Abstract Details

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Title: BG2: Woody Shrub Encroachment in Semiarid Grasslands: A Substar Component of the Terrestrial Global Carbon Sink?

Abstract:

Many dryland regions, which cover 40% of the land surface of the glo have undergone chronic land degradation during the last century [1]. example, in North America most arid/semi-arid grasslands have expe some degree of woody shrub encroachment, similar to the Jornada Ba southern New Mexico, where ecosystems have been dramatically alte since the late 1870s as a result of the extensive encroachment of C3 shrubs into grasslands previously dominated by native C4 grasses. Th mechanisms driving grass-shrub transitions are complex and involve interactions between both natural (e.g., drought) and anthropogenic (overgrazing by domestic cattle) agents. Does woody shrub encroachn into grasslands and savannas lead to an increase in the amount of ca stored in those ecosystems? Empirical data, while limited, suggests th woody shrub encroachment may be a substantial component of the terrestrial global carbon sink [2]. However, in our assessment of the literature (limited here to grasslands receiving <300mm annual precipitation), we found that field studies purporting to show changes organic matter (SOM) associated with grass-shrub comparisons are o based on problematic assumptions. Using the patch arid lands simula (PALS) we examined the effects of woody shrub encroachment on SO soil nutrients in the Jornada Basin (http://jornada-www.nmsu.edu/), studied semiarid region located in the northern Chihuahuan Desert. W conducted simulations for the period 1915 to 2000, under a range of environmental conditions and perturbations. The PALS approach over some of the limitations of empirical schemes because it allows us to e how specific ecosystem characteristics (e.g., plant root and shoot bior SOM, soil nitrogen) change over decadal-to-century periods under pre climatic sequences in plant communities composed of plant functional (FT) (e.g., grasses, shrubs, annuals, perennials with associated rootir distributions), soil textures and water holding capacities. Our results s that relatively large changes in plant FT composition (e.g., a complete from a grass- to a shrub-dominated community) leads to only small c in SOM content; on the other hand, changes in soil structure/texture climate (e.g., decadal-long droughts) have a much greater effect. Usi landscape (spatially-explicit) version of PALS [see 3], we found that c in the spatial patterning of plants (associated with shifts in plant FT composition) produces a redistribution of SOM that can offset potenti