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In situ Rb-Sr dating of muscovite and biotite of western Maine plutons.

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The geologic history of Maine is shaped by multiple episodes of orogenic events and regional deformation. Significant igneous intrusions during and after the Acadian orogeny (~ 400 Ma) in western Maine contributed to prolonged heating in this region. Existing U-Pb dates show that most of the plutons studied here crystallized between 400–364 Ma [1]. Here we investigate the cooling history of these plutons using the Rb-Sr system. *In situ* Rb-Sr dates of muscovite and biotite from eighteen samples were determined using an ESI imageGEO193 excimer laser coupled to an Agilent 8900 ICP-MS/MS. To correct for matrix-dependent elemental fractionation, muscovite dates were age-corrected to the WCM-1 muscovite (306 Ma), and biotite dates to LaPosta (93.7 Ma). Muscovite dates range from 403–260 Ma (n=17), and biotite dates range from 336–238 Ma (n=18). In general, mica Rb-Sr dates are systematically younger than the crystallization dates, though by how much varies between plutons. Biotite dates are typically ~60–90 Ma younger than muscovite dates in the same sample, consistent with the known differences in closure temperatures between muscovite and biotite. The difference between crystallization ages and Rb-Sr cooling ages decreases for the southernmost, youngest plutons (Songo and Sebago) compared to the oldest, northern plutons (e.g., Adamstown). For instance, the pre-Acadian Adamstown pluton (452 Ma) gives muscovite dates of 331–318 Ma and biotite dates of 260–230 Ma, suggesting that this area was isotopically reset during and after Acadian plutonism.

[1] Gibson et al. (2011), *Atlantic Geology 57*, 147-191.