Information relevant to experiment 2

Related files and script:

experiment\_2\_initial\_final\_flux.xls

experiment\_2\_initial\_final\_flux\_analysis.R

experiment\_2\_soil\_moisture.xls

experiment\_2\_soil\_moisture\_analysis.R

experiment\_2\_dry\_down\_curve\_1

experiment\_2\_dry\_down\_curve\_2

experiment\_2\_dry\_down\_curve\_analysis.R

C flux responses to a gradient of pulse sizes & frequencies

For our second experiment (experiment\_2), we varied precipitation size and frequency over a four-month period, while keeping the total volume of water added the same across treatments. We added the following volumes and frequencies of deionized water using a spray bottle: 1.8 mm every 2 days, 2.7 mm every 3.5 days on average (Tuesday and Thursday each week), 5.4 mm every 7 days, 7.7 mm every 10 days, and 10 mm every 14 days over a four-month period. We had *n* = 5 replicates per treatment (total of 50 mesocosms; *n*=25 for moss crust and *n*=25 for cyanobacteria crust). Cumulative water added (70 mm) was the same across treatments and was equal to the mean upper quartile range of rainfall over the four-month period from April – July 2009-2016.

To see how precipitation pulses and frequency influence CO2 flux after four months of treatments, we measured NSE, respiration (*R*), and gross primary production (GPP) after the final watering treatment on all samples, 120 minutes after administering water. We chose 120 minutes based on past experiments, which showed CO2 flux under small watering amounts peaked around 120 minutes after watering, to ensure we captured flux differences between biocrust types at the smallest watering amount (Reed et al. 2012).

Statistical analyses

For our second experiment, we used linear models to compare interactions between crust type and treatment at the beginning and end of the experiment for different measurements of CO2 flux (GPP, NSE, *R*). Model performance diagnostics were performed to ensure models met all assumptions.