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# Interaction of vegetative cover and N addition on soil $CO_2$ efflux in an oak savanna ecosystem

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Numerous fertilization experiments have demonstrated that nitrogen (N) addition leads to shifts in soil respiration. In forest ecosystems N addition typically results in decreased soil respiration, while grasslands generally have the opposite response. Neither result is universal because the direction of the response is dictated by site-specific soil and vegetation properties.
The MaNiP large scale nutrient manipulation experiment aims at studying ecosystem properties, such as soil respiration, by altering nitrogen (N) and phosphorus (P) stoichiometry. The experimental site is a dehesa, an oak-savanna ecosystem in Extremadura, Spain. The tree-grass structure results in a mosaic of two distinct soils coexisting within the same parent material and climatic conditions. Soils beneath trees are richer in organic matter, have a higher C:N, and a relatively well developed A-horizon compared to soils in the open grassland. This offers an ideal opportunity to study how soil properties modify responses to stoichiometric shifts.
We established automated respiration chambers in both of these soil types within plots fertilized with N and where no nitrogen was added (Control). By comparing the magnitude of near continuous $CO_2$ fluxes in these chambers with onsite Eddy Covariance Towers, we can quantify the relative contribution of soils under trees and in open grassland to ecosystem respiration and how the nutrient treatments moderate their responses to seasonal fluctuations in temperature and moisture.
Preliminary results suggest that soil respiration increased with fertilization and that fluxes underneath tree canopies are more responsive, likely due to higher C content and microclimatic properties. Further analysis will determine if fertilization influences annual cycles in respiration or the sensitivity of respiration to climatic drivers and pulses (e.g., rain).
Our initial conclusion is that vegetation cover modifies the interaction of soil C and N cycle in this ecosystem.