

The only known tin deposit in the Chilean Andes: Tignamar district, Arica

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Within the Central Andes lie metal deposits associated with magmatism arising from oceanic lithosphere from subduction under the South American continental crust. The famous tin-rich deposits containing some of the highest concentrations exist in the Andes of northwestern Argentina, southern Peru, and Bolivia are associated with Paleozoic to Pliocene igneous rocks. Chile geographically adjacent has magmatic centres of similar age and yet does not contain any tin deposits., with one exception, the Capitana Mine, located in northern Chile in the Belén-Tignamar district, in the heights of the Andes near Arica (18°35'S; 69°30'W). The initial reporting of Capitana ore vein hosted 7% Sb, 0.1% Ag, 5% Cu, 2.5% Pb, 11.8% Bi, and 4.7% Sn. The Capitana system is a high- to- intermediate sulfidation polymetallic epithermal system formed within a Miocene volcanic centre intruding Mesozoic and Cenozoic volcanic rocks. A unique hand sample of vein quartz with ore collected in 1963 was studied exhaustively for this project. Ore-microscopy recognized pyrite, sphalerite, chalcopyrite, tetrahedrite-tennantite, covellite, bismuthinite and traces of orpiment and stibnite. X-ray diffraction confirms the presence of some rare sulphosalts containing tin.

The geological map offers some clues concerning the presence of this unique tin deposit in Chile. The Belen-Tignamar District is underlain by a tectonic slice of Proterozoic-Paleozoic metamorphic rocks known as the Belen Metamorphic Complex (BMC), with rocks identical to those in the basement of the Bolivian tin province. Lead isotopes in the Capitana ores match those of the BMC. Either the tin in Capitana was remobilized from these rocks, or carbon-rich pelitic schist in the BMC interacted with the Tertiary magmas reducing them and leading to the concentration of divalent tin in residual fluids responsible for the unique epithermal tin deposit. [Poster]