Digital Photogrammetric Derivation of Large Scale DEMs

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Introduction

Digital photogrammetry can provide high resolution Digital Elevation Models (DEMs) for use in the measurement and monitoring of natural landscape features. Two examples follow relating to ground vegetation and peatland surveys.

1. DEMs and heather utilization

A study of the effect of sheep density on a heather/grass mosaic is using high resolution DEM data (20cm x 20cm), derived from 1:1 000 scale aerial photographs to characterize the vegetation mosaic.

Figure 1. Experimental plots with locations of transects overlaid on orthophotograph

Figure 1 shows the distribution of 669 transects for which the height of the heather canopy was recorded and tests are being carried out on the DEM collection parameters (e.g. maximum permitted parallax) and DEM quality (using ground surveys), for use with the detailed ground observations (Figures 2 and 3).

Figure 2. Orthophotograph draped across high resolution DEM, showing heather/grass mosaic and transect lines (in cyan).

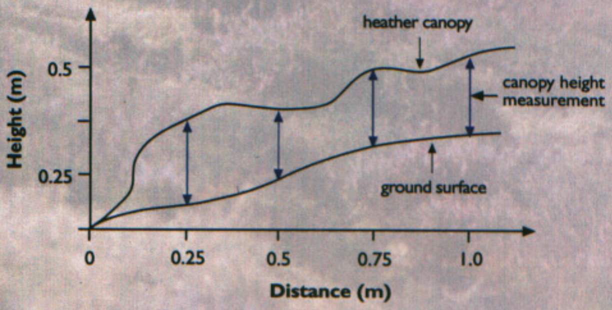

Figure 3. Schematic view of ground observations along transects

2. DEMs and peatland surveys

Multiple dates of DEM data are being used to estimate changes in the surface heights of peatlands and woodland canopies. Figure 4 shows orthophotographs of a peatland area, with 1946 data (panchromatic) overlaid on that for 1998 (colour), plus ground survey points and the pattern of current drainage and other boundaries. The DEMs were interpreted to identify the patterns of peat working, woodland and within canopy boundaries (Figure 5 shows data for 1946). The difference in height of the peatland and woodland surfaces was derived by comparing the two DEMs showing that the peatland surface was higher in 1946, and the area and height of the woodland has changed with management and natural regeneration. Figure 6 shows the merged surfaces for the two dates.

Figure 4. Orthophotograph for 1946 (panchromatic) overlaid on 1998 (colour), with OS Landline data and depth points located.

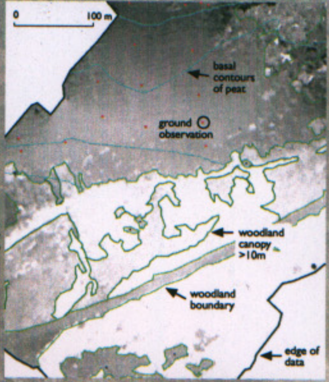

Figure 5. DEM for 1946 showing interpretation of within canopy differences in height and contours of underlying mineral soil.

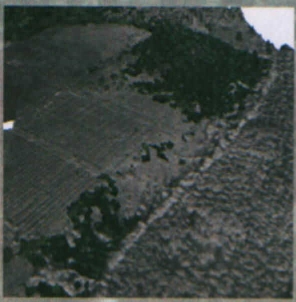

Figure 6. Perspective view of intersecting DEM surfaces for 1946 (panchromatic) and 1998 (colour), in which the orthophotograph is visible for the year for which the terrain surface is higher.

Conclusion

High resolution DEMs derived from large scale aerial photographs and detailed ground survey are capable of use in the characterization, interpretation and measurement of change in natural resources.

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