New geochronological constraints on tin and tungsten mineralisation in the Variscides

Patrick Carr*[1], Christophe Ballouard , Christian Marignac , Michel Cathelineau , Matthieu Harlaux , Loïs Monnier , Julie Michaud , Michel Cuney , and Julien Mercadier

[1]GeoRessources – Université de Lorraine - UMR CNRS 7359 - GeoRessources – France

Résumé

Tin (Sn) and tungsten (W) ores are spatially associated with evolved peraluminous granites and are typically thought to result from a single magmatic-hydrothermal event. However, recent work show that Sn and W are genetically and geochemically decoupled during crustal melting processes and melt-fluid partitioning, implying a diachronous deposition of Sn and W mineralisation. Such a contradiction partly results from the lack of direct dating of ore-bearing minerals, preventing good estimation of the absolute age for Sn and W mineralisation and accurate metallogenic models.
Here, we will briefly present recent advances in LA-ICP-MS geochronology of cassiterite and wolframite undertaken at GeoRessources in Nancy. This includes the estimation of the long-term reproducibility of some current cassiterite reference material U-Pb ages indicating a realistic age uncertainty of ±2%, that is likely similar for wolframite.
Moreover, we present a new compilation of wolframite and cassiterite U-Pb ages from deposits within the West European Variscan Orogeny. Key examples from the Massif Central, France (e.g., Echassières and Cévennes) and the Iberian Peninsula of Spain and Portugal (e.g., Panasqueira, Argemela, Santa Comba and Fregeneda-Almendra) are discussed and in complementary presentations of this meeting. Whilst individual deposits commonly show complex multi-stage mineralisation, two main conclusions can be drawn at the scale of the Variscan orogen: 1) wolframite mineralisation (typically within quartz-wolframite veins) is predominantly recorded in the Massif Central and Iberian Peninsula at *ca* 315 Ma (±8 Ma) and 2) cassiterite magmatic and hydrothermal mineralisation occurs near continuously but spatially variable with ages ranging from *ca* 320 Ma to 290 Ma. In combination with compiled U-Pb ages of zircon and monazite that constrain crustal melting and magmatism, we present a crustal scale model that relates tin and tungsten mineralisation to thermal anomalies within the lower crust.

Mots-Clés: tin, tungsten, cassiterite, wolframite, LA, ICP, MS, U–Pb, geochronology

*Intervenant