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Preliminary fluid inclusions study in the Bucium Rodu-Frasin Neogene volcanic structure, Metaliferi Mountains, Romania

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Bucium Rodu maar-diatreme and Frasin dome volcanic structures and related Au-Ag epithermal deposits are located in the northeastern part of the South Apuseni Mountains, and belong to Bucium-Rosia Montana-Baia de Aries metallogenic district, within so called "Golden Quadrilateral".
The microthermometric measurements were carried out using double polished sections, on bipyramidal magmatic quartz phenocrysts and hydrothermal quartz phenocrysts. Depending on the clarity of the quartz, samples were polished down to 200 – 400 μm thick. A standard microscope for transmitted and reflected light was used for the sample petrography. Linkam THM SG600 heating-freezing stage, combined with a Nikon E 400 microscope and a Nikon DXM 1200F digital camera, were used to measure the fluid inclusions homogenization temperatures.
The Frasin magmatic quartz phenocrysts, occurs as well-formed bipyramidal β -form quartz phenocrysts and contain apatite, zircon, melt inclusions and fluid inclusions. They reach up to 1 cm in diameter and their cracks are re-filled with carbonate, sericite and sulfides. The size of fluid inclusions ranges from very fine (2-3 μm) up to 25 μm. Primary and pseudosecondary fluid inclusions are not common, they occur in small groups with sizes ranging between 5-20 μm, having two phases: liquid and vapor. Based on the homogenization temperatures and phase proportions at room temperature, we could separate 2 types/fields of range for primary and pseudosecondary fluid inclusions as follows: 1. Liquid rich fluid inclusions (50-60 vol. % liquid) with Th=370-406°C and 2. Vapor rich fluid inclusions (10-30 vol. % liquid) with Th=420-519°C. All of the fluid inclusions homogenize by the disappearance of the vapor phase.
Microthermometric data from hydrothermal quartz crystals were obtained from quartz phenocrysts of carbonate-quartz-base metal sulfides-gold veins of the dacite breccias. Primary fluid inclusions from hydrothermal quartz crystals have sizes up to 50 μm and comprise two phases: liquid and vapor. Liquid rich inclusions comprise 70% of fluid inclusion population and have the proportion of two liquid phase ranging between 60-90 vol. % liquid. Based on the homogenization temperatures and phase proportions at room temperature, we could separate 3 types/fields of range of hydrothermal fluid inclusions as follows: 1. Liquid rich fluid inclusions (80-90 vol. % liquid) with Th=234-293°C, 2. Liquid rich fluid inclusions (50-80 vol. % liquid) with Th=324-399°C; 3. Vapor rich inclusions (95-70 vol. % vapor) Th=424-497°C. Vapor rich inclusions comprise 30% of fluid inclusions population and have the proportion of vapor ranging between 95-70%. The microthermometric measurements showed high Th ranging between 424-497°C.
The presence of high temperature fluids trapped in hydrothermal quartz that are not common with epithermal stage (<300°C) suggests the existence of a second vent of reheated fluids showing a polistadial activity in the region.
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