

Continuing Project

Resilience of soil organic carbon to harvesting: A long-term soil productivity experiment

CAFS 20.81

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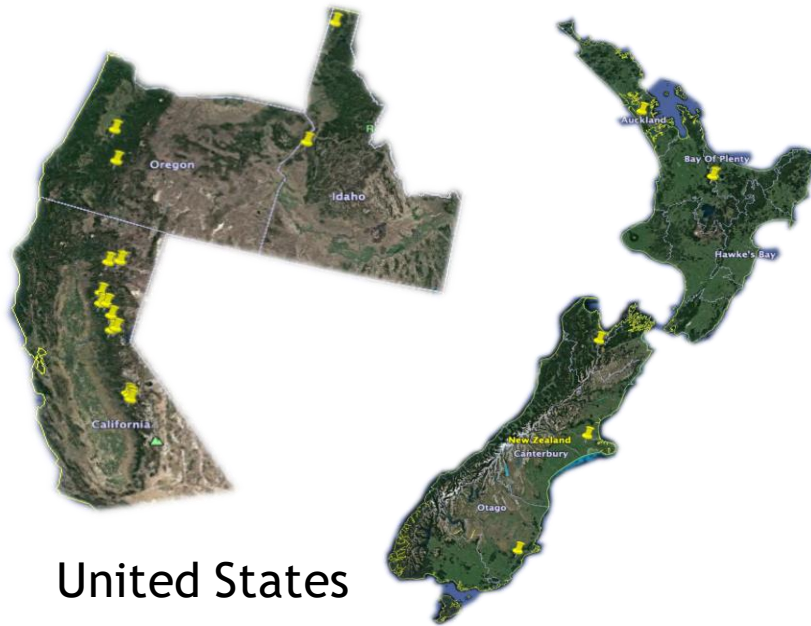


Hypotheses or Objectives

Objectives: Elucidate the mechanisms that impart resilience to forest SOC after extreme disturbances across a wide range soils and forest types of the world.



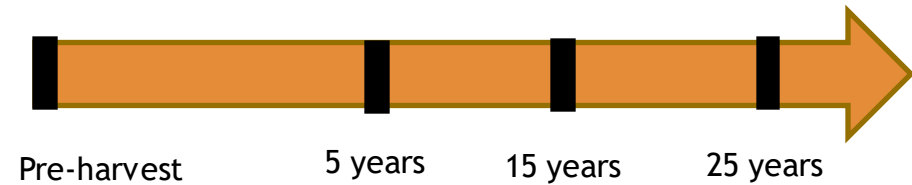
Methods



United States

New Zealand

Soil Sample Timeline



Organic Matter Removal Treatments



OM0 - Tree boles removed.



OM2 - All aboveground biomass removed. Bare soil exposed.



Criteria for LTSP site selection:

1. Temperate conifer forests
2. Pre-harvest, early, and mid post-harvest samples and data available
3. Physical samples exist!
4. Sampling depth to 30cm



Methods

Biomarker Analyses

1. CuO Oxidation
Lignin derived phenols are the major products in CuO (Otta and Simpson, 2007)
2. GC-MS

Radiocarbon

- Graphitization – USFS Northern Research station FS Carbon, Water and Soils Lab in Houghton, MI.
- Radiocarbon measurements – W.M. Keck Carbon Cycle Accelerator Mass Spectrometer Facility at UC Irvine.



What are biomarkers?

Macromolecules from plants and microbes that have been broken down

CuO Oxidation Method –
chemical oxidation of organic matter macromolecules to monomers

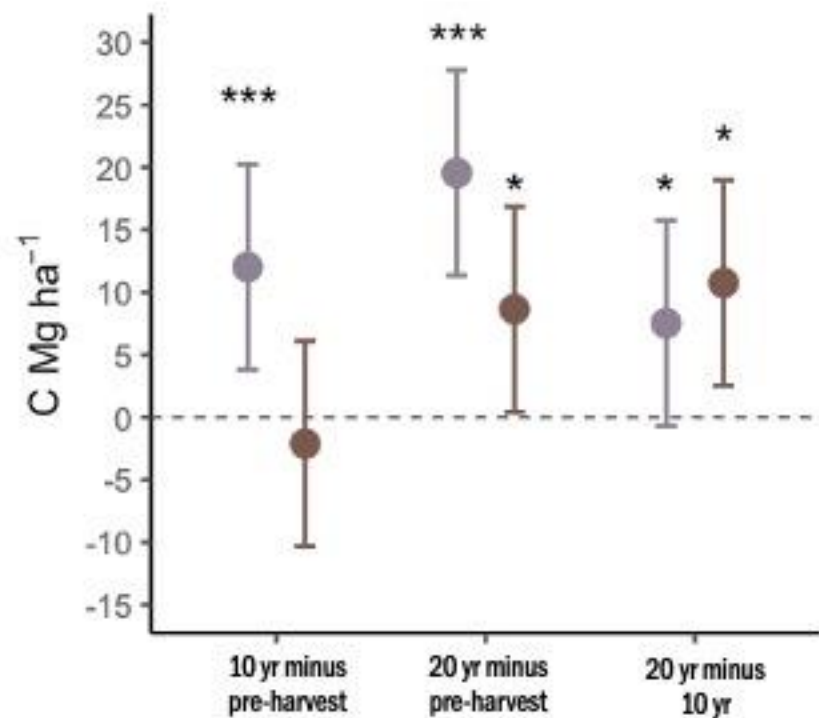
Can use biomarker ratios to determine composition of carbon –

- angiosperm vs gymnosperm
- Wood vs grasses and needles
- Char vs lignin

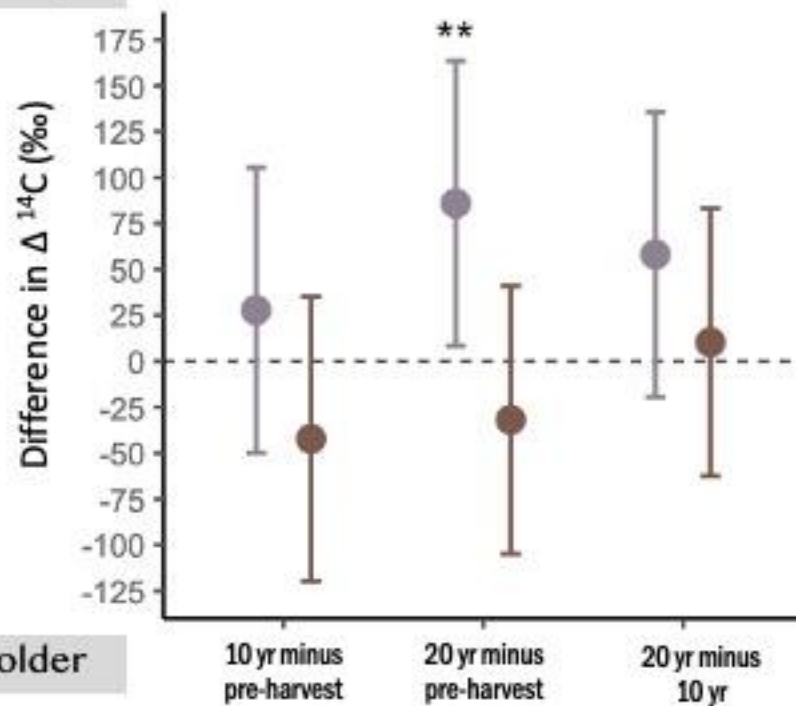


Brandy City, CA - Persistent

- Stem only removal (SO)
- Whole tree + forest floor removal (WT + FF)



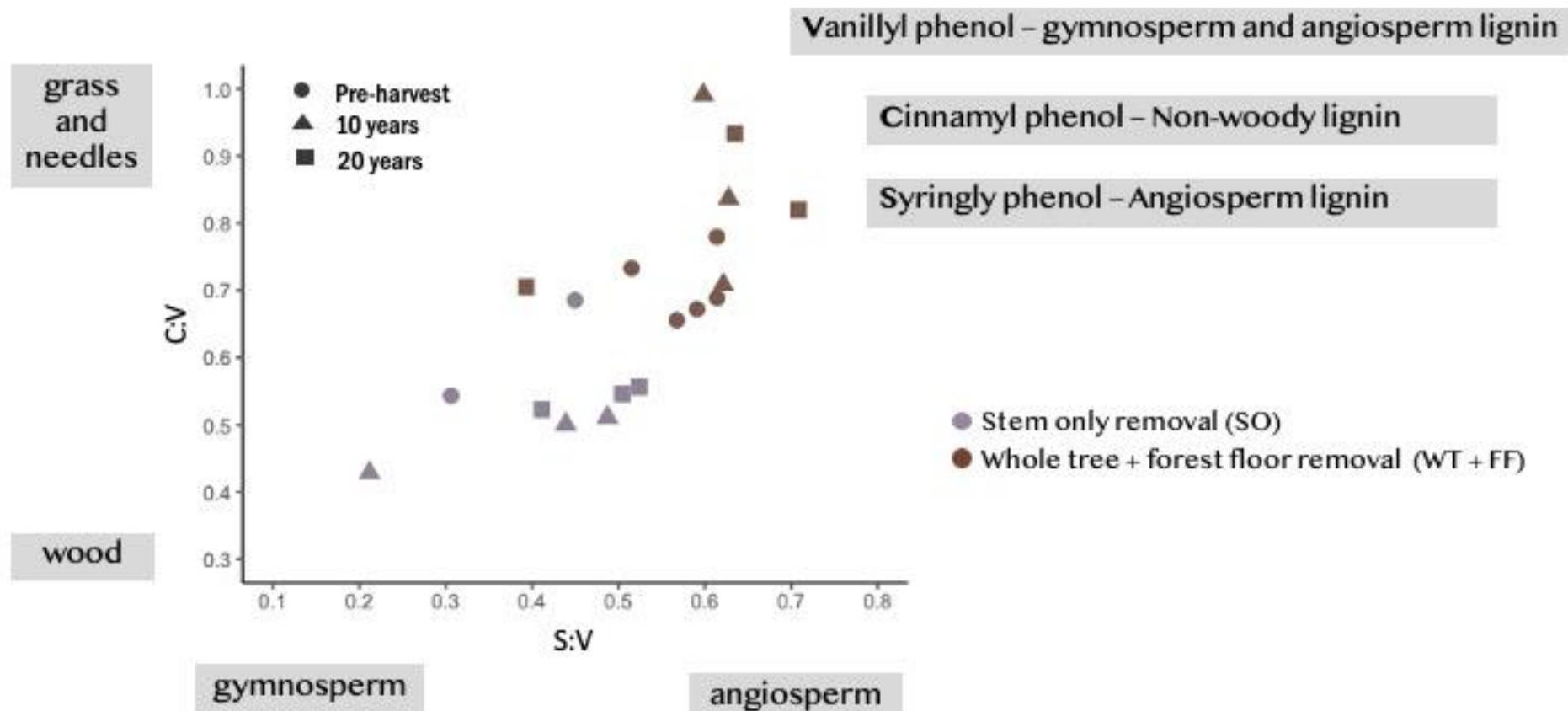
younger



older



Brandy City, CA - Persistent





Lab Work and Data Analysis

- mineralogy
- Important Deadlines
 - Steph's defense Fall 2023



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USDA-AFRI Grant 2018-06813
CAFS

