

Abstract ID: 149

Title: RE-THINKING THE METALLOGENESIS OF THE
SOUTHWESTERN NORTH AMERICA PORPHYRY COPPER
PROVINCE: NEW INSIGHTS FROM U-PB AND RE-OS
GEOCHRONOLOGY OF MEXICAN PORPHYRY COPPER
DEPOSITS

Student: No

Topic: Economic Geology

Medium: Oral Presentation

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Keywords: Copper Porphyry deposits, Southwest North America, U-Pb, Re-Os

Abstract: The Cu deposits of southwestern America and northwestern Mexico represent the second largest porphyry copper deposit (PCD) province worldwide, with copper resources amounting to ~25% of the total known porphyry copper resources (>150 Mt). Most of the PCDs in this region are thought to be associated with the Laramide Orogeny (~80-50 Ma). High convergence rates between the Farallon and North American plates coupled with shallow subduction are often cited to explain the distribution of PCDs throughout Arizona, New Mexico and Texas, however, the PCDs of northern Mexico do not fit the temporal and spatial patterns observed to the north. The most widely-cited age distribution model for the formation of this PCD province was proposed by Titley (1995) who noted a series of NWW-SEE striking PCD belts that young to the SW, a distribution that is consistent with the inferred NE-directed subduction of the Farallon plate during the Laramide Orogeny. In part, this model is based on K-Ar ages determined in the

1960s, however, because K-Ar and Ar-Ar isotopic systems are easily disturbed by low-temperature thermal events, these geochronologic methods do not always yield rock crystallization ages.

Here, we present U-Pb and Re-Os data from four Sonoran PCD centers from 30°N. The new geochronological data indicate the presence of two Late Cretaceous porphyry copper mineralization events in Sonora (Los Humos and La Fortuna del Cobre). This data requires an alternative model for the porphyry mineralization in southwestern North America and Mexico, where: 1) Late Cretaceous mineralization is not restricted to northern Arizona, 2) magmatism overlaps in space and time, and is more broadly distributed than previously thought, and 3) the ages of productive intrusives and mineralization events are younger to the east. This new data suggests that mineralization follows the inland migration pattern of an arc at estimated rate of 6 mm/yr.