Magma genesis and Cu-Au ore formation (Apuseni Mountains, Romania) in light of Pb, Sr and Nd isotopic and chemical trends

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The porphyry-style and epithermal Cu-Au deposits of the Apuseni Mountains, Romania are hosted by Miocene magmatic rocks ~200 km behind the Carpathian subduction front. The host rocks are predominantly calc-alkaline diorites intruded from 14.7 – 7.4 Ma into NW-SE lineaments and graben-like structures containing coeval volcanic rocks. An additional pulse of post-ore, alkaline magmatism occurred at 1.6 Ma. Rocks younger than 12.5 Ma contain adakite-like signatures of high Sr/Y and relatively non-radiogenic Nd and Sr isotopes ($0.7040 \leq {}^{87/86}Sr \leq 0.7047$, $0.51261 \leq {}^{143/144}Nd \leq 0.51269$; Roşu et al., in press). Additional sampling of unaltered magmatic rocks was done in order to provide a comprehensive evaluation of Pb isotopes and complete Nd and Sr isotopic data and rock chemistry, covering the maximum ranges in age and chemical composition. Field and microscopic observations of magma mixing and mingling suggests interaction of several magma types prior to intrusion of the stocks. Neogene magmatism is currently thought to be the product of extension during rotation of lithospheric blocks indenting the Carpathian arc (e.g., Seghedi et al., 2004). Adakite-like magmas were emplaced generally after large-scale rotation and are interpreted to represent derivates from a fluid-metasomatized mantle source (no geotectonic evidence for slab melting; Roşu et al., in press). Combined geochemistry and Pb, Nd and Sr isotopes will be used to further constrain magma genesis, with an emphasis on determining possible parameters responsible for the formation of Europe's largest Cu-Au ore district.

References

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Epithermal gold district in southeast Iran

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In this study the formation of an epithermal gold deposit in Bazman area at southeast Iran, Baluchestan has been investigated this area and is covered by neogene volcanices. (andesite and andesi-basalts). Romanko et.al have suggested more investigations about epithermal or mezothermal ore formation in the area. The area is fractured and faulted. Alteration has affected the volcanics in at least two stages. Epithermal textures are observed broadly in the area, including coloform texture in microscopic and macroscopic scales, fracture filling, stock works, bladed calcite, vuggy (residual) quartz and zoned crystals. Hydrothermal brecciation is an important feature of the area. Ore formation has occurred as Au bearing chalcedony-adularia veins, veinlets and stock works.

Fluid inclusion investigations has showed formation temperature of 160-270 degrees and low salinities (about 1.5-3 percent NaCl equivalent).

The alteration minerals association including adularia + gypsum + chlorite + sericite ± kaolinite ± goethite show the effection of a neutral ore forming fluid.

Pyrite zones have not shown any mineralization and have very low Au contents.

Ag has low contents in rich Au samples, base metals (Cu,Pb,Zn) have low with Au and Ag with Au is low and negative.

Textural characteristics and characteristics of fluid inclusions shows an epithermal environment. In addition, the alteration minerals association and fluid pH (neutral pH) resulted from studing them shows the effection of an low sulfidation epithermal gold deposite.