

Advances in historical and archaeological research, forensic science, and Geographic Information Systems can be teamed to offer a more complete picture of this historical battle, one that is often filled with myth, speculation, and bias. From a strictly terrestrial or aerial point of view, the events that unfolded on June 25th, 1876 can only be partially reconstructed, leaving many unanswered questions. With spatial context, and the capability to link multiple types of data, a GIS can produce a much more accurate record of events, complete with a categorical and temporal frame of reference. These types of analyses can be applied to many situations in order to gain a deeper understanding of significant historical events.

"Those who cannot remember the past are condemned to repeat it."
- George Santayana

Research question:

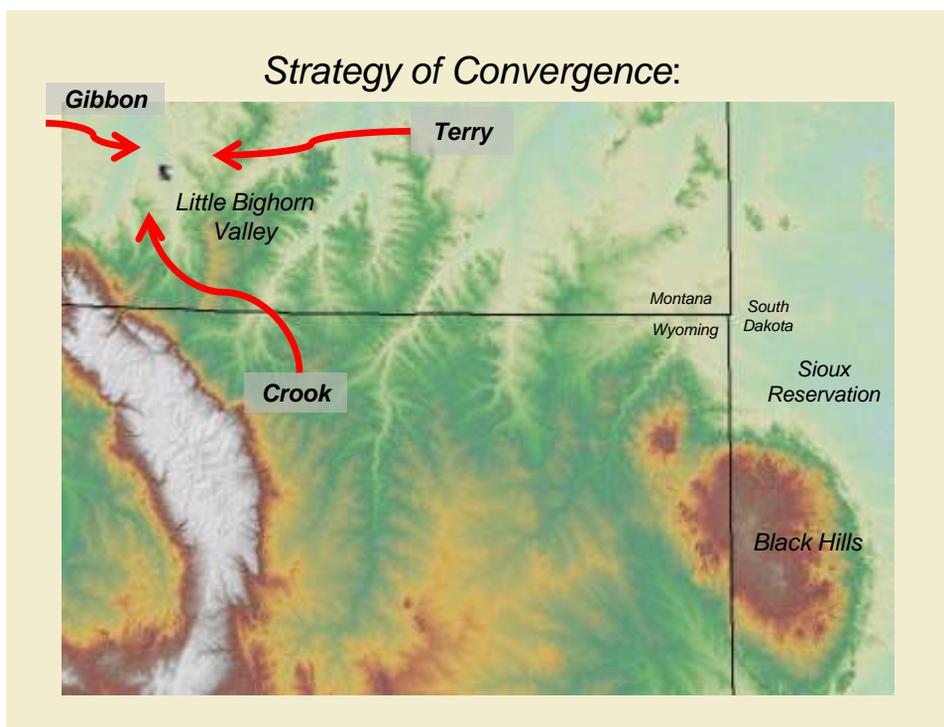
What are the major terrain features in and around Little Bighorn Battlefield National Monument and how did these features (including elevation, vegetation, and viewshed) influence the strategies adopted by each side of the conflict?

Methods and Materials:

- Analysis confined to two major engagements:
 - Lt. Col. George A. Custer with 210 men near Last Stand Hill (all killed)
 - Major Marcus Reno and Capt. Frederick Benteen with 400+ men on Reno Hill (60+ killed)
- Data used to facilitate analysis:
 - USGS 10m & 30m DEMs, local hydrography, NAIP Imagery, and grave markers
- Derived elevation, viewshed, and aspect maps used as background for the location, tactics, and movements of both sides
- Location of 7th Cavalry casualties examined to reinforce how tribal units exploited local terrain to their advantage

Timeline of events:

- Mid 1800's: Accelerated westward expansion leads to conflict between Native Americans and travelers using the Oregon and Bozeman Trails
- Military outposts established in Montana and Wyoming to provide protection for settlers, miners, and the railroad interests
- Early 1870's: Military expeditions led to discovery of gold in Black Hills – part of the Sioux Reservation formed under the Laramie Treaty of 1868
- Chief Sitting Bull (Lakota Sioux) refused to sell the land to US government
- Spring/Summer 1875: Sioux, Arapahoe, Cheyenne join Sitting Bull in defiance – encampment of 10,000 plus in Little Bighorn valley
- U.S. President Grant and General Sherman initiate military campaign described as a "strategy of convergence" designed to force them back to the reservation



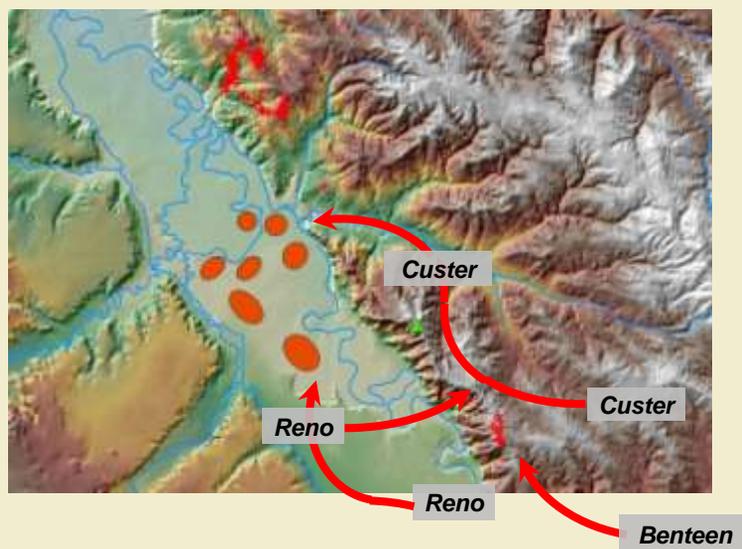
Strategy of Convergence:

- Gibbon's assignment: the west prong of the attack - intercept the natives as they fled the valley ahead of Crook's and Terry's troops
 - Instead: was delayed by late spring snow (terrain and weather)
 - Crook's assignment: the south prong of the attack
 - Instead: was attacked (at Battle of Rosebud Creek) by Crazy Horse, forced to retreat
 - Terry's assignment: the east prong of the attack
 - Terry was unaware of Gibbon's and Crook's misfortunes
- Sent Custer and 600+ troops ahead to the Little Bighorn Valley

Custer's Plan:

- Custer's assignment: Pinpoint the location of the Native encampment, wait for reinforcements from remaining troops before engaging in battle
- Custer assumed the entire village was escaping
- Custer implemented a plan to corral the natives in the river bottom
- 600 men were split into 4 groups:
 - Reno and just under 200 men were to attack the encampment from the south and receive support from the remaining troops with Custer
- Custer and 210 men charged across the northeast bluffs to cut off the escape route to the north

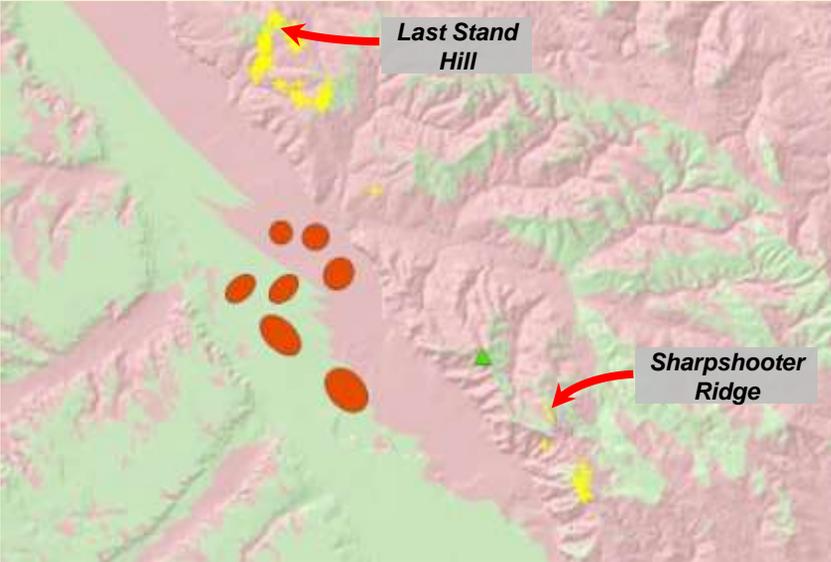
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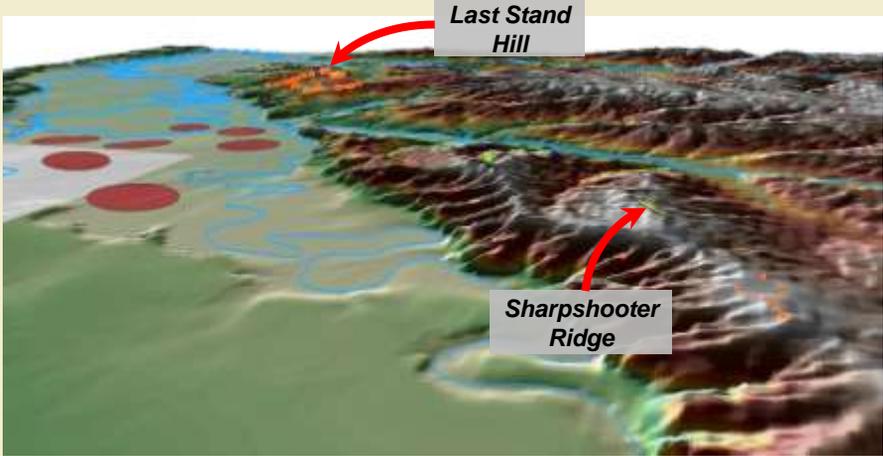
Reno Battle and Retreat:



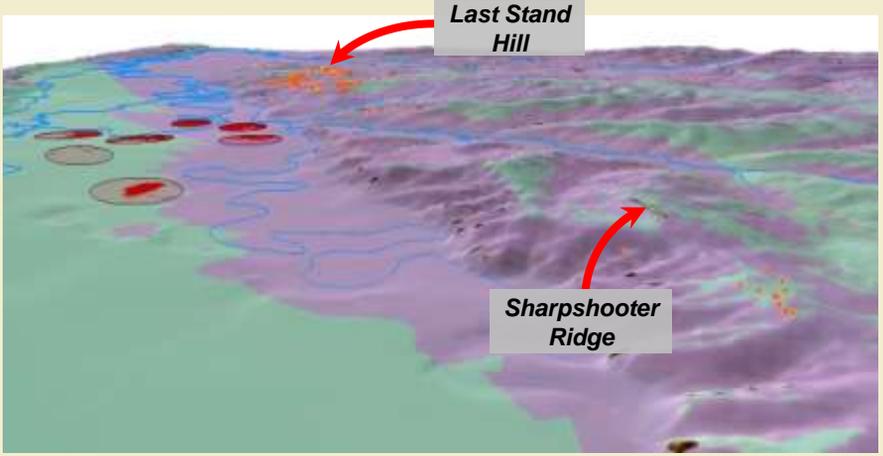
Sharpshooter Ridge Viewshed:



Little Bighorn Valley in ArcScene

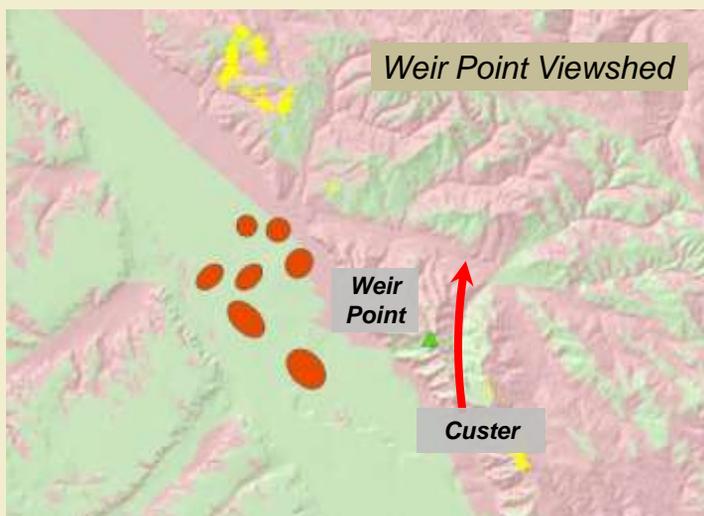


Sharpshooter Ridge Viewshed:



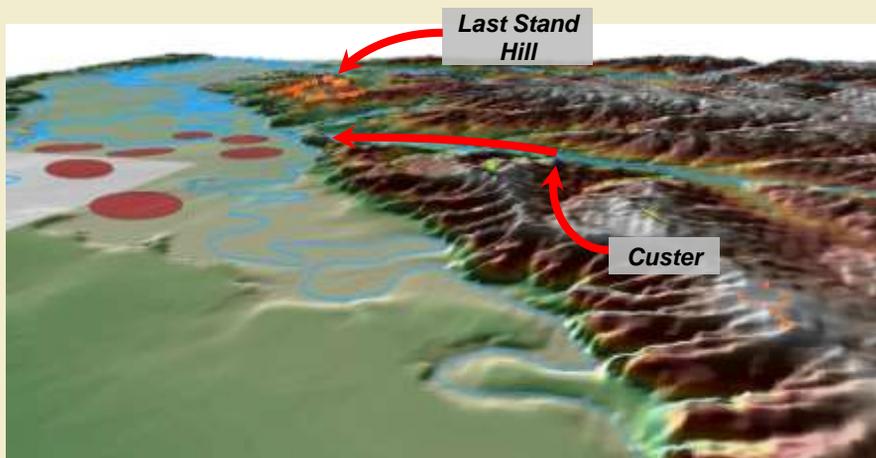
Custer's Last March:

- Custer observes Reno's engagement from bluffs as he travels northwestward
- Determines urgent need to find a suitable attack point to prevent escape
- Did NOT go to Weir Point (better view of valley and the encampment below)



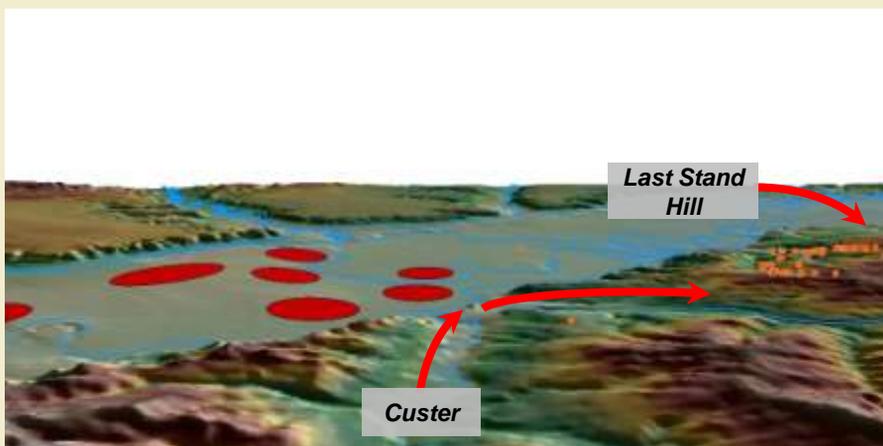
Custer's Last March:

- Custer travels down Cedar and Medicine Tail Coulees
- Could not see extent of encampment until at edge of river bottom
- However, he was visible from valley from several spots below
- Does NOT see Reno's retreat



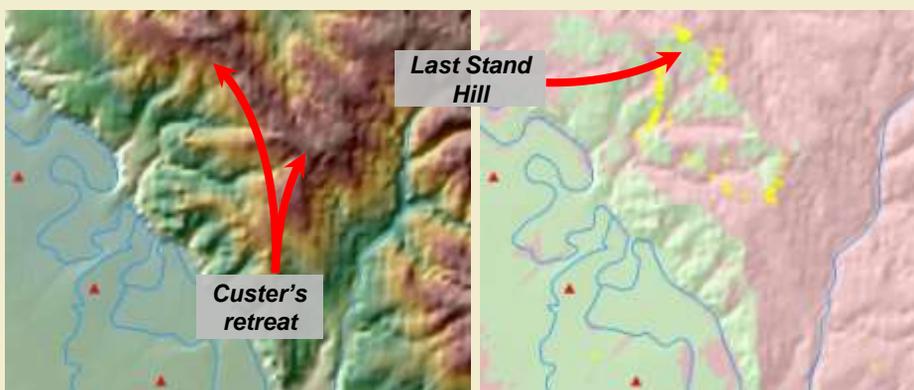
Custer's Last March:

- Runs into heavy resistance at the edge of encampment
- Retreats toward higher ground (Last Stand Hill) to reunite all companies
- No support from Reno or Benteen as requested
- Mounts a defensive position (no other option) and holds briefly



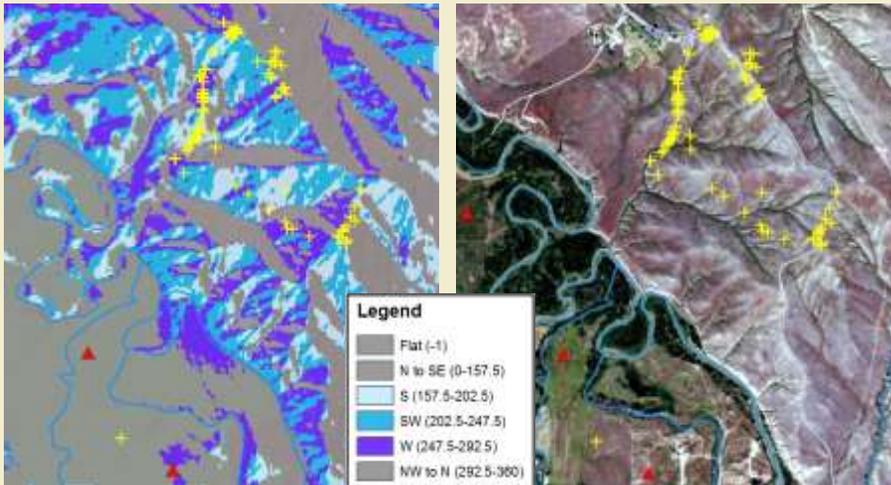
Custer's Last Stand:

- Viewshed analysis (from multiple points in valley) reveals high visibility of Custer's troops as they took positions on higher ground
- Trees (terrain feature) partially obscure Custer's view of activity in valley
- Natives, familiar with terrain, are fully aware of troops and movements



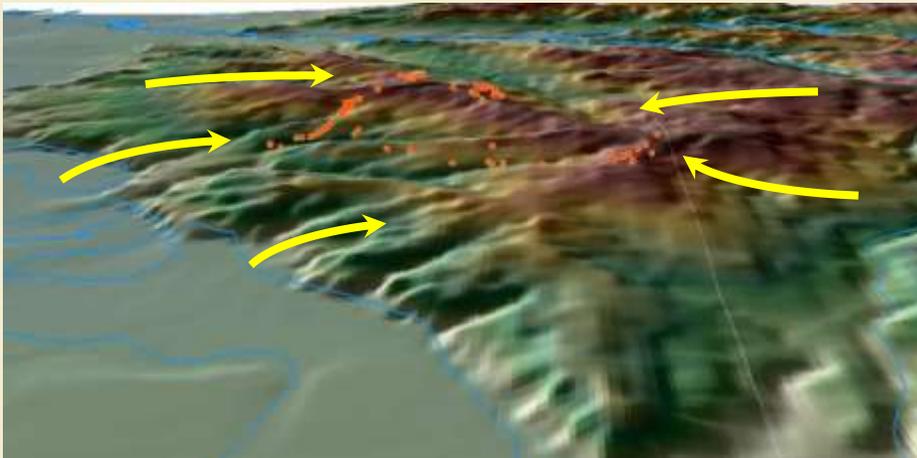
Custer's Last Stand:

- Aspect analysis supports visibility of Custer's troops
- South, Southwest, and Western facing slopes make up the majority of the terrain on which Custer was placing his men
- The natives were located mainly in these 3 directions from Last Stand Hill



Custer's Last Stand:

- Natives are fully aware of 7th Cavalry positions AND familiar with terrain
- Deeply eroded coulees and draws provided a natural path up the hills
- Tall grasses also provide cover as they swarm the hill from all directions
- Custer's men were eventually surrounded, and the massacre ensued





Conclusions:

Our analysis has concluded that terrain - including elevation, vegetation, aspect and viewshed - contributed heavily to the final outcome. In our GIS analysis, we have modeled a historic battle and examined the major events that led to the unfortunate outcome at The Battle of The Little Bighorn. This GIS represents the terrain of Reno Hill and Last Stand Hill, illustrating how the Native tribes exploited this terrain to surround the 7th Calvary.

The combination of this GIS representation with historical, archaeological, and forensic conclusions recreates the events, concluding that an unfortunate combination of technique, terrain, and timing led to the deaths of over 260 men.

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