

How Much CO₂ Comes from Longleaf Pine Forest Soils, and Why?

Policymakers faced with the challenge of limiting greenhouse gas emissions need to know more than simply how much carbon dioxide (CO₂) comes from, and is absorbed by, forests. To understand how forests will respond to climate change it is essential to know how much CO₂ comes from different components of the forest, and emissions from the soil are poorly understood. For over six years, we measured CO₂ emissions from longleaf pine forest soils which differed in their ability to hold water and represented different regions within the southeastern coastal plain. The information on CO₂ from the soil was combined with data on CO₂ taken up or released by the whole forest, measured from towers extending beyond the treetops.

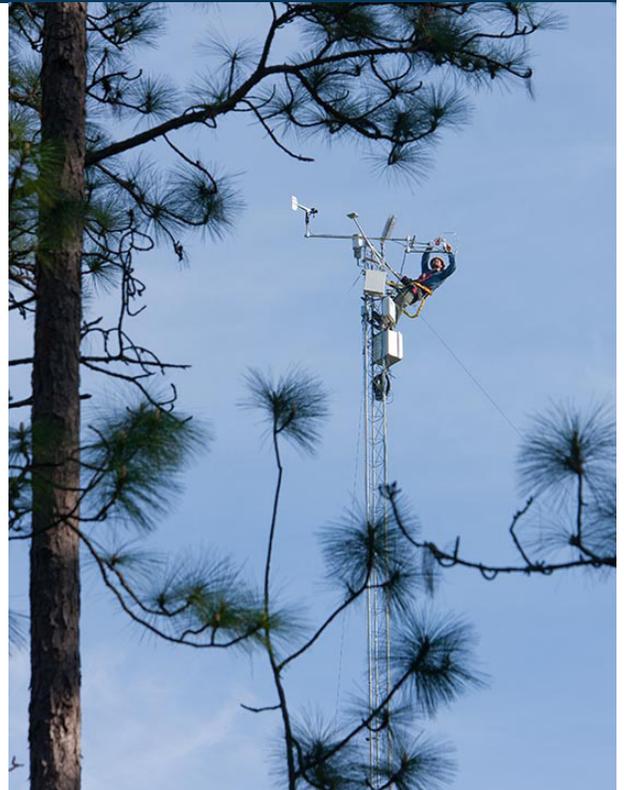
Carbon dioxide emissions were higher under warm or dry climate conditions, and averaged over six years, there was no increase in the carbon stored in dry and intermediate forest soils. In forests on moist soils, however, there was an increase of 8 tons per hectare of carbon. Approximately half of the CO₂ that was released from the forest to the atmosphere came from soils, and this proportion changed little with year-to-year variation in climate. The results advance the science of predicting climate effects on soil CO₂ emissions across the diverse and growing expanse of longleaf pine forests of the southeastern coastal plain.

CITATION

Wiesner, S., C. L. Staudhammer, H. W. Loescher, A. Baron-Lopez, L. R. Boring, R. J. Mitchell, and G. Starr. 2018. Interactions among abiotic drivers, disturbance and gross ecosystem carbon exchange on soil respiration from subtropical pine savannas. *Ecosystems*, 20 pp. doi.org/10.1007/s10021-018-0246-0.

CONTACT

Gregory Starr, gstarr@ua.edu



KEY POINTS

Understanding natural CO₂ emissions is essential for regulation of human-controlled CO₂ emissions

Soil respiration was responsible for roughly half of total CO₂ emissions from frequently burned longleaf pine forests

CO₂ emissions increased during periods of unusually warm or dry weather

Longleaf pine forests growing on moist soils increased in carbon storage over six years, but forests on drier soils did not