

Metamorphic and magmatic fluid sources for sulfide-bearing vein assemblages at Sierra Norte ranges, Sierras Pampeanas, Argentina.

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The study area (29°46'S, 64°07'W) is part of the Sierra Norte-Ambargasta batholith, composed of Cambrian to Ordovician I-type calcalkaline granitoids, emplaced in Precambrian metasediments. Two sulfide-bearing vein systems occur nearby a 170km² dacite-rhyolite stock. At Rodeito, a quartz stockwork crosscuts low-grade metasediments; several vein types have been identified, with assemblages composed of quartz, epidote, calcite, chlorite and albite. Chalcopyrite, pyrite, bornite, galena and sphalerite have been recognized. At Caspi Cuchuna, a silica-carbonate sulfide-bearing vein system extends throughout 2km², emplaced in granodiorite host rocks. Three main vein types have been distinguished; mineral assemblages include chlorite, quartz, sericite, adularia, calcite, magnetite and hematite, grouped in different paragenesis. Chalcopyrite, pyrite, bornite, sphalerite and an Ag-bearing phase occur together with Sb-As-Au-Bi geochemical anomalies. Quartz fluid inclusions from Rodeito veins yielded homogenization temperatures (Th) in the range 300-400°C. The quartz-chlorite geothermometric pair shows equilibrium temperatures of 600-650°C. Isotopic data at Rodeito are: $\delta^{18}\text{O}_{\text{Qz}}=10.3\text{-}11.2\text{‰}$, $\delta^{18}\text{O}_{\text{Chl}}=5.8\text{-}6\text{‰}$ and $\delta\text{D}_{\text{Chl}}=-59, -61\text{‰}$. Computed $\delta^{18}\text{O}_{\text{H}_2\text{O}}$ at 600°C= 9.8‰ (from quartz) and 8.5‰ (from chlorite). The $\delta\text{D}_{\text{H}_2\text{O}}$ computed from chlorite at 600°C is -26‰. Microthermometric data in quartz from Caspi Cuchuna veins show Th between 235-335°C. Measured isotopic values are $\delta^{18}\text{O}_{\text{Qz}}=11\text{‰}$, $\delta^{18}\text{O}_{\text{Cc}}=16.6\text{‰}$ and $\delta^{13}\text{C}_{\text{Cc}}=-5.2\text{‰}$. Computed $\delta^{18}\text{O}_{\text{H}_2\text{O}}$ (from Qz at Th)= 5.2‰. Sulfides distribution seems to derive from two different genetic models. Water isotopic data from Rodeito suggest a metamorphic origin for fluids involved in quartz-sulfides deposition, whereas a magmatic origin is indicated for fluids at Caspi Cuchuna area, which appears to represent the roots of an epithermal system.