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Joint 72nd Annual Southeastern/ 58th Annual Northeastern Section Meeting - 2023

Paper No. 40-7

Presentation Time: 10:20 AM

RECONSTRUCTING THE PALEOZOIC STRUCTURAL, METAMORPHIC, AND EXHUMATIONAL HISTORY OF THE SOUTHERN APPALACHIAN BLUE RIDGE AND INNER PIEDMONT

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The southern Appalachians preserve evidence for three Paleozoic orogenies that contributed to construction of the composite southern Appalachian orogen, including the Taconic (480–440 Ma), Neoacadian (380–340 Ma), and Alleghanian (330–280 Ma) events. However, the complexity of thermal-metamorphic overprinting and polydeformation has impeded efforts to examine questions related to tectonic processes such as the crustal escape flow hypothesis in the southern Appalachians. To address this, new monazite and xenotime laser ablation split-stream U-Pb and hornblende $^{40}\text{Ar}/^{39}\text{Ar}$ dates have been produced for the Blue Ridge (BR) and Inner Piedmont (IP), and these data are being compiled with all previously available geo-thermochronological and quantitative P - T data to construct P - T - t histories for different parts of the orogen. Monazite U-Pb dates from prograde monazites in the North Carolina BR yield a clear Taconic (464–441 Ma) metamorphic signal for conditions up to granulite facies, which is interpreted to result from development of a Taconic accretion-subduction complex. Following the Taconic arcs collision, this part of the BR was cooled during Neoacadian and Alleghanian uplift and exhumation pulses, as indicated by thermochronologic dates spanning a wide range of closure temperatures (~550–220 °C). In the IP and Sauratown Mountains window, U-Pb dates of mostly prograde monazite growth yield a dominant Neoacadian signal (369–358 Ma), which corroborates previous age estimates for IP Barrovian metamorphism up to sillimanite II grade. In the IP, hornblende $^{40}\text{Ar}/^{39}\text{Ar}$ ages of 380–345 Ma generally indicate syn-Neoacadian cooling below ~500 °C. In the IP between the Brevard and Brindle Creek fault zones, Y-rich monazites yield younger dates (~330 Ma) that overlap with hornblende $^{40}\text{Ar}/^{39}\text{Ar}$ yield ages (335–324 Ma). Combined, these ages are interpreted to reflect post-Neoacadian reactivation and retrogression of the Brevard fault zone and potential folding(?) of the Brindle Creek fault zones during early Alleghanian deformation. This retrograde deformation persists until at least 297 Ma, as reflected by xenotime dates in the Brevard zone (311–297 Ma). Future work will address how the timing and extent of metamorphism, deformation, and exhumation may vary south of the present study area.

Session No. 40

[T18. Alleghanian Overprinting of Pre-Alleghanian Accreted Terranes](#)

Sunday, 19 March 2023: 8:00 AM-12:00 PM

Regency Ballroom B (Hyatt Regency Reston)

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