

**NEAR-SURFACE REMOTE SENSING OF REGIONAL
VEGETATION PHENOLOGY**

A THESIS SUBMITTED TO
THE GLOBAL ENVIRONMENTAL SCIENCE
UNDERGRADUATE DIVISION IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF

BACHELOR OF SCIENCE

IN

GLOBAL ENVIRONMENTAL SCIENCE

AUGUST 2015

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ABSTRACT

Radiation flux measurements taken at stationed towers throughout the world have been recognized as a significant avenue to deepen the scientific communities' understanding of plant phenology. Several studies have recently used radiation flux time-series data to evaluate and/or validate vegetation index time-series that were created from satellite measurements. The objectives of this study were to use radiation flux measurements to calculate vegetation indices in contrasting biomes and to examine the relationship between climatic drivers that control plant growth and the seasonal trends in the vegetation index time-series. Three sites were used for this study: Brookings (South Dakota), Mead (Nebraska) and Missouri Ozark (Missouri). Using regression analysis curves were fit to vegetation index time-series data. Phenological metrics that characterized the inter-annual variability of the start of the growing season (SOS) were calculated from the fitted curves at each biome. Linear regression was used to examine the climatic drivers of SOS. This study found that temperature controls SOS at agricultural (Mead) and grassland (Brookings) biomes. Precipitation was the climatic driver that controlled SOS at Missouri, a deciduous forest. It was concluded that high temporal resolution radiation flux measurements capture inter-annual variability of vegetation growth associated with climate drivers and can serve as a means to evaluate, calibrate, and validate climate science quality of satellite time-series data.

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