Archaeological geophysical prospection in peatland environments: Locating the Sweet Track at Canada Farm, Shapwick Heath (Somerset)

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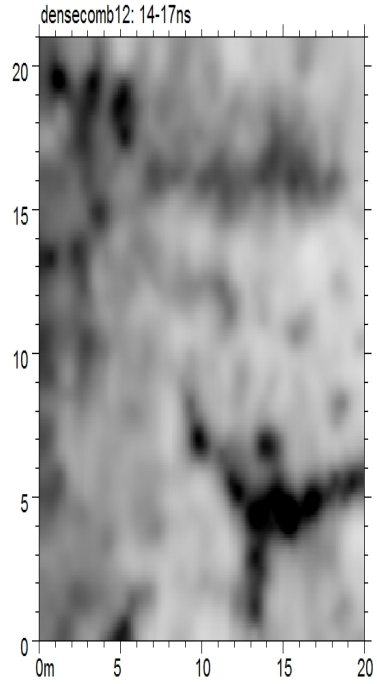
"Geophysical techniques can, as yet, have little part to play in wetland evaluation."
(English Heritage, 2008, 17)

Peatland environments preserve organic material, including anthropogenic objects, because they are waterlogged, and therefore anaerobic. These objects are not preserved on most other sites, so peatland sites have contributed enormously to our understanding of the past. Peat also preserves paleoenvironmental evidence and is the primary resource for understanding the past climate and ecology of the UK. However, these sites often lie within or at the base of wet, deep, homogenous peat which makes them invisible to surface observers. As a result, they most often come to light whilst being destroyed. Once located, they are difficult to excavate, leading to a bias towards small area, detailed excavations, rather than open area work which allows monuments to be placed within a landscape context. Furthermore, these sites and the environments they inhabit are very sensitive, so invasive evaluation techniques are ruled out. There is a need for non-invasive techniques to detect, monitor and contextualize peatland sites. A research project to evaluate the use of geophysical prospection for this purpose is being undertaken at Bournemouth University. In the past it has been suggested that peat deposits are too wet, too deep, too homogenous or similar to the target for traditional dry land geophysical techniques to be of any use. However, as this research demonstrates, there are detectable physical and chemical differences between the archaeological deposits and structures and the surrounding matrix. The overall research project sets out to document these and find survey techniques that can recognize them.

The project has defined four peatland environment types: upland and lowland, each divided into sites with sub peat and intra peat archaeological deposits. Eight case study sites have been selected that represent these. This presentation focuses on work in lowland peat deposits, and a case study of these at Shapwick Heath in the Somerset Levels, which was prospecting for the Sweet Track. Dated at 3200 BC (approx) this is the oldest known trackway in Britain and is of a unique single plank construction. The surveys over a preserved section of the track all located an anomaly in the known location of the trackway. The resistivity and conductivity (EM) surveys showed a linear anomaly running north/south, 2m wide and 16m in from the western edge of the grid. They also show a gradient of increasing resistivity values from west to east across the grid. The resistivity inversion modeling showed that this gradient appears to show a more resistive layer that starts at about 5-8m in from the western edge, growing more intense to the east and extending down about 0.75m. To the east and underneath this is a generally much less resistive body. The magnetic survey was very quiet but showed an area of enhancement in the far south east corner of the survey and a faint linear negative anomaly about 1m wide running north-south about 14m in from the western grid edge. The GPR showed a large dendritic reflector in the south west quadrant of the grid between 10-28ns/ 0.4m deep. There is a faint linear reflector at roughly the same depth running north/south, 2m wide and about 16m in from the western grid edge. From this depth the northern edge of the grid and in particular the north-east corner shows high

amplitude responses that seem to be ‘cut’ at the 16m mark, in line with the previously noted anomaly. The EM38B magnetic susceptibility survey revealed no anomalies of any significance. The linear north/south anomaly is interpreted as being, or being caused by the Sweet Track. The stronger dendritic anomaly in the GPR data is interpreted as being a bog oak.



[pic]

Figure 1: Top of image is northern grid edge (see figure 2). GPR Timeslice at 14-17 ns. The squared amplitude of the GPR signal, split into forward and reverse directions then recombined to reduce antenna noise. Low pass filtered. Line of trackway (right of image at 16m east) together with the much stronger response from a bog-oak (bottom left). Darker colours represent higher amplitudes. Created with GPR-SLICE.

However, it seems that only the GPR was directly responding to the trackway. The electrical data shows an anomaly in the location of the track, but not the bog oak, whereas the radar shows both. If they were responding to the same physical properties of the wood, the bog oak should also show in the EM and RM15 data. There is also a gradient in the resistivity of the peat, and a common depth to the changes. This common depth is around 0.75m from the surface; the same depth as the trackway in that location. The track was built on a semi-stable surface in the peat and was later subsumed so it is possible this reflects a change in the type or physical and chemical properties of the peat itself. The gradient could also be as a result of this, or of different ground water bodies.

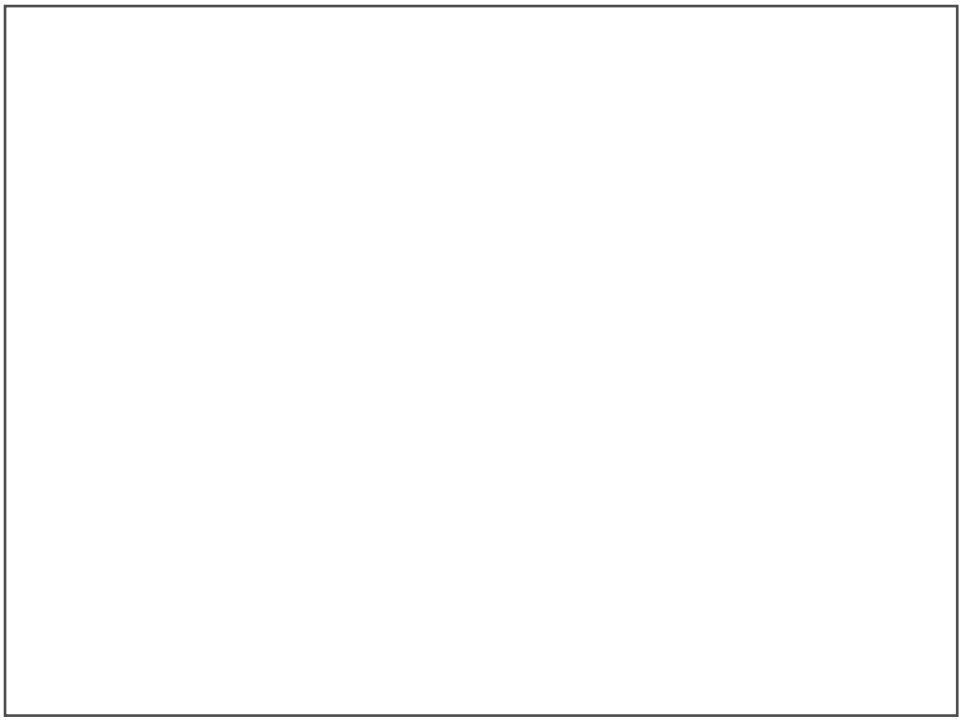


Figure 2: Location of survey and major anomalies with reference to known archaeology and previous GPR survey by Usti Electronics (Utsi Electronics, 2001).

The reasons for the trackway showing like this, especially in the magnetometer data are not clear. The current working hypothesis is that the track itself is influencing the hydrology within the peat causing the loss or collection of minerals within the pore water and peat matrix, and it is these variations that are being detected. Further work is planned on the site to sample the water and peat and conduct chemical analyses to determine if there is a variation in the chemical composition that reflects the changes shown in the geophysical data.

References:

English Heritage, 2008. *Geophysical Survey in Archaeological Field Evaluation (2nd Edition).* 2nd ed. Swindon: English Heritage.

Utsi Electronics, 2001, *Trial GPR surveys of three sites in the Somerset Levels: Part 1- A section of the Sweet Track 2nd July 2001*: UNPUBLISHED Held By: English Heritage

Acknowledgements: This work is being undertaken under a Bournemouth University funded PhD Studentship under the supervision of Prof. T Darvill and P. Cheetham. The research was conducted under a Section 42 license from English Heritage, and with the permission and support of Phil Holms, the Natural England reserve manager at Shapwick Heath.