

White mica Rb-Sr petrochronology hints prolonged deformation following peak orogenesis in SE Brazil

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Micas are key fabric-forming minerals in deformed rocks, exerting notable influence on crustal rheology. Despite their complex crystal chemistry, micas have proven to be useful tools to constrain the evolution of orogenic belts. The Southern Brasília Orogen (SE Brazil) provides a consistent record of continental collision, with main orogenic stages spanning from 630 to 540 Ma. A complex dataset of Ar-Ar mica dates spread from 540 to 490 Ma, suggesting slow cooling. Minding known limitations of the Ar-Ar method, such as potential deformation-induced isotopic reset, we test the reliability of Ar-Ar data for deformed metasedimentary rocks by integrating microstructural observations, white mica compositional data, and *in situ* Rb-Sr ages. White mica defines the main foliation in all samples, accompanied by biotite and/or chlorite in metawacke and metapelite. A precursor foliation is highlighted by folded cleavages within white mica and by discordant inclusion tracks in porphyroblasts. Mica along the main foliation may exhibit microfolding, crenulation, kink bands, or recrystallized domains. Composition trends towards muscovite endmember, with significant proportions of celadonite and minor paragonite. Na-rich zones correlate well with less deformed domains, such as preserved crystal cores. One metapelite sample exhibits variable muscovite-celadonite content across microfolds affecting main foliation mica. Coarse-grained mica in a muscovite quartz-schist sample produced a Rb-Sr age of *ca.* 490 Ma, contrasting with the *ca.* 450 Ma age calculated for recrystallized mica. Muscovite from metapelite and metawacke yielded similar Rb-Sr ages of *ca.* 490 Ma, with individual dates for Na-rich domains showing greater spread in the $^{87}\text{Rb}/^{86}\text{Sr}$ and $^{87}\text{Sr}/^{86}\text{Sr}$ ratios when compared to Na-poor regions. Data for a muscovite quartzite sample evidence extensive Sr mobility processes, initially preventing the definition of a geologically meaningful age. Filtering odd data resulted in an age of *ca.* 460 that overlaps, within uncertainty, the 450-490 Ma interval. Microstructural control over Rb-Sr data provides a direct link between obtained ages and deformation, apparently decoupled from post-peak cooling. Our dataset expands the evolutionary timespan of the Southern Brasília Orogen in up to 50 Myr, highlighting an opportunity to refine timing, rates, and conditions of prolonged deformation in the middle to upper continental crust.