The Southern Appalachians in Alabama

A preview of geological features to be encountered on future fieldtrips
Appalachian physiographic province in eastern U.S.
Geologic and Physiographic Features of Alabama
Physiographic/Geologic Provinces

- Gulf Coastal Plain (1)
- Appalachian Plateau (2)
- Valley & Ridge (Foreland Fold & Thrust) (3)
- Northern Ala. Piedmont (Blue Ridge) (4)
- Inner Piedmont (5)

- (1) K to Q age clastic and minor carbonate sediments
- (2) M to |P age clastic and carbonate sedimentary rocks
- (3) Cambrian to |P clastic and carbonate sedimentary rocks
- (4) Late Proterozoic to Devonian metaclastic and metavolcanic rocks intruded by Paleozoic plutons
- (5) 1.2 Ga Grenville basement unconformably overlain by late Proterozoic cover sequence
Structural blocks within the northern Alabama Piedmont (Blue Ridge)
Tightly folded rocks (Shady Dolomite) of the Foreland near Sylacauga, Alabama
Folded cleavage in the Heflin Phyllite
Bedding in Cheaha Quartzite at High Fall Branch Mapping Site
Compositional layering (bedding?) in Hatchet Creek Group metasediments
Migmatitic Hatchet Creek Group
metasediments (Coosa River)
Folded and thrust-faulted Mitchell Dam
Amphibolite
Elkahatchee quartz diorite with xenolith and cross-cutting granitic dike
Sequence of cross-cutting granitic dikes in the Elkahatchee quartz diorite.
Pegmatite cross-cutting Rockford-type granite
Foliation in garnet schist
S1 and S2 generation foliation in garnet staurolite schist
Helicitic S1 Fabric in Garnet

• Ga has included folded foliation (S1)
Backscatter image of Ga+Bi+Pl+Mu assemblage used for geothermobarometry
Early-to-middle Paleozoic world paleogeography

- Rodinia assembled in late Proterozoic
- Iapetus forms in early Paleozoic as Laurentia rifts apart from Rodinia
- Closure of Iapetus during early to middle Paleozoic generates igneous and metamorphic orogenic activity along Laurentian margin
Laurentia and Gondwana collide by late Paleozoic “finalizing” the Appalachian orogenic belt. The collisional event folded and thrust faulted the terranes brought together by the closing of Iapetus.
Models for the tectonic evolution of the southernmost Appalachians in Alabama must account for the lack of a Taconic signature.

- Age of metamorphism in Alabama and Georgia Appalachians appears to be Acadian (Devonian).
- The microcontinent of Avalonia becomes the Inner Piedmont terrane of the southern Appalachians.
- The eastern portion of the Blue Ridge is a “suspect” terrane because of uncertain geographic affinity.
Possible geometry of Laurentian margin in mid-Paleozoic time
The western portion of the Blue Ridge contains Laurentian Grenville basement rocks and therefore represents the easternmost margin of mid-Paleozoic Laurentia.

The eastern Blue Ridge is a suspect terrane.

The Inner Piedmont terrane is the transported remnant of Avalonia.

All “sutures” between terranes in the southern Appalachians are transported (deformation is thin-skinned).