Soil Respiration Response To *Adenostoma Sparsifolium* Microsites Among Seasons in Semiarid Shrubland

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Arid and semiarid ecosystems have an essential role in terrestrial carbon cycling and should be considered in models that attempt to predict the effects of global warming. In the last decade, studies have shown that semiarid shrublands are significant carbon sinks. Hence, downward carbon dioxide (CO_2) fluxes into soils in arid and semiarid ecosystems is a growing topic of research. Moreover, quantifying temporal and spatial variability in soil respiration can be challenging to achieve. Soil is highly heterogeneous due to the variant nutrients, minerals, organic compounds, and microorganisms it contains. These soil segments can react differently to meteorological conditions and are specifically paired with biological mechanisms, resulting in an immense variability of soil CO_2 effluxes. Additionally, patchiness in vegetation can create microsites that have different responses to increased temperatures, influencing their soil respiration rates. Soil carbon cycling activity beneath shrub canopies has been found to be higher than in bare soil gaps because of higher soil organic matter, higher litter biomass, and reduced solar radiation reaching the ground, creating cooler, wetter microclimates. Therefore, it is important to study the impacts of shrub canopies on soil respiration, especially in semiarid ecosystems where these effects have been scarcely researched. Among the semiarid chaparral vegetation communities, *Adenostoma sparsifolium* (redshank) shrubs create significant amounts of litter below canopies, which may increase soil respiration rates. However, redshank communities have not been thoroughly studied and there is no knowledge of how these shrub's microsites can affect soil CO_2 fluxes in semiarid shrublands. Here we introduce a project with three research objectives: (1) examine temporal patterns in soil respiration among beneath redshank shrub and bare ground microsites, (2) examine spatial variation of soil respiration by analyzing the effects of microsite characteristics, and (3) evaluate the impact of microsites on temperature sensitivity. To achieve this, we will conduct a randomized 12-month experiment with different microsites created by redshank shrub communities. We will collect continuous 24-hour CO_2 flux measurements with automated dynamic chambers at six 5 m x 5 m plots and each plot will include two microsite types: beneath redshank shrub (50 cm from trunk or main roots) and bare ground (150 cm away from trunk or main roots). We will determine if soil respiration differs among seasons (growing, dry, and wet), and establish if microsites characteristics including soil temperature, soil moisture, litter biomass, and shrub size influence soil CO_2 fluxes. We will also examine the effects of microhabitats on temperature sensitivity by analyzing the relationships between soil respiration and soil temperature. We hypothesize higher variability of soil CO_2 effluxes during the dry season, due to the soil respiration pulses that will be created by precipitation events. Also, we foresee microsites beneath larger shrubs, with greater litter depth and dry biomass to have higher soil respiration than smaller shrub's microsites and bare ground. And we also expect microhabitats with higher moisture to be more sensitive to temperature in this chaparral ecosystem.

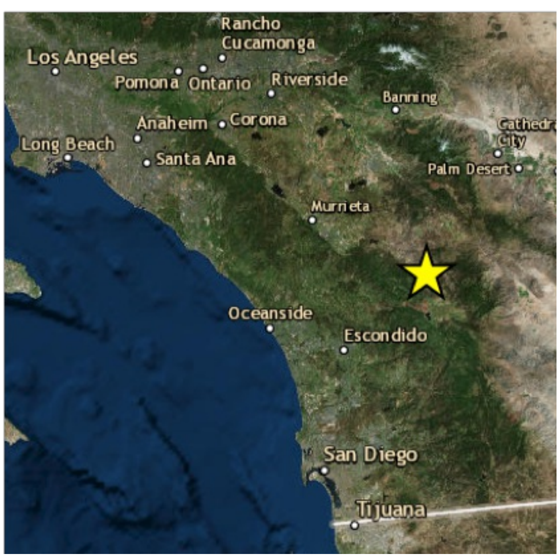

Figure 1. Sky Oaks Field Station located northeast of San Diego, CA and 75 km east of Pacific Ocean.

Figure 2. LI-8100 long-term chamber placed 150 cm from redshank trunk at Sky Oaks Field Station.