Investigating the Sustainability of Perennial Agriculture

Sutherlin, C. E.; **Brunsell, N. A.**; **De Oliveira, G.**; **Crews, T.**; **Vico, G.**

The changing climate leads to uncertainties concerning the sustainability of certain agricultural resources, and with the additional stresses of an increasing global population, uncertainty in food security will greatly increase. To adhere to future food demands in the face of this changing climate, perennial agriculture has been a proposed solution. However, it is equally important to assure that perennial agriculture is not negatively affecting the climate in exchange for this proposed more robust food source. We chose to examine the interactions between perennial and annual agricultural crops by focusing on the efficiency of exchanges with the atmosphere. This is done using the omega decoupling factor for 4 different sites as a way of quantifying the contributions of radiation and stomatal conductance over the resulting water and carbon cycles. This gives us an indication of how the plant canopy is interacting with, and influencing the local microclimate. Ultimately, this should give us an indication of the ability of perennial crops to aid in the climate mitigation process. We hypothesized that the perennial site chosen would have omega values more similar to the omega values of a natural grassland rather than an annual crop site. Using AmeriFlux towers to determine the canopy values needed to calculate the omega decoupling factor, we focused on the Kernza perennial crops being grown at the Land Institute in Salina, Kansas (KLS), in comparison to a natural grassland in Manhattan, Kansas (KON), a typical land cover model in Lawrence, Kansas (KFS), and an annual crop site in Lamont, Oklahoma (ARM). These results will allow us to move forward in the investigation of perennial crops as a sustainable food source.

Publication:
American Geophysical Union, Fall Meeting 2017, abstract #B53B-1951

Pub Date:
December 2017

Bibcode:
2017AGUFM.B53B1951S

Keywords:

0402 Agricultural systems; BIOGEOSCIENCES;
0429 Climate dynamics; BIOGEOSCIENCES;
0495 Water/energy interactions; BIOGEOSCIENCES;
1843 Land/atmosphere interactions; HYDROLOGY