

Seasonal Grassland Productivity Forecast for the U.S. Great Plains Using Grass-Cast

Objective

Inconsistent precipitation in the drought-prone U.S. Great Plains leads to uncertain vegetative yields. Current predictive tools for land managers fail to directly translate drought intensity to grassland productivity and to detect flash droughts. To address these limitations, researchers developed Grass-Cast, an innovative grassland productivity forecast system to provide science-informed estimates of growing season aboveground net primary production (ANPP).

Approach

- ❖ Developed correlations between ANPP, normalized vegetation difference index (NDVI), and actual evapotranspiration (AET).
- ❖ Grass-Cast feeds observed weather data into the DayCent model to predict AET and uses established correlations to generate ANPP estimates.
- ❖ Generated ANPP forecasts every two weeks throughout the growing season for 10 states in the U.S. Great Plains region.
- ❖ Used Grass-Cast to generate county-level ANPP forecasts for 2017-18. Updated to 10 km x 10 km grid scale for 2019-2020.
- ❖ Compared Grass-Cast end-of-season ANPP estimates to independent dataset.

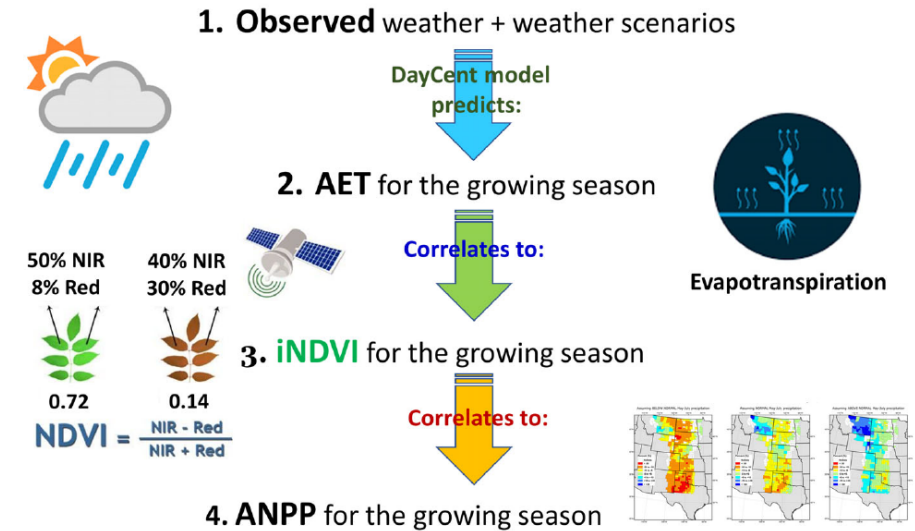
Results

- ❖ By late May-early June, Grass-Cast was able to predict end-of-growing season ANPP with correlation greater than 50%.
- ❖ A retrospective evaluation comparing Grass-Cast end-of-growing-season ANPP to an independent MODIS-NDVI dataset found that the two agreed 69% of the time over the past two decades.

Significance

Grass-Cast is the first predictive tool for forecasting grassland productivity for the entire U.S. Great Plains region. Grass-Cast may be adapted for areas beyond the Great Plains and to predict perennial biofuel grass production.

Overview of "Grass-Cast" Procedure



Schematic of the Grass-Cast procedure. NIR=near infrared; iNDVI=cumulative growing season NDVI