A practical Introduction to Ground Instrumentation for GIS and Earth Observations: Soil Moisture & Temperature

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Delta-T Devices

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Introduction

GIS and Remote Sensing techniques provide invaluable tools for the study and understanding of a range of issues concerning the environment, climate impact, water availability, vegetation cover, food security and urban planning. Use of this technology involves data capture, visualisation, analysis and interpretation in order to appreciate relationships, patterns and trends.

Measurements from remote sensing (instrumentation mounted on satellites, planes or UAVs) can be complemented with data acquired on the ground using appropriate ground instrumentation to, for example, enhance spatial resolution or to validate remote sensing techniques, so called "ground-truthing".

This poster describes fieldwork carried out as part of course module **EAM3620 Skills in Remote Sensing** of the *MSc in Remote Sensing & GIS of Aberystwyth University* to generate geospatial maps relating topography with variations in surface soil moisture and temperature.

Study area

Field work was carried out within the grounds of the National Library of Wales (co-ordinates 52.41367, -4.07002) defined by the blue box below. (Figure 1)

Figure 1 Study area

Instrumentation

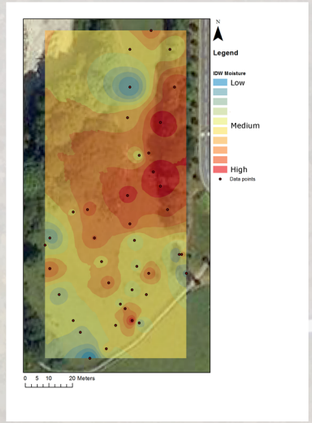
At each measuring point in the study area these measurements were taken:

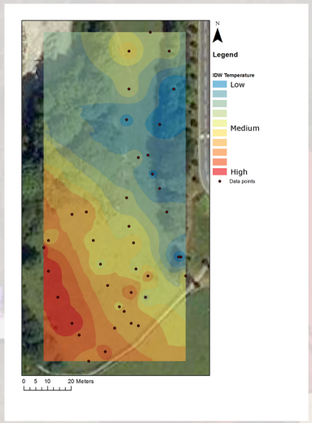
Soil Temperature
GPS & elevation

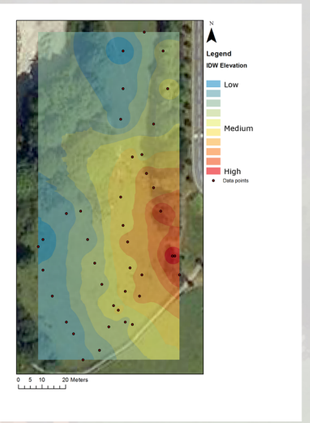
Soil Moisture - SM150 Kit, Delta-T Devices

Results

The point measurements acquired from the ground instrumentation, along with GPS co-ordinates, were used to create three interpolated maps of soil moisture, soil temperature, and elevation using the ArcGIS v6.3 package (ESRI).

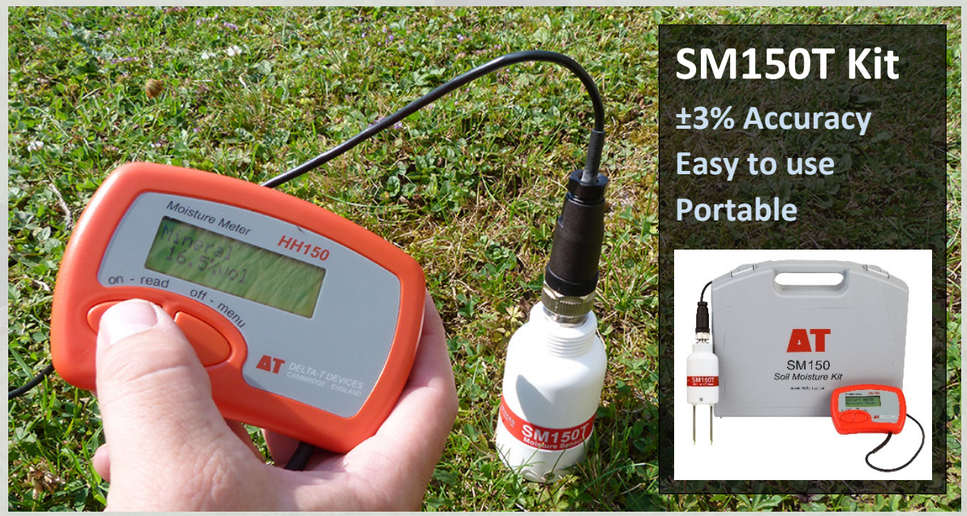






Interpolated contour maps can be created to correlate topographic features with physical measurements.
In this study, as can be observed from the maps, a negative correlation was found between moisture and temperature with higher moisture areas appearing to correspond to lower temperatures, and vice versa.
During this field study students developed skills in planning and executing a measurement regime, collecting field data, incorporating field data in a context of creating spatial information and analysing derived maps using specialised software platforms.

Further work may include the acquisition of parameters characterising vegetation (e.g. leaf area, green area index) and also remote sensing data such as NDVI, hyper- and multi-spectral imaging, radar and lidar etc. The SM150 Kit is well suited for this sort of field work and is based on over 40 years' expertise in designing and manufacturing field instrumentation.



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