Human-climate feedbacks in the northern North American Great Plains

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The northern North American Great Plains (NNAGP) have seen massive land use changes over the past half-century. Increases in agricultural intensity are consistent with observed cooling and increases in precipitation during the vegetative growing season. Have land managers responded to these climate changes in a way that further cools growing season climate, creating a positive feedback? Here, I review decadal changes in land management, hydrology, and climate in the NNAGP and demonstrate that it has experienced globally unique hydroclimate trends. Increases in evapotranspiration at the expense of sensible heat flux (a decrease in the Bowen ratio) have increased convective precipitation likelihood. The surface-atmosphere coupling framework used to quantify these changes also indicate that convective precipitation was anomalously unlikely weeks before the onset of the 2017 "flash" drought. Surface-atmosphere feedbacks in the NNAGP appear to be tipping toward a more closely coupled state, with both advantageous and deleterious effects on human livelihoods. From these results, I will argue that understanding the mechanisms underlying human-climate feedbacks in the NNAGP provides a framework for quantifying regional climate services across the globe.

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Refreshments 3:15 PM
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