Ticking all the boxes: the added value of heritage surveys of woodland by LiDAR

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Abstract

Mapping archaeological features is a key activity for understanding and maintaining national heritage records by government and for historic landscape reconstruction by scientists and academia. Such mapping has hitherto relied on collection and interpretation of aerial photography. Archaeological features reveal themselves in photography as crop marks or field patterns caused by shadowing and highlighting of small variations in terrain morphology. However, this approach to mapping has some clear limitations, as features beneath forest canopies cannot be detected at all. In the UK forestry covers some twelve percent of the landscape and thus represents a significant area in which the archaeological record is incomplete or entirely missing. Areas affected by this problem in other parts of the world may be significantly higher. For organisations charged with recording and managing heritage this is a serious problem because the only viable approach – ground survey – is both difficult and expensive.

The emergence of small footprint, airborne LiDAR is now rapidly opening up new approaches to mapping heritage features. Previous work by the present authors has demonstrated that with appropriate visualisation techniques, hillshading of LiDAR DEM's can offer a much more effective approach to feature detection than photography. Furthermore, they have also demonstrated that the ability of LiDAR to penetrate forest canopies opens up the potential for airborne mapping of sub-canopy archaeological features.

The application of this technology to some British forests has already led to the discovery of many, previously unknown sites of potential archaeological significance. As such, the dissemination of the findings is receiving considerable interest within the heritage sector, media and wider public. There are limitations to the survey method and caveats with the data and informing project partners and stakeholders of the pros and cons of a LiDAR survey over a wooded landscape is essential. However, this very process of knowledge transfer has highlighted the many other potential benefits of the survey and this paper will examine some of them. Examples include opportunities to engage with volunteers in the on-site identification of features identified in hillshaded images.

The very 3-dimensional nature of these heritage surveys allows interactive visualisation of historic landscapes, cross-sectional analysis of individual monuments and provides a powerful mechanism for dissemination and engagement. The data is also of use to other non-heritage professionals such as forest and landscape managers and planners, providing information about the forest structure and a landscape both with and without woodland cover. In the longer-term, findings from these surveys can be used to create heritage trails within forests, thereby increasing their cultural value through increased education and recreation.

Experience from these heritage surveys has already shown the significant diversity of applications of the surveys and data. This in turn can be used to build partnerships in advance of undertaking new surveys.