

Re-Os dating of mineralization in Siah Kamar porphyry Mo deposit (NW Iran) and investigating on its temporal relationship with porphyry Cu-Mo deposits in the southern Lesser Caucasus, NW and central Iran

Vartan Simmonds (1), Mohssen Moazzen (2), and David Selby (3)

(1) University of Tabriz, Research Institute for Fundamental Sciences, Tabriz, Iran, Islamic Republic Of (simmonds_vartan@yahoo.co.uk), (2) University of Tabriz, Department of Earth Sciences, Tabriz, Iran, Islamic Republic Of, (3) Durham University, Department of Earth Sciences, Durham, UK

The Neo-Tethyan basin closure in Iran is characterized by the Urumieh-Dokhtar magmatic arc (UDMA), formed by north-eastward subduction of the Neo-Tethyan oceanic crust during the Alpine orogeny. This belt also coincides with the porphyry copper metallogenic belt of Iran, which hosts many porphyry Cu-Mo deposits (PCDs) and prospects, such as Sungun (NW Iran) and Sarcheshmeh (central Iran). The Siah Kamar porphyry Mo deposit (PMD) is the first discovered porphyry molybdenum deposit on this belt, which is located 10 km west of Mianeh (NW Iran), with 39.2 Mt proved reserves @ 539 ppm Mo and 66.4 Mt probable reserves @ 266 ppm Mo. The host porphyry stock has quartz-monzonitic composition, which intruded the volcanic and pyroclastic rocks of Eocene age.

Re content of molybdenites is about 10.44-41.05 ppm which, considering the several tens of ppm concentration, is comparable with porphyry Mo deposits (e.g., Climax in USA), being clearly distinguished from porphyry Cu-Mo deposits.

Re-Os dating of molybdenites from this PMD has given model ages between 28.1 ± 0.15 to 29.06 ± 0.2 Ma, and isochron age of 28.0 ± 2.1 Ma, corresponding to the middle Oligocene (upper part of Rupelian).

Comparing the ages determined for Siah Kamar PMD with porphyry Cu-Mo mineralizations in the Lesser Caucasus indicates that it is younger than most of the dated PCDs and prospects there, especially those of upper Eocene, while it is a little older than Paragachay and first-stage Kadjaran PCDs [1]. In a regional scale of NW Iran, it shows a narrow overlap with vein-type Cu-Mo-Au mineralizations in Qarachilar (Qaradagh batholith) and is nearly coeval with Haftcheshmeh PCD, indicating that mineralization in the Siah Kamar PMD corresponds to the second porphyry mineralization epoch in NW Iran, proposed by [2].

Meanwhile, mineralization in Siah Kamar is older than all the porphyry Cu-Mo mineralizations along the central and SE parts of the UDMA, except the Bondar Hanza PCD in Kerman zone, which nearly correlates with the Siah Kamar PMD. This signifies the episodic nature of magmatic activities and the related mineralizations along the UDMA and meanwhile, indicates that collision between the Arabian and Iranian plates was dischronous, being earlier in NW Iran and later in SE Iran, which can be resulted from the oblique convergence of these plates. Therefore, while the north-western part of the Neo-Tethyan basin (in the Lesser Caucasus and NW Iran) was closed in lower Eocene [1], its SE section was still open and so, the magmatism and mineralizations resulted from the melting of subducting slab and mantle metasomatism vary temporally along the UDMA.

[1] Moritz, R., Rezeau, H., Ovtcharova, M., Tayan, R., Melkonyan, R., Hovakimyan, S., Ramazanov, V., Selby, D., Ulianov, A., Chiaradia, M., and Putlitz, B. (2016) Long-lived, stationary magmatism and pulsed porphyry systems during Tethyan subduction to post-collision evolution in the southernmost Lesser Caucasus, Armenia and Nakhitchevan. *Gondwana Research*, 37, 465-503.

[2] Simmonds, V., Moazzen, M., and Mathur, R. (2016) Investigation on the age of mineralization in the Sungun porphyry Cu-Mo deposit, NW Iran with a regional metallogenic perspective. EGU General Assembly, 17-22 April 2016, Vienna.