

# Comparing carbon stocks in the O horizon of shale and sandstone watersheds according to topographic position and ecosystem characteristics

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## Summary

### Purpose

Soil organic (O) horizons are a large and dynamic pool of C in forests

- Does C stored in the O horizon differ between the shale and sandstone watersheds or among ridgetop, midslope and toeslope positions?
- Does tree basal area or presence of rock correlate with O horizon C storage?



Sandstone site midslope facing downhill



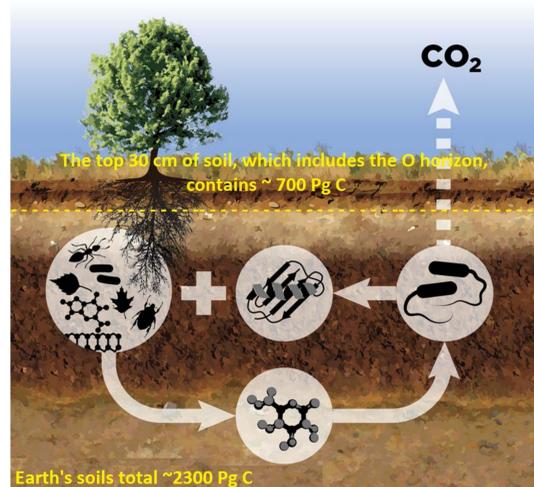
Shale Hills South Toeslope facing uphill

### Conclusion

- C stocks between sites and between different topographic positions within sites differed, likely due to differences in plant communities.
- No direct correlation exists between the number or size of rocks found in a 5m radius of the O horizon plots and its C content.
- No direct correlation exists with tree basal area at a 10 m scale and O horizon C content but there is a correlation at coarser resolutions.

### Further Questions

- Do rocks cause C to accumulate in non-rock zones? Or do rocks reduce the likelihood or size of tree growth, thereby reducing C accumulation via litter inputs?



Soils are critical to biotic, atmospheric, and hydrologic forces that influence climate change and the global carbon (C) cycle

### Background

- The Susquehanna Shale Hills (shale bedrock) watershed and the Leading Ridge/Tussey Mountain (sandstone bedrock) watershed in central PA were compared for their organic C content.
- The shale site is comprised primarily of a sugar maple canopy and sparse understory while the sandstone site is comprised of a red maple canopy, dense mountain laurel understory.
- The shale site is 0% rock on the soil surface while the sandstone site is 30% rock.

### Methods

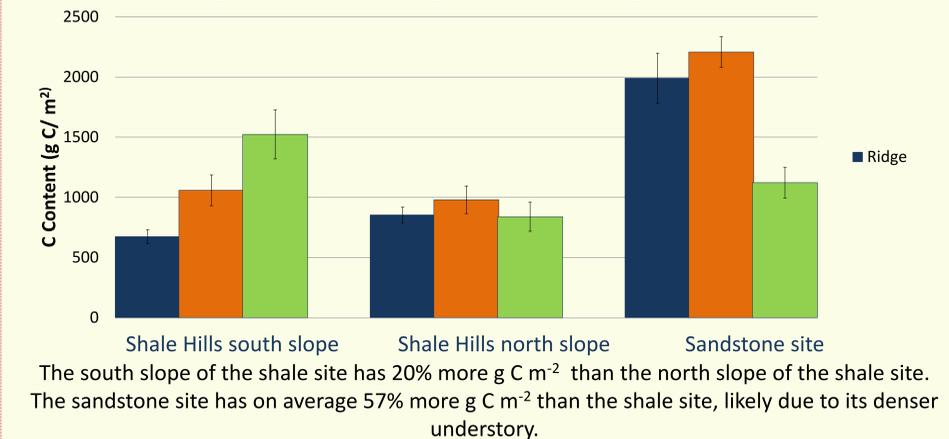
- O Horizons within a 24.9 cm ring were collected every 25 m of a transect
- A total of 140 samples collected over 9 transects
- Samples were dried in a 55 °C oven to calculate Gravimetric Water Content
- Samples were further dried in a 105 °C oven for 24 hours then in a 450 °C oven for 16 hours to measure organic carbon loss on ignition.



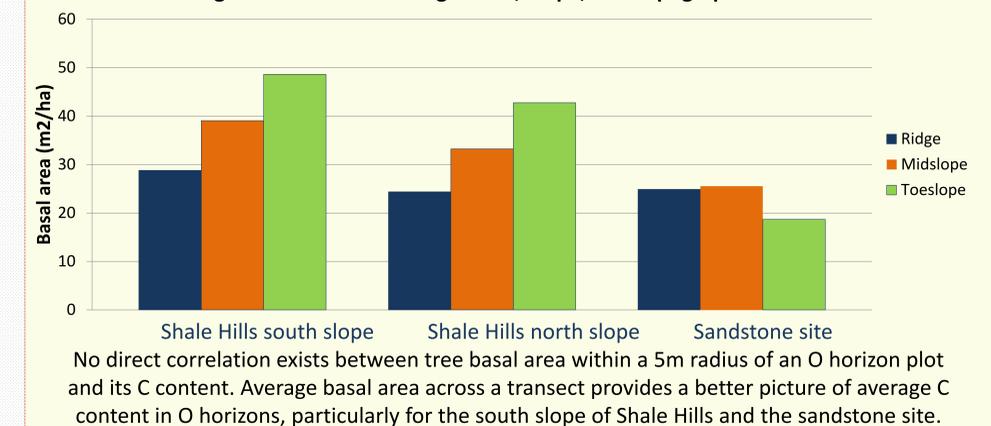
The author collecting an O Horizon sample at Shale Hills

## Results

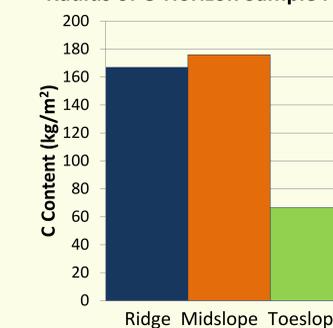
### Average C Content According to Site, Slope, Topographic Position



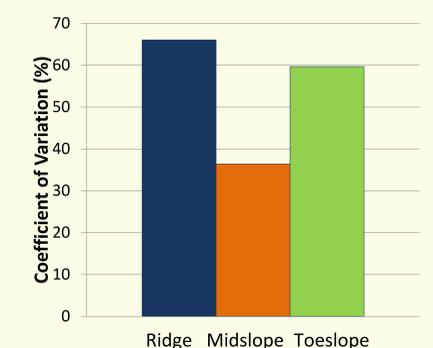
### Average Basal Area According to Site, Slope, and Topographic Position



### Average C Content at the Sandstone Site According to Topographic Position and Litter Presence in a 5m Radius of O Horizon Sample Plots



### Sandstone site C Concentration Coefficient of Variation according to Topographic Position



Litter coverage which, when multiplied by g C/m<sup>2</sup>, provides a scaled up view of the O horizon C content.