Carbon Dioxide Gas Soil Flux in the Riparian Zone

Luis Luna, Andrew Howell, Jack Sigismondo, Jackson James

Department of Science, Sonoma State University, Rohnert Park, CA 94928 E-Mail: lunalu@sonoma.edu howella@sonoma.edu sigismon@sonoma.edu jamejack@sonoma.edu

Introduction

Our project focused on the respiration of soil microbes and roots within the riparian zone. The respiration of these organisms causes CO_2 gas flux (the flow of carbon dioxide gas) through and out of the soil. We took data along Copeland Creek at multiple points. At each point, we marked a transect perpendicular to the creek and measured the CO_2 gas emitted from soil at different points along the transect to compare the distance from the creek and CO_2 levels. This subject is important to study because soil CO_2 flux is a significant contributor to climate change. As carbon dioxide is a major greenhouse gas, it raises heat insulation of the atmosphere and contributes to global climb in temperature.

Materials & Methods

Materials: Vernier CO_2 Sensor & Labquest, Tape Measure

Methods:

- Selected 4 incremental areas suitable for testing
- Measured a 3 meter transect from the stream towards the bank
- Recorded latitude and longitude at each transect
- Measured CO_2 respiration with probe over 60 second intervals, recorded observed data manually
- Repeated steps every 0.5 meters along 3 meter transect, moved on to next location

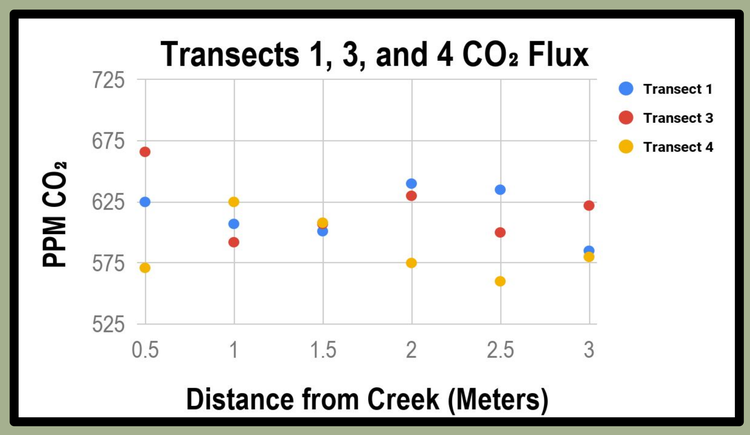


Figure 1: Graph of transects 1, 3, and 4, because these transects showed no significant relationships.

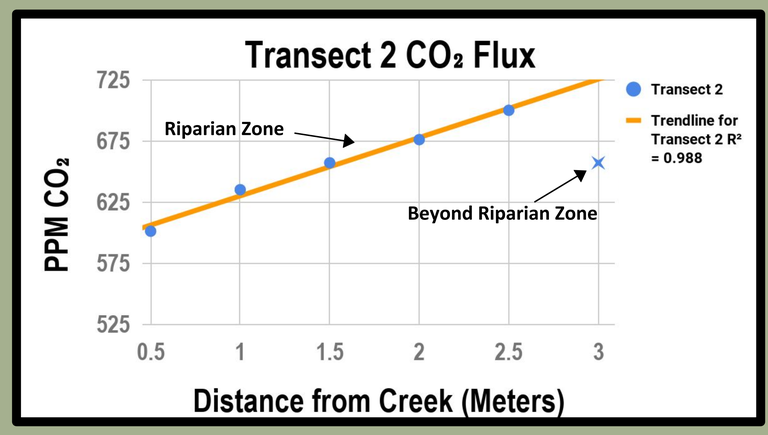
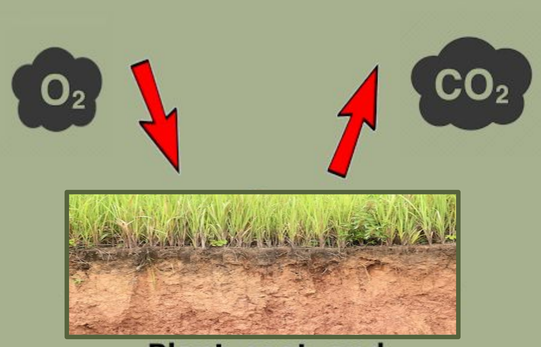


Figure 2: Trendline of recorded data along Transect 2. This trendline reveals an extremely high correlation, excluding one anomalous point.



Plant, root, and organism interaction

Discussion

- Similar studies show that proximity to the water table decreases microbial respiration
- This was not the case in three out of the four transects in our study
- Transect 2 showed a very strong relationship between soil CO_2 flux and proximity to water
- Transect 2 was unique because it was largely vegetative due to being in the riparian zone
- Transects 1, 3, and 4 were likely not riparian bank material

Figure 3: CO_2 Gas Probe in modified bottle. The modified bottle helps capture the released carbon dioxide gas.

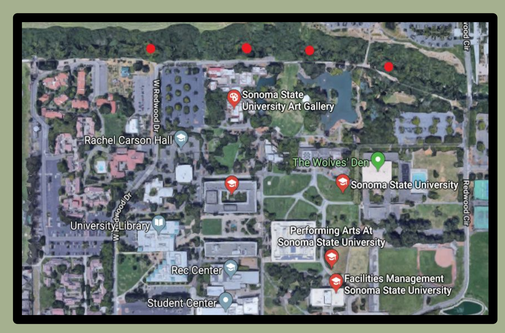


Figure 4: Locations of transects along Copeland Creek at Sonoma State University. Each point was selected incrementally, however some variation was introduced at each site.

Acknowledgements

Robin Glas for the CO_2 meter used in our experiment,
Wendy St. John for her guidance,
and the rest of Science 120 Department

References

- Pacific, V. J., McGlynn, B. L., Riveros-Iregui, D. A., Welsch, D. L., & Epstein, H. E. (2008). Variability in soil respiration across riparian-hillslope transitions. Biogeochemistry, 91(1), 51-70.
- Poblador, S., Lupon, A., Sabaté, S., & Sabater, F. (2017). Soil water content drives spatiotemporal patterns of CO 2 and N 2 O emissions from a Mediterranean riparian forest soil. Biogeosciences, 14(18), 4195-4208.
- Pacific, V., Riveros, D. A., McGlynn, B. L., Welsch, D., & Epstein, H. A. (2006, December). Soil CO2 Concentration and Surface CO2 Efflux Across Riparian/Hillslope Transitions. In AGU Fall Meeting Abstracts.