

## **Preliminary $^{40}\text{Ar}/^{39}\text{Ar}$ Results and a Tectonic Overview of the Mt. Rogers Area, VA-NC**

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Argon thermochronology and detailed petrology can be used to constrain the tectonic evolution of complex polymetamorphic rocks. Here, we discuss preliminary results from a transect in the Blue Ridge anticlinorium along the VA-NC state line south of Mount Rogers. The rocks in the western part of our field area consist primarily of meta-granite of the Grenville basement which has been intruded by post Grenvillian mafic dikes. The cover rocks to the east include Neoproterozoic to early Paleozoic meta-sedimentary rocks of the Ashe and Alligator Back formations. The rocks in our area are cut by NE trending thrust faults including the Fries and Gossan Lead Faults.

$^{40}\text{Ar}/^{39}\text{Ar}$  cooling ages of amphiboles, muscovites, and potassium feldspars can be used to construct model cooling histories. These cooling histories can be used to estimate the timing of peak metamorphism(s) and the rate(s) of exhumation. Establishing the time of peak metamorphism allows discrimination between major orogenic events, while the rate of cooling can be used to discriminate between the faster cooling of tectonic exhumation vs. the slower cooling of isostatic rebound of over-thickened crust.

Metamorphic fabric within and around the bounding ductile fault zones are also being analyzed. Amphibole and mica lineations within the Ashe Formation trend down dip of the foliation, whereas in the vicinity of the Brevard fault zone (a major tectonic boundary between the Blue Ridge and Inner Piedmont), the lineation turns to a strike parallel orientation, indicating poly-metamorphism within the Ashe Formation. Using the  $^{40}\text{Ar}/^{39}\text{Ar}$  method, we hope to date the micas defining these different events and place constraints on the timing of movement along the faults.

Preliminary  $^{40}\text{Ar}/^{39}\text{Ar}$  results of amphibole from a marble within Mesoproterozoic meta-granite west of the Fries fault gave a cooling age of 963 Ma which we interpret as cooling through the 500°C isotherm following the peak of Grenville metamorphism. Muscovite from a schist in the eastern cover rocks within the Ashe Formation south of the Fries Fault gave a cooling age of 337 Ma. These data indicate that the western (Grenvillian) rocks were not metamorphosed to amphibolites-facies conditions since the Neoproterozoic, while the Ashe Formation did not cool from amphibolite-facies conditions until the Mississippian.