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Application of *in situ* Rb-Sr dating of micas to hydrothermal ore deposits

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The recent development of *in situ* Rb-Sr dating of micas by LA-ICP-MS/MS has increased our geochronologic toolkit for studying a broad range of rocks while preserving textural relationships and spatial resolution. White micas are thought to record closure temperatures of ~400 to 500 °C for the Rb-Sr system, making them ideal for studying low-to-medium temperature hydrothermal ore deposits. Rb-Sr dating of white micas thus has the potential to constrain the formation age of ore deposits that have previously been difficult to date, though there remain questions as to the actual processes recorded by the Rb-Sr system (i.e., crystallization versus resetting during fluid infiltration or reheating). In this project, we present *in situ* Rb-Sr mica dates from porphyry and vein deposits representing a variety of emplacement dates, providing an opportunity to evaluate Rb-Sr dates in igneous and hydrothermal systems. For example, the Texas Canyon barren porphyry with W-Mo gives preliminary Rb-Sr mica dates of 50 ± 5 Ma (ms) and 52 ± 2 Ma (bt), which are in agreement with U-Pb zircon dates of aplite dikes associated with mineralization. White micas associated with Sn mineralization in the Erzgebirge give Rb-Sr dates of 306 ± 3 Ma (Geyer) and 300 ± 9 Ma (Zinnwald), in agreement with previous estimates for the timing of Sn mineralization based on dates associated with the second skarn alteration stage (U-Pb cassiterite, garnet). The Panasqueira W-Sn deposit encompasses the magmatic-hydrothermal transition, with cooling of the granite and greisenization at ~295 Ma (U-Pb apatite). Rb-Sr of white mica in a vein associated with mineralization gives a date of 302 ± 9 Ma, whereas white micas from the greisen and the unaltered granite date to ca. 270 Ma. The vein associated with mineralization likely formed below the closure temperature for Rb-Sr in white mica and may record mineralization. Conversely, white micas from the greisen and the unaltered granite formed above the closure temperature, and appear to record later cooling ages.