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Title: LATE MIOCENE SHALLOWING SUBDUCTION AND METALLOGENESIS IN THE SIERRAS PAMPEANAS

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Abstract: The large metallic ore deposits, mainly those related to the Andean Cycle, are concentrated along the western slope of the Andes in the Chilean side of the Cordillera. Their occurrence was explained based on the location of the magmatic arc at about 250 to 350 km away from the trench at the time of their emplacement. This fact is confirmed by the location of large high sulfidation gold porphyries along the axis of the central Andes during Miocene times. The main Miocene ores are concentrated in the well known mineralized belts like the El Indio-Valle del Cura or Maricunga. The distribution of these large epithermal systems is mainly developed in the Chilean slope of the Principal Cordillera, and only a small part of them is emplaced very near to the international border, like Pascua-Lama and Veladero in the San Juan province, Argentina.
However, the study of the Neogene volcanic arc shows complex east and south shifts through time, starting in the middle Miocene along this segment of the Central Andes. This migration has been closely correlated with the collision of the Juan Fernandez ridge against the South American trench at about 24ºS at 18 Ma. The subsequent migration of the Juan Fernandez ridge reached the present 33ºS latitude nearly 10 Ma ago. That shift controlled the shallowing of the subduction zone, the timing of the tectonic stacking and uplift of the Principal and Frontal Cordilleras, as well as the migration and expansion of the magmatic arc belt (Jordan et al. 1983). As a result of that event, small volumes of arc magmas were emplaced in the Pampean foreland, mainly along oblique weakness zones that concentrated the subvolcanic and volcanic rocks as far away as near 700 km from the trench. The evaluation of this magmatism through several exploration programs has resulted in the finding of the La Alumbrera and Rio Frio, two large Cu-Au porphyries emplaced at about 7 and 5 Ma.
Nevertheless, subvolcanic bodies and lavas of andesitic to dacitic composition emplaced during the shallowing of the subduction zone in Late Miocene and Pliocene times are widespread in the foreland, hundred of kilometers away from the Andes. These rocks have controlled the emplacement of many alteration zones, such as those present in the Famatina and Pocho volcanic fields. Many of them are prospects presently under economic evaluation. All this magmatic activity and associated mineralization, which were closely controlled by the shallowing of the subduction zone, has resulted in

significant exploration interest in the Pampean flat-slab occurrences of volcanic arc rocks.

Reference: Jordan, T.E., Isacks, B.L., Ramos, V.A., and Allmendinger, R.W., 1983, Mountain building in the Central Andes: Episodes, v. 3, p. 20-26.