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## GSA Connects 2022 meeting in Denver, Colorado

Paper No. 250-6

Presentation Time: 2:45 PM

### PROGRESS CONSTRAINING TECTONOTHERMAL MODELS FOR THE SOUTHERNMOST APPALACHIANS

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The Appalachian Mountains expose one of the most complete deeply exhumed orogenic belts in the world. These rocks provide the opportunity to understand tectonic processes in the mid- to lower- crust that can be linked to upper crustal processes interpreted from less exhumed orogenic belts. However, 3 Paleozoic orogenies (Taconic, Neoacadian, Alleghanian) in the southern Appalachians produced a complicated thermal-metamorphic history that is poorly understood. Recently obtained monazite U-Pb ages in the western, central, and eastern Blue Ridge of Tennessee and the Carolinas range from 459 to 441 Ma, indicating that this part of the Blue Ridge preserves Taconic (Ordovician) metamorphic mineral assemblages and were not significantly reheated during Neoacadian (Devonian) or Alleghanian (Mississippian) orogenesis. Five published garnet Sm-Nd ages from the eastern Blue Ridge in Alabama and Georgia of 331 to 320 Ma indicate widespread Alleghanian metamorphism. The northwestern extent of these Alleghanian metamorphic rocks is constrained by a garnet Sm-Nd age of 357±3 Ma from NW of the transtensional Goodwater-Enitachopco fault. However, published metamorphic age constraints are lacking SE of and along strike to the NE of the Alleghanian rocks.

We report new garnet Sm-Nd ages for northern Georgia that constrain the extent of the Alleghanian metamorphic rocks. Garnet-staurolite-hornblende gneiss in the Pumpkinvine Creek Formation yields an Alleghanian age of 323±3 Ma (MSWD=6.6, N=7). To the NE, garnet-muscovite-biotite gneiss from within the structural window at Brasstown Bald and migmatitic-sillimanite- and spinel-bearing garnet-biotite neiss from outside the window at Blood Mountain have ages of 446±6 (MSWD=0.7, N=4) and 448±8 (MSWD=6, N=7) Ma, respectively. These 2 indistinguishable ages confirm the premetamorphic stacking of thrust sheets exposed in the structural window. Comparison of these new ages indicates post metamorphic displacement on the Allatoona fault between the Dahlonega terrane and the western Blue Ridge.

Additional garnet ages spatially distributed across the Piedmont of east central Alabama and the Murphy belt of NE Georgia extent are currently in-progress. The full data set will be used to test tectonic models including possible out-of-sequence thrusting and crustal channel flow.

Session No. 250

#### D36. Recent Advances in Tectonics and Structural Geology

Wednesday, 12 October 2022: 1:30 PM-5:30 PM

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