

Plantation Carbon Storage: Distribution and Management Effects

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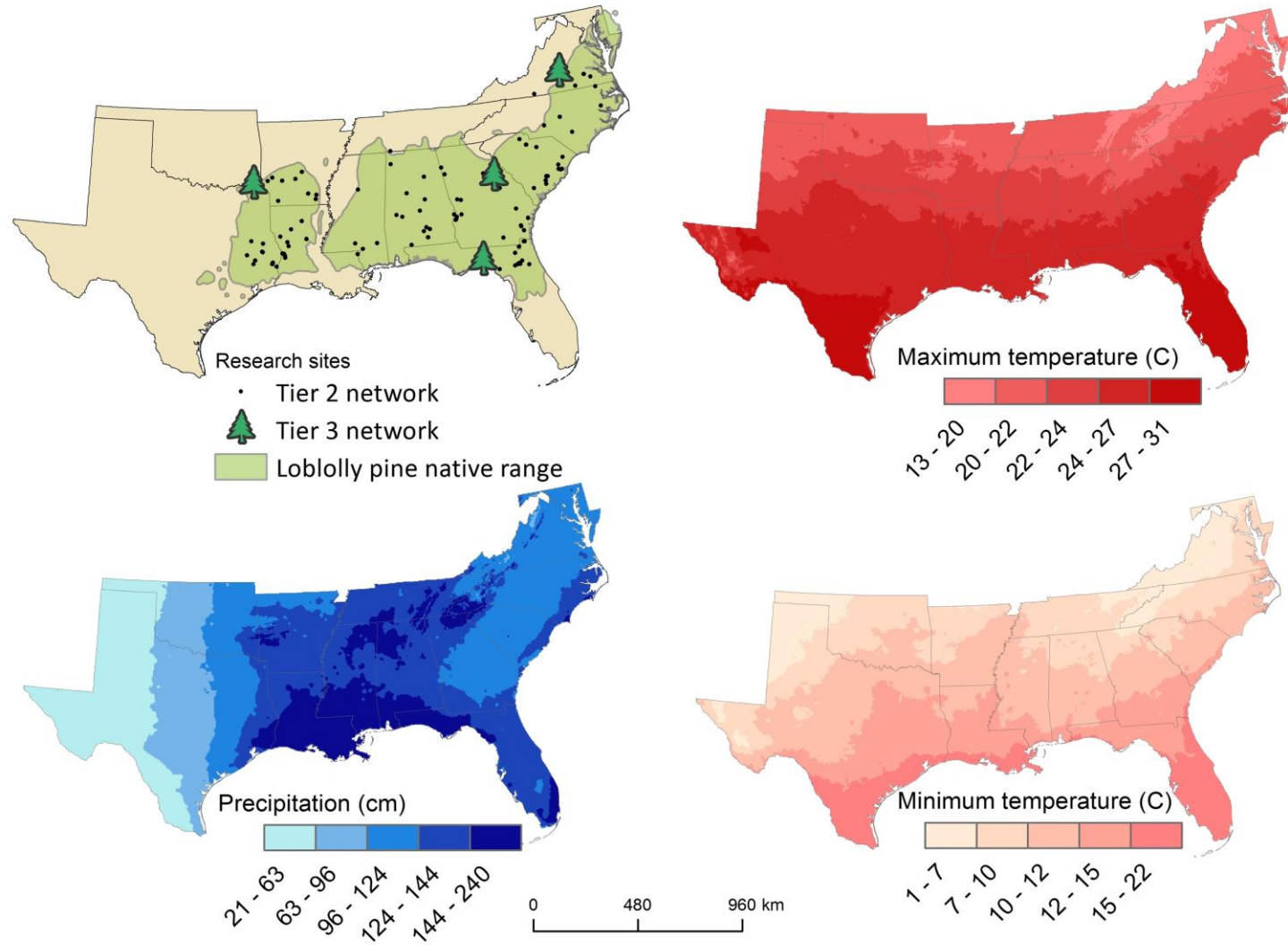


Overview of Tier II Network

- 123 distinct sites pulled from the experimental designs of coops
 - Forest Biology Research Cooperative
 - Forest Modeling Research Cooperative
 - Forest Productivity Cooperative
 - Pine Management Research Cooperative
- 322 plots sampled. Usually one representative treatment plot per site.



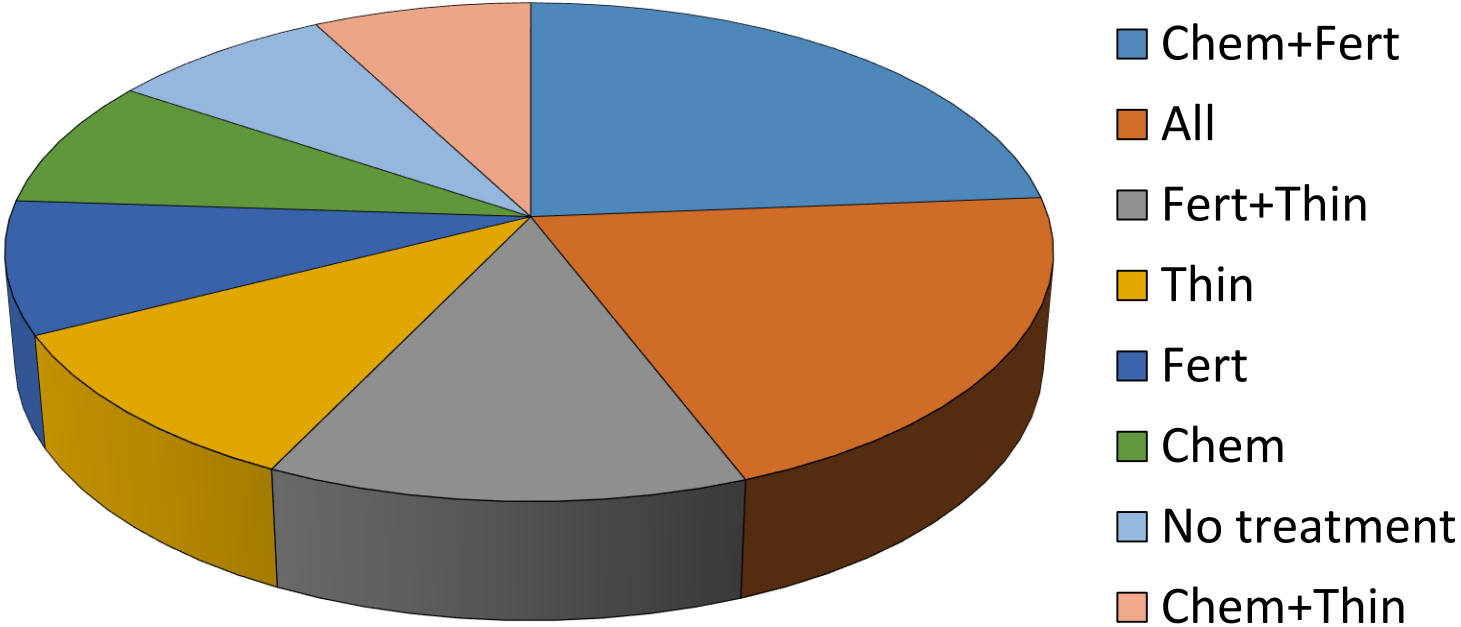
Network of sites and climate



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Silvicultural Treatments in Tier II Network



322 distinct treatments

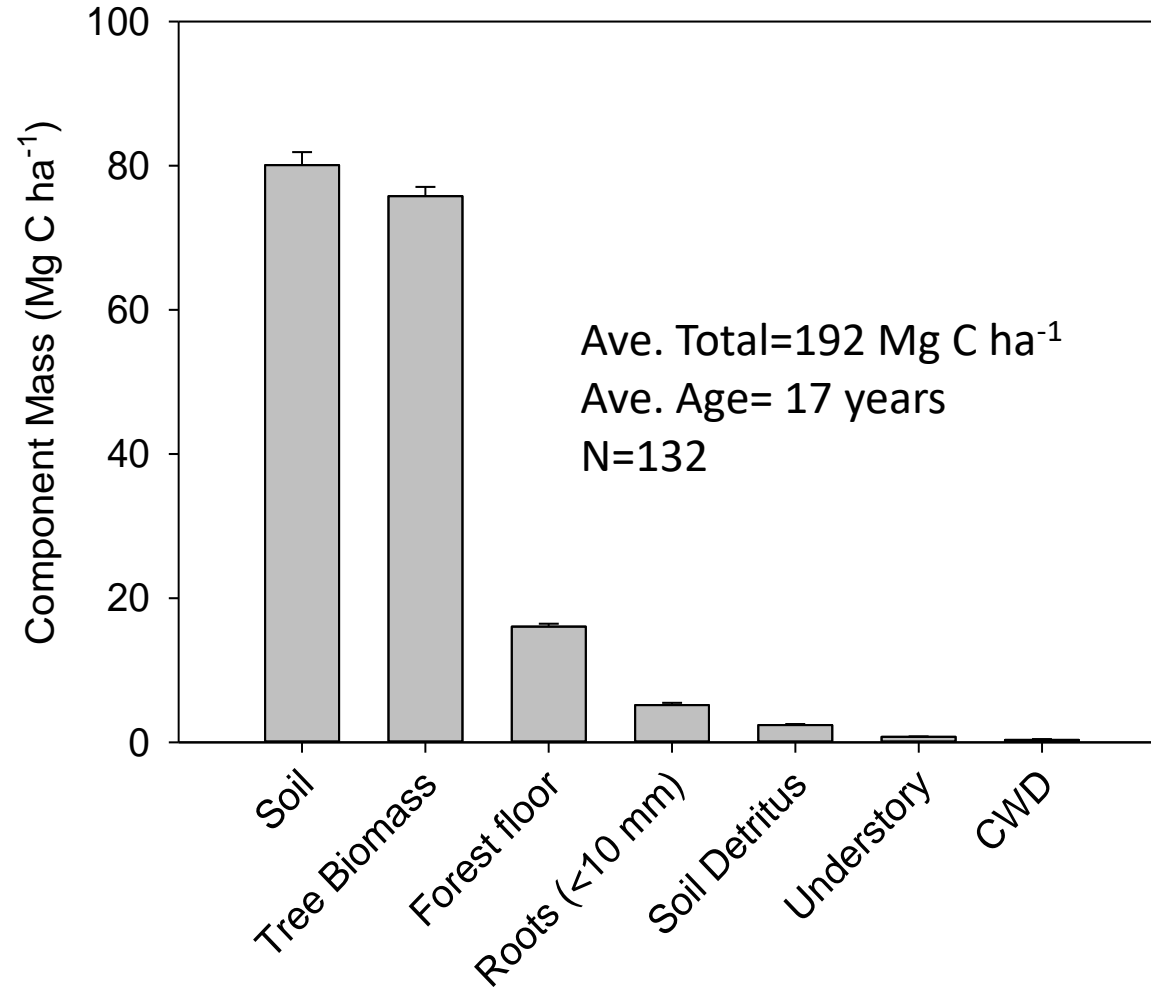


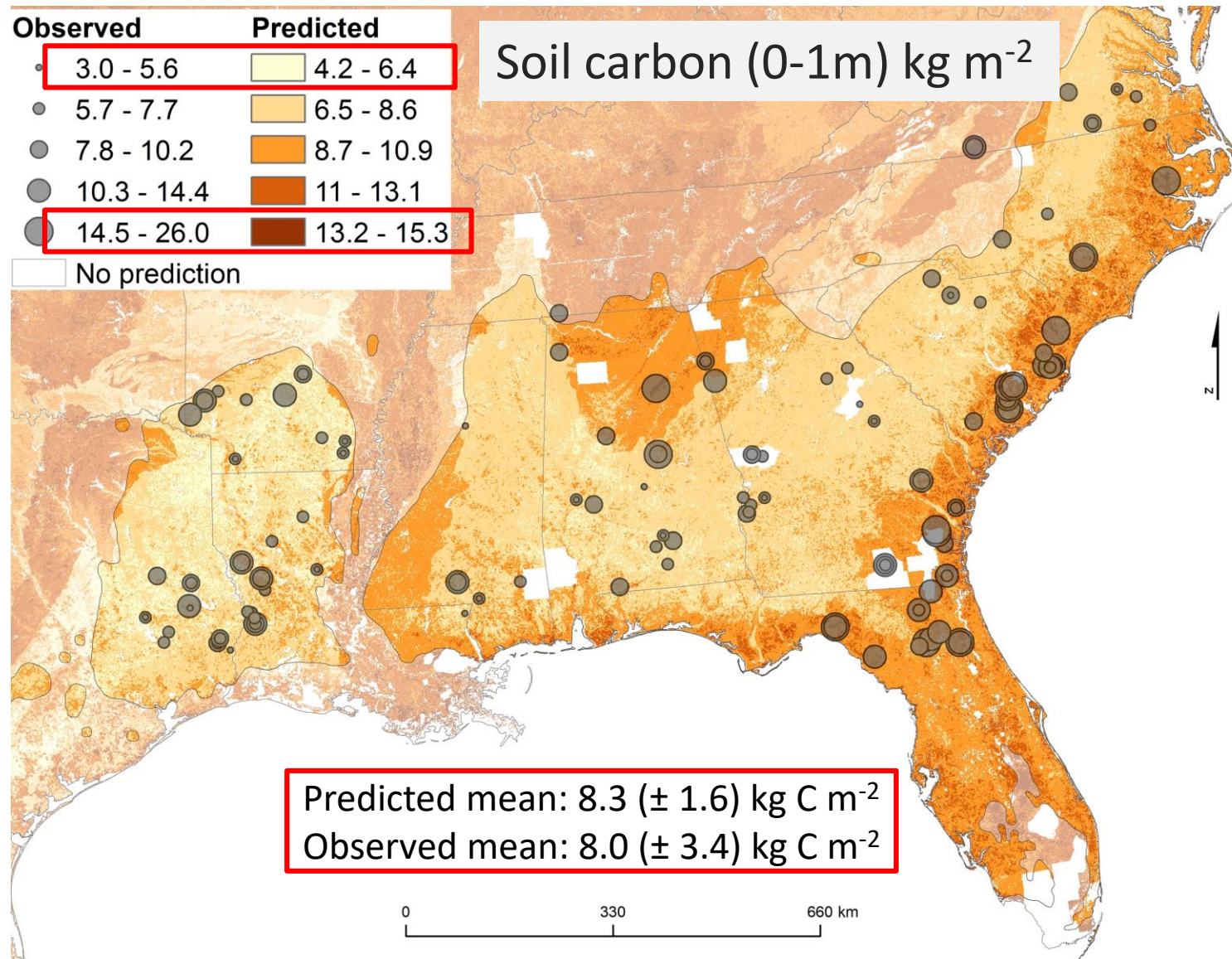
Carbon Sampling Protocol

- Aboveground biomass and coarse roots
 - Cooperative mensurative data and allometry
- Soil Samples
 - 0-10 cm, 10-20 cm, 20-50 cm, 50-100 cm
 - Roots and woody debris at all depths
- Forest Floor
 - Litter and Duff (Oi and Oe+Oa)
 - Fine roots <2 mm are included in this estimate
- Understory
- Coarse woody debris and stumps



Carbon Distribution

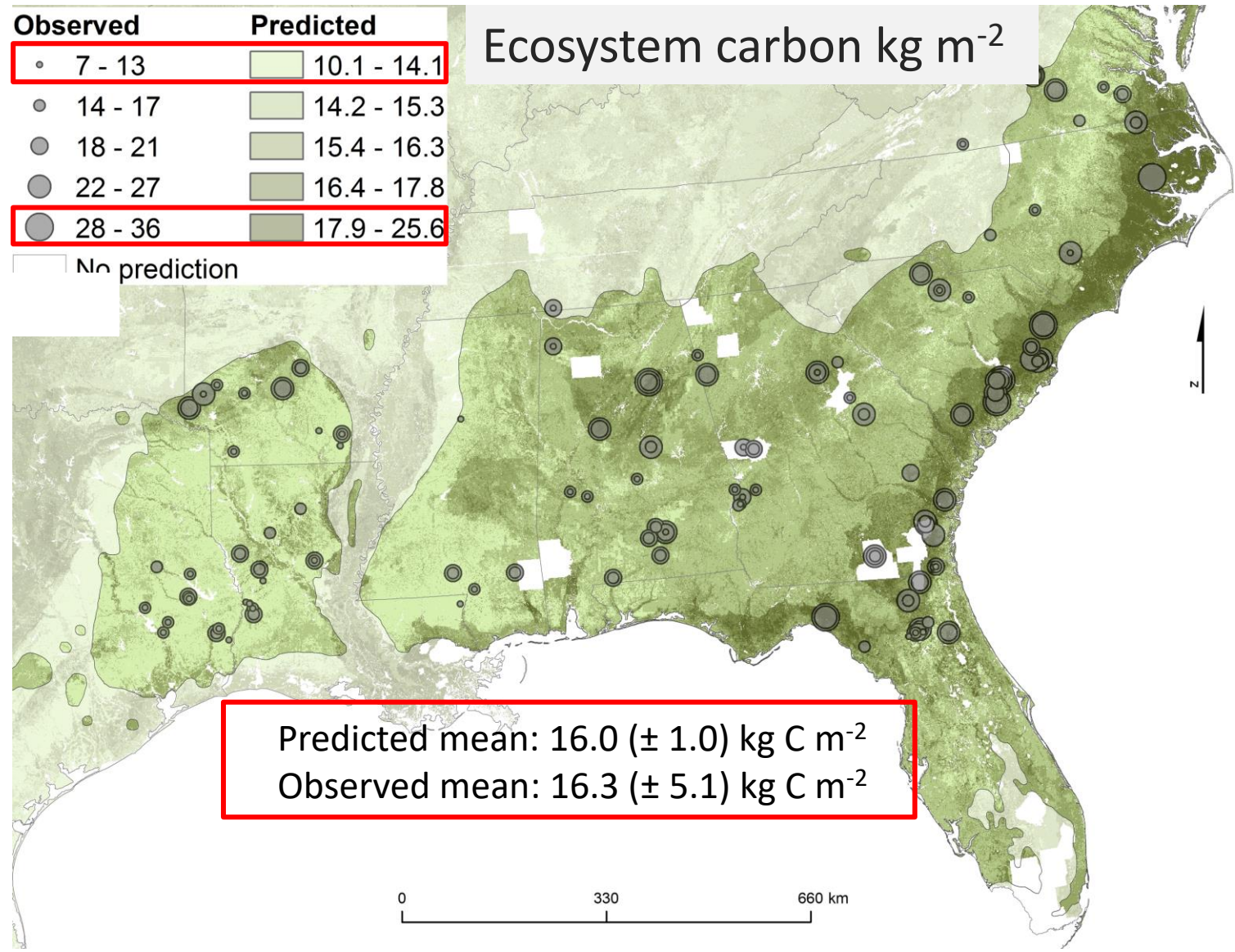




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PINEMAP



Across the Southern US states

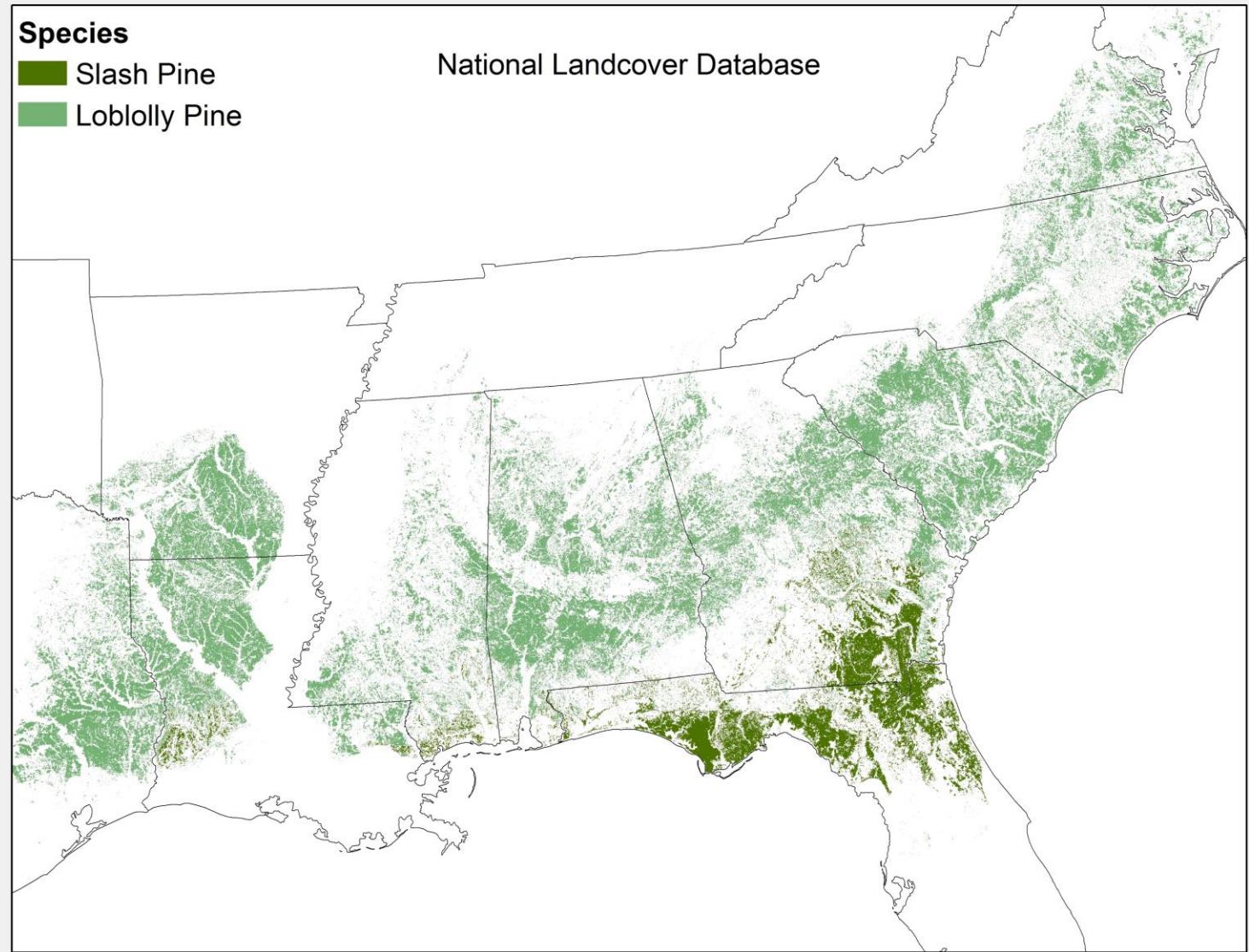
~ 13.3 to 19.1 Pg soil carbon

~ 26.1 to 29.1 Pg ecosystem carbon

In loblolly and slash pine forests

~ 1.4 to 2.2 Pg soil carbon

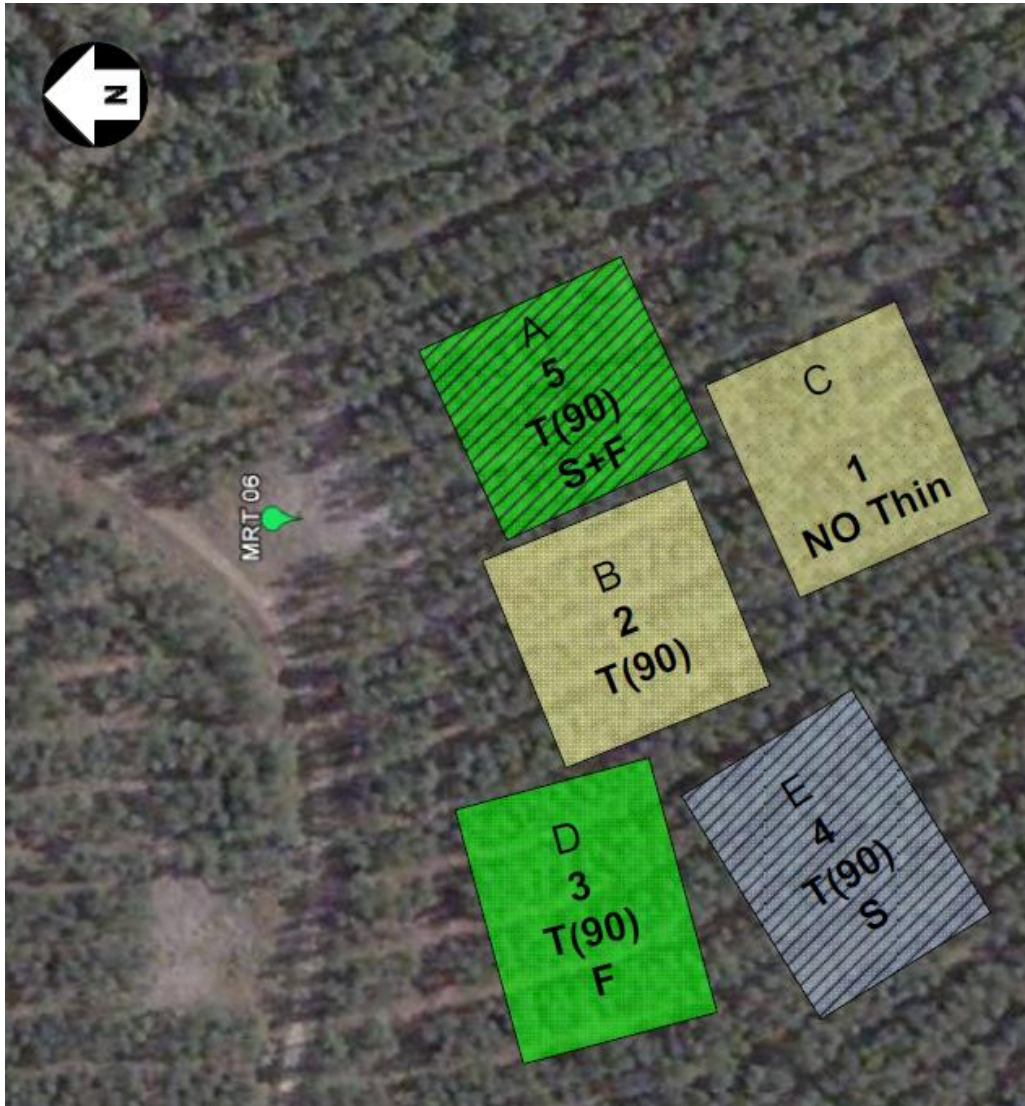
~ 2.8 to 3.8 Pg ecosystem carbon



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Pair plot and simple correlation approach



Each site treated as replicate in paired plot analysis.

Does a change in tree biomass correspond to a change in another pool?

Pairings

Thinning

Thin	Chem	Fert		Thin	Chem	Fert	N
1	0	0		0	0	0	7
1	1	0		0	1	0	14
1	1	1		0	1	1	24
1	0	1		0	0	1	8

Chemical Control

Thin	Chem	Fert		Thin	Chem	Fert	N
0	1	0		0	0	0	1
1	1	0		1	0	0	9
0	1	1		0	0	1	4
1	1	1		1	0	1	4

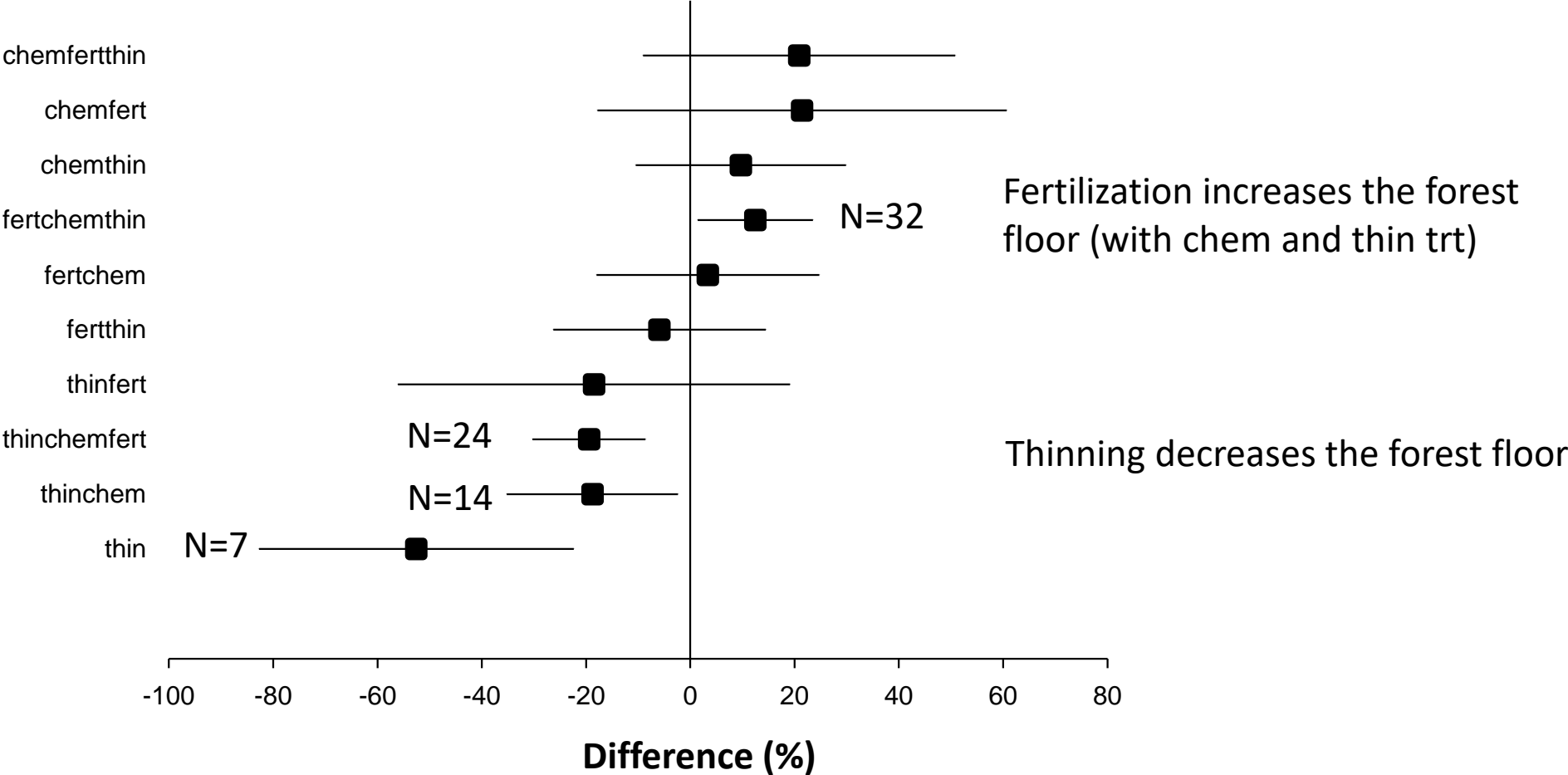
Fertilization

Thin	Chem	Fert		Thin	Chem	Fert	N
0	0	1		0	0	0	1
1	0	1		1	0	0	7
0	1	1		0	1	0	10
1	1	1		1	1	0	32

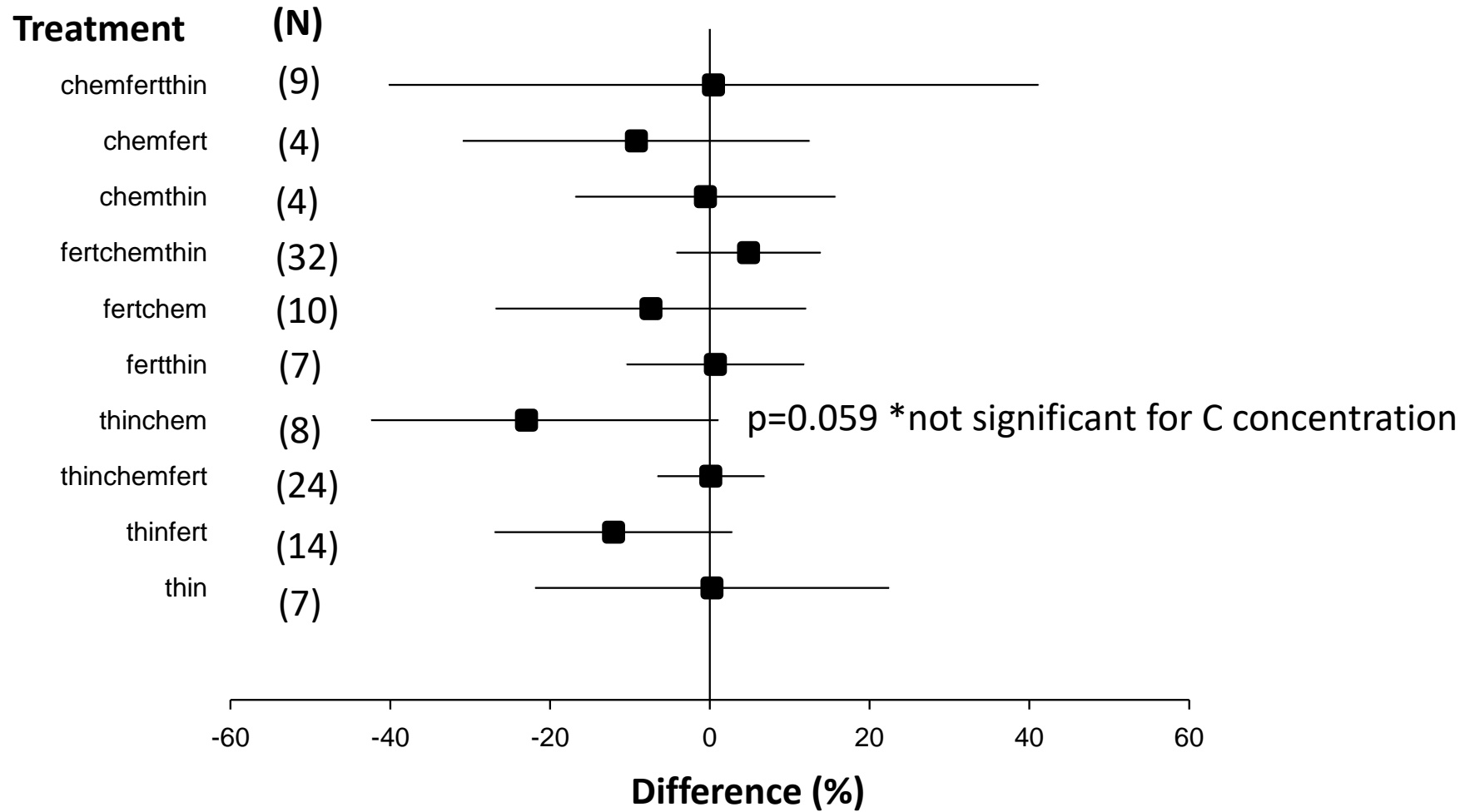


Forest Floor Carbon

Treatment



Soil Carbon (Mg C ha⁻¹) to 1 meter

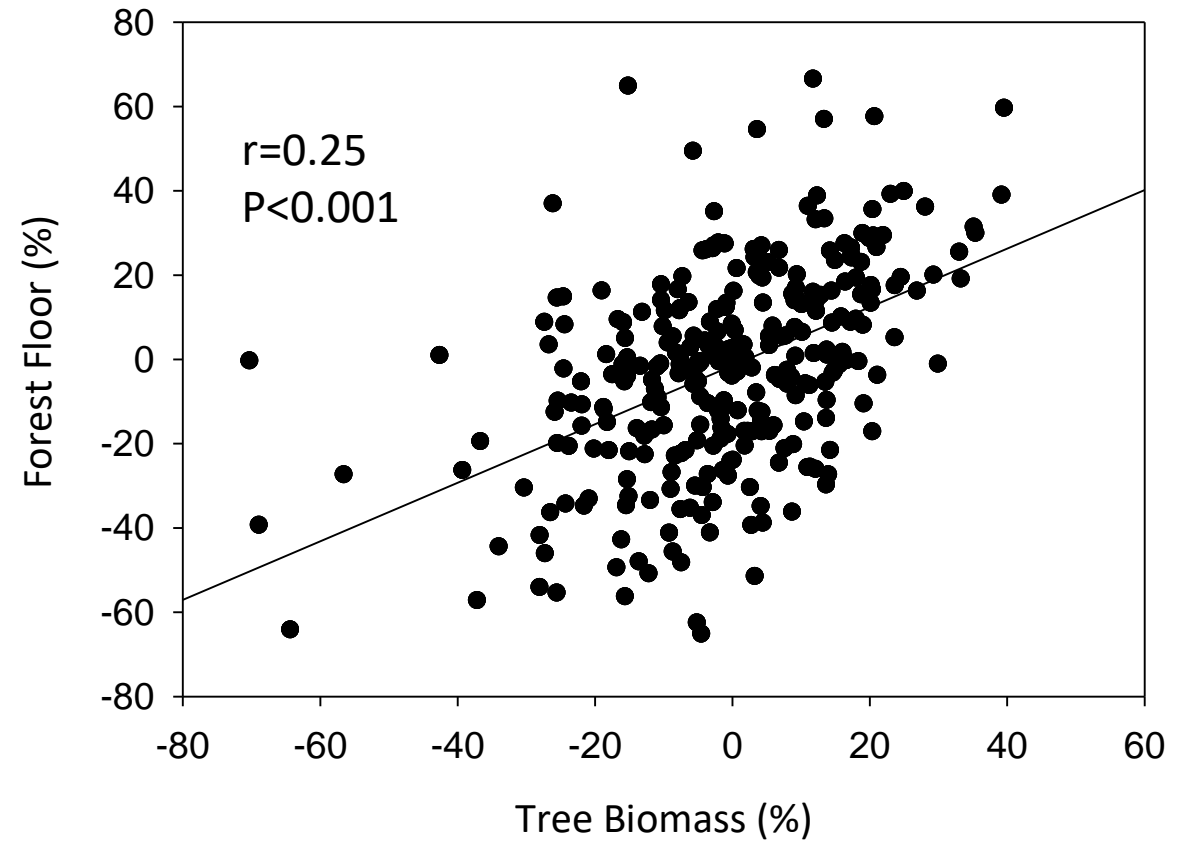
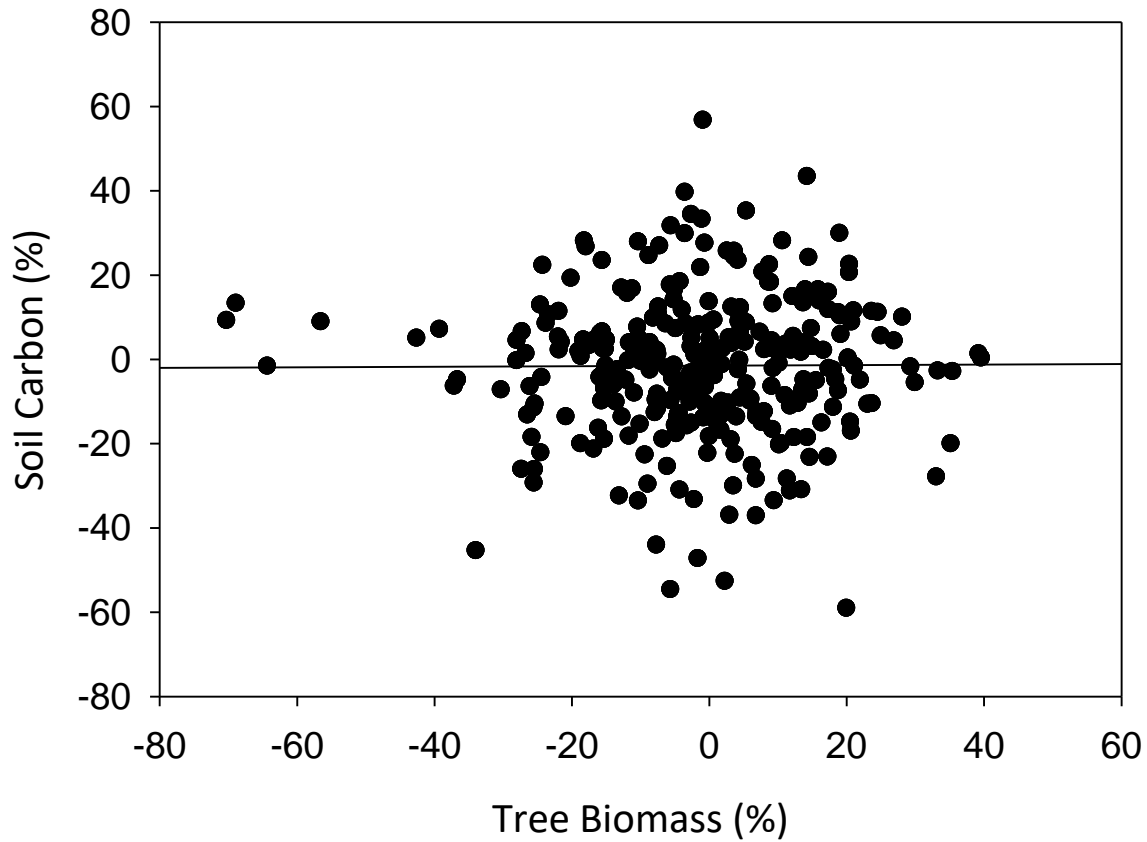


Does soil or forest floor carbon vary with biomass?

- Paired plot analysis leaves out 80 plots with no in-site contrast, because based on binaries, they are the same (e.g. High vs. Low fertilization)
- Varying levels of replication across treatment combinations
- Different types of forest (e.g. drainage class) can obscure magnitude of effect in soils



Biomass Change vs. Soil or Forest Floor Change



Summary

- Soil and tree biomass store 75% of ecosystem C (for soils to 1 meter).
- ~10-12% of stored C in the region is in loblolly pine and slash pine forests.
- Forest management can affect the forest floor and aboveground C pools but has no discernible effect on soil C.

