



## **Estimating Annual Net Primary Productivity of Tallgrass Prairie (1989 - 2007) at Regional Scale Using Satellite Remotely Sensed Measurements**

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Weekly Advanced Very High Resolution (AVHRR) near cloud-free Normalized Difference Vegetation Index (NDVI) image composites were correlated with annual net primary productivity (ANPP) ground reference measurements collected by plot-level harvests of peak biomass at the Konza Prairie Long-Term Ecological Research site near Manhattan, Kansas. Over a 12-year (1989 -2000) study period, NDVI was strongly correlated with ANPP ( $r = 0.86$ ). Our findings show that the optimal correlation period was within the third week of July. Regression transformation coefficients were used to model ANPP for a Kansas four-county area (~7,000 ha) for each of 19 years (1989 -2007). The four-county area resides within the Flint Hills and is similar climatologically and ecologically to tallgrass prairie throughout the region. ANPP and ANPP-anomaly maps were created to show year-to-year and within year ANPP variation. Our model overestimated ANPP in 1994 by about  $100 \text{ g/m}^2$ . The ANPP trend from 1998 to 2007 was upward for both the NDVI-estimated and ground-based reference data. Our ANPP and ANPP anomaly maps show complex variation within and among years, suggesting that there are multiple factors influencing ANPP each year and across the study area that could not be completely explained by weather data collected within the study area. Estimates of ANPP at 1-km spatial resolution could increase our understanding of ecosystem response to natural and anthropogenic factors, and enhance the predictive resolution of biogeochemical models used to estimate such factors as  $\text{CO}_2$  flux.

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