

Investigating organo-mineral suspended sediment dynamics as controls on phosphorus export from the Blackwater Catchment

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Research Objectives

Suspended sediments act as a major vector for the transport of phosphorus through the stream system

Therefore...

- Define the relationship between P concentrations and the organic carbon and Al/Fe oxyhydroxides composition of suspended sediments
- Develop an accurate, non-destructive, and cost-effective method of assessing the spatial and temporal dynamics of phosphorus cycling within and between storm events of differing magnitude and following agricultural practices
- Assess potential of fingerprinting sediment source areas – can sediments from field drains and road runoff be traced downstream based on geochemistry
- Develop model of P flux out of the catchment based on organo-mineral chemistry, stream flow, and antecedent soil moisture conditions

Sources of Sediment

Field Drains



Road Runoff



Storm Drains



Field Runoff



Drainage Ditches



Bank Poaching



Visual Impacts

Turbidity



Sedimentation



Covering equipment



Algal films



Overgrown



Benthic algae



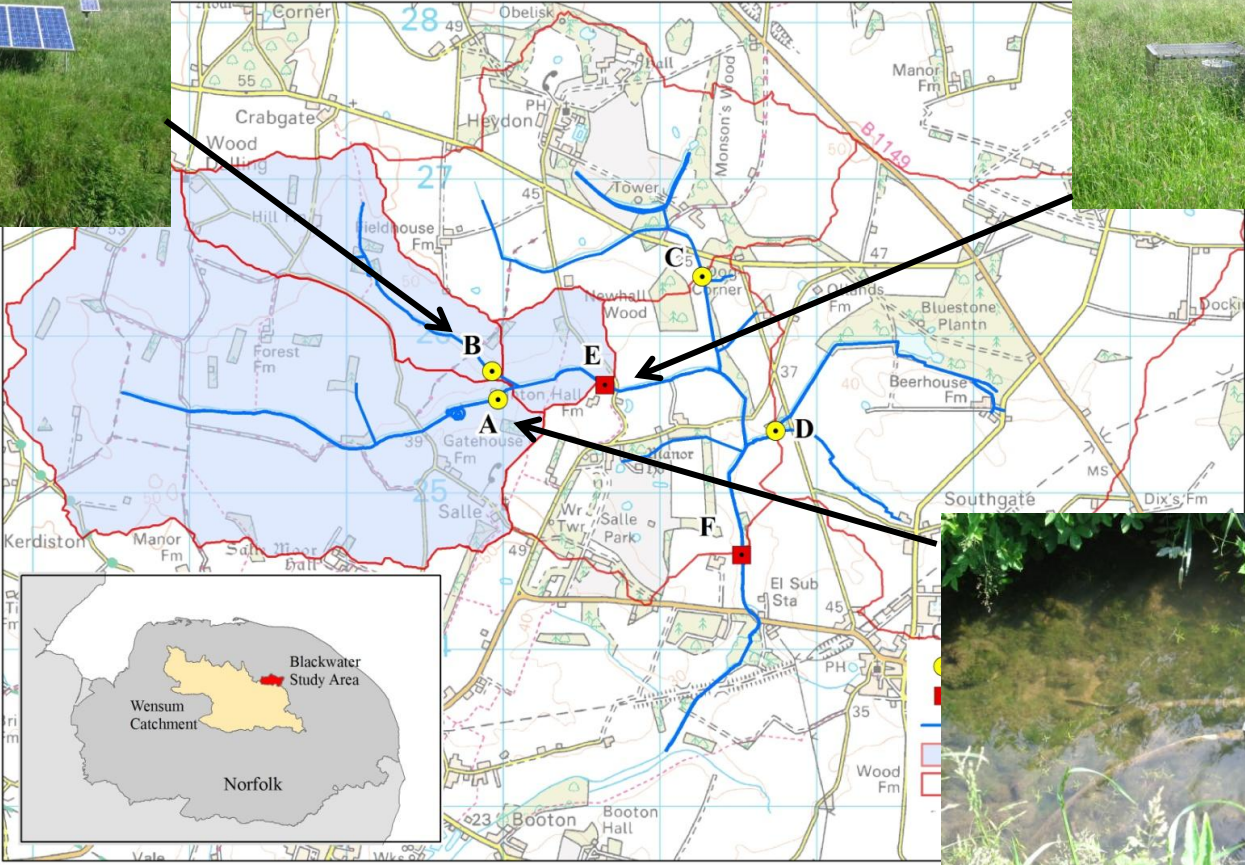
Monitoring Sites



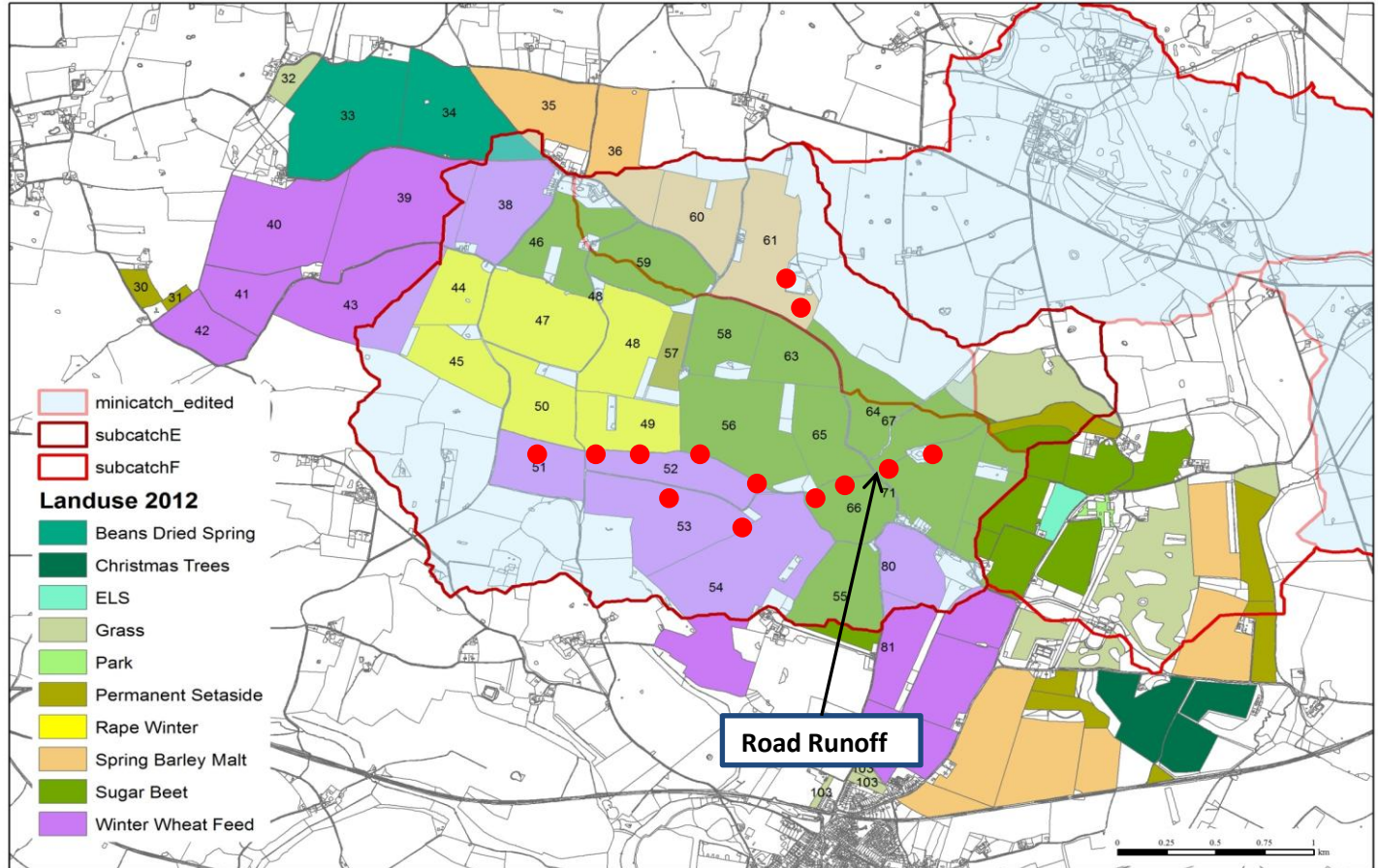
Extra ISCOs installed



New Intakes



Field Drains



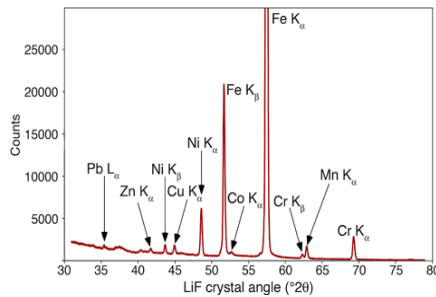
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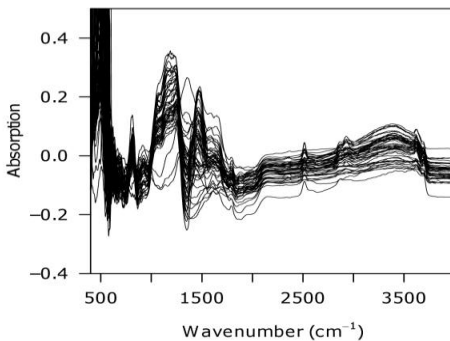
Spectroscopy Analysis



Water samples vacuum filtered onto Quartz fibre filter papers

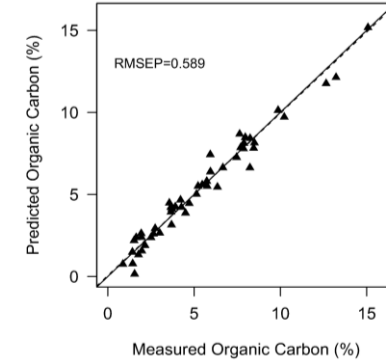
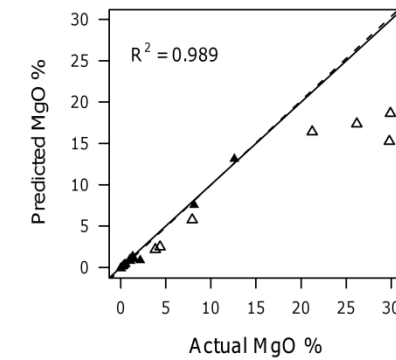
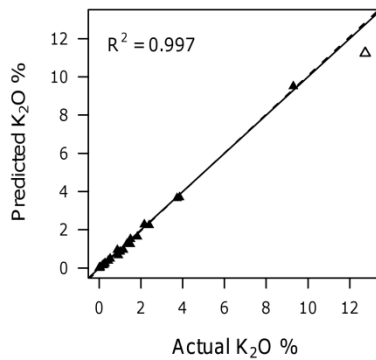
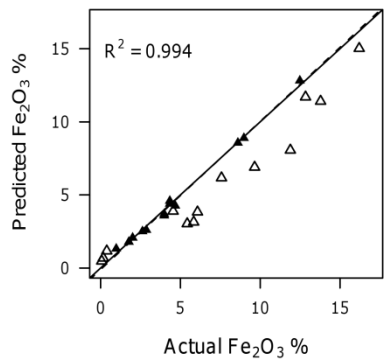
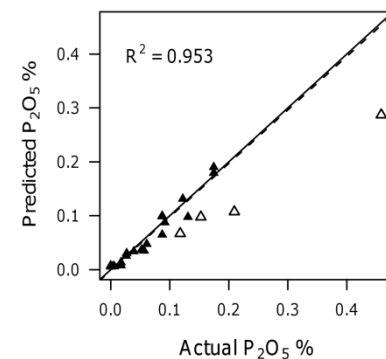
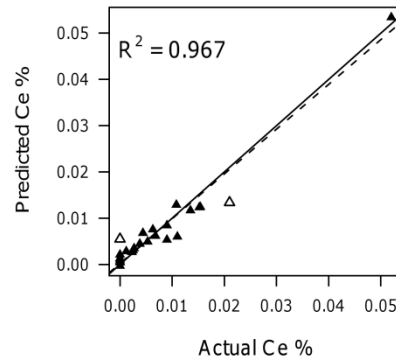
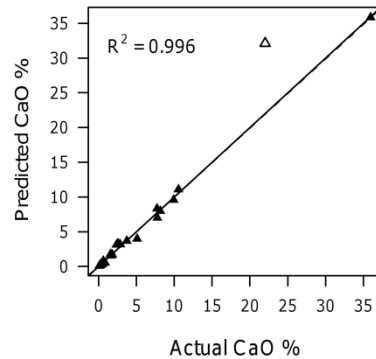
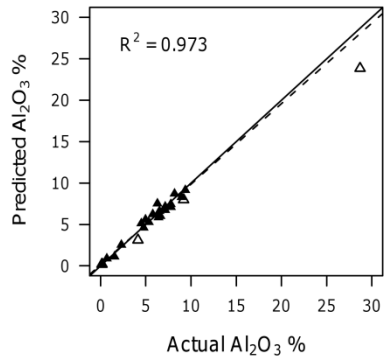


Scanned with an X-ray Fluorescence (XRF) Spectrometer: Elemental composition (Al, Ca, Ce, Fe, K, Mg, Mn, Na, P, Si, Ti); potential for sediment source fingerprinting



Scanned with Diffuse Reflectance Infrared Spectrometer (DRIFT) – PLS model to predict Organic Carbon and Fe/Al oxyhydroxides

Calibrations





Next Steps

Data Collection:

- October 2012 – October 2013
- Weekly grab sampling
- ISCO automatic storm event sampling
- Storm event sampling field drains and road runoff

Data Interpretation:

- time-series analysis
- sediment source fingerprinting
- catchment modelling