

Outcrop Mapping at Woodall Shoals, South Carolina-Georgia

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Introduction

Multiply deformed and metamorphosed sillimanite-grade rocks of the eastern Blue Ridge are spectacularly exposed at Woodall Shoals in a single 2,000-m² outcrop. The outcrop was mapped, in remarkable detail (1:60 scale), by Bob Hatcher and several of his students between 1976 and 1983 (Figure 1), and is described by Hatcher (1989).

For purposes of the present exercise, this very large outcrop (Figure 2) serves as a generic scale model of an exhumed high-grade terrain from an orogenic belt. It contains a full compliment of rock fabric and complex geologic structures typical of such areas, including compositional (gneissic) layering, schistosity, and mineral and crenulation lineations, multiple generations of folds and associated interference patterns, boudins with internal fabrics and pressure shadows, and joints. Lithologies include biotite gneiss, granitic gneiss, garnet-biotite schist, amphibolite, calcsilicate quartzite, pegmatite, ultramafic rock, and quartz veins. All but the latest pegmatite has been transposed to form the dominant foliation.

Much of the outcrop surface is erosional, such that it is nearly horizontal and has irregularities reflective of lithology and geologic structure. To some extent, therefore, the outcrop also serves as a scale model of a topographic surface in a deformed mountain belt. Surface irregularities also provide students with sufficient 3D insight to aid interpretation of structures.

While mapping at Woodall Shoals, students should keep in mind that similar structures are commonly developed at map and regional scales, but are only apparent after considerable interpretation of field observations and map patterns. In areas of relatively poor exposure, such as the southern Appalachians, this can be very challenging, even daunting. Mapping at Woodall Shoals, with the benefits of 100% exposure and a relatively small area, provides a good introduction to mapping metamorphic rocks and familiarity with associated structures.

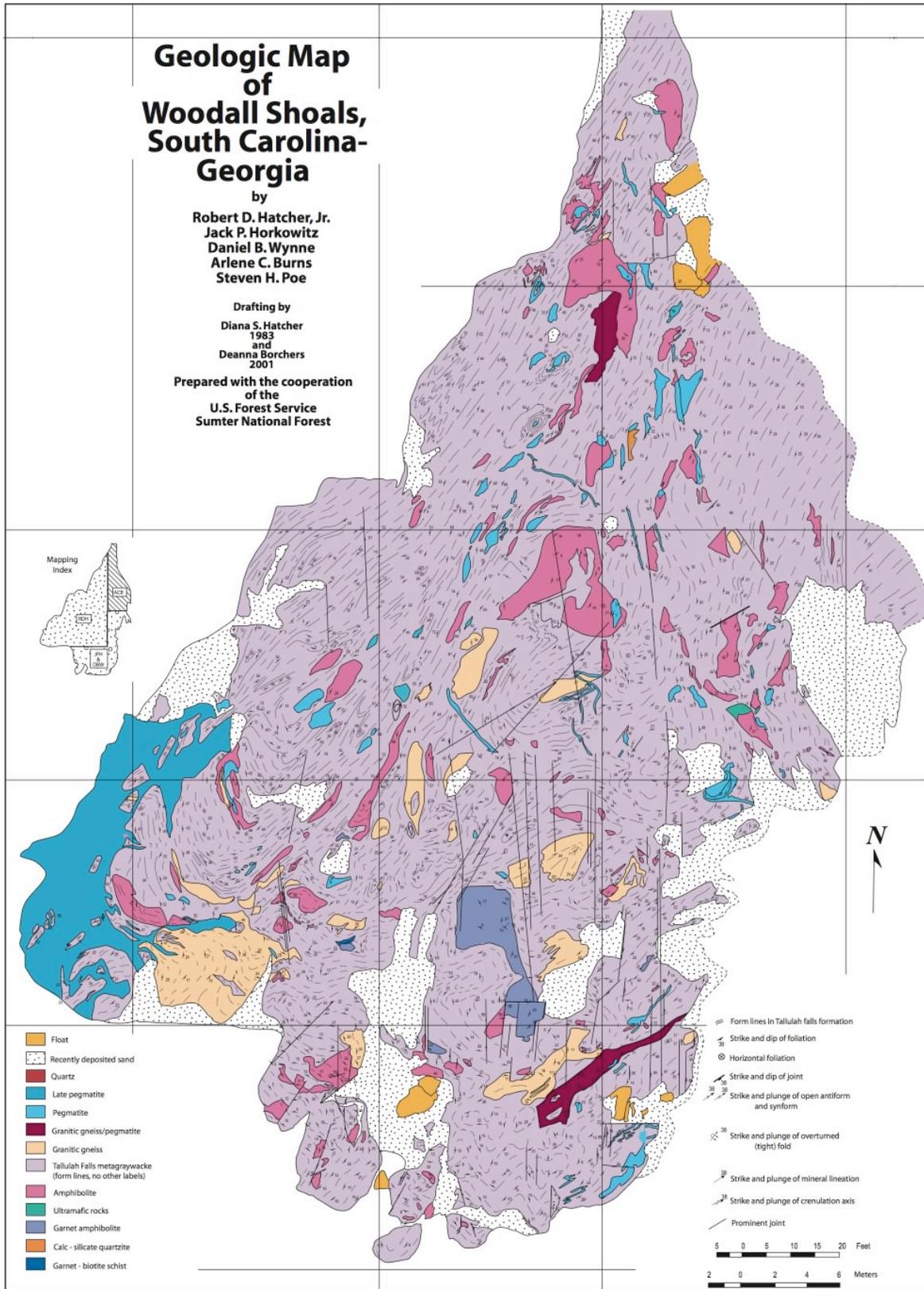


Figure 1. Geologic map of the outcrop at Woodall Shoals (Digitized version of Hatcher et al., 1989, provided by Bob Hatcher.)

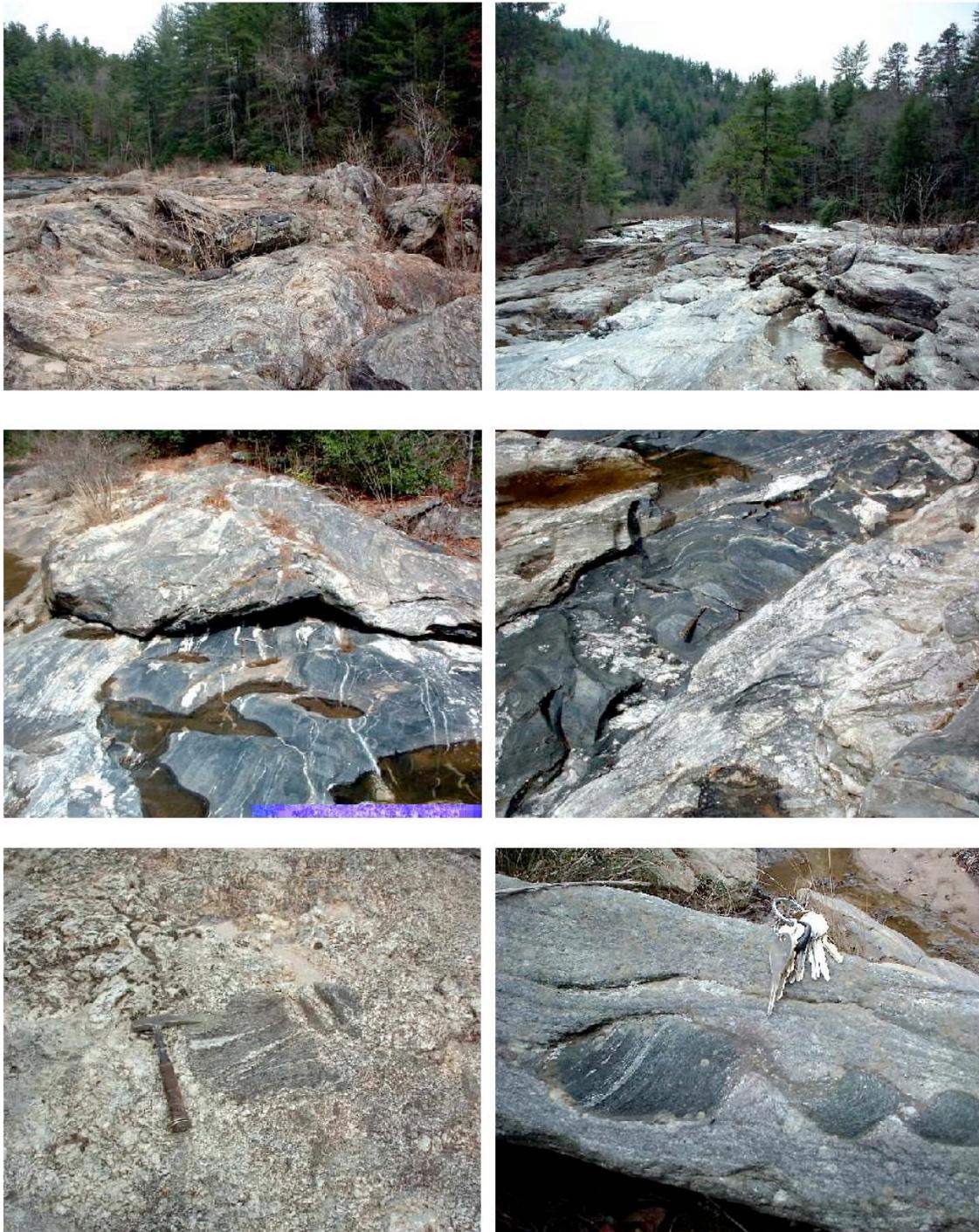


Figure 2. Photographs of the outcrop at Woodall Shoals.

Location and Setting

Woodall Shoals is located on the Chattooga River, 15 miles northwest of Westminster, SC (18 miles by road) or 7 miles southeast of Clayton GA (14 miles by road), in the Rainy Mountain 7.5-minute quadrangle, South Carolina-Georgia. From the Highway 76 bridge over the Chattooga River (South Carolina-Georgia state line), go east 2.5 miles to Orchard Road. Turn right onto Orchard Road and go 0.5 miles to Woodall Shoals Road. Turn right onto Woodall Shoals Road. The Woodall Shoals parking lot and trailhead, with outhouse, is at the end of Woodall Shoals road. A 0.25-mile trail leads to the outcrop (Figure 3).

Unlike the typical roadcut, Woodall Shoals is far removed from the noise and hazards of the highway. It is a very pleasant place to spend a day, particularly during good weather in the spring or fall of the year. The outcrop is devoid of vegetation and projects into the Chattooga River, making it completely exposed to the elements, including warm sunshine.

Project Details

Students will work in groups of 3 or 4 to map relatively small parts of the Woodall Shoals outcrop. Project areas measure 10 m x 10 m (or 30 ft x 30 ft).

The mapping project proceeds as follows:

Upon arrival at the outcrop, each student is provided with a copy of Hatcher et. al.'s (1989) map, printed at 1:250 scale with project areas omitted (Figure 4). (Printed at 1:250 scale, on an 11 in x 17 in sheet, the typeface on this map is small, but legible.)

The instructor briefs students on selected parts of the map and corresponding parts of the outcrop, outside of project areas, so that students become familiar with map scale, lithologies, and structures.

After the briefing, students are assigned to a group and a project area.

Each group is provided with communal mapping equipment and supplies (tape measure, cord, and chalk).

Each student is provided with a Brunton pocket transit and should have other personal mapping equipment and supplies (field notebook, hand lens, pencils, colored pencils, clipboard, etc.).

Each student is also provided with a 1:100-scale map showing boundaries of his/her project area and adjacent parts of Hatcher et. al.'s map.



Figure 3. Map showing the location of Woodall Shoals, relative to Clayton, GA. (Modified from the USGS Toccoa, Georgia-North Carolina-South Carolina Quadrangle, 1:100,000 scale.)

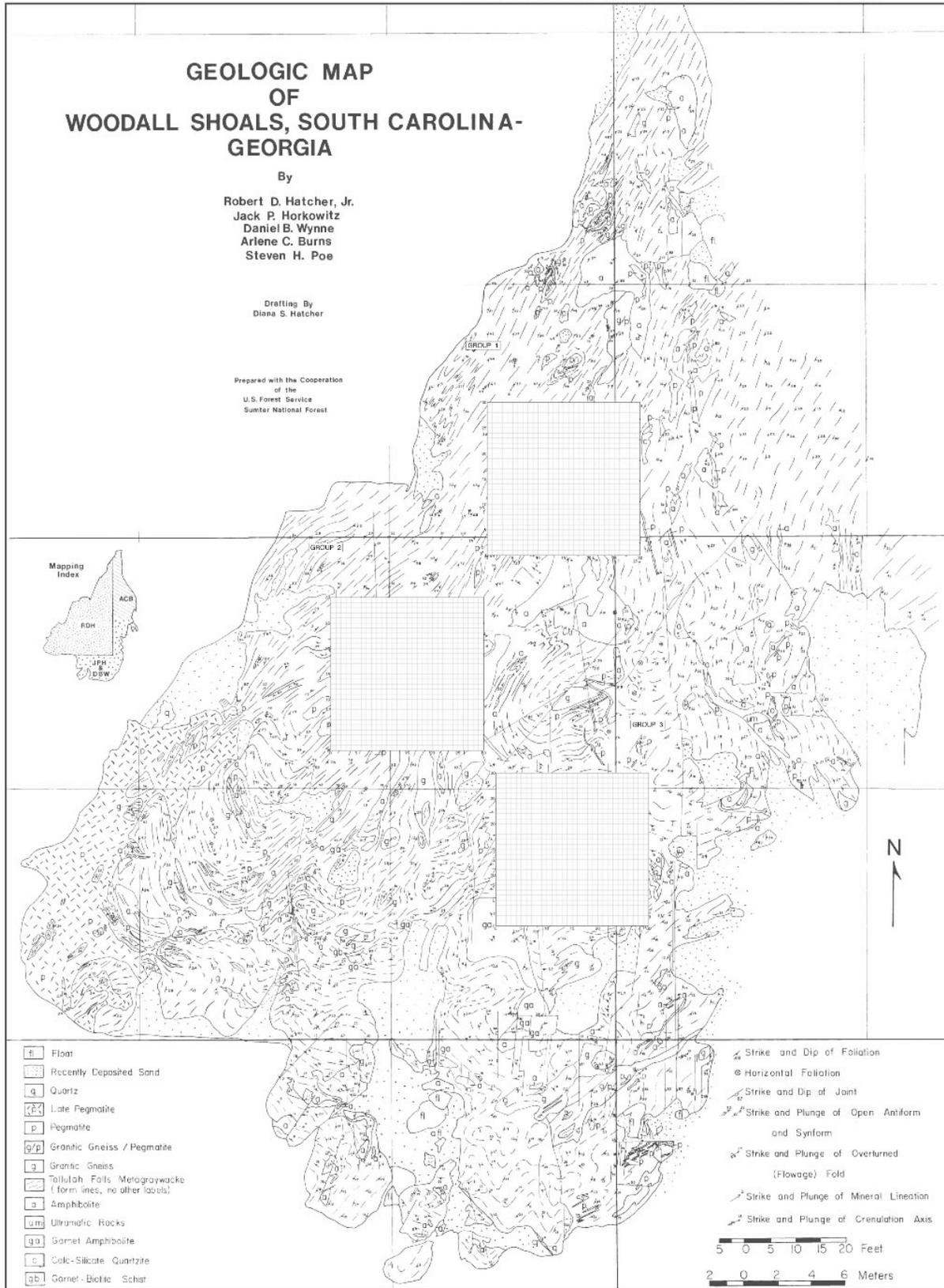


Figure 4. Geologic map of Woodall Shoals with project areas omitted (masked). (Based on Hatcher et. al., 1989.)

The instructor may suggest a rudimentary procedure for students to follow, which logically starts with identifying the project area and establishing a grid on the outcrop, which can be marked in chalk.

Completed maps are collected at the conclusion of the project, while still at the outcrop.

Several hours is generally sufficient for groups of intermediate to advanced mapping students to map 100 m² of the outcrop, with reasonable completeness and accuracy, given that boundary geology is provided.

Acknowledgements

Bob Hatcher kindly provided the digitized version of his map of Woodall Shoals (ws_map_compl_smll_6_19_04.pdf).

References Cited

Hatcher, R. D., 1989, Woodall Shoals, Rainy Mountain Quadrangle, South Carolina-Georgia: the Rosetta Stone for the Eastern Blue Ridge of the Carolinas and Northeast Georgia (Stop 1), in Fritz, W. J., Hatcher, R. D., and Hopson, J. L., editors, *Geology of the Eastern Blue Ridge of Northeast Georgia and the Adjacent Carolinas*, Georgia Geological Society Guidebooks, v. 9, n. 3.

Hatcher, R. D., Horkowitz, J. P., Wynne, D. B., Burns, A. C., and Poe, S. H., 1989, *Geologic Map of Woodall Shoals, South Carolina-Georgia*, Georgia Geological Society Guidebooks, v. 9, n. 3, Plate 3.

Associated Files

ws_commentary.pdf	Author's commentary on the present mapping project, 50 KB
ws_mapping_proj.pdf	This document, 8 MB
ws_map_proj_area_1.pdf ws_map_proj_area_2.pdf ws_map_proj_area_3.pdf	Maps of project areas (Group 1, Group 2, and Group 3), 450 KB