

North Wyke Farm Platform – Portable Gamma Spectrometry Pilot Study

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Rationale

The research proposed was to field test a novel instrumental approach to estimating soil erosion rates. Advances in spectrometry have produced the next generation of Portable Gamma Spectrometers (PGS), which allows for extensive non-invasive surveys to be conducted over wide areas.

The PGS (Figure 1.) measures the activity of caesium-137 (^{137}Cs), an artificial fallout radionuclide deposited worldwide primarily during the nuclear testing in the 1950s and 60s. Total inventories of ^{137}Cs in the soil can be compared along slope transects to quantify soil erosion, transport and deposition. In situ field measurements of ^{137}Cs is a potential rapid and cost-effective alternative to conventional sampling and laboratory methods.

There are three phases to the developmental approach of which the use of North Wyke Farm Platform is the first.



Figure 1. Portable Gamma Spectrometer



Figure 2. Soil core extracted for ^{137}Cs activity comparison between in situ and laboratory detector systems.

Activities carried out

At North Wyke, we carried out three consecutive and cumulative 10-min (600s) measurements for 3 plots (slope top, middle and bottom) along two transects. This was primarily to test the count rate and inventory calculations along 2 slopes. This is a non-invasive method; the PGS is set up on a tripod, 1 m above the soil surface.

We also extracted small cores (Figure 2.) direct aligned with the detector using a soil auger (max. 30 cm depth, 2.5 cm diameter). With these samples, we aim to compare the inventories calculated using the PGS to traditional soil sampling and laboratory measurements at the University of Exeter.

This project is ongoing, with a larger more detailed non-invasive survey on the Farm Platform planned for 2018.