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FLUID INCLUSION STUDIES IN EPITHERMAL AURIFEROUS-QUARTZ DEPOSITS OF MACIZO DEL DESEADO, SANTA CRUZ, ARGENTINA.

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Fluid inclusion (FI) studies were carried out on samples from five localities in the Macizo Del Deseado, Santa Cruz Province. They consisted of microscopy, microthermometry and microRaman spectroscopy. Figure 1 is the histogram for all Th obtained in this study.

The Macizo del Deseado became an area of high exploration interest following the discovery of important Au/Ag-bearing quartz veins. They are of the low sulphur epithermal adularia-sericite mineralization type. The Bajo Pobre and Dorado/Monserrat veins are hosted by andesites and basalts of the mid-Jurassic age whereas the Cerro Vanguardia and Manantial Espejo veins are in a volcano-piroclastic complex of middle to upper Jurassic age (Chon Aike Formation). The latter has an extensive areal distribution consisting basically of ignimbrites and piroclastic breccias of rhyolitic composition. The El Macanudo siliceous vents are lateral exposures of sinter crusts deposited on ignimbrite covers. In the El Macanudo area four thin sections from different concentric vent layers showed a dominance of chalcedony with quartz in limited areas. The few FI detected were primary, small (< 5µm), and always monophasic. Freezing studies were unable to show noticeable phase changes or nucleation of vapor phases pointing to a very low FI formation temperature (<70°C).

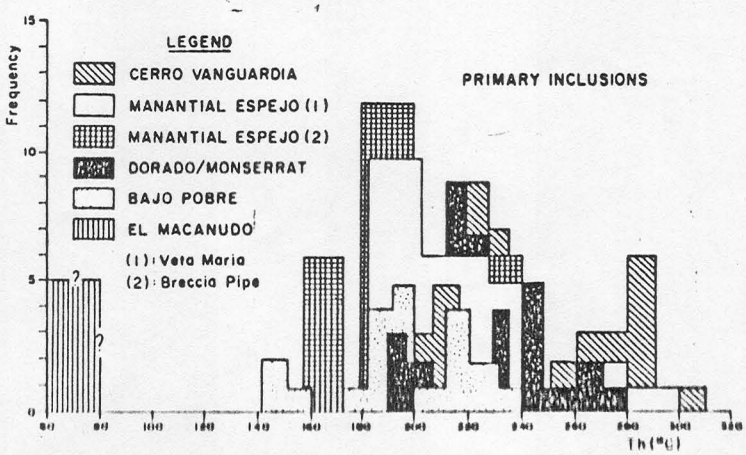
Samples from Bajo Pobre area presented many FI in growth zones (primary) of quartz crystals. One phase FI dominate over the two phase ones. The aqueous fluid indicated almost pure water (0.18-0.35 wt% NaCl equiv.). The measured Th may be somewhat lower than the highest values (~230°C, Fig. 1) as necking down is a common feature. In the Manantial Espejo area, Rios et al. (1994) indicated low salinity (4 wt% NaCl equiv.) aqueous FI in quartz from Veta Maria. A sample from a breccia pipe indicated higher salinity (5.0-6.6 wt% NaCl equiv.). Quartz crystals from both samples present growth zones with decreasing Th: from 300 to 180°C in the vein and from 240 to <160°C in the breccia.

In the Dorado/Monserrat area barite which is of late stage paragenesis presented only one phase FI of fairly large size (~15 µm), with T_{mice} = -1.0°C (1.74 wt% NaCl equiv.). Common occurrence of superheated ice metastability precluded further measurements. FI in quartz indicated salinities of 0.71-1.4 wt % NaCl equiv. and Th in the range of 190-280°C.

At Cerro Vanguardia deposit quartz from Atila vein presented fairly good FI related to growth zones. The Tmice all fell in the narrow range of -0.2 to 0.0°C (0.35 wt% NaCl equiv.). The T_h were between 200 and 310°C, the highest T_h found in this study.

The obtained composition and temperatures of fluids fit well within the values known for veins in volcanics of epithermal Au deposits (Roedder, 1984 - Table 15-4). They are also consistent

with studies on conditions of Au deposition in these environments (Berger and Henley, 1989). If the temperature is one of key factors in Au precipitation as is suggested by these authors (Fig.2) it fits well in our case: Cerro Vanguardia, Manantial Espejo, and Dorado/Monserrat which presented the highest Th values are the areas with richer Au mineralization. Mineralization is poor or non existent at Bajo Pobre and El Macanudo where the T_h is below 200-220°C. In these areas, deeper levels where the temperatures reach values equivalents to Cerro Vanguardia and Manantial Espejo, may prove to be the places with Au precipitation. The correlation between Au mineralization and T_h of FI in quartz is a prospecting tool worth further testing in Chon Aike formation quartz veins.



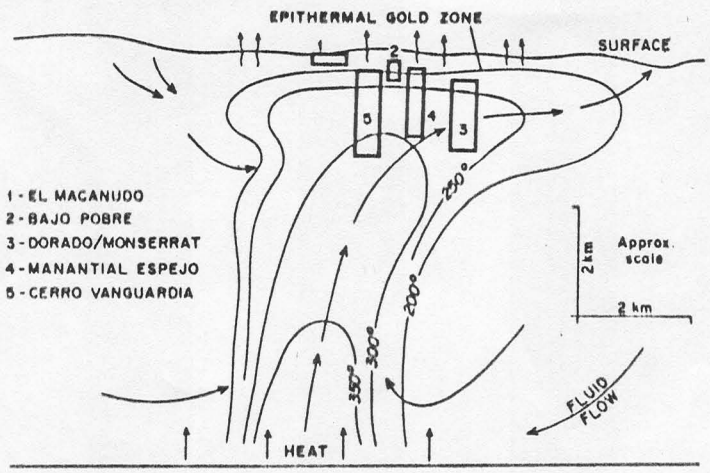


Fig. 1: Composed histogram of aqueous two-phase FI homogenization temperatures from the studied areas.

Fig. 2: Cross section showing isotherms of a geothermal system to indicate levels of FI entrapment in the studied areas. (adapted from Berger and Henley, 1989).

References

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