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GSA Connects 2021 in Portland, Oregon

Paper No. 204-10

Presentation Time: 10:50 AM

DEFINING METAMORPHIC TIMING, EXTENT, AND CONDITIONS IN THE SOUTHERN APPALACHIAN BLUE RIDGE AND INNER PIEDMONT—INSIGHTS FROM MONAZITE XENOTIME GEOCHEMISTRY AND GEOCHRONOLOGY

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In the southern Appalachians, questions persist regarding the spatial extent and conditions of metamorphism for the Taconic, Neocadian, and Alleghanian orogenic events. Ongoing research seeks to investigate the viability of the channel and/or escape flow models as potential mechanisms for lower crustal flow during orogenesis. Thus, metamorphism due to these events must be constrained in the central and eastern Blue Ridge (CBR, EBR) and Inner Piedmont (IP) provinces, which are key components of these models. In this contribution, we present one part of this ongoing research—recent results of monazite-xenotime U-Pb geochronology and rare earth element (REE) geochemistry from western North Carolina. Monazite and xenotime from six metasedimentary and metavolcanic samples collected from the CBR and EBR northwest of the Brevard Fault Zone (BFZ) yield Taconic U-Pb dates (> 400 Ma) and show no evidence of Neocadian or Alleghanian mineral growth or resetting. Chondrite-normalized REE abundances for the EBR samples show minimal depletion in heavy REE (HREE) relative to light REE (LREE). Two mylonitic samples located adjacent to or within the BFZ yield both Taconic and Neocadian dates; REE concentrations and petrography suggest that the youngest date, c.339 Ma, records retrograde xenotime and monazite growth during garnet breakdown following peak Neocadian metamorphism and is not indicative of early Alleghanian prograde influence. In the Brevard and Brindle Creek thrust sheets of the IP, monazite and xenotime U-Pb dates from four metasedimentary samples yield Neocadian (c. 340-360 Ma) to very early Alleghanian (c. 322-335 Ma) dates; however, the Alleghanian dates are limited to the easternmost portion of the Brindle Creek thrust sheet near the Central Piedmont Suture. Monazites from samples in the IP record varying, but pronounced, depletion in HREE relative to LREE. Combined with petrographic evidence of garnet resorption and monazite-xenotime rim growth and corresponding U-Pb dates, IP rocks likely record prograde Neocadian metamorphism followed by retrograde monazite-xenotime growth prior to the main Alleghanian pulse. The abovementioned models are supported by these data, but additional geochemical and piezometric analyses are needed to better elucidate their impact during Neocadian orogenesis.

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Session No. 204

[T25. Metamorphism into the 21st Century I—A Celebration of the Career of Mike Brown](#)

Wednesday, 13 October 2021: 8:00 AM-12:00 PM

Portland Ballroom 252 (Hybrid Room) (Oregon Convention Center)

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