Climate warming could induce a feedback loop involving decreases in soil organic carbon and water-holding capacity. (S03-huntington054938-Poster)

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Abstract:
Climate change could result in net losses of soil organic carbon (SOC) if the effects of warming on decomposition exceed potential gains in SOC through increases in net primary productivity (NPP). Net losses of SOC would lead to losses of plant-available water-holding capacity (WHC) because they are directly related. Loss of SOC and WHC could set up a feedback loop whereby decreases in WHC cause decreases in NPP and residue inputs that further reduce SOC. This amplification of SOC losses would be most apparent in moisture-limited agroecosystems. WHC decreases by about 1 to 3% for every 5% decrease in SOC for silt loam textured soils. An empirical model suggests SOC losses of 7 to 28% in the surface 20 cm following increases in mean annual temperature of 1.4 to 5.8 C, which is the current range in global average IPCC projections for 2100 AD. These losses in SOC correspond to decreases in WHC in the range of 1 to 17%. The consequences of such changes range from relatively unimportant to quite substantial for grain production and maintenance of SOC levels. The range of uncertainty and the potential vulnerability emphasize the need for refining these estimates.

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