A bigger tent for CAMP?

Geochronology and geochemistry of mineralized lower-crustal intrusions in NW Italy

STEVEN W. DENYSZYN*[1], MARCO L. FIORENTINI[1], ALISON M. DAVIS [1]

[1]Centre for Exploration Targeting, ARC Centre of Excellence for Core to Crust Fluid Systems, School of Earth and Environment, University of Western Australia, Perth 6009, Australia
(*correspondence: steven.denyszyn@uwa.edu.au)

The Ivrea-Verbano Zone of northwest Italy preserves an exhumed complete continental lithospheric section. The lower-crustal rocks represent a history of crustal underplating by mantle melting, followed by the intrusion of sills and pipe-like bodies that contain Ni-Cu-PGE sulfide mineralisation. The largest and least studied mineralised intrusion is the La Balma – Monte Capio sill, which is a compositionally layered body with a peridotitic base grading upwards to an amphibole-gabbro.

This entire lower-crustal magmatic system has previously been thought to have been emplaced rapidly, with a shared mantle source. In addition, Ni-Cu-PGE sulfide mineralisation associated with the various intrusions in the Ivrea-Verbano Zone has been previously assumed to be coeval with the early Permian crustal underplating. However, geochemical and high-precision geochronological studies indicate that the initial magmatic underplating occurred in the early Permian, followed by pipe emplacement in the early Triassic (Locmelis et al., 2016). New geochronological data indicate that La Balma – Monte Capio sill is significantly younger, with an ID-TIMS U-Pb age on low-U zircon of 200.7 ± 0.8 Ma, coeval with the Central Atlantic Magmatic Province (CAMP).

As the Ivrea-Verbano Zone is a unique window into pre-Alpine geology that enables the study of a major mafic magmatic event, the greater extent of which was likely obscured or destroyed in later tectonic activity, this study argues the possibility that La Balma–Monte Capio sill represents a significant eastward extension of the CAMP. This hypothesis invites the exciting possibility that a significant and previously undocumented metallogenic event may be associated with CAMP.

Locmelis, M., Fiorentini, M.L., Rushmer, T., Arevalo, R., Adam, J., Denyszyn, S.W., 2016. Sulfur and metal fertilization of the lower continental crust. Lithos 244, 74-93.