Quick Carbon: Tools for Rapid, Landscape-Scale Soil Carbon Assessment
“Quick Carbon’s research mission is to create an accessible, open-source measurement system that empowers individuals to generate reliable soil carbon data for ecological understanding, decision making, and markets.”
Sampling strategy
Soil C measurement
Group: Point info
Cluster

Answer
23

Group: Metadata
GPS Location

Grass
How much of the plot is covered in grasses?

- 0-1%
- 1-10%
- 10-25%
- 25-50% [Checked]
- 50-75%
- 75-99%
- 99-100%
Reflectance data

Remote sensing data

Digital soil map data
Next steps
• Use case testing and validation based on 2018 data
• Optimization of handheld tool
• Testing sample design methods
• Building ‘global’ models
• Connecting the dots to automate estimation
FREE ACCESSIBLE GEOSPATIAL DATA

DYNAMIC WEB APP FOR CLUSTERING AND STRATIFICATION

Using a priori knowledge of regional drivers of soil carbon, we can use freely available geospatial data to stratify study sites into clusters of similar variation. This allows us to increase our sampling effort, and increase inventory accuracy.

OPEN SOURCE STRATIFICATION AND SAMPLING DESIGN

SIMPLE, EFFICIENT FIELD WORK

With an integrated mobile application, data collection with Quick Carbon is simple and efficient. Additional site data and location information can be collected at the same time soils are scanned. Data are then pushed to a web server where they can be retrieved later and analyzed.

IN-FIELD SOIL SPECTRAL READINGS

1. EXTRACT SAMPLE
2. PIN & SCAN

LAB  A subset of the samples are sent to the lab for analysis. These data are used to calibrate a local SOC estimation model that can be used in subsequent years.

CLOUD-BASED SAMPLING DESIGN

CLOUD-BASED MACHINE LEARNING

HIGH RESOLUTION MAPS OF SOIL CARBON

ACCURATE, PRECISE, SOIL C VALUES

IN-FIELD SPECTRAL DATA + GEOSPATIAL COVARIATES
OpenTEAM

OpenTEAM community website coming this fall
Yale F&ES Science Team

Mark Bradford, PhD | Faculty Lead

Emily Oldfield, MS & PhD | Science Advisor

Dan Kane, MS | Lead Researcher
MAE = 0.19 
R2 = 0.70

MAE = 0.48 
R2 = 0.69

MAE = 0.34 
R2 = 0.50