The Magmatic Sulfide Inclusion in some Intrusions from the Metaliferi Mountains, Romania (preliminary data)

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In the South Apuseni Mountains (SAM) area, the Miocene-Quaternary magmatic activity evolved in three episodes. The earliest volcanic rocks are Lower Badenian (ca. 15 Ma old) dacitic tuffs, the age is inferred from stratigraphic relationships with paleontologically dated Miocene sediments. The main episode, developed in Upper Badenian-Pannonian is represented by an early volcanogenic sedimentation in newly created pull-apart basins, followed by two magmatic activity events. The first, between 14.8–11 Ma, (calc-alkaline medium-K quartz andesites with amphibole, pyroxene ± biotite) is spatially restricted to Zarand-Barza-Zlatna-Rosia Montana-Bucium areas. This area shows a progressive clockwise rotation of 70º between 14.5 Ma and 12 Ma. The second, between 12.6–7.4 Ma (calc-alkaline medium to high-K quartz andesites with amphiboles, biotite ± pyroxene), covers largely areas in the Deva-Sacaramb-Hartagani and Baia de Aries-Rosia Montana zones. The main products here are "adakite-like" calc-alkaline rocks. Small bodies with alkaline features (trachyandesites, microdiorites; 10.5 Ma) in Sacaramb-Hartagani area and basaltic andesites (7.4 Ma) in Rosia Montana-Bucium area, with distinct geochemical signature, are the latest products in the respective districts. Paleomagnetic data indicate no rotations. The last episode (Early Pleistocene) displays an alkaline character and occurs on a different geostructural context after a gap of about 6 Ma only in Uroi Hill (1.6 Ma) at the east to Deva zone.

The Neogene ore-deposits of the SAM are related to "normal" and "adakite-like" calc-alkaline intermediate magmatic complex structures generated under extensional regime in a non-subduction setting. Despite of some mineralogical and geochemical differences existing between "normal" and "adakite-like" calc-alkaline andesites, the whole area of SAM is characterized by numerous porphyry copper systems (Cu+Au, Mo), base metal-gold and telluride epithermal ores: veins, breccia pipes or replacement bodies. There are three main episodes for mineralization processes: the first, at the Badenian/Sarmatian boundary in Rosia Montana area (13.6 Ma), the second, (largely developed at regional scale) after the cessation of the clockwise rotation, between 12.5-10 Ma (Middle Sarmatian-Upper Pannonian) and the third, in Pannonian, between 9.5-8.5 Ma at Baia de Aries.

Based on the field observations, geochronological, geochemistry and isotopic data of the rocks and according to pre-ore and post-ore setting of some intrusions from “volcano-plutonic” structures that generated porphyry copper (Deva, V. Morii, Bucium Tarnita) or epithermal gold mineralizations (Sacaramb, Rosia Montana, Baia de Aries) we have selected the samples for investigations. We have analyzed these samples and measured by LA-ICPMS the unexposed primary sulfide melt inclusions (MIS) enclosed in phenocrysts of plagioclase, amphibole and sometimes magnetite. Petrographic observations on polished surfaces show that MIS has varied shapes. They are represent as monophases sulfide minerals (pyrrhotite, chalcopyrite, and bornite) or are composed of several phases of these sulfide minerals associated sometimes with Fe-oxides, accounting for variations in fO_2, fS_2 and iron activity in the host magma. Sulfide MIS were analyzed for their Fe, Cu, Ni, Au, Ag and Te contents. At regional scale, the contents of these elements and theirs ratios present important values according to the type of MIS and the type of mineralization, too. The Cu contents are usually up to 10wt%, with frequent values between 10wt.%-20wt.% and sometimes up to 40wt.%. Gold concentrations are approximately constant between 0.5 and 2 ppm.