The Great Circle Stanton Drew

LiDAR evidence for a vestigial bank at the Great Circle Stanton Drew

John Richards

Abstract

A magnetometry survey at the Stanton Drew stone circles in 1997 concluded that the Great Circle had once possessed an encircling ditch with the implication that there would have been an encircling bank as at other henges such as Avebury. However, there was no trace on the surface of the ditch or bank.

Examination of LiDAR data suggests that there may be a remnant of the bank visible as a break in slope following a circular arc outside the north-west quadrant of the Great Circle.

Introduction

In the early days of 2016, a Facebook user posted some hillshade images produced from LiDAR data of some well-known prehistoric sites in Wessex, including Avebury, Maiden Castle and Stanton Drew (Rock 2016). On the image of Stanton Drew, a faint shadow in the shape of a circular arc seemed to be visible just outside the north-west quadrant of the Great Circle (*see Figure 1*).

The more prominent linear features in the vicinity of the Great Circle are known to be the remnants of medieval or later field boundaries (*see Figure 2*), but it was thought the circular arc could relate to a prehistoric feature.

In 1997, an English Heritage team carried out a magnetometry survey and concluded that the Great Circle had once been enclosed by an inner ditch and outer bank with two entrances. However, they said there was no topographic evidence today for either bank or ditch, and in the seventeenth and eighteenth centuries Aubrey and Stukeley had written that they could see no trace. The bank and ditch may have been degraded by time or cultivation, or even deliberately filled in (David *et al* 2004). The English Heritage results were confirmed and extended by a BACAS team in 2010, which produced the magnetometry survey results shown in Figure 3 and interpreted in Figure 4. John Oswin suggested at the time that there may be features in the results that showed part of the henge bank, and stake holes within the bank and ditch outlines, most visible in the north-western quadrant, but the signals were too weak to make any claims for them (Oswin *et al* 2011: 21).

The circular arc on the LiDAR hillshade image would appear to align with the ditch on the magnetometry survey. Analysis was carried out to investigate whether there could be any connection.

Figure 1
Hillshade image of Stanton Drew Great Circle, north to top (Rock 2016).

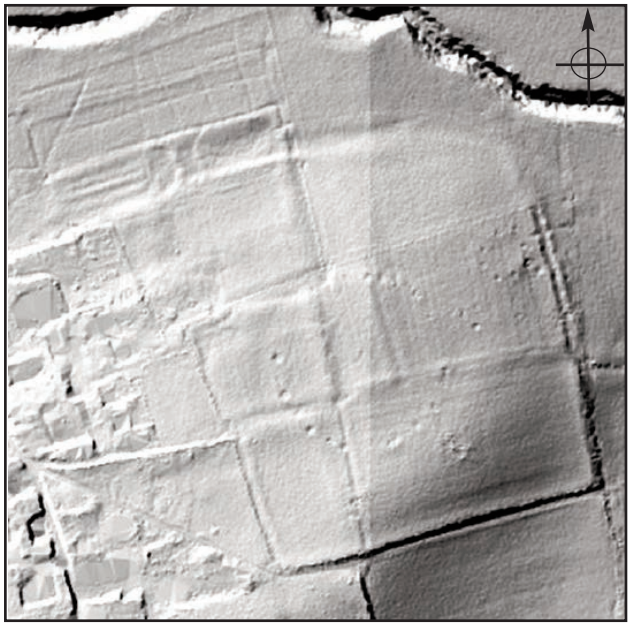
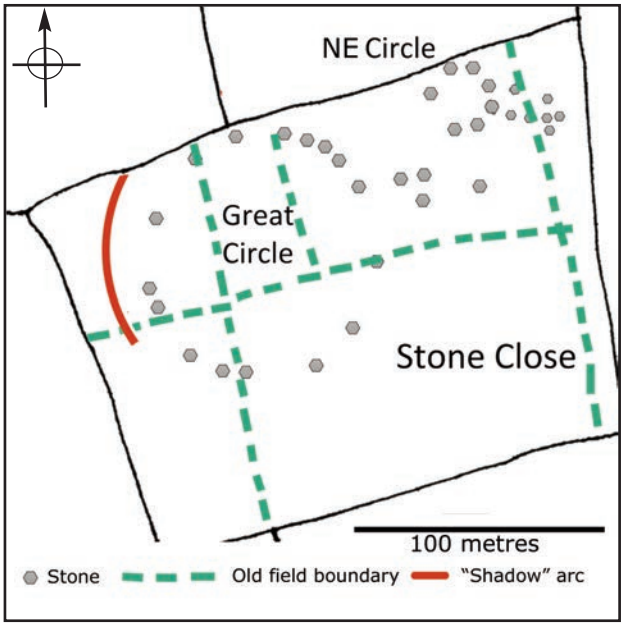


Figure 2
Interpretation of LiDAR hillshade image.



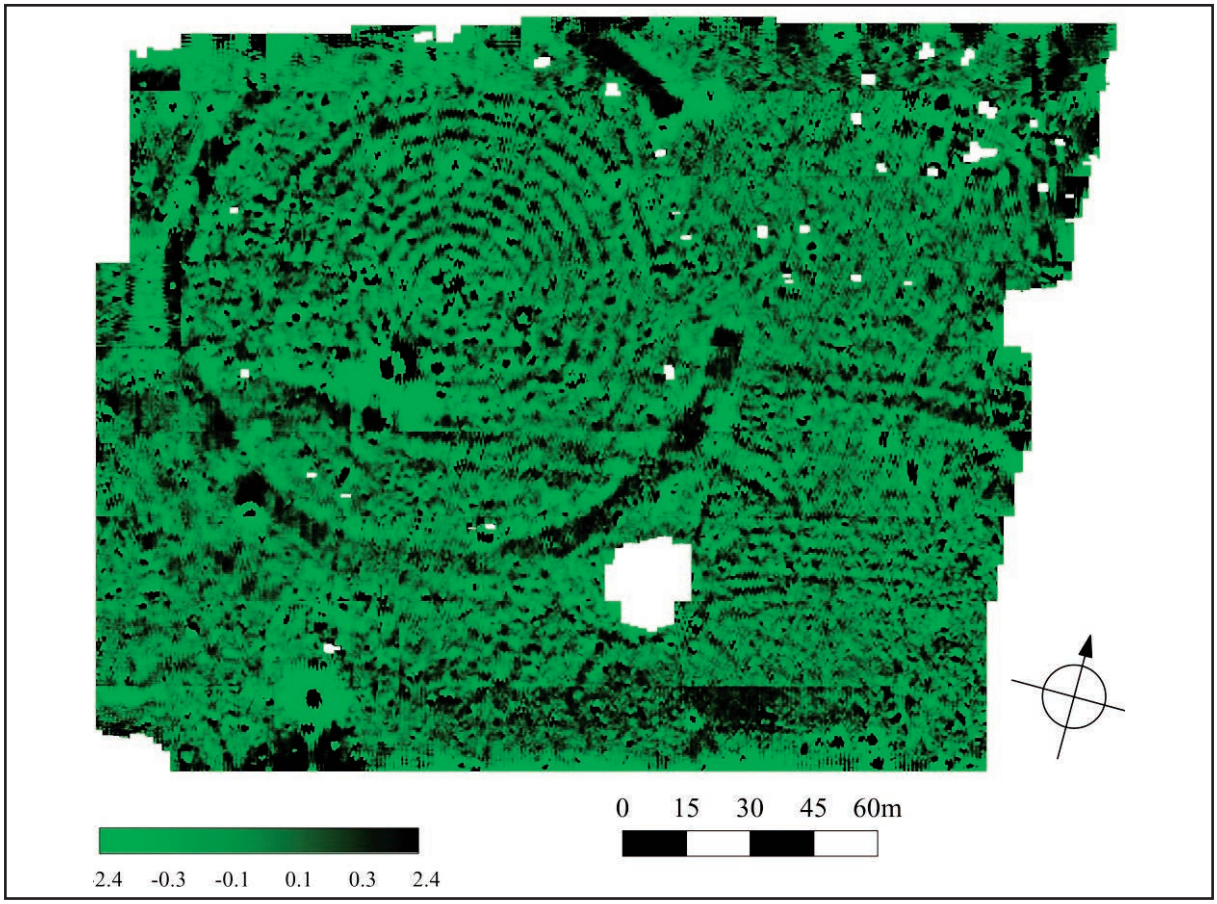
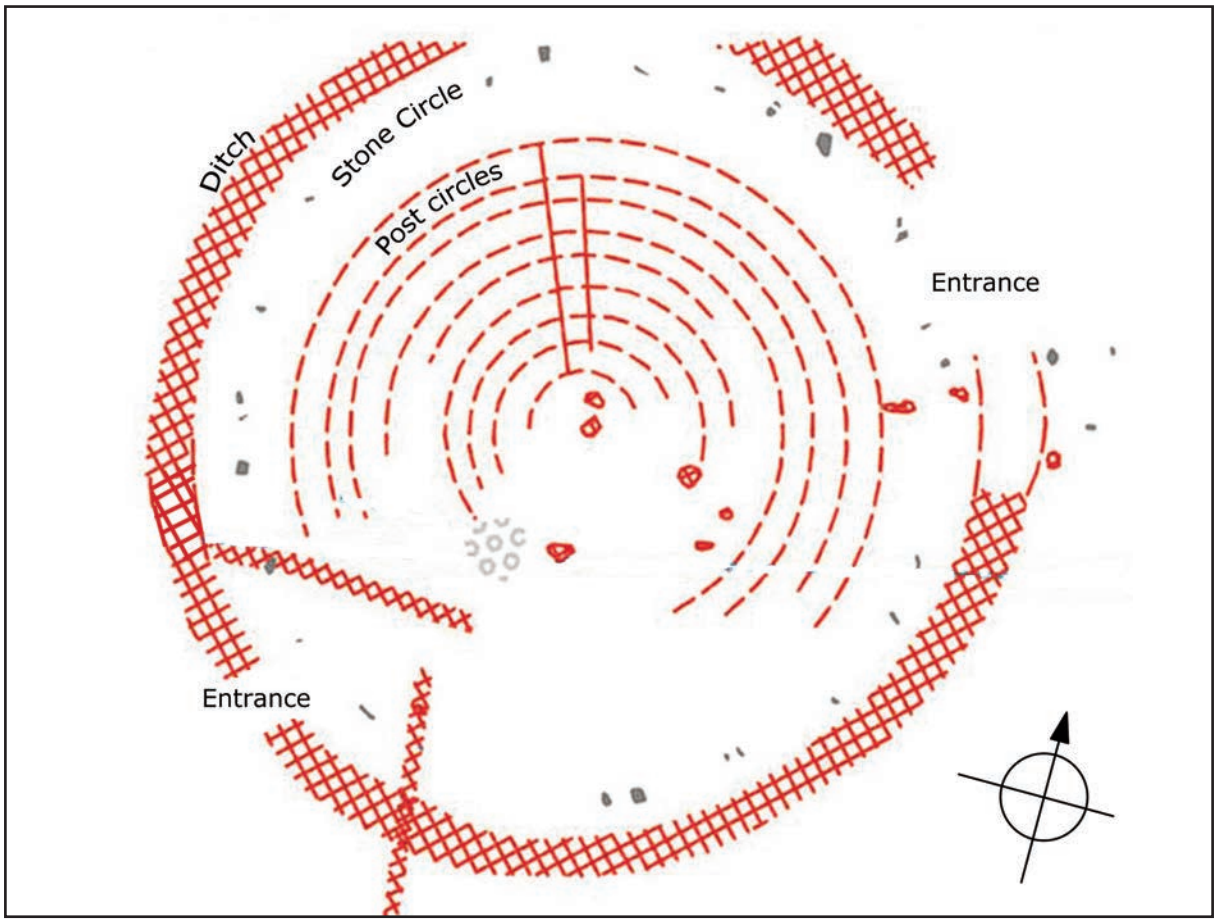
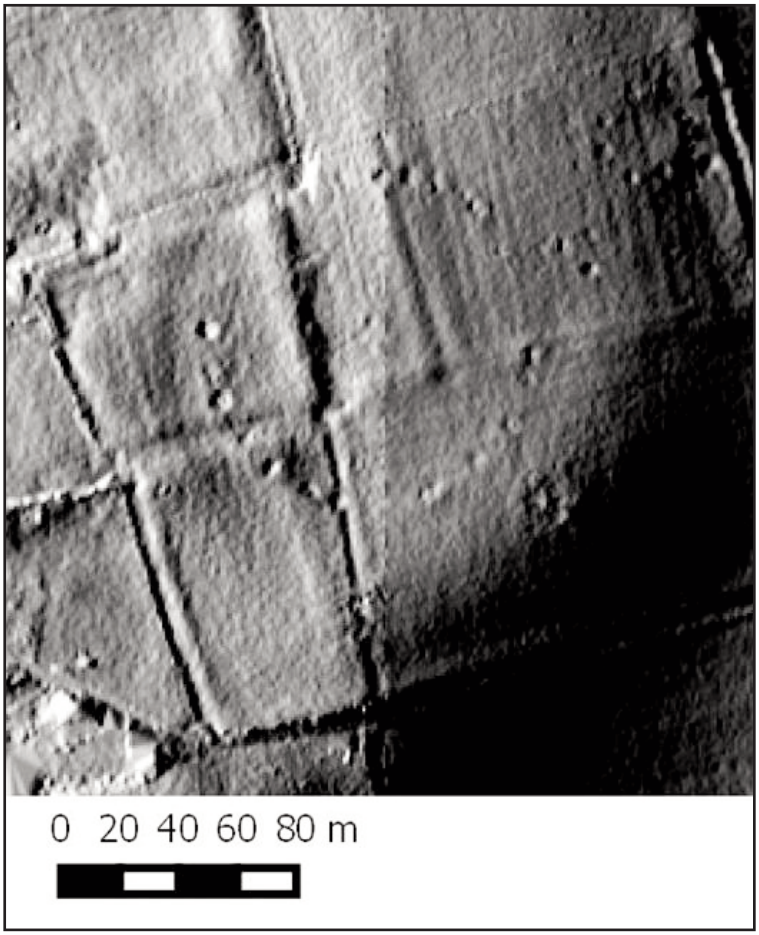
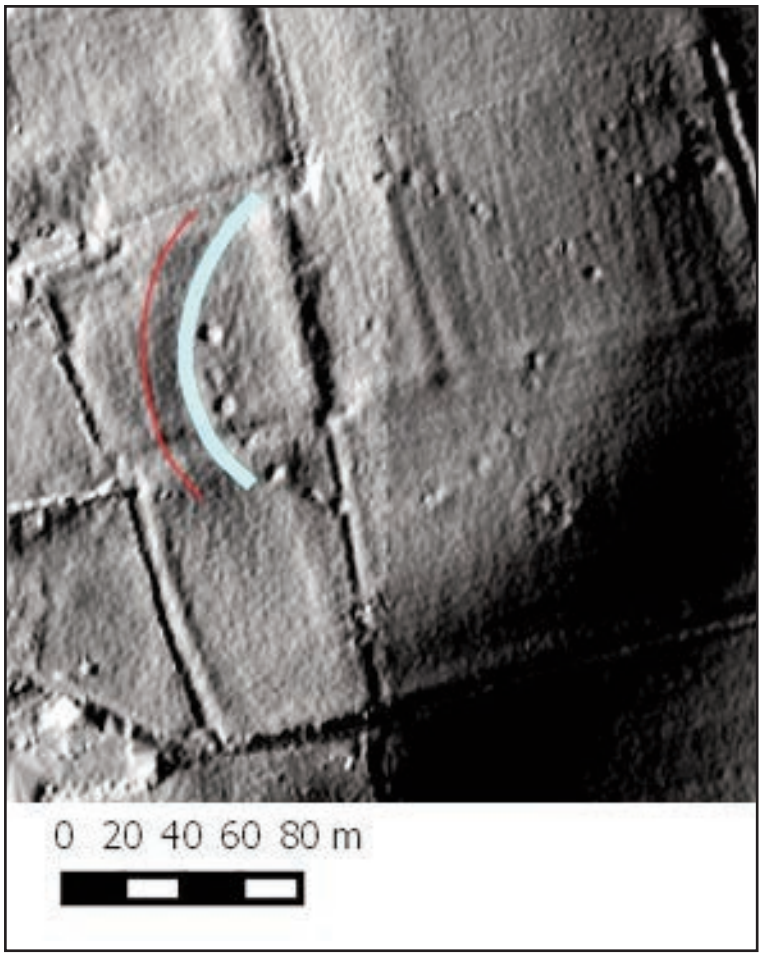


Figure 3 above
BACAS magnetometry survey of Stone Close (Oswin et al 2011).

Figure 4 below
Interpretation of magnetometry at Great Circle.







Data Analysis

New hillshade images were produced using the DTM (Digital Terrain Model) 1m LiDAR data for the OS grids ST5963 and ST6063. It was found that it was possible to make the feature more distinct using an azimuth of 280°, an altitude of 10° (corresponding to a sunset in the west-north-west) and a Z factor (vertical exaggeration) of 3 (*see Figure 5*). A few other values were tried for the azimuth at random around the Circle, but no comparable features were noticed.

The DTM data was inspected by creating terrain profiles and this revealed that the feature was caused by a slight break in slope running in a circular arc, some 100 metres in length. With the illumination set low and at an azimuth of 280°, a shadow was cast eastwards and down slope. In Figure 6, part of the course of the ditch has been superimposed together with a red line at the western side of the shadow corresponding to the break in slope.

The break in slope is very slight, a change of two or three degrees at most, as shown in the example profile in Figure 7. It is 9 metres from the believed location of the ditch, which is itself 6 to 7 metres in width and stands 7 metres out from the stone circle.

The position of the break in slope is difficult to establish with any precision. A set of twenty terrain profiles were created in QGIS as radials towards the centre of the Great Circle. For each profile, an attempt was made to estimate the point where the break occurred. In some cases this was fairly straightforward, as in Figure 7. In the other cases an interval was chosen in which the break could be said to occur, and the start (outer) and end (inner) points of the interval were plotted. The results are shown in Figure 8.

Figure 5 above
Stanton Drew Stone Close, hillshade image from DTM 1m LiDAR, azimuth 280°, altitude 10°, Z factor 3.

Figure 6 left
The hillshade image with the line of the break in slope (red) and part of the ditch (light blue).

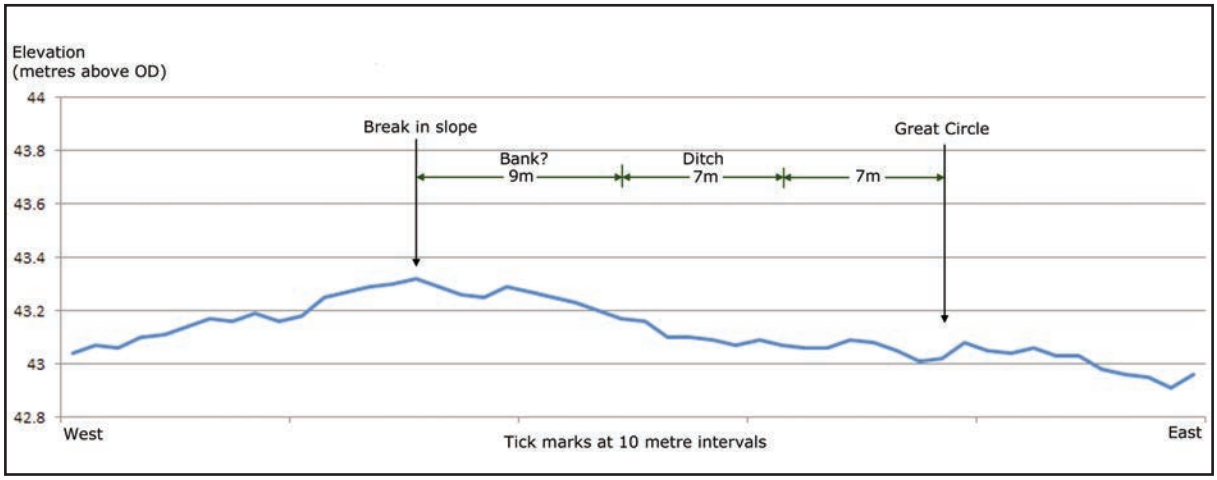
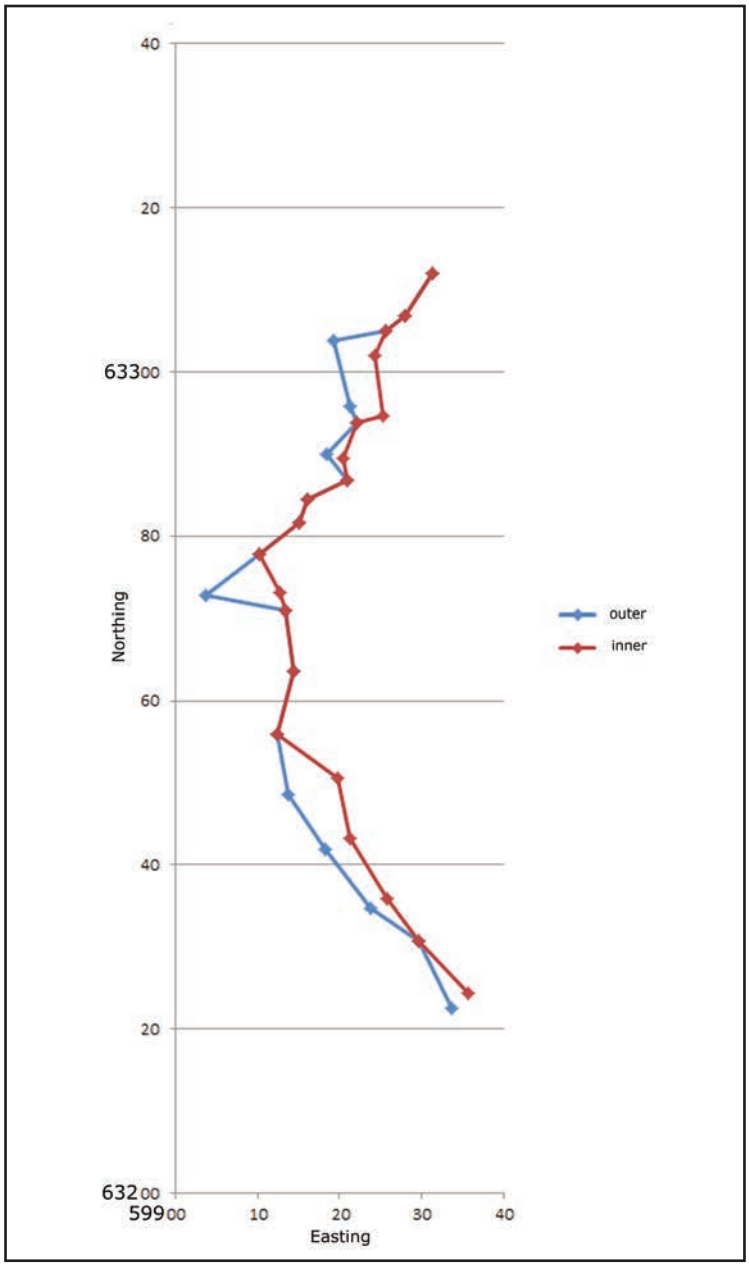


Figure 7 above
Example terrain profile. Note the vertical scale has been exaggerated to make the slope break visible.

Figure 8 below
The break in slope, plotted from a set of terrain profiles. Where the position is uncertain, the outer (start) and inner (end) points have been plotted. Axes are in OS grid coordinates.



Discussion

Belief in the existence of a bank is based solely on the supposition that the magnetometry surveys show a ditch, and that hence a bank surrounding the ditch would have existed if the Great Circle was a classic henge. If the LiDAR data provides evidence for a bank then this could be a significant discovery.

The LiDAR data appears to show there is a slight break in slope that is in the right position and follows a circular arc parallel to the Great Circle in its north-west quadrant. However, it is so slight that it does not appear visible on the ground.

Although the hillshade model shows a convincing arc, closer inspection of the data shows that it is not a perfect one. In some places, the break in slope is a few metres from the predicted position; in others, it disappears completely. This is not surprising, as natural erosion and weathering of the ground would all play a part, but it does increase the uncertainty as to whether this is purely a coincidental feature.

If the feature is a vestige of the bank then we need to consider what it might represent. It could be that it corresponds to the foot of the outer edge of the bank. The ditch may have been deliberately infilled with the contents of the bank after the henge fell into disuse. The bank would then have a maximum width of about 9 metres. This width is comparable with that of other henges, for example, the original bank at Avebury (Gillings and Pollard 2004: 8) and that at Arbor Low is between 8 and 10 metres.

There are other possibilities for the creation of the feature. It could be that livestock or farm vehicles tend to follow a path that has worn down the ground in this area. It is very unlikely that livestock would do this, there are large gaps between the stones and they are more likely to wander randomly, but it is possible that farm vehicles are driven round, rather than through, the circle.

It would be worth repeating the analysis if the 25cm or 50cm LiDAR data becomes available for this area to see if that provides any better definition. Meanwhile, there is the possibility that the feature might be apparent on the ground when sunlit from the right direction, this would occur towards sunset in midsummer.

No comparable features in the LiDAR data have been detected in the other quadrants around the Great Circle but there may still be things to be discovered. In the south-east quadrant, the ground falls away to the south-east and the River Chew floodplain, this causes the dark shadow in the bottom-right corner of the hillshade image in Figure 5; but this is a natural feature that occurs some 30 metres from the stones.

Any conclusions have to be very tentative because the evidence is slight. However, it may be that other techniques may become available that will enable the hypothesis to be tested. If excavation ever does occur at Stanton Drew then the north-west quadrant of the Great Circle may be a good candidate for investigation of the bank and ditch.

Technical Information

The version of QGIS that was used was QGIS 2.12.2-Lyon (64-bit).

It was decided to use the DTM data instead of the DSM data for the analysis. DTM data is produced from the DSM by removing non-natural features, and hence avoids the possibility that buildings or walls cast shadows in the hillshade image, though in this case that turned out not to be a factor.

References

David, A., M. Cole, T. Horsley, N. Linford, P. Linford, and L. Martin. 2004. "A rival to Stonehenge? Geophysical survey at Stanton Drew, England." *Antiquity* 78: 341-358.

Environment Agency. 2016. *LiDAR data.* http://environment.data.gov.uk/ds/survey#/download.

Gillings, Mark, and Joshua Pollard. 2004. *Avebury*. London: Duckworth.

Oswin, J., John Richards, and R. Sermon. 2011. *Stanton Drew 2010: geophysical survey and other archaeological investigations.* BACAS/BANES

Rock, Juamei. 2016. *Post to Prehistoric Explorers Club Facebook group*. 3 January 2016. https://www.facebook.com/groups/525116760924617/permalink/675225312580427/