

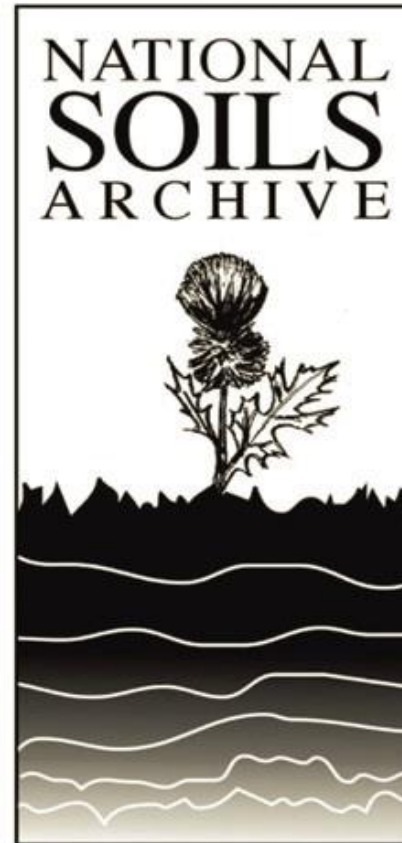


National Soils Archive of Scotland

Dr Allan Lilly

Curator National Soils Archive

INSII mtg, Nov 2021

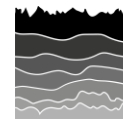


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Where and who we are



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Soil Survey
of Scotland



The maintenance and running of the Archive is funded by the Scottish Government via Underpinning National Capacity



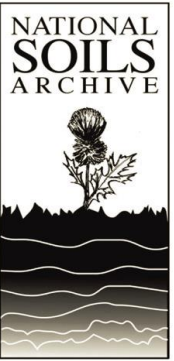
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Soil store to Archive (2007): Preserve and conserve



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Scotland's National Soils Archive:



- Systematic Soil Survey of Scotland samples from 1934
- National Soil Inventory of Scotland (NSIS) 1978-87 and NSIS (2007-09)
- Long term experiments and Research samples
- A soil DNA archive -80°C
- Milled portions

- more than 60,000 <2mm, air-dried soil samples collected from 15,000 locations –each with unique id linked to a soils database
- Archived composite topsoil samples from soil fertility experimental plots (1950s to 1980s)
- Samples donated from individuals and organisations



Subsets of the main archive



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Soil fertility experiments



-80° Soil DNA archive



Donated samples



Milled portions



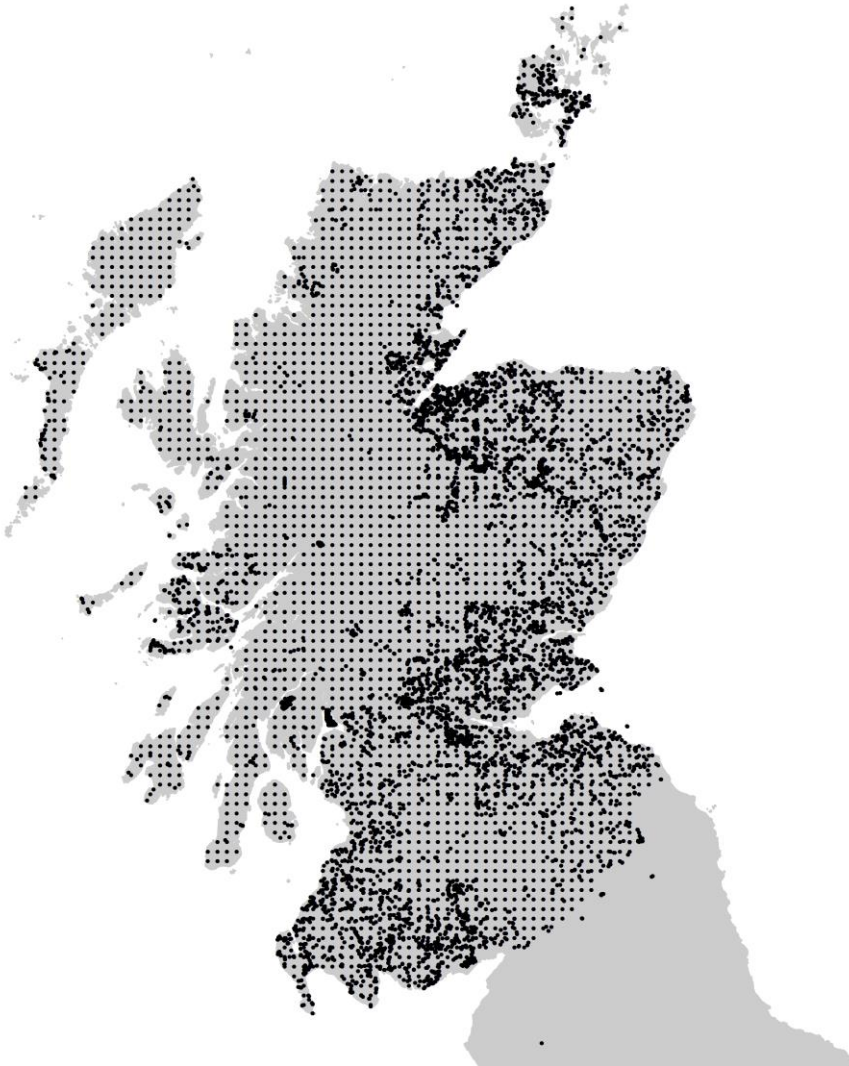
Sampled locations



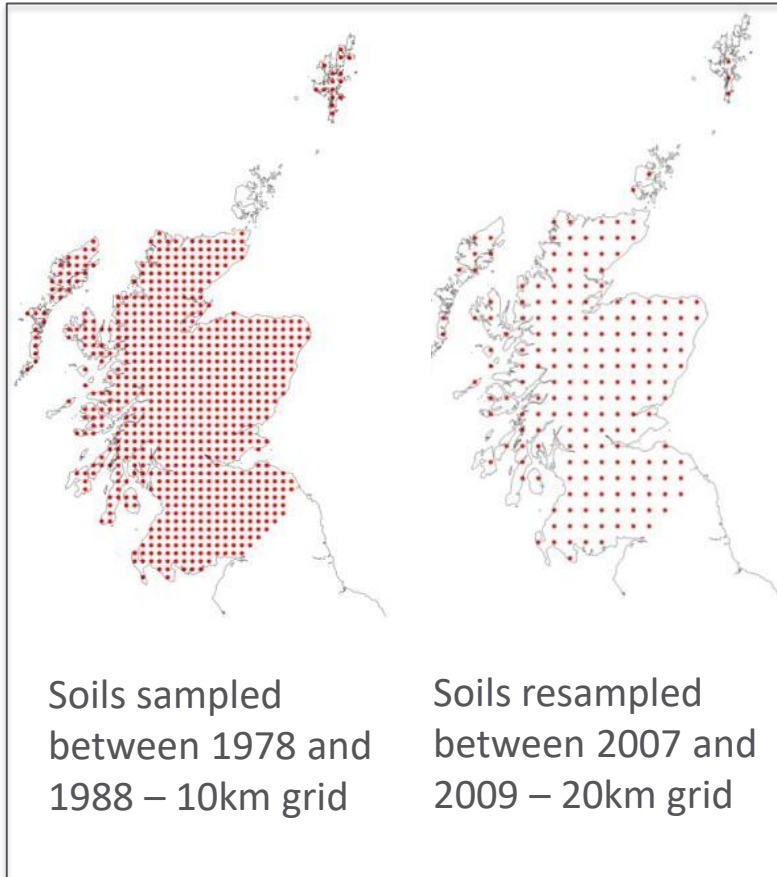
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Scotland is roughly 78,000 km² so with more than 60,000 air-dried soil samples collected from 15,000 locations we have a profile density of 5.2 profiles/km²

- Systematic Soil Survey of Scotland samples from 1934
- National Soil Inventory of Scotland (NSIS) 1978-87 and NSIS (2007-09)
- Long term experiments and Research samples



Use of the Archive soils to quantify changes in organic C stocks in Scottish Soils



- asked by Scottish Government if Soil C was changing
- resampled at 183 sites
- Initially found decline in C content between previous and new samples

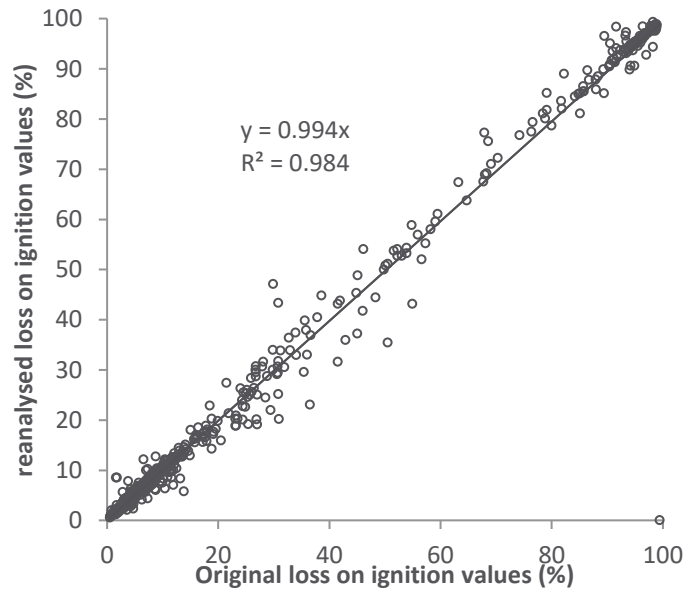


Value of having an archive

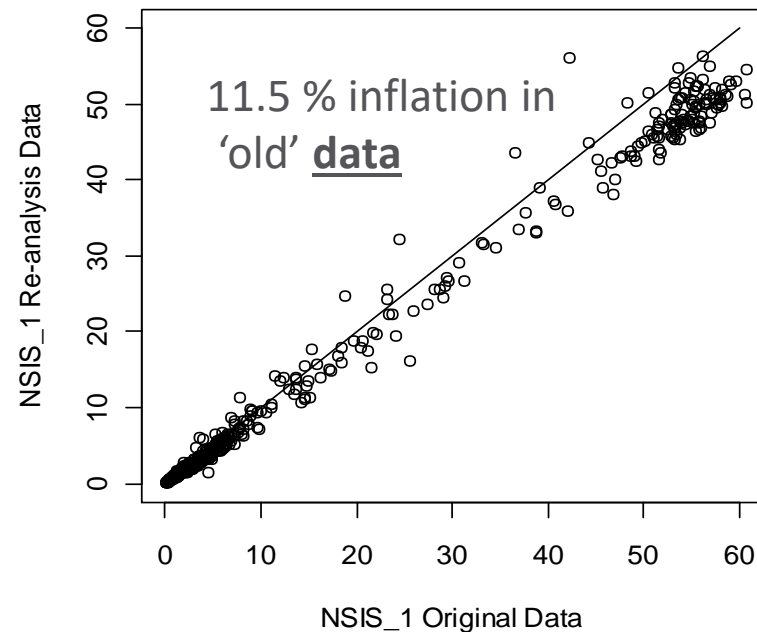


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Loss on ignition %



NSIS_1 Carbon %

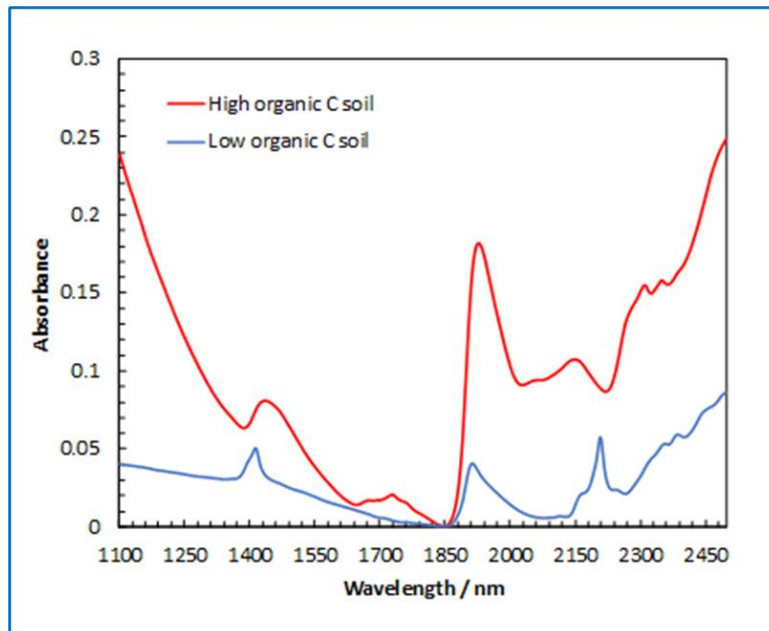


- Re-analysis of soil for SOC showed no overall change
- Issues with repeatability of measurements of SOC concentration over time – **Key value in retaining an archive**
- Highlighted by reanalysis of archived soil samples



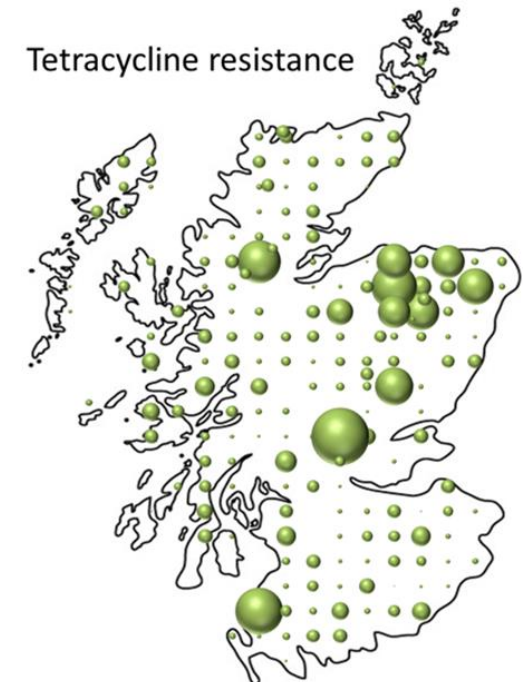
Use of archive soils to predict previously unmeasured soil properties

Infrared (IR) spectroscopy:
Models that relate spectra
signals with measured
AWC in soil samples.



Antimicrobial Resistance

- AMR genes confer resistance to antibiotics forming 'superbugs'
- Using the archived soils found 'hot spots' of AMR genes

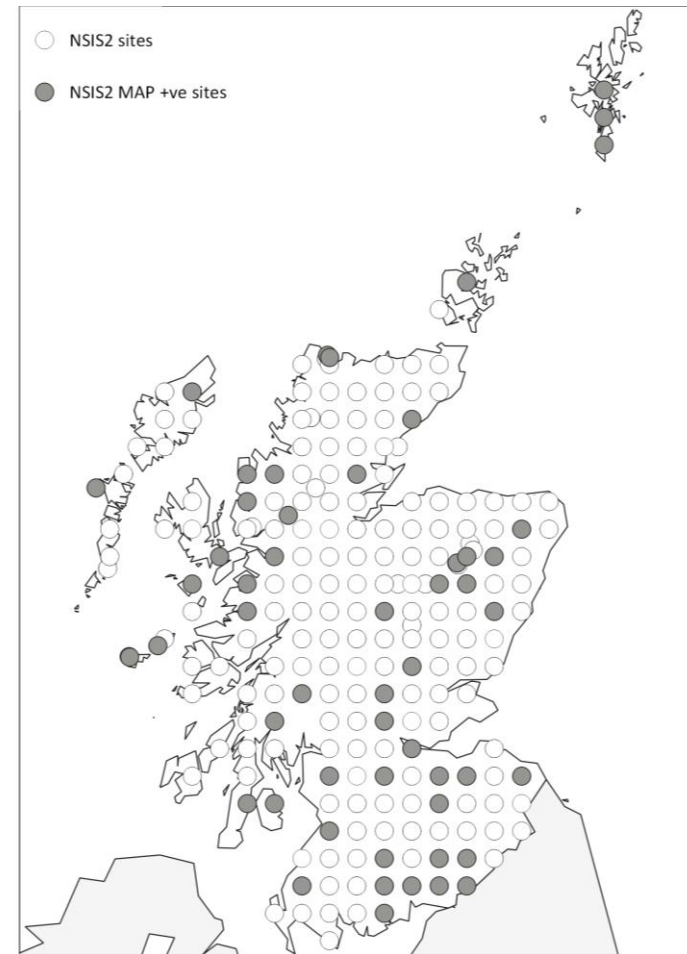


Mycobacterium avium paratuberculosis (MAP)



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- Causes Johne's Disease (JD) in livestock and linked to Crohn's Disease in humans
- JD affects the gut, preventing nutrient absorption, and leading to diarrhea, malnutrition, and death
- studied the prevalence of MAP in archived Scottish soils
- Higher MAP prevalence linked to low pH, high Fe and Al concs, and low organic matter and moisture.
- pH was the dominating factor, suggesting adjustment of pH is the best way to control MAP in soil



Ilana Halperin print



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Ilana Halperin - 'James Hutton (Parent Material) 2017'

*Woodblock print using soils from
Slighhouses (James Hutton's Borders
farm) and Japanese minerals on
handmade Yame Washi paper*

*Printed at Peacock Visual Arts,
Aberdeen.*



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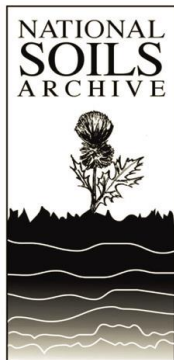


Access policy and procedures

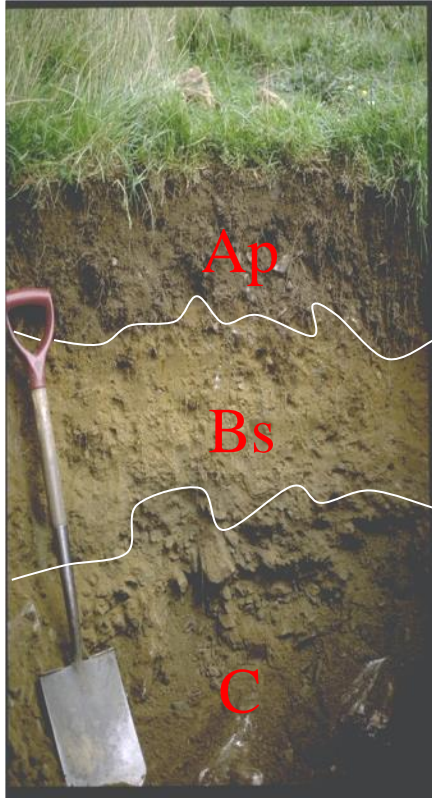


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- Stewardship – store samples in secure and stable condition
- Record and track new acquisitions and withdrawals
- Precious and limited resource but should to be used for research which adds value to existing knowledge
- Written access policy (on website)
- Supported access – limited staff have access to the samples
- Requests reviewed by committee (Archive curator, manager and database manager)
- Threshold below which we reserve the right to refuse a request (currently set at 80g) unless in the national interest.
- Encourage non-destructive analyses
- Does the work need to be done on archived soils?
- No subsample returned to original pot – held separately
- Cost of duplicating archive offsite - £800k (€940k/\$1.1M))



Thanks for listening



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