

Geologic Map of Barbados: Volume II

Robert C. Speed*

Northwestern University, Illinois, USA

NOTE FROM THE EDITORS

Geologic Background

Volume II of Bob Speed's *Geologic Map of Barbados* is the second of two compilations of hand-drawn geologic maps that he generated during a quarter-century of fieldwork on Barbados. Volume I — Robert C. Speed, 2012, *Geology and Geomorphology of Barbados*, GSA Special Paper 491 (<https://doi.org/10.1130/2012.2491>) — addressed the geology of the entire island, with an emphasis on widespread Quaternary units. It was mapped at 1:10,000 and consists of 12 maps. Volume II focuses on the pre-Quaternary basal complex in the Scotland District and Windward Slope geomorphologic zones. It was mapped at 1:2,500 and consists of 61 maps. An expanded explanation of units listed in the Geological Legend of Volume II can be found in Volume I (see p. 12–21).

As Bob noted in Volume I, the Scotland District is a deep topographic embayment facing the Atlantic coast in northeastern Barbados. Its former protective cap of limestone has been removed by mass wasting, exposing the underlying siliciclastic basal complex. The Scotland District is part of the Windward Slope, the east-facing flank of the island's central highlands region that is generally steeper and more rugged than the east- and south-facing slopes.

The basal complex is what originally attracted Bob's scientific attention to Barbados. He called Barbados

“the geologically most interesting place on Earth.” It is a rare exposure of a fairly young, exhumed submarine accretionary prism that is a part of the Barbados Ridge. The Barbados Ridge is an extensive forearc high between Tobago and a point east of Martinique that formed above the Lesser Antilles subduction zone. As the only part of this ridge currently above sea level, Barbados is, indeed, a rare geological gem. On land, the mechanisms and kinematics of regional deformation of this accretionary prism were able to be studied in detail. Bob started mapping the basal complex in the late 1970s (Richard attended summer field camp with him there in 1979). From 1981 to 1998, Bob and his students and colleagues authored 32 papers on its structure and tectonic implications. The maps in Volume II are the raw materials from which these insights were derived.

Production of the Volume II map set required us to develop solutions for some cartographic problems. Bob constantly revised his maps as he continued his fieldwork in the 1980s and 1990s, but of course kept his older maps in his files. Many of these 1:2,500 maps, with late dates, were labeled “final.” In many other cases, we had to sort through different versions of the same 1:2,500 quadrangle to ensure that we were presenting Bob's latest thinking about the geology he encountered, even if he hadn't had time to finalize those to his satisfaction. A more acute problem arose when we could not find any 1:2,500 geologic maps for some quadrangles, particularly in the NW and SE parts of the Scotland District. We determined that Bob had mapped them because the geology of those areas is shown on a photocopy of

Speed, R.C., author, with Speed, C., Sedlock, R., and Andreas, L., editors, 2019, *Geologic Map of Barbados: Volume II*: 2 p., https://doi.org/10.1130.Speed_Map-vol_2.

Geologic mapping © 2019 by Christine Speed. All rights reserved. Individuals have permission to make hard or digital copies only for the noncommercial purposes of advancing science or education. Copyright credit must be cited. British Ordnance Map of Barbados © by the Government of Barbados is reproduced here as a base map for derivative use purposes only. Copyright credit must also be cited.

*posthumous

a huge “vellum overlay” on which he had traced the linework, symbols, and data of all his 1:2,500 maps of the Scotland District. Christine also found Bob’s original, tattered 1:2,500 field maps in their garage. Richard merged these “tatties” with carefully enlarged excerpts of the highly reduced photocopy to reproduce Bob’s missing 1:2,500 maps. Lawrence stitched together the “new” maps with Bob’s final 1:2,500 maps to produce the maps in Volume II.

Base Maps

To adequately depict the complexity of these deformed basement rocks, Bob worked at 1:2,500 scale. He used a “1968 British West Indies” topographic map as his base map. Created before Barbadian independence, it was already old then. On this bulky map series, the British had identified quadrangles by a number and an ordinal direction — e.g., 28NW, 28SW, 33NE, etc. — which Bob adopted.

However, as we investigated transferring the geology of Bob’s field maps to clean base maps, we discovered that the 1:2,500 map series was out of print, and apparently had been for some time because the bookstore staff at the Barbados Lands and Surveys Department had never heard of it. On a persistent second visit, a Barbadian friend was told by the Chief Surveyor of Barbados that no digital form of this map existed. So we continued to search for a printed version by consulting an English/Barbadian map historian, a former University of the West Indies geology professor, a former Barbados Ministry of Energy official, an Internet provider who had purchased the rights to sell all the old British colonial maps of the West Indies, and several U.S. university map libraries.

We were unsuccessful. Lawrence then suggested enlarging the Volume I 1:10,000 base map by 400%. This solution produced a few side effects. Stretching square 1:2,500 quads to fit rectangular 1:10,000 base map sheets meant that georeferencing had to be sacrificed. On the other hand, this choice made it very easy to compare maps in Volume I with those in Volume II. The locator legends show that wherever a 1:2,500 quad overlaps two different 1:10,000 map sheets, it is listed under both base map sheets. And, we retained Bob’s identification system to allow the reader quick reference as to specific quad location within a sheet.

Implementation

Beyond side effects, choosing to use the 1:10,000 base map created cartographic challenges. In their original form, the Volume I base maps already possessed several layers of content in Adobe Photoshop. When enlarged to 1:2,500, the resulting files became huge even before being overlaid with the scans of Bob’s maps, which, in turn, required several more layers. Each layer was then sized, rotated, and stretched. The files were then flattened from multiple layers to one layer. Then the geological legend, locator legends, and title blocks, which had been built separately, were added. The resulting files were too large for many programs and almost all file formats, so they were downsampled to 50% and saved as JPEGs. Users can enlarge them to 200% to achieve the original scale of 1:2,500.

Conclusion

Christine remembers entering Bob’s office at Northwestern University one day in the late 1990s. Dozens of 2’ × 2 ½’ vellum sheets filled with intense, pencil-drawn geology were lying on every remotely flat surface. His office had transformed into a magical habitat. She eyed them uncomprehendingly. “What’s all this?” It obviously represented a lot of work. But Bob could be an elusive creature and he had an inventory of evasive moves. One was “facial expression as response.” This day, he gave her a dazzlingly broad smile—a glimpse of brilliant plumage usually hidden. Whatever they were, he was very satisfied with them. This huge project gave him joy. In silence, he opened his translucent glass door. They walked through to another reality, leaving the magical sheets behind as he carefully closed the door behind them.

We are grateful for the fortitude and patience of the geologic community that has been waiting for these Volume II maps. We also express gratitude for the unwavering solidarity on behalf of Bob’s memory received from Bob’s former students, his original cartographers, his loyal Barbadian friends, map editor, John Van Hoesen, and the peer reviewers who helped to bring this work to publication.

Christine Speed, Editor
Richard Sedlock, Geologist
Lawrence Andreas, Cartographer