Globally, soils hold more carbon than the atmosphere and total terrestrial biomass combined. The bulk of soil carbon is soil organic carbon (SOC), a dynamic pool which receives inputs from plants and releases carbon mainly by microbial respiration. Imbalances between these SOC inputs and outputs can cause soil to become a carbon source or sink to the atmosphere, thereby exacerbating or mitigating the problem of greenhouse gas-induced global warming. Therefore, many recent land management efforts have focused on maintaining and increasing SOC stocks.

Detecting landscape-scale changes in SOC is difficult. It may take years for a measurable change in SOC to occur, and extensive sampling may be required to produce confident estimates of SOC stocks (Wiesmeier et al., 2019). Therefore, direct measurement of SOC stocks may not be feasible for many farmers, ranchers, and ecologists. Furthermore, implementation and adaption of SOC management strategies often occurs faster than SOC stocks can be reliably assessed. This timescale mismatch makes it difficult for land managers to evaluate the effectiveness of their actions in time to change course. Therefore, identifying reliable indicators of SOC change is crucial for managing SOC stocks.

In annual grasslands, biological communities are potential indicators of SOC status. Plant and soil microbial communities can shift in response to underlying processes that control SOC. Additionally, these biological communities influence rates of primary production and decomposition, processes that directly affect SOC stocks. Because both plant and microbial communities in annual grasslands can exhibit significant interannual variation, measurements of these communities may indicate the status of SOC-controlling processes in the recent past.

* **What regional scale is appropriate for what indicator**
* **Are indicators good for states or rates?**