BRC Science Highlight
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Assessing Precipitation, Evapotranspiration, and NDVI as Controls of U.S. Great Plains Plant Production

Background/objective

Numerous precipitation and moisture-related factors have been found to influence aboveground net primary production (ANPP) of grasslands. The ability to understand and model these complex interactions will be crucial to accurately predicting ANPP of biofuel grasses in the U.S. Great Plains (GP). Here, researchers employ site- and regional-scale datasets to probe how precipitation-related variables and normal difference vegetation index (NDVI) are related to spatial and temporal ANPP patterns.

Approach

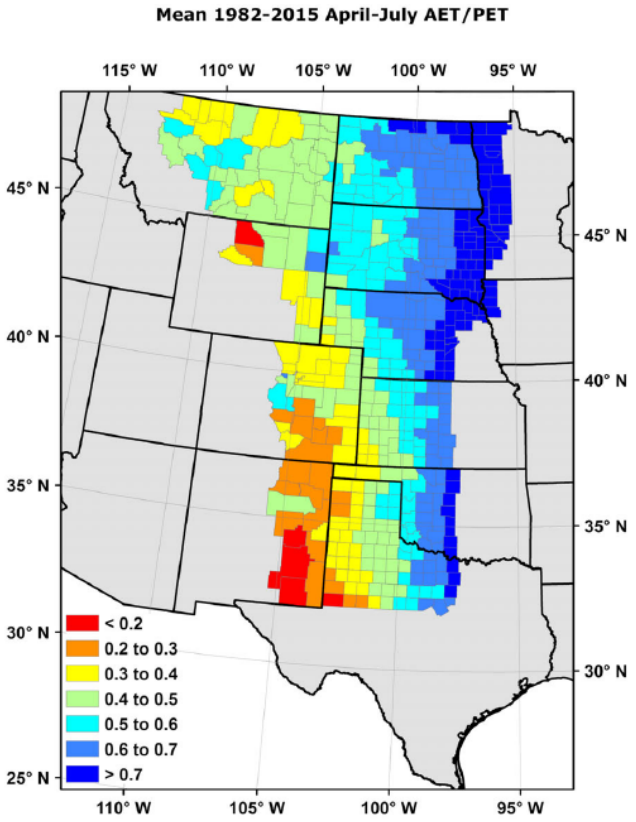
- Long-term actual evapotranspiration (AET) and transpiration (Tr) were simulated using the DayCent biogeochemical model.
- Correlations were calculated between long-term pasture- and county-level ANPP data in the GP with DayCent outputs as well as NDVI data.

Results

- AET was the major factor controlling annual changes in ANPP at both regional and site-level spatial scales.
- AET was also correlated with NDVI, which can be used to estimate ANPP.
- Results show a strong pattern of increasing AET to PET ratio and ANPP going eastward and northward across the GP (see figure).

Significance

Understanding that different precipitation-related variables control ANPP depending on moisture levels across the GP allows for the development of spatially explicit forecasting of ANPP, which will result in improved decision-making by land managers for biofuel grass production. Results of this study can be used to improve Grass-Cast model predictions of ANPP across the GP.



Ratio of cumulative April-July AET to PET (1982-2015) increases going eastward and northward across GP counties.

*Chen et al. 2019. "Assessing Precipitation, Evapotranspiration, and NDVI as Controls of U.S. Great Plains Plant Production." **Ecosphere**. DOI:10.1002/ecs2.2889*

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