

The Geology, Geochemistry and Geochronology of the El Abra Mine, Chile and the adjacent El Abra-Pajonal suite

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The El Abra Porphyry Copper Deposit is a major deposit located in the El Loa Province, Northern Chile, and is spatially associated with a complete suite of intermediate to felsic composition, calc-alkaline intrusions, called the El Abra-Pajonal complex [1]. The deposit is notable for its outstanding out-crop and low level of alteration.

Preliminary Ti-in-zircon thermometry [2], U/Pb zircon dating, whole rock major element chemistry and petrography indicate that the El Abra-Pajonal suite represents upper crustal magma chambers, where processes including assimilation, fractional crystallisation and magma mixing occurred. A mid to lower crustal chamber, which evolved over an 7.5Ma period (between 43.8 – 36.3 Ma), underpins the upper crustal chambers. Periodicity of injection of new magma from the interpreted lower into upper crustal chambers is in the order of 1Ma.

The Pajonal-El Abra suite has a clearly defined cooling trend, initiated and then truncated by at least two major thermal events, interpreted to be injection of mafic magma into the lower crustal chamber. The overall cooling trend is consistent with the dating, suggesting relatively slow cooling in the lower crustal magma chamber in the order of ~32°C/Ma.

References

- [1] Ambrus J. (1977) *Economic Geology*, **72**, 1062-1085.
- [2] Watson E. B. and Harrison T. M. (2005) *Science* **308**, 841-844.