

Sand, Science, and the Civil War: Sedimentary Geology and Combat

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Review

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Hippensteel, Scott. *Sand, Science, and the Civil War: Sedimentary Geology and Combat.* University of Georgia Press, 2023. PAPER. \$44.95. ISBN 9780820363530. pp. 360.

Human interaction with the natural world has always been a defining element of military operations, but the way scholars have depicted this has changed over time. Military historians routinely discussed the ways that terrain, weather, surface processes, and access to food or water have affected past conflicts, but typically treated warfare as a process in which humans exerted their will on a static, unchanging environment. The natural landscape was the stage, not an actor. Around 2000, environmental historians entered the conversation, asking military historians to consider the organic nature of warfare more fully and working to illuminate the ways that ongoing ecological processes could shape and be shaped by combat. While some environmental historians have successfully drawn on the insights of the natural sciences in their work, they tend to focus on climatology, epidemiology, and biology, ignoring other fields. More recently, the discipline of military geoscience has introduced literature on past and present military operations written by geologists, geographers, engineers, and environmental scientists. But military geoscience publications are relatively sparse and have made few inroads into mainstream history circles, particularly on the subject of the Civil War.

Scott Hippensteel's *Sand, Science, and the Civil War* steps into this fray, filling a critical gap in several different literatures on America's Civil War. Across 20 brief chapters, Hippensteel demonstrates how sedimentary geology affected military operations on a range of scales, from the continental creation of mountains that acted as offensive obstacles to the weathering of sand

into an effective force multiplier for coastal fortifications. Hippensteel is not a historian by training—he is an associate professor of earth sciences—and perhaps for that reason, *Sand, Science, and the Civil War* does not follow the expected structure or chronology of a typical history monograph. Nevertheless, Hippensteel’s work is an excellent primer on geologic processes salient to the study of warfare, the evolution of the military geosciences during the Civil War, and the intersection of geology with Civil War-era artillery, fortifications, mobility, and even morale.

Part I acts as an extended introduction to the larger work, explaining in rapid succession the geologic formation of rocks, the types of rocks found on Civil War battlefields, the importance of sediments for fortification building, and the types of artillery that were available at the time. If the science fails to stick at first, do not worry—Hippensteel reinforces important aspects of geologic processes for the reader throughout the book. Each subsequent part of *Sand, Science, and the Civil War* is organized by physiographic province. The Piedmont / Valley and Ridge section covers rock weathering and its effects on Stones River and Antietam, in addition to a consideration of how the types of rocks in this region impacted troop movements, logistics, and railroad building. The Coastal Plain chapters explore McClellan’s Peninsula Campaign and Burnside’s efforts at Fredericksburg as well as the effects of mud and dust on soldier experiences. Hippensteel then examines the fluvial processes of the Mississippi River Valley that shaped Grant’s taking of Vicksburg, and the trial and error of building, strengthening, attacking, and defending coastal fortifications such as Fort Pulaski, Fort Fisher, and Battery Wagner. The final part considers lessons learned, both during the Civil War itself but also for subsequent conflicts. Hippensteel ends with the argument that the Civil War is the best conflict in which to study the influence of geology on infantry tactics due to later changes in technology and artillery

in the world wars. Throughout, Hippensteel's inclusion of primary source excerpts and congenial tone make the science-heavy book an easy read for historians. He is particularly good at geology puns, like naming Chapter 13, "The Vicksburg Campaign: Grant Does More with Loess."

Sand, Science, and the Civil War is not Hippensteel's first foray into Civil War history. In 2019, he published a related work, *Rocks and Rifles: The Influence of Geology on Combat and Tactics during the American Civil War* (Springer). However, *Rocks and Rifles* is structured by battle—there are chapters on Second Manassas, Spotsylvania, Petersburg, etc. While some of that material makes it into this book, *Sand, Science, and the Civil War* is a much more thorough education in geologic processes and contains a wider range of examples, particularly when it comes to military operations along coastlines. Indeed, I have never read a more insightful consideration of the relationship between building material, surrounding landscape, fortification design, commander choice, and battle outcome as I did in Part Five, "To Take the Coasts."

More generally, the strength of this work is Hippensteel's emphasis on the interaction of human decision-making with geology. Sometimes, military leaders took advantage of geologic features, and at other times, they underestimated them. In some places, geologic features were an ally, and in others, they were an obstacle. Hippensteel even takes time to juxtapose battles in which geologic features were similar to allow readers to see the weight of individual actions on historical outcomes. In focusing on the various ways military commanders either successfully exploited or failed to account for geology, Hippensteel side-steps one of the primary issues in environmental histories of war: agency. Can oil have agency? Can rain? Can we say that soils shaped the Civil War in the same way Grant or Lee did? In *Sand, Science, and Civil War*, that is not an issue. Although Hippensteel makes a clear case for the dynamism of geology's influence

on combat, strategy, tactics, and logistics, he never strays from the core contention that geology's importance was down to how well or how poorly leaders accounted for it.

Sand, Science, and the Civil War will appeal to both military and environmental historians; those scholars interested in artillery and fortifications will find it particularly useful. This book may not have the story-based narrative that historians often expect, but it will be an important Civil War reference work for years to come.

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