerals. These Secondary uranium minerals were deposited near the surface by evaporation.

Source:
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KeyWords Plus:
PRECAMBRIAN CRUSTAL EVOLUTION; A-TYPE GRANITOIDS; CHEMICAL CHARACTERISTICS; EASTERN DESERT; SILICIC MAGMAS; IGNEOUS ROCKS; NUBIAN SHIELD; SAUDI-ARABIA; PETROGENESIS; ORIGIN

Reprint Address:
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Publisher:
V H WINSTON & SON INC, 360 SOUTH OCEAN BLVD, PH-B, PALM BEACH, FL 33480 USA

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