

Classification of Blanket Mire Microhabitats using Field and Imaging Spectroscopy

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Blanket mire is a globally rare peatland type, occurring only in temperate oceanic climates where high levels of rainfall have resulted in a mantle of peat covering large tracts of land. Scotland contains approximately 10,000 km² of blanket mire, which includes some of the largest and most undisturbed areas of this habitat in the world, and represents around 10% of the total area. Blanket mire plays an important role in the carbon and hydrological cycles, and many sites are protected due to their high conservation value. Peatland sites are threatened by changes in land use, pollution, and climate change, with impacts observed through shifts in fine-scale surface features and vegetation structure. To accurately monitor blanket mires and the effects of environmental change on them, we must survey them down to the scale of hydromorphological microforms – for example, hummocks dominated by ericaceous shrubs or wet hollows formed by *Sphagnum* moss. Given the extensive and remote nature of many peatland sites, this is too large a task for efficient ground survey. Blanket mire is therefore an ideal target for remote sensing methods.

Emerging sensor technology and classification techniques allow for ever more detailed and higher resolution classifications. By using newly acquired airborne Hyperspectral and LiDAR data, imaging spectroscopy is being combined with field ecology to study blanket mire at the crucial micro-scale for the first time. In a ground-up approach, field spectroscopy is being used to create a spectral library of abundant vegetation and other surface cover types from complementary field locations in Scotland. Preliminary findings from May 2006 show that reflectance peak features at NIR wavelengths (800 – 1300nm) should allow discrimination between key vegetated and unvegetated microform classes, while features at SWIR wavelengths give an indication of surface wetness and water table depth. These results give a strong indication of the potential to process airborne data from May 2006 and summer 2007 (AISA Eagle & Hawk; CASI-2) to generate the required fine scale habitat maps. This paper will also address the innovative approach that has been taken in the methods used to collect and examine ground reference data for the project, applying Monte Carlo simulation to the optimisation ecological mapping procedures. By using a combination of data sources at high spatial and spectral resolutions it is hoped to develop classification procedures that are precise enough to detect and quantify subtle changes in the structure of blanket mire sites, and to achieve a finer scale characterisation of this important habitat than has been previously possible with remote sensing.

Relevant conference theme:

- Remote sensing applications to hydrology, carbon cycle, biochemical and –physical cycles, plant ecology, ecosystems, snow, soil moisture, agriculture, natural ecosystems, etc.