Abstract
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Spatial variation in soil CO2 efflux and movement of DOC in the soil profile

Land use changes have substantial effects on soil characteristics as well as biogeochemical cycling, and assessing these effects of these changes is important in order to fully realize the end result of anthropogenic activities. Conversion of natural ecosystems to agricultural systems has resulted in substantial soil carbon loss as a consequence of deforestation, tillage and other physical soil disturbances, removal of crop residues, diminished nitrogen fertility, and changes in soil temperature and moisture as a consequence of cultural practices such as clean cultivation (Lal, 2002). However, Sperow et al. (2003) reviewed known reports of CO₂ emissions and carbon inputs for cropland soils and found that most soils under cultivation in the United States were, in fact, acting as C sinks.

This study will investigate the differences between vineyards and adjacent oak woodlands on the same soil type caused by the shift from wildlands to managed agricultural systems and evaluate their respective soil carbon storage potentials. This will be accomplished through the use of laboratory and field experiments. Soil CO₂ efflux measurements and soil CO₂ profile measurements will be used in conjunction with a laboratory incubation to detail changes in carbon cycling and nitrogen transformations between the sites as well as determine the relative contribution of different soil CO₂ sources through the use of $^{13}$C analyses. Spatial variation in soil CO₂ efflux, as well as several other parameters including SOM, soil moisture, soil temperature, soil N, and total C and N, will be examined and mapped at these sites using GIS software. Analysis and quantification of the spatial variation as well as the identification of casual relationships will enable me to develop a more accurate and useful representation of the soil respiration and potential soil carbon storage at these sites.