

## Soil under soldier's feet decides victory or defeat of armies

Terrain or the lie of the land decides the victory or defeat of armies battling for supremacy on its soil and the number of casualties they suffer.

Geologist Robert Whisonant, long fascinated by the history of Civil War, teamed up with geomorphologist Judy Ehlen, both from Radford University, to probe military history under the soldiers' feet.

The duo examined the geomorphology, arrangement and form of the earth's crust and its relationship with geologic structures, of several battlefields and compared the terrain to known casualties for each day of fighting, according to a release of the American Geological Society.

The question, asked Whisonant, is whether a correlation exists between the geology of the battlefield and casualties taken there. For some battles in the Civil War, the story told by the shape of the land is clear: soldiers were at greater risk in some areas because the underlying geology created a more dangerous terrain.

'Gettysburg is a good example where the Union had the high ground, but one disadvantage was the hard rock that forms that high ground is so close to the surface that the soldiers couldn't dig trenches.'

They were open targets for artillery assault by the Confederates. But the disadvantage didn't just go one way: 'Those Confederate soldiers had to go up an open slope formed on more erodible rock with nothing to get behind when they finally had to attack.' That's what Whisonant and Ehlen mean by their presentation 'No Place to Run, No Place to Hide'.

Whisonant and Ehlen also studied the terrain at Antietam, the site of the bloodiest battle in the Civil War, where on Sep 17, 1862 up to 23,100 soldiers were killed, wounded, or declared missing.

'What's so striking at Antietam,' said Whisonant, is that 'two geologic units underlie [that area]. One is a very, very pure limestone that as it erodes it literally melts. Mostly what you get with that is a very even, level, open surface - there just aren't a lot of deep holes and high hills that give soldiers a place to hide.' On one area of this flat surface, known as Miller's Cornfield, 'armies just shot each other to pieces until absolute exhaustion set in.'

Nearby, however, a different formation lies beneath the terrain, made up of limestone and dolomite with some shale. 'It makes for a very different kind of topography - dissected topography' that provides good cover and concealment, and according to this study, 'the casualties are much lower on that part of the battlefield.'

They will be presenting their findings Sunday at the 2008 Joint Meeting of the Geological Society of America, Soil Science Society of America, and American Society of Agronomy, among others, in Houston, Texas.

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