

AGES OF EPITHERMAL DEPOSITS IN MEXICO:
REGIONAL SIGNIFICANCE AND LINKS WITH THE EVOLUTION OF TERTIARY VOLCANISM

ANTONI CAMPRUBÍ,[†] LUCA FERRARI,

*Centro de Geociencias, Universidad Nacional Autónoma de México, Carretera Querétaro-San Luis Potosí km 15.5,
Campus UNAM-Juriquilla, Apartado Postal 1-742, 76230 Santiago de Querétaro, Qro., Mexico*

MICHAEL A. COSCA,

Institut de Minéralogie et Géochimie, Université de Lausanne, BFSH-2, CH-1015 Lausanne, Switzerland

ESTEVE CARDELLACH,

Departament de Geologia, Universitat Autònoma de Barcelona, 08193 Bellaterra, Spain

AND ÀNGELS CANALS

*Departament de Cristal·lografia, Mineralogia i Dipòsits Minerals, Universitat de Barcelona,
Carrer de Martí i Franquès s/n, 08028 Barcelona, Spain*

Abstract

We present an analysis leading to a new space-time classification of the Mexican epithermal deposits, based on new data and interpretations from seven deposits in central Mexico, and a new age for the La Guitarra deposit, Temascaltepec district. From the latter, adularia from a barren stage of mineralization and from quartz bands of the main ore stage, together with orthoclase phenocrysts from host monzogranites (with a known late Laramide age) were analyzed by the ⁴⁰Ar/³⁹Ar method. The ages obtained from adularia samples are 32.9 ± 0.1 Ma and 33.3 ± 0.1 Ma, corresponding to the middle part of Lower Oligocene. These ages are slightly younger than that of the ignimbrite succession exposed next to the study area, and they suggest that the deposit is related to the crystallization of comagmatic intrusive rocks. Contrary to previous assumptions of a Miocene age for several epithermal deposits in southern Mexico, the ages from La Guitarra show that, south of the Trans-Mexican volcanic belt, these deposits may be Oligocene or older. In addition, the interpretation of a genetic link between intrusive rocks and epithermal mineralization is consistent with previous work on fluid geochemistry of the deposit.

To evaluate the obtained ages in a regional context, we analyzed the geographic distribution and age of Tertiary epithermal deposits in central Mexico. Our study shows that mineral deposits coincide with the main volcanic pulses of the Sierra Madre Occidental. The distribution of epithermal deposits can be thus divided into three main groups: (1) between ~48 and ~40 Ma, (2) between ~36 and ~27 Ma, and (3) between ~23 and ~18 Ma. Within the first group are the Batopilas and Topia deposits that record the oldest ages found for epithermal deposits in Mexico. Deposits of this age are hosted by the Lower Volcanic Supergroup of the Sierra Madre Occidental, and are related to the Laramide magmatism of the Sierra Madre Occidental. Many of the epithermal deposits in Mexico occur within the second time span in a northwest-southeast belt from Chihuahua to the Mexico and Guerrero states. These deposits are related to the main episode of ignimbrite flare-up of the Sierra Madre Occidental. The third group includes the Bolaños, San Martín de Bolaños, and Pachuca-Real del Monte deposits, plus, possibly, seven other epithermal deposits analyzed in this work. These deposits are related to the last ignimbrite flare up of the Sierra Madre Occidental with a general west-northwest-east-southeast distribution, recently documented in the southern Sierra Madre Occidental.

[†] Corresponding author: e-mail, camprubi@geociencias.unam.mx