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New mineral discoveries and porphyry-epithermal exploration potential of Iran

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Iran is a resource-rich country, occupying a central position in the Mesozoic-Cenozoic Neotethyan orogenic belt, which stretches from the Alps to Indochina. The most important mineral resources in the country include iron, copper, zinc, gold, and coal. Major deposits include the Mehdi Abad and Anguran Pb-Zn deposits, the Sarcheshmeh, Meiduk, and Sungun porphyry Cu-Mo deposits, the Zarshuran, Sari Gunay, Agh Darreh Au deposits, and the Gol Gohar, Sangan, Chadormalu Fe deposits.

The principal porphyry and epithermal deposits are located along the Tertiary Urmieh-Dokhtar magmatic arc, a linear NW-SE–trending volcanoplutonic belt that extends along the length of the Zagros orogenic belt for ~2, 000 km. These include several world-class porphyry Cu deposits, mostly associated with post collisional calc-alkaline magmas (Sar Cheshmeh: ~1.1 Gt at 0.64% Cu, 0.03% Mo; Meiduk: ~170 Mt at 0.82% Cu, 0.006% Mo; Sungun: ~500 Mt at 0.76% Cu, 0.01% Mo), and the less studied epithermal Au deposits. Iran's largest epithermal deposits include the Sari Gunay postcollisional epithermal Au deposit (52 Mt @ 1.77 g/t Au), the Zarshuran sedimentary rock hosted deposit (11.13 Mt @ 7.9 g/t Au), and the limestone-hosted Agdarreh deposit (6.62 Mt @ 3.7 g/t Au) in the Takab volcanoplutonic zone.

Here we group porphyry-epithermal deposits in Iran into seven provinces including Ahar-Arasbaran Magmatic Arc, Urumieh–Dokhtar Magmatic Arc, Alborz Magmatic Arc, East Iran zone, Kerman Porphyry Belt, Makran Volcanic Arc, and Kashmar-Khaf zone. In each province we discuss the characteristics of major porphyry-epithermal mineralization and highlight recent discoveries and exploration potential.