



CAN COMPUTERISED TERRAIN ANALYSIS FIND BOUDICA'S LAST BATTLEFIELD?

We have few details of the native response to the Roman invasion of Britain in AD43, but one episode entered folklore: the rebellion of an East Anglian queen. Steve Kaye thinks he knows how to narrow down the search for the elusive site of Boudica's last stand

Boudica, the rebellious queen of the Iceni, lost her final confrontation with Roman power in AD60–61 or 61–62. She had previously destroyed the towns of Colchester, London and St Albans, and possibly Silchester, but the site of the concluding battle – though much debated – is not known. Our understanding of events comes from accounts written by the near-contemporary Roman historians Tacitus and Cassius Dio, and archaeological evidence for destructive burning. What I am to describe here began with the thought that interesting insights into the battle's location might be gained by combining the techniques of modern terrain analysis with Tacitus's description of the battle site.

As Tacitus describes it in his second and more detailed account, Suetonius Paulinus, the Roman governor in Britain who commanded the second, ninth, 14th and 20th legions, was waging a successful attack on Anglesey when he was interrupted by news of a revolt. The Iceni, an East Anglian tribe

led by Boudica, had been driven to revenge by Roman treachery: a pact had been broken by the violent actions of Roman soldiers against both her people, and herself and her daughters.

The Iceni were joined by the Trinovantes "and others", who together destroyed Colchester (Camulodunum). The veteran cohorts of the ninth legion, led by their commander Petilius Cerialis, marched from their fort (probably at Longthorpe near Peterborough) to assist the besieged colony, but were met at an unknown location by the already victorious Britons. The Roman infantry were destroyed and Cerialis retreated, with his surviving cavalry, back to the fort.

News of the destruction of the ninth might have reached Suetonius as he marched towards London (Londinium) with 10,000 armed men of the 14th and 20th legions. He also heard that the Exeter-based second legion was not marching to join him: he was without half of his combat strength. The 14th

and 20th legions arrived at London, where Suetonius decided to abandon the proto-city, and marched his men and any civilians who could keep up away from the Britons. London was destroyed. A similar fate befell St Albans (Verulamium) to the north. The horde of Britons followed the retreating Romans who were forced to turn and offer battle. The Roman legionaries, auxiliaries and cavalrymen were victorious, supposedly killing nearly 80,000 Britons for the loss of 400 of their own men. Boudica perished, either from taking poison (Tacitus) or illness (Dio).

Terrain and Tacitus

One of the wonders of the internet is the availability of free data and software that enable even amateurs to contribute to research. To investigate Boudica's story, I have used Shuttle Radar Topography Mission (SRTM) data at 90m resolution, and the System for Automated Geoscientific Analyses (SAGA). The SRTM data were loaded to SAGA and used to calculate, and display, a multitude of terrain features such as rivers, slopes and gradients, ridges, the concavity or convexity of slopes, aspect and, particularly important for this study, plains. The resulting terrain model was interrogated either visually or via mathematical means. Supporting

information such as towns, forts and roads were also loaded to SAGA. Next the terrain analysis model was matched to Tacitus's account.

His key passage is:

So So Suetonius gathered the 14th legion and detachments of the 20th, together with the nearest available auxiliaries – in all around 10,000 armed men – and prepared to join battle without delay. He chose a position in a defile [faux] with a wood [silva] behind him. He established there could be no enemy except at his front, where there was an open plain [aperta planities] with no fear of ambush. Then he drew up his regular troops in close array [frequens ordinibus], with the light-armed auxiliaries at the flanks and the cavalry massed on the wings. By contrast, unprecedented numbers of British troops and followers paraded wildly everywhere. Their confidence was such that they brought their partners to witness the victory, installing them in carts at the extreme border of the field [campus].

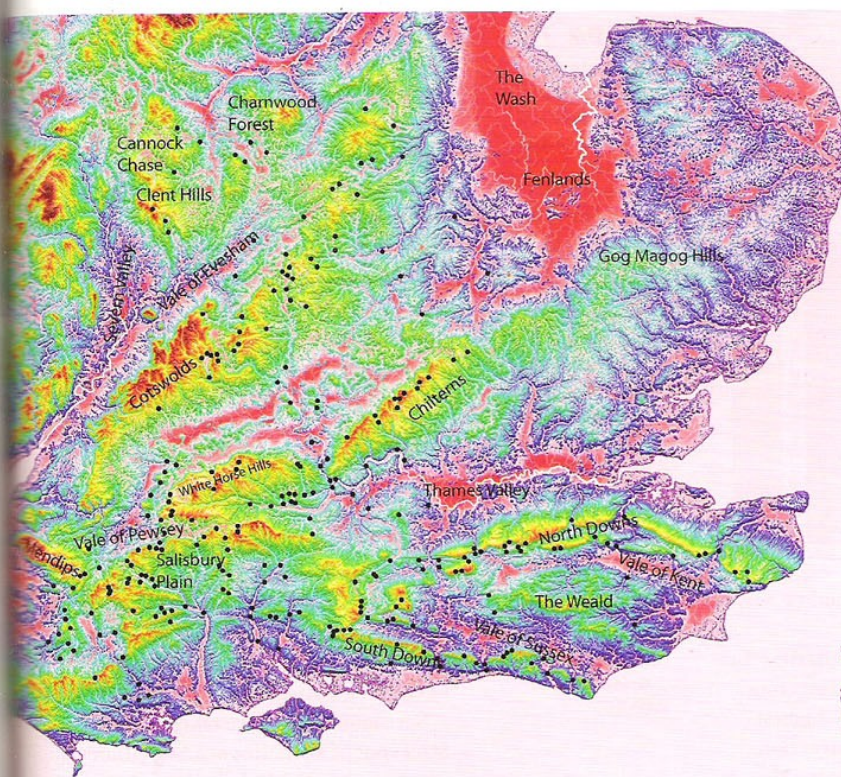
The key topographical elements are the defile and plain, which suggest the location is similar to that found at escarpments where lower, relatively flat ground abuts ground that rises sharply and is commonly wooded even today. Within the face of escarpments are often found narrow passes cut by rivers, streams or periglacial action.

Tacitus limits the plain's extent by placing the British wagons on the "extreme border". The width of the defile can be estimated from the Roman "close array" (approximately 0.5–1m per legionary). Hence, although the precise number of legionaries is not known, an estimated defile width of 750–1250m seems reasonable.

Although Tacitus's description allows for little misunderstanding in its gross form, that is a defile facing an open plain, an extremely complex algorithm would be required to search the digital terrain model for such features. Therefore the terrain model was visually examined to find possible battle sites with the following criteria:

- a defile approximately 1km wide set within an elevated feature. The defile's sides must rise at least 30m above the bottom and have a steep slope (generally over 8°), and must extend at least 1.5km in both directions to discourage mass flanking movements by the Britons. These sides could be a mix of high and broken ground
- an adjacent, lower elevation, plain (less than 4° of slope) or extensive flat area with gentle slopes, at least 1km across to accommodate the British horde and wagons
- a gentle, positive slope (less than 5°) between the Britons and Romans
- a river or stream, sufficient to water 10,000 men and 1,000 horses and capable of protection by the Roman force
- the site must not be easily flanked, for example by an adjacent road or valley
- the site should not so intimidate the Britons that they would not offer battle but instead besiege the Romans – it must be inviting to the Britons and appear to them to be a trap for the Romans
- the Roman army must be able to march radially from London by road to reach the site's vicinity.

I selected few sites west of the Fosse Way, as there is no evidence for destruction of forts or towns on or beyond that road, for example at Cirencester. These criteria were not rigid: often one was given precedence over another. My initial visual selection, which did not take into



MAP 1

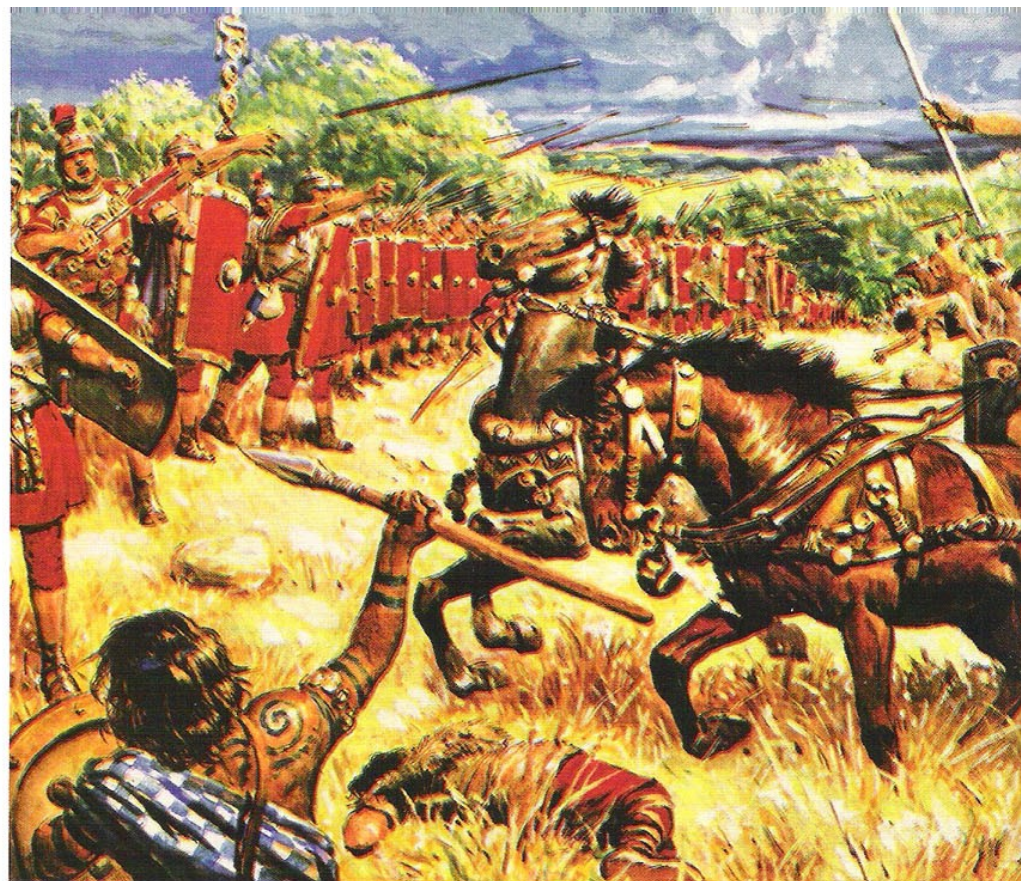
The 263 possible sites for Boudica's last battle (black dots) derived from terrain analysis and geographical features overlying the terrain data. Tacitus's description of the environs, a defile facing a plain, results in battle sites predominantly located at the margins of upland chalk and limestone regions

consideration any strategic or political concerns, identified 263 sites (see maps 1 and 2) – far fewer than the thousands often supposed. Dadlington, the new site for the Battle of Bosworth (feature, May/June 2010), was also identified as a Boudican candidate!

The 263 sites are mostly at the margins of the chalk and limestone regions. Few are located in the lowland regions except where deep incisions by rivers have created the required profile. There are only one or two sites within the Iceni and Trinovantes tribal areas of eastern England. Further examination of events may help localise the battle site to a smaller area.

Reversal of strengths

We may imagine that Suetonius's strategy was to use his four legions to contain the Boudican rebels by marching his 14th and 20th legions down Watling Street towards London, while the ninth held the ground to his north as the second, marching from Exeter, formed the southern pincer. As we have read, the ninth was destroyed and the second did not arrive. Suetonius's strategy had failed and he marched on to London. St Albans may have been burned by the rebel group that destroyed the ninth and then followed Suetonius south. Relative strengths had been reversed: Suetonius was now alone with two legions facing



and then galloped back up Watling Street before giving battle. This militarily improbable, and improper, action would have been mentioned by Tacitus: he does not explicitly state that the legions were with Suetonius in London, because that was to be expected. To return north along Watling Street, with supply depots

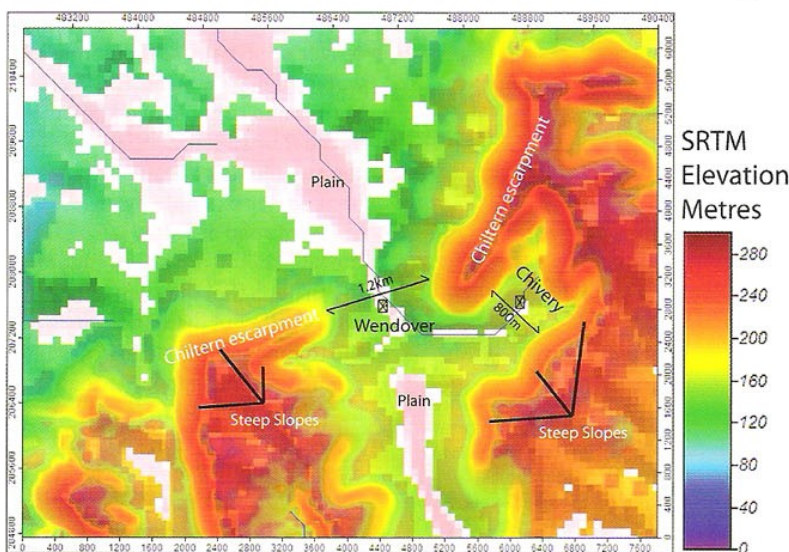
A woman defiled, as envisaged by CL Doughty (1913–85) for Look and Learn. Having ransacked a few museums, Boudica attacks the Roman 14th legion under Suetonius Paulinus

civilians were accepted into the army, something that a commander would not allow if he intended battle, nor do civilians voluntarily head towards a battle zone – they flee in the opposite direction.

Suetonius could have headed south across the London bridges but, for a host of strategic and tactical reasons, he probably chose the west road, the Portway, towards Silchester and the “most loyal” client king of the Atrebates, Cogidubnus. The Portway is also the shortest and quickest route to the western military zone and the second legion. Boudica and the rebel horde followed.

Terrain analysis identifies three possible battle sites along the Portway before Silchester but they are tactically poor for the Romans. Michael Fulford (University of Reading) has found evidence for extensive burning and in-filled wells at Silchester (Callewa Atrebatum). Some time between AD60 and 80, he has said, “the settlement is completely wiped out”, and rebuilding on a new plan and alignment begins in AD70. Fulford suggests that Silchester might have been destroyed by Boudica. If he is right and the Boudican rebels reached the town, then the battle site is likely to be further west.

Suetonius might have taken Ermin Street out of Silchester heading either west, towards Mildenhall, or north-



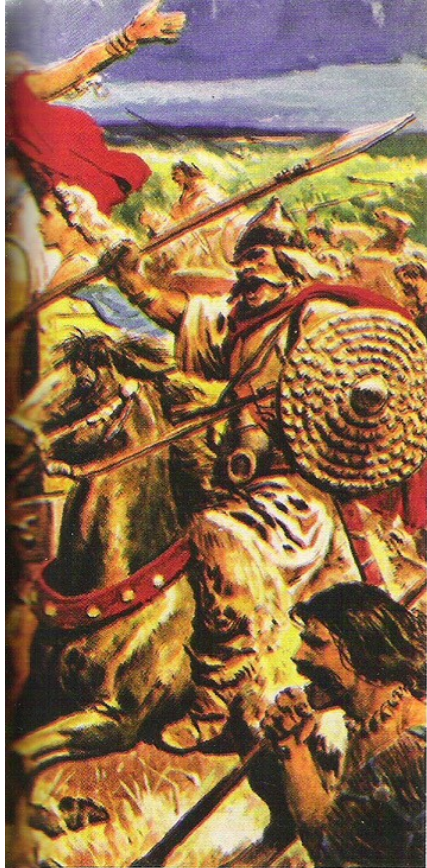
MAP 2
Example of two battles sites (Wendover and Chivery) on the Chiltern escarpment. The pink, fading to white colour, in valley bottoms and upland areas, marks the location of plains (slopes less than 4°). The STRM elevation data are overlain by yellow-to-red maximum slope data, accentuating the escarpment edges (in maps 2 and 3, blue lines are computer-generated rivers; border graticule in metres, National Grid)

the Boudican rebels who must destroy Suetonius's army or lose the revolt.

Tacitus states that Suetonius reached London, and left – but he does not say where he went. Some investigators suggest he rode with cavalry to London without his legions,

depleted and Britons raiding, was not a sensible option.

To march east, towards the rebel heartland, is the most dangerous course, one that has the highest probability of total destruction. Additionally, Tacitus states that



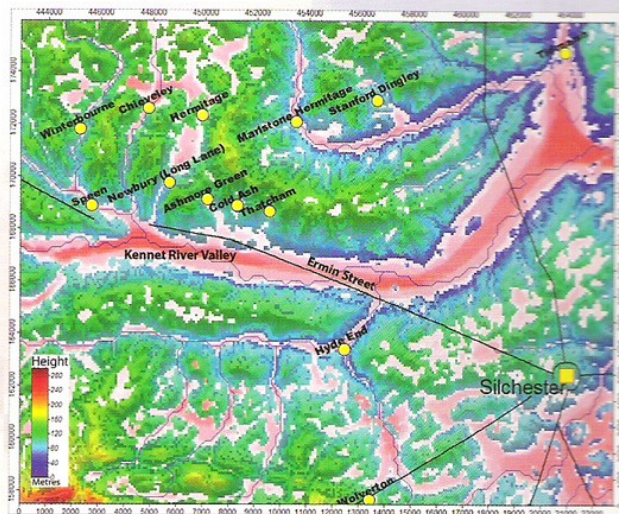
Turn and fight

Suetonius's strategy, since leaving London, had probably been to march west towards the Roman military zone and join with the second legion, but he now realised that the strategy had failed. He must turn and fight.

Tacitus says that Suetonius chose a battle site where the enemy were only to his front, suggesting he quickly outpaced the following horde, reached his previously chosen defile and prepared for battle. In essence, Suetonius used his superior education, military training and combat experience to select a battle site whose favourable attributes were concealed from Boudica. But where?

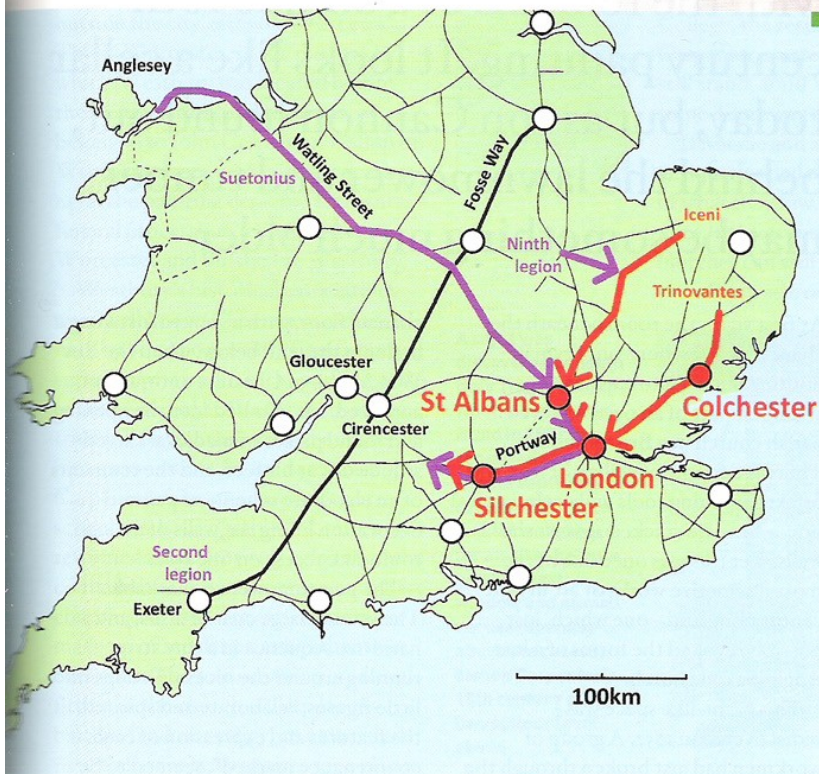
Less than one day's march from Silchester, the Kennet river valley and surrounding hills have a number of possible battle sites identified by the terrain analysis which seem very favourable (see map 3) – but then again, so does the site at Tidmarsh just south of the Goring Gap! Only archaeological finds will solve the riddle of Boudica's last stand.

west, towards Cirencester and Gloucester. Not only is this road more easily-traversed than other roads out of Silchester, but it also keeps his force within the territory of the Atrebates and their numerous hillforts north of the river Kennet in the White Horse hills.



MAP 3

Battle sites (yellow dots) for the Kennet river valley near Silchester. All are within a day's march of the town, making them favourable to the Romans, not least because they lie within the territory of their allies, the Atrebates. If Silchester was burned by Boudica, the actual battle site is probably west of there



Britain resisting Rome around AD61. Near-contemporary classical histories can be interpreted to suggest that native rebels led by Boudica moved south and west from East Anglia, defeating the ninth legion before falling to the 14th commanded by Suetonius Paulinus. The texts describe the loss of Colchester, St Albans and London, confirmed by archaeological evidence. Excavation has also shown destruction and rebuilding at this time in Silchester

*Steve Kaye is a retired geophysicist, oil company IT manager and consultant. SRTM digital elevation data are available from srtm.csi.cgiar.org. The SAGA software can be found at saga-gis.org/en/index.html. The classical texts and archaeology of Boudica's rebellion are described in *Boudica: Iron Age Warrior Queen*, by R Hingley & C Unwin (Hambledon & London 2005)*