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The late Variscan ferroan granite magmatism of southern Sardinia: inferences from Mo metallogenesis

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Metallogeny is a powerful tool to investigate crustal evolution; a good example is offered by the Variscan basement of Sardinia and its Mo deposits. Mo ores are poorly represented in Variscan metallogenic provinces of Europe: however, in Sardinia, numerous small Mo deposits, often associated to Sn, W and F ores, are present, invariably related to an early Permian intrusive peak bracketed at about 290 Ma (Fadda et al., 2015; Naitza et al., 2017). In Sardinia, two main magmatic peaks have been schematized at pre-300 and 290 Ma. In southern Sardinia, the 290 magmatic peak is made up of several intrusive F-bearing rock-suites (Conte et al., 2016), belonging to ilmenite series, showing a slight peraluminous character and mostly classifiable as ferroan granites (sensu Frost and Frost, 2011). Mo-bearing granites form a distinct suite of relatively small plutons, emplaced at very shallow depth (about 1kb) in an exhumed Variscan low-grade basement. Peculiar characters of Mo-bearing granites are the occurrence of greisenized microgranite and granophyre cupolas, with fayalite-bearing pegmatites, and ilmenite, xenotime-(Y), monazite, fluorite, and local topaz as accessory phases. Recently, Conte et al. (2016) interpreted these granites as originated by partial melting of low crustal felsic metaigneous photoliths enriched in granophiles (Mo, Sn, W). Mo ores occur as: a) endo- and exo- quartz-muscovite greisens with molybdenite±Fe-Cu sulphides, and b) quartz-molybdenite±wolframite±Fe-Cu-Zn sulphides±fluorite±topaz hydrothermal veins and stockworks, hosted in granites or in country rocks. Redox state of magmas exerts a strong control on Mo metallogeny, as in Mo districts worldwide ores are usually hosted by high-fO_2 magnetite series intrusions (Ishihara, 1981). The close field association of Sardinian Mo mineralization with ferroan, low-fO_2 ilmenite-series granites may be explained in terms of Mo-enriched crustal sources of magmas, and very efficient geochemical concentration processes. Mo concentration occurred during latest intrusive phases in granitic cupolas, as local subsolidus reactions. They involve: 1) leaching of Mo5+ and Mo6+ from their primary hosts (e.g., biotites) by Cl- and F-rich fluids under decreasing pH and increasing fH_2O and fO_2, and 2) transport of Mo cations towards intrusive contacts, where they quickly reacted with Sulphur from country rocks to be reduced as MoS2. Overall, the late Variscan Mo metallogenic peak in Sardinia is a single event located in a short timespan at around 290 Ma. In the early Permian extensional setting of Corsica-Sardinia batholith, a distinct HT/LP event related to melting of mantle lithosphere (Rossi et al., 2015), triggered partial melting of Mo-bearing deep crustal sources, producing the F-bearing ferroan magmas. The singular concentration of Mo-bearing granites could indicate a peculiar compositional character of the Sardinian lower crust.

References:
Conte A.M. et al. (2016). Proc. 2nd European Mineralogical Conference, Rimini, Italy, 154.
Fadda et al. (2015). Proc. 13th Biennial SGA Meeting, Nancy, France, Vol. 2, 721-724.
Frost, C. D. and Frost R. B. (2011). J. Petrol. 52, 39-53.
Ishihara S. (1981). Econ. Geol., 75th Anniversary Volume, 458-484.
Naitza S. et al. (2017). Ore Geol. Rev. 80, 1259–1278.
Rossi et al. (2015). Bull. Soc. Géol. France 186, 171-192.