Geophysical Research Abstracts
Vol. 15, EGU2013-4551, 2013
EGU General Assembly 2013

Peat Depth Assessment Using Airborne Geophysical Data for Carbon Stock Modelling

Antoinette Keaney (1), Jennifer McKinley (1), Alastair Ruffell (1), Martin Robinson (1), Conor Graham (1), Jim Hodgson (2), and Mohammednur Desissa (3)

(1) School of Geography, Archaeology and Palaeoecology, Queen's University Belfast, Belfast, N. Ireland (a.keaney@qub.ac.uk), (2) Geological Survey of Ireland (GSI), Dublin, Republic of Ireland, (3) Geological Survey of Northern Ireland (GSNI), Belfast, N. Ireland

The Kyoto Agreement demands that all signatory countries have an inventory of their carbon stock, plus possible future changes to this store. This is particularly important for Ireland, where some 16% of the surface is covered by peat bog. Estimates of soil carbon stores are a key component of the required annual returns made by the Irish and UK governments to the Intergovernmental Panel on Climate Change. Saturated peat attenuates gamma-radiation from underlying rocks. This effect can be used to estimate the thickness of peat, within certain limits. This project examines this relationship between peat depth and gamma-radiation using airborne geophysical data generated by the Tellus Survey and newly acquired data collected as part of the EU-funded Tellus Border project, together encompassing Northern Ireland and the border area of the Republic of Ireland. Selected peat bog sites are used to ground truth and evaluate the use of airborne geophysical (radiometric and electromagnetic) data and validate modelled estimates of soil carbon, peat volume and depth to bedrock. Data from two test line sites are presented: one in Bundoran, County Donegal and a second line in Sliabh Beagh, County Monaghan. The plane flew over these areas at different times of the year and at a series of different elevations allowing the data to be assessed temporally with different soil/peat saturation levels. On the ground these flight test lines cover varying surface land use zones allowing future extrapolation of data from the sites. This research applies spatial statistical techniques, including uncertainty estimation in geostatistical prediction and simulation, to investigate and model the use of airborne geophysical data to examine the relationship between reduced radioactivity and peat depth. Ground truthing at test line locations and selected peat bog sites involves use of ground penetrating radar, terrestrial LiDAR, peat depth probing, magnetometry, resistivity, handheld gamma-ray spectrometry, moisture content and rainfall monitoring combined with a real-time Differential Global Positioning System (DGPS) to monitor temporal and spatial variability of bog elevations. This research will assist in determining the accuracy and limitations of modelling soil carbon and changes in peat stocks by investigating the attenuation of gamma-radiation from underlying rocks.

Tellus Border is supported by the EU INTERREG IVA programme, which is managed by the Special EU Programmes Body in Northern Ireland, the border Region of Ireland and western Scotland. The Tellus project was funded by the Northern Ireland Development of Enterprise Trade and Investment and by the Rural Development Programme through the Northern Ireland Programme for Building Sustainable Prosperity.