Geophysical Research Abstracts
Vol. 18, EGU2016-15606, 2016
EGU General Assembly 2016

Mapping bare soil in South West Wales, UK, using high resolution colour infra-red aerial photography for water quality and flood risk management applications

Helena Sykes (1,2), Simon Neale (2), and Sarah Coe (2)

(1) Geography and Environment, University of Southampton, Southampton, United Kingdom (hs1e15@soton.ac.uk), (2) Natural Resources Wales, Cardiff, United Kingdom

Natural Resources Wales is a UK government body responsible for environmental regulation, among other areas. River walks in Water Framework Directive (WFD) priority catchments in South West Wales, UK, identified soil entering water courses due to poaching and bank erosion, leading to deterioration in the water quality and jeopardising the water quality meeting legal minimum standards. Bare soil has also been shown to cause quicker and higher hydrograph peaks in rural catchments than if those areas were vegetated, which can lead to flooding of domestic properties during peak storm flows. The aim was to target farm visits by operational staff to advise on practices likely to improve water quality and to identify areas where soft engineering solutions such as revegetation could alleviate flood risk in rural areas.

High resolution colour-infrared aerial photography, 25cm in the three colour bands and 50cm in the near infrared band, was used to map bare soil in seven catchments using supervised classification of a five band stack including the Normalised Difference Vegetation Index (NDVI). Mapping was combined with agricultural land use and field boundary data to filter out arable fields, which are supposed to bare soil for part of their cycle, and was very successful when compared to ground truthing, with the exception of silage fields which contained sparse, no or unproductive vegetation at the time the imagery was acquired leading to spectral similarity to bare soil. A raindrop trace model was used to show the path sediment from bare soil areas would take when moving through the catchment to a watercourse, with hedgerows inserted as barriers following our observations from ground truthing. The findings have been used to help farmers gain funding for improvements such as fencing to keep animals away from vulnerable river banks. These efficient and automated methods can be rolled out to more catchments in Wales and updated using aerial imagery acquired more recently to examine the effects of change.