ANNOTATED BIBLIOGRAPHY: FORESTS & MDPI SINCE MAY 2019

ARCHMILLER AND SAMUELSON (2016)

**Keywords: soil CO2 efflux; roots; *Pinus palustris;* soil moisture**

Title: Partitioning Longleaf Pine Soil Respiration into its Heterotrophic and Autotrophic Components through Root Exclusion

*Introduction (ArchMiller and Samuelson, 2016):* Soil respiration (Rs) is used to estimate heterotrophic respiration (Rh), which is comparable to other forests with temperate coniferous ecosystems. Soil heterotrophic respiration is the biggest contributor to ecosystem and is used with net primary productivity to estimate if area is carbon source and sink. A method to measure total Rs uses trenching to cut roots in order to cut the photosynthetic pathway, which theoretically leaves residual heterotrophic activity in soil and allows measurement of Rh. There are few downsides to this method approach. They hypothesized that Rh would comprise 70% to 90% of Rs and that by ~100 days, measurements of Rs from root exclusion tubes would give a stable estimate of Rh.

*Methods (ArchMiller and Samuelson, 2016*): Small-diameter exclusion tubes were pushed into the soil, severing the existing roots and excluding root ingrowth. This was done around randomly selected trees. The tubes were installed in mid-May and the initial measurement was taken 41 days later. Approximately 100 days later, measurements of Rs were taken. Soil respiration levels were measured at two week intervals.

*Discussion (ArchMiller and Samuelson):* Small diameter root exclusion tubes were used to estimate Rh and found 40-50 days of root exclusion may be enough time to isolate Rh from root exclusion treatment tubes. Longer incubation did not change overall estimate Rh to Rs because soils were sandy and had great amounts of drainage, however, further research is still suggested. Other studies may have overestimated Rh compared to their findings. The proportion of Rh to Rs varies with annual Rs levels. With sandy soil, root exclusion tubes decreased Rs, however, further research is necessary for a more complete picture of heterotrophic respiration (Rh) and autotropic respiration (Ra) in Rs.