Metallogenetic Epochs and Tectonic Evolution of the Northern Chilean Andes

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The Andes of northern Chile is one of the richest mineral provinces in South America. Mineralization is there related to a series of eastward younging magmatic belts. Although the causes of this eastward shift are still a matter of debate, the times of migration closely match the time of change in the global plate dynamics. Each one of these belts shows a unique petrologic signature and a specialized metallogeny. The oldest, Jurassic, "La Negra" system, a carrier of stratabound coppers deposits, is a suite of tolehitic extensional lavas erupted along the Coastal Ranges during the initial stages of Andean subduction. A "middle" Cretaceous phase of enhanced extension correlates with the emplacement of massive magnetite-apatite and magnetite-calcopyrite (La Candelaria) orebodies, stratabound deposits and rare porphyry coppers. A new magmatic system was established further to the east along the axis of the modern-day Central depression during the Paleocene, when rhyolitic collapse calderas and dome complexes which convey high and low sulfidization epithermal gold-silver deposits where emplaced.

The best known system, was shaped, however, in the Eocene-Oligocene, during and after an interval of high-velocity oblique plate convergence which resulted in the emplacement of giant porphyry coppers (Chuquicamata, La Escondida, etc) along the fault traces of the trench-linked Domeyko Fault system. The youngest, metal rich, epoch corresponds to the Oligocene-Miocene, when, during the initial stages of the modern central Andean arc buildup, rich epithermal gold-silver deposits were formed within the Maricunga belt.