Geology, Alteration, Mineralization and Hydrothermal Evolution of the La Bodega-La Mascota Deposits, California-Vetas Mining District, Eastern Cordillera of Colombia, Northern Andes.

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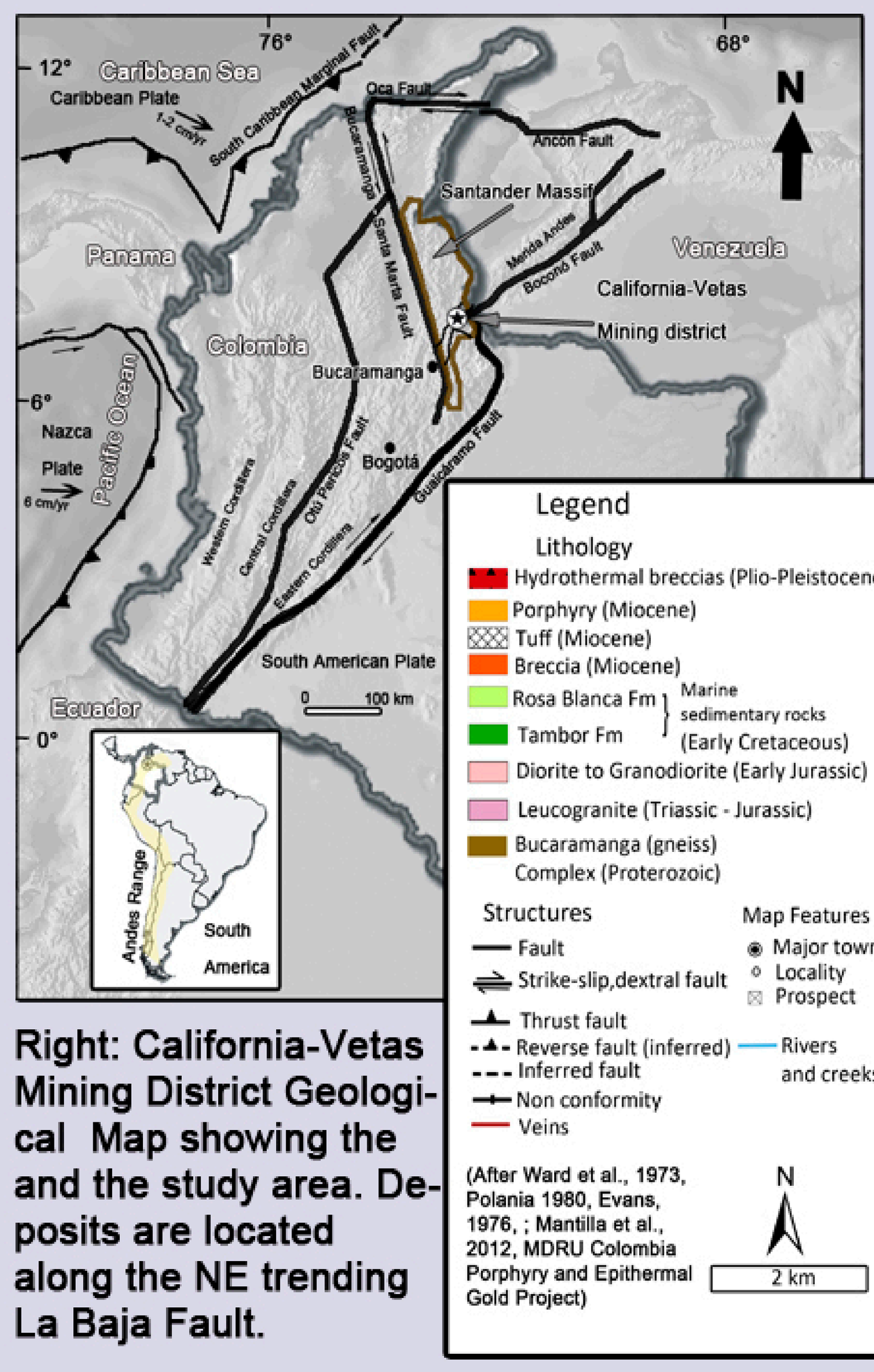
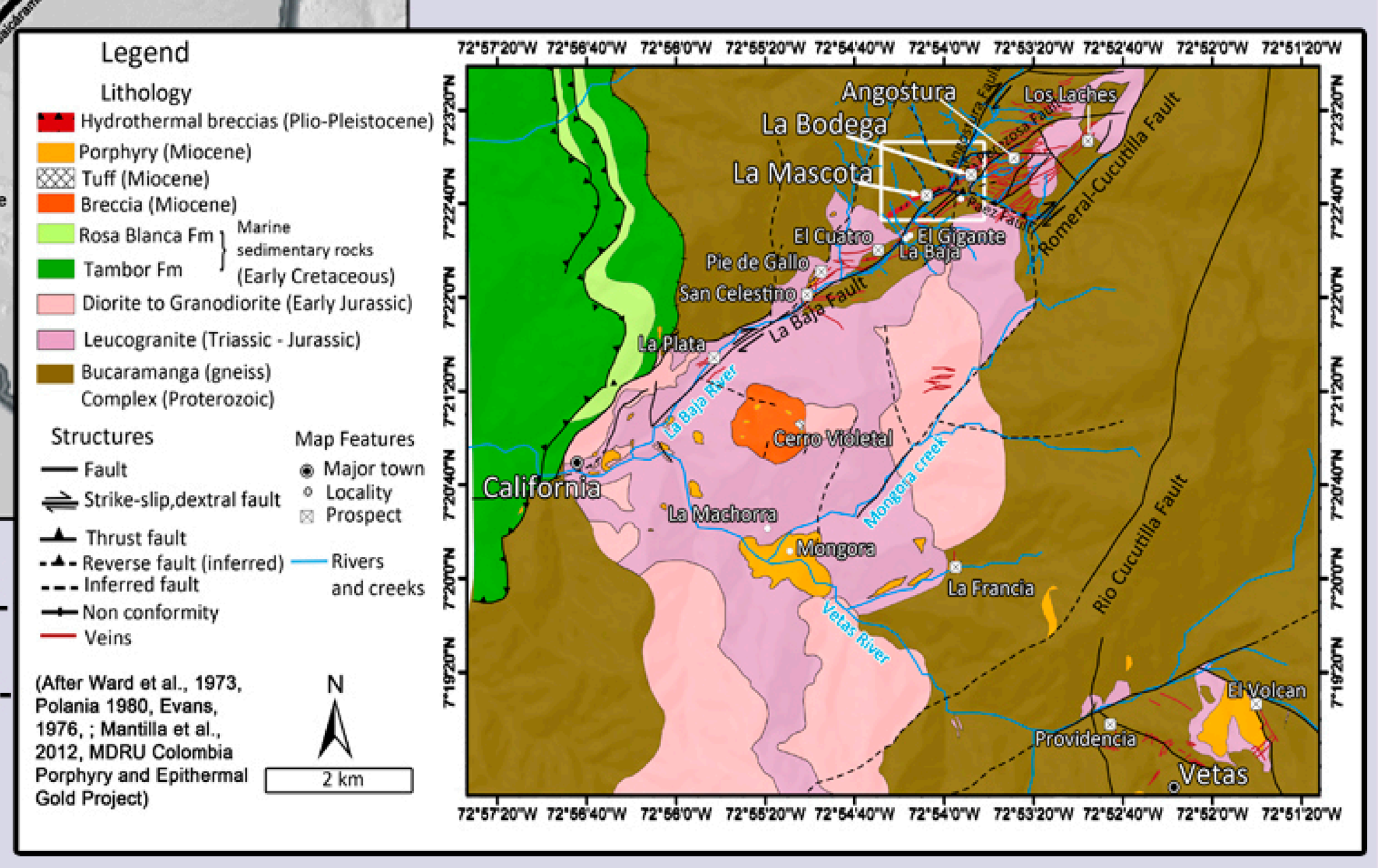
AME BC Mineral Exploration Roundup 2014

Introduction

La Bodega and La Mascota deposits (inferred resources in 2010 of 3.47 Moz Au, 19.2 Moz Ag and 84.4 Mlbs Cu at 2 g/t Au cut off) are located in the California-Vetas Mining District, in the Northern Andes of Colombia. Mineralization exhibits NE-trending, NW-dipping structural control associated with the right lateral strike-slip La Baja fault. Mineralization at La Bodega is composed of vein networks and tectonic-hydrothermal breccias while at La Mascota is largely contained in hydrothermal breccias. Mineralization is hosted in Proterozoic rocks from the Bucaramanga (gneiss) Complex and Triassic-Jurassic granites from the Santander Plutonic Group.

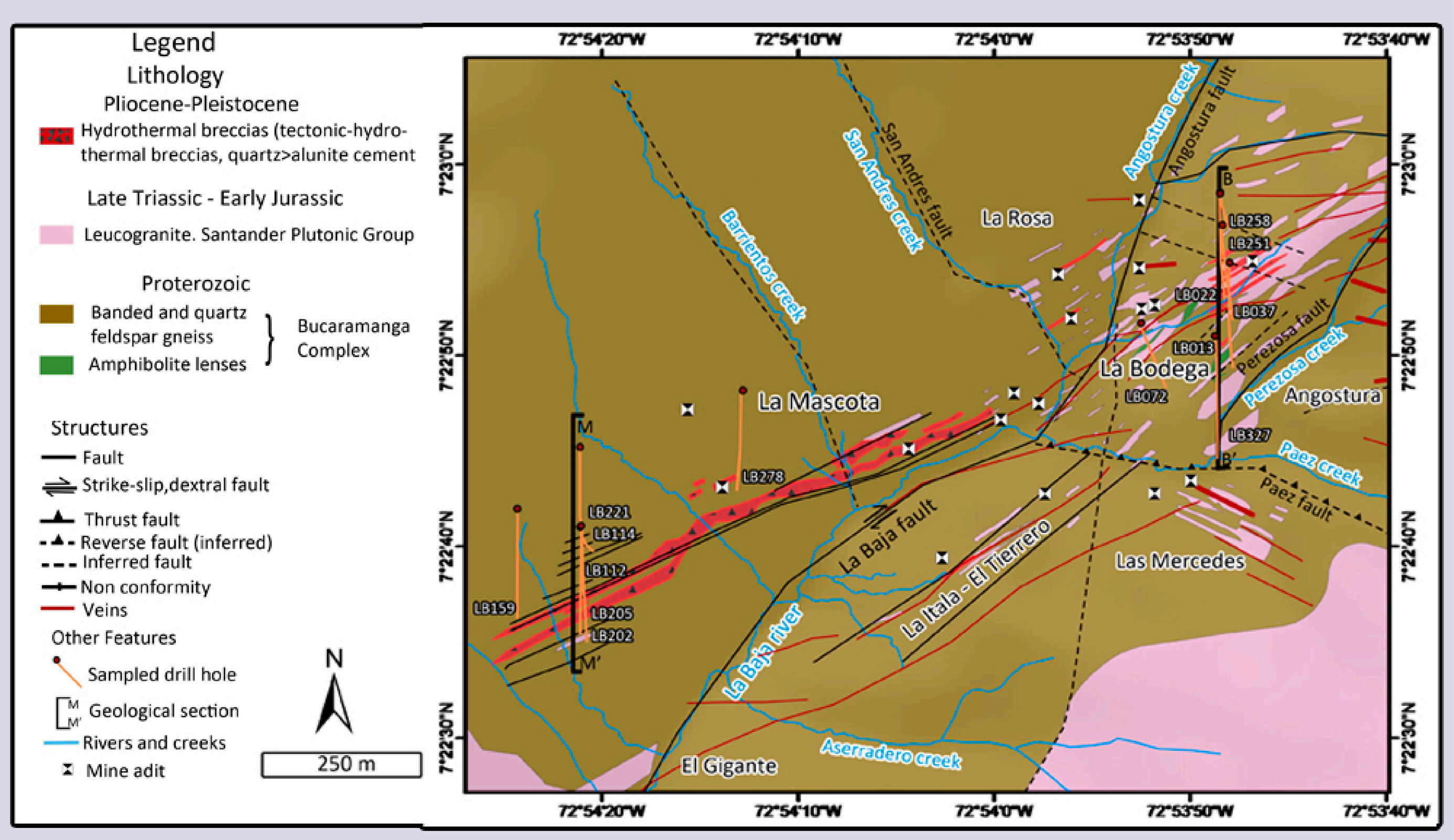


Left: Location of California-Vetas Mining District (CVMD) within Colombia, South America. The CVMD is adjacent to the NE striking Boconó Fault in close vicinity to the intersection with the tNE striking Bucaramanga-Santa Marta Fault

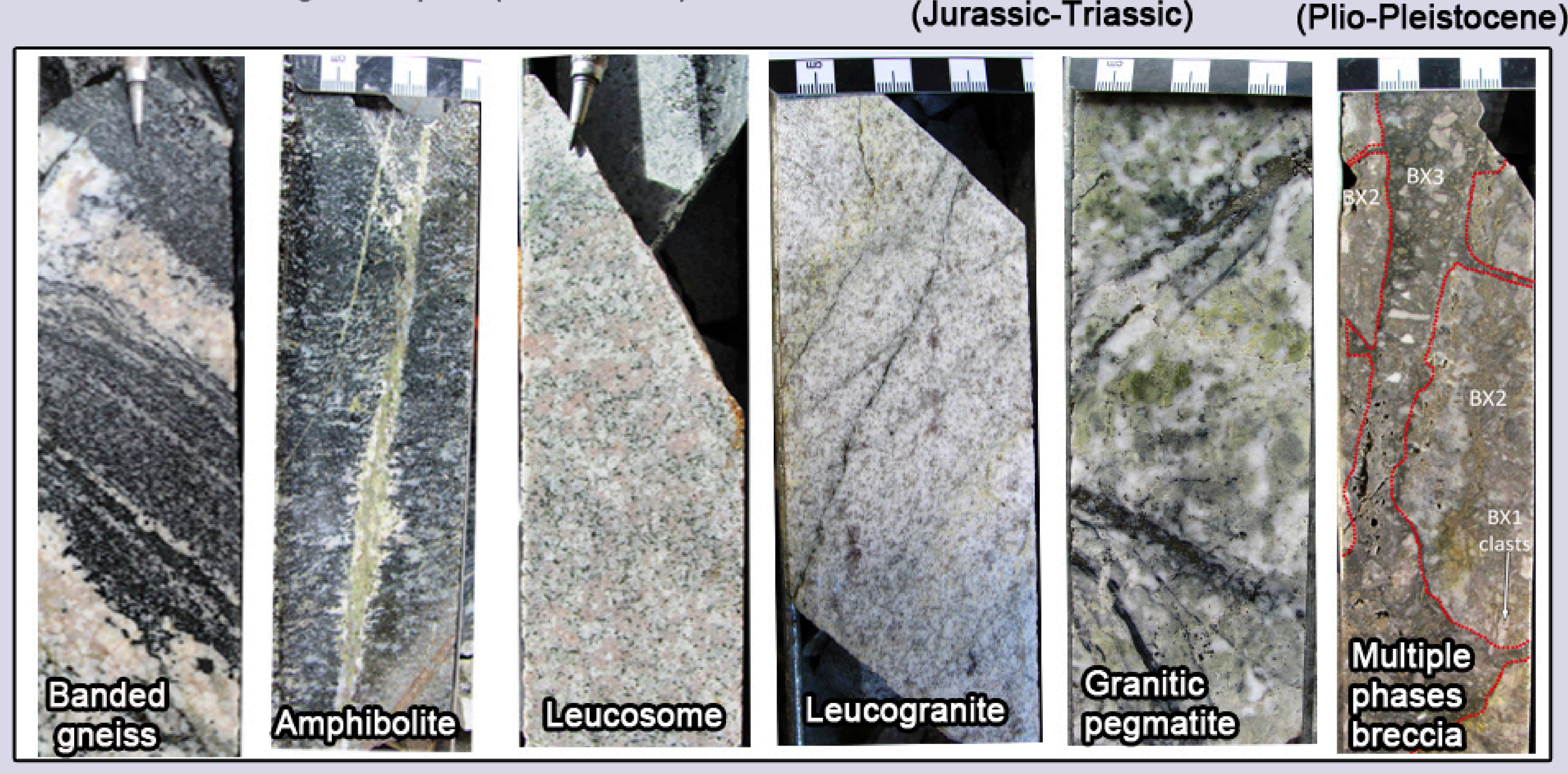


Right: California-Vetas Mining District Geological Map showing the and the study area. Deposits are located along the NE trending La Baja Fault.

Below: La Mascota and La Bodega area geological map showing geological sections M-M' at La Mascota and B-B' at La Bodega (Modified after A. Bernasconi and Ventana Gold Corp. geology department; original map provided by Ventana Gold Corp, 2010)

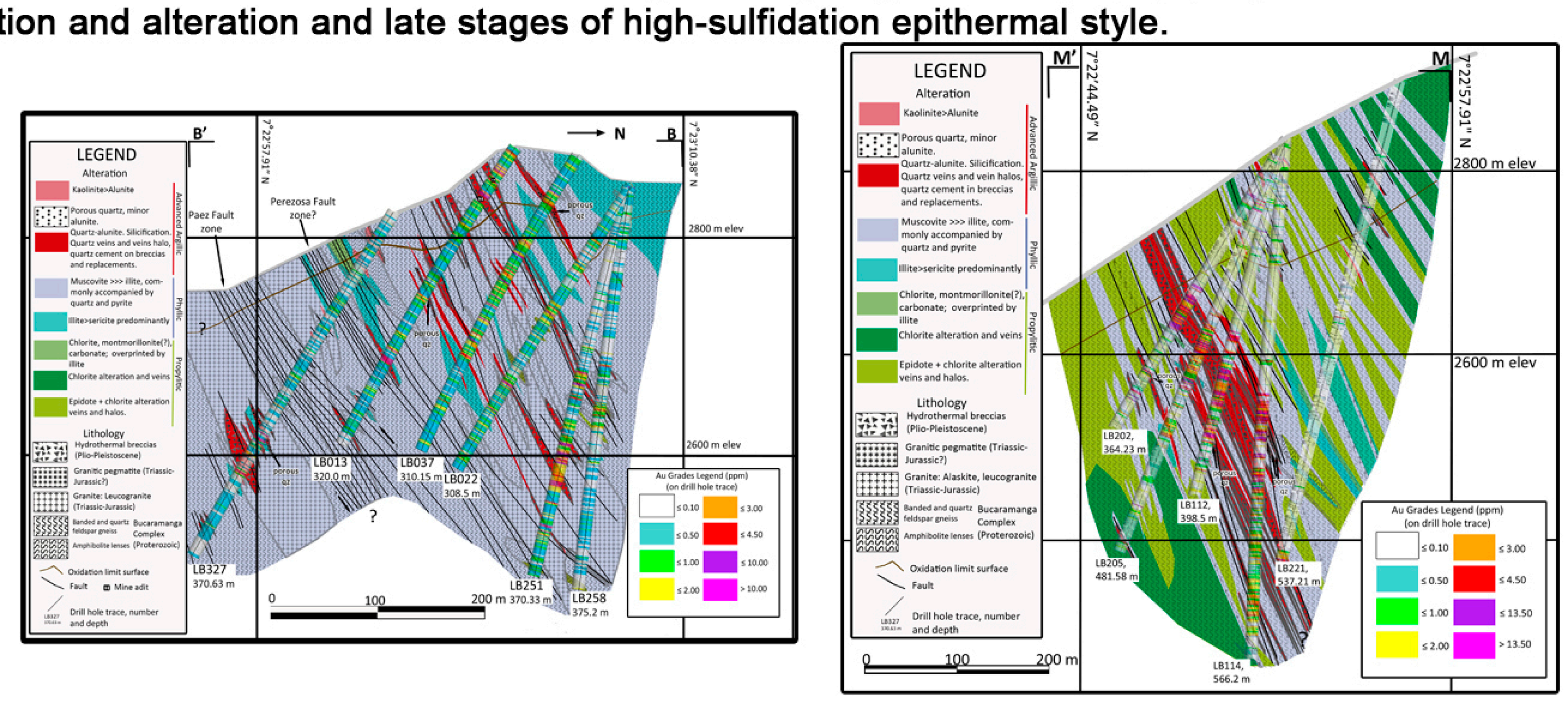


Rocks at La Bodega-La Mascota



Hydrothermal alteration and mineralization

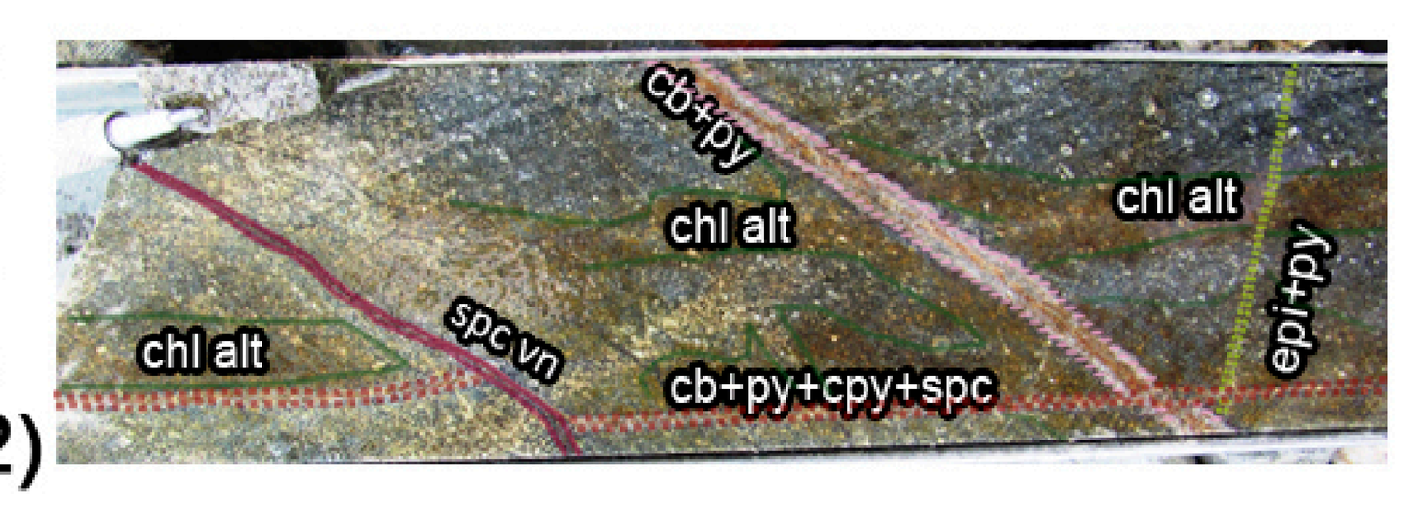
Alteration and mineralization at La Bodega-La Mascota is structurally and lithologically controlled and occur in six different stages. Early stages are of porphyry style mineralization and alteration and late stages of high-sulfidation epithermal style.



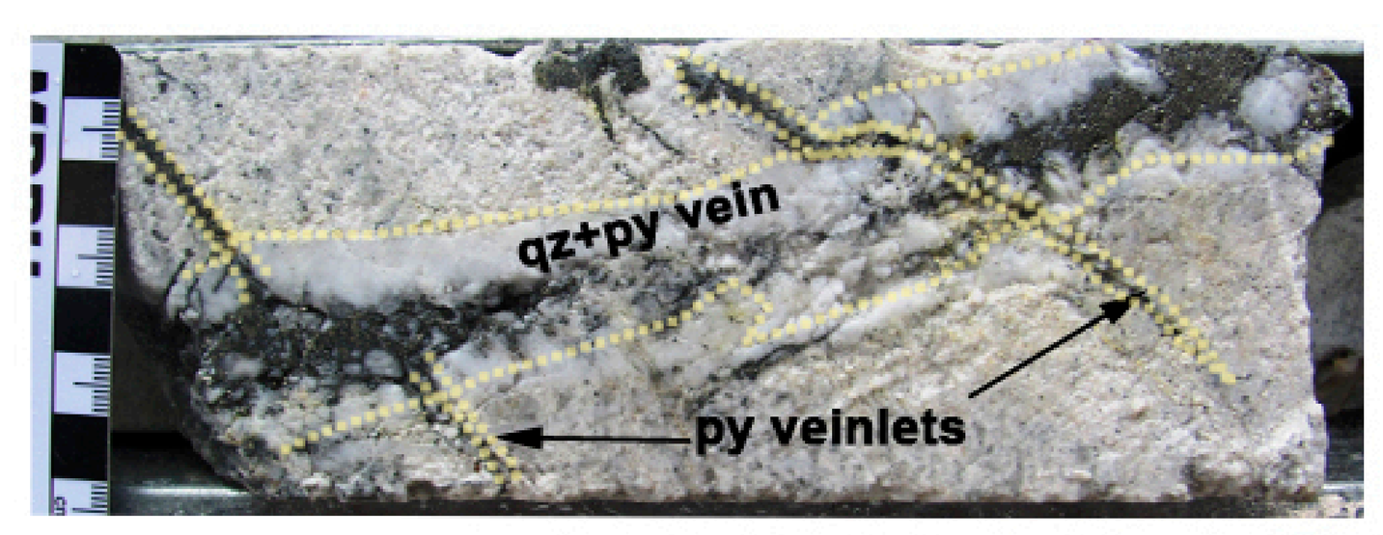
Alteration-geology sections. Gold grade is shown on drill hole traces (data provided by AUX and Ventana Gold Corp., drawn using Leapfrog Mining software). Left: La Bodega B-B' NS section. Right: M-M'La Mascota NS section. Phyllic alteration is more widespread at La Bodega than at La Mascota. Higher gold grades are associated with hydrothermal breccias and advanced argillic alteration.

Porphyry style alteration and mineralization

Stage 1 is characterized by propylitic alteration: with epidote (epi), chlorite (chl), carbonate (cb), specularite veins (spc), minor pyrite (py) and chalcopyrite (cpy). stage 1 is probably associated with porphyry style molybdenite veins at El Cuatro Re/Os dated at ~10.14 Ma (Bissig et al., 2012)

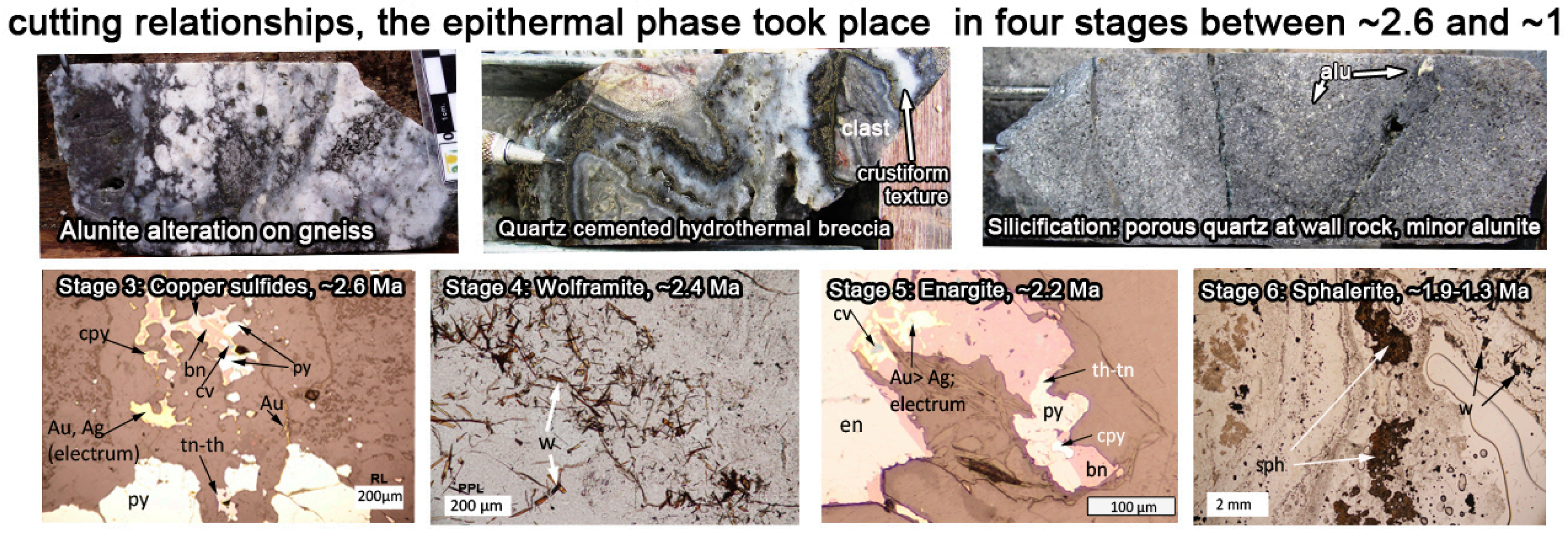


Stage 2 is characterized by phyllic alteration (muscovite/sericite – illite, quartz, pyrite) associated with quartz+pyrite veins. According to $^{40}Ar/^{39}Ar$ geochronology on muscovite Stage 2 took placed ~3.4 Ma.



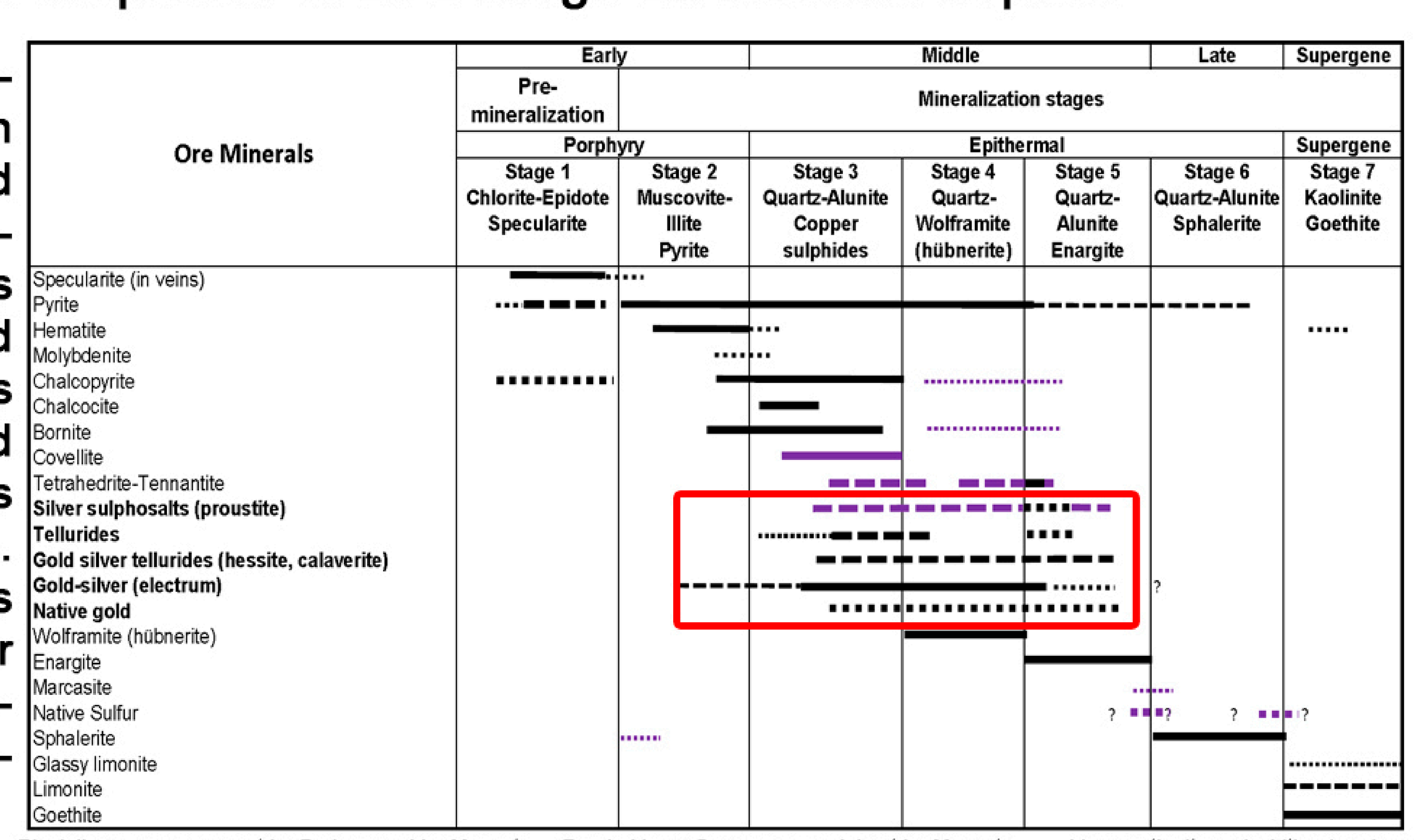
High-sulfidation epithermal alteration and mineralization

Advanced argillic alteration: Alunite-quartz alteration, silicification, quartz cement in hydrothermal breccias. According to $^{40}Ar/^{39}Ar$ geochronology on alunite and based on vein/breccia cross-cutting relationships, the epithermal phase took place in four stages between ~2.6 and ~1.3 Ma.



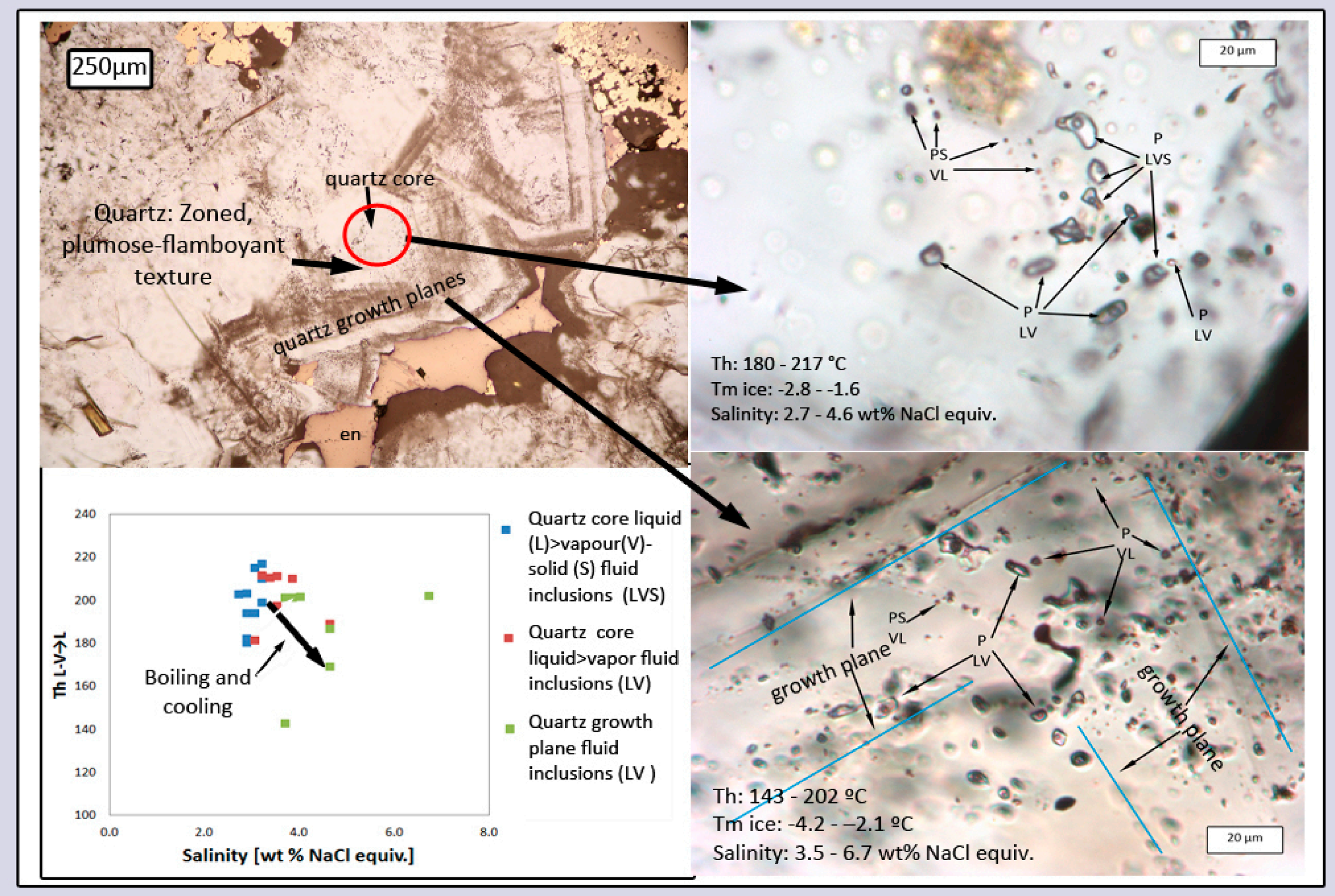
Paragenetic Sequence of La Bodega-La Mascota deposit

Gold-silver mineralization took place mostly in stages 2 through 5 (red box) associated with sulfides. Gold occurs as electrum, native gold and tellurides. Silver occurs as electrum silver and sulfosalts. Pyrite is common in all stages. Hydrothermal events were followed by near surface supergene alteration and fault reactivation.



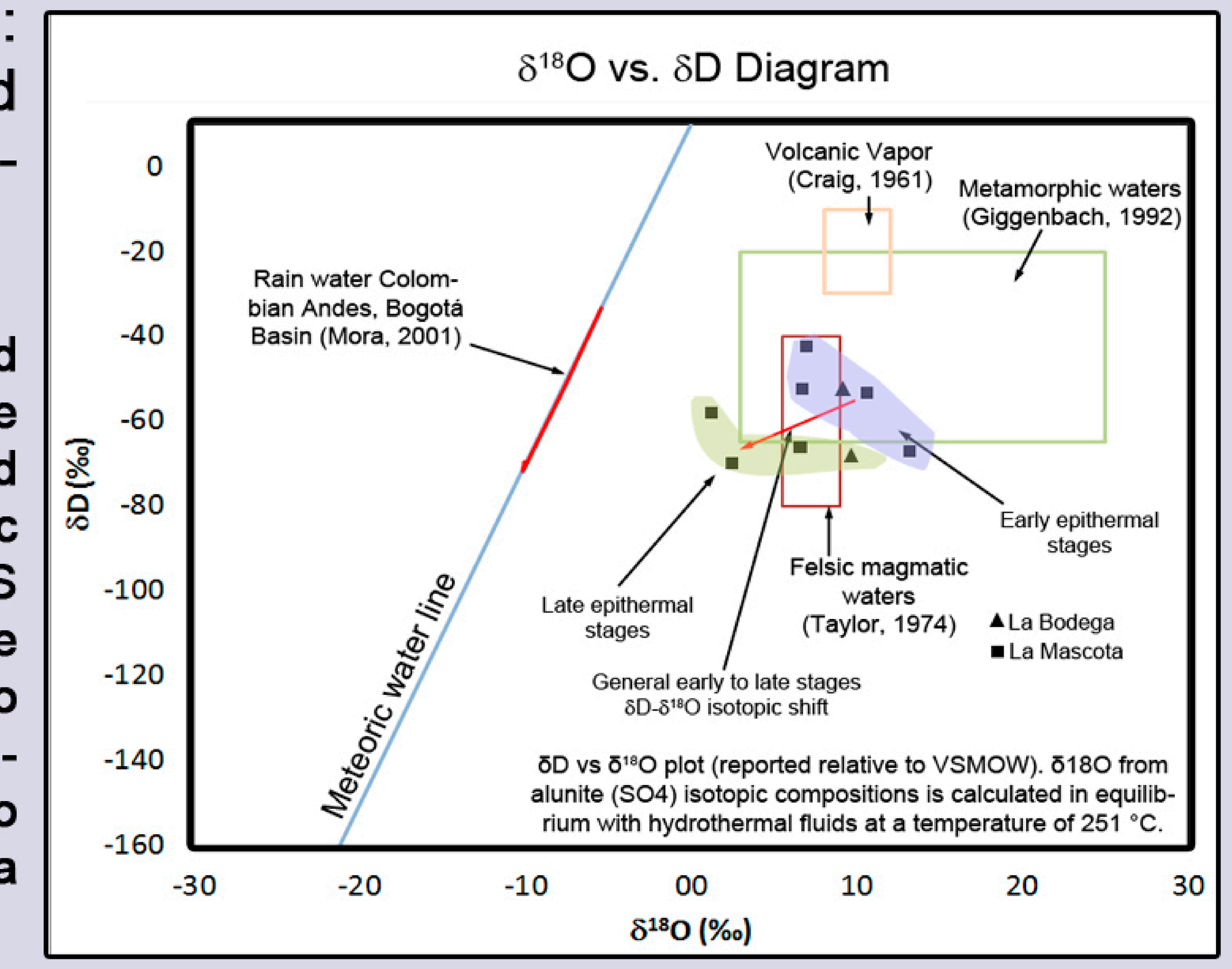
Fluid Inclusions and Microthermometry

At La Mascota, stages 4-5 zoned quartz primary fluid inclusions assemblages indicate boiling with homogenization temperatures of ~143-238°C and salinities of 0.5-5.6 wt% NaCl equiv.



Stable Isotopes: nature and origin of the mineralizing fluids

Based on δ¹⁸O and δD data, alunite was precipitated from magmatic fluids. Pyrite δ³⁴S signatures range from -16.9‰ - to 11.3‰ at La Mascota and -8.3‰ to –6.1‰ at La Bodega.



Conclusions

Alteration and mineralization took place episodically in distinct hydrothermal pulses over 8-9 Ma. from the Late Miocene to the Pleistocene. Pliocene-Pleistocene epithermal high-sulfidation alteration/mineralization cross-cuts and superimposes on porphyry style alteration/mineralization and it was deposited from fluids of magmatic origin undergoing boiling/cooling.

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Acknowledgments

The authors wish to thank the sponsors of this project AUX Colombia Ltd. and Ventana Gold Corp.- CVS Explorations Ltda. as well as the sponsors of the MDRU Colombia Porphyry and Epithermal Gold Project including Eco Oro Minerals, Teck Resources, Barrick Gold, Sunward Resources, Anglo American, Anglogold Ashanti.