First in-situ Rb-Sr dating of metasedimentary rocks from the Pontiac subprovince, Superior Craton, Canada. Implications towards the regional metamorphic evolution of the sequence.

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The Pontiac subprovince consists of metaturbidites, plutons and thin ultramafic rock layers of Archean age and lies south of the Cadillac-Larder Lake (C-LL) fault zone which is the boundary between the Pontiac and the extensively mineralized Abitibi Greenstone Belt. The sediments show a Barrovian metamorphic gradient which increases southwards, away from the C-LL fault. The most likely tectonic provenance for the Pontiac sedimentary rocks is that they represent a relic accretionary prism with material derived from both the Abitibi and an older terrane. Zircon U-Pb dating shows that deposition occurred not later than 2685±3 Ma ago and recent, robust Lu-Hf dating of garnets bracketed Pontiac's peak metamorphic conditions at 2658±4 Ma. For this study we used a recently developed LA-ICP-MS/MS method for in-situ Rb-Sr dating of biotite and plagioclase in samples ranging in metamorphic grade (biotite to sillimanite zones) from the Pontiac subprovince. Calibration of the instrument was achieved by repeated ablations on several reference materials (see Hogmalm et al. 2017) which also provided the monitoring of accuracy and precision throughout the analyses. Results show a range in dates between 2550 Ma and 2200 Ma with an average of 2440±50 Ma (2σ). Samples from the staurolite and kyanite zones have a larger range with respect to the other zones, but no significant differences are observed in the data with any method of data handing. These dates are ≈300Ma younger than the peak metamorphism in the area and this is attributed to either overgrowth and re-setting of the Rb-Sr system by a second metamorphic/hydrothermal event, or diffusional resetting with core-rim age variations. Possible influence from the adjacent late syntectonic to post-tectonic monzodiorite-monzonite-granodiorite-syenite (MMGS) plutons dated 2671±4 Ma and the garnet-muscovite-granite series (GMG) dated ≈2650 Ma cannot be ruled out. This study provides insights about the metamorphic history of the sequence and supports previous findings regarding resetting of some isotopic systems with relatively low closure temperatures (=350-400°C) by later thermal events.