Results: Ventisqueros warming on soil C processes

Soil respiration was measured five times from October 24, 2021 to February 2, 2022, spanning the wet and dry seasons.

**Microclimate**

On average during the measurement period, the OTC’s warmed the subsoil **0.95°C** during the day and **1°C** at night (p=0.007, t=2.707); the soil surface **1.85°C** during the day and **0.22°C** at night (p<0.001, t=-41.105); and the air **2.36°C** during the day and **0.09°C** at night (p<0.001, t=-72.99). Gravimetric soil moisture in the OTCs was reduced by about 1.6%, p<0.001, t=45.98).

**Soil variables**

Soil C and N pools varied spatially. %C, %N, microbial biomass C, microbial biomass N, and TDN varied by block, with blocks 3 and 4 representing the largest C and N pools. Warming influenced soil C pools but only in certain blocks: warming reduced %C and soil C/N relative to control plots in block 4 and reduced MBC in block 2. Warming did not affect soil N pools (table 1).

**Soil respiration**

Warming reduced soil respiration (Rs) relative to control plots in Block 3 (p=0.04, t=-2.312) but had no effect in other blocks. Rs was highest in the wet season (p=0.015, t=2.465) and generally higher in blocks 3 and 4 (p= 0.012, t=2.658; p=0.046, t=2.071, respectively). Rs increased with gravimetric soil moisture (p<0.001, t=3.903) but was not correlated with soil temperature nor air temperature (table 2). Both wet and dry season Rs was correlated with dissolved organic C (wet: p=0.039, t=2.225; dry: p=0.057, t = 2.035).

**Ratio responses**

To better understand the drivers of spatial variability in Rs and soil C and N pools, we divided the warming values by the control values for each plot to get a response ratio for each measurement. We found the response ratio of soil %C was negatively correlated with soil %C in the control (p=0.0239, t = -2.455) and inorganic N (p=0.022, t=-2.488) in the control plots. In other words, plots with greater %soil C in the control plots saw greater soil %C losses in response to warming while plots with less soil %C in the control had increased soil %C in the warmed plots.

Rs was higher in warmed vs. control plots in plots with low soil %C while Rs in warmed plots was lower or equivalent to the controls in plots with high soil %C.