

ASSESSING GRASSLAND DISTRIBUTIONS AND SPATIO-TEMPORAL VARIATIONS IN THE U.S. GREAT PLAINS WITH MODIS IMAGERY

Qing Chang

Dr. Cuizhen Wang, Thesis Supervisor

ABSTRACT

The North American Great Plains is the primary grassland in the United States. Both cool season grasses (CSG) and warm season grasses (WSG) grow in the Great Plains, with their distributions vary with environmental conditions and climate dynamics. As global climate change is being a hot topic today, there is a need of detailed maps of these grass functional types in the Great Plains to enhance our understanding of grassland ecosystems and their responses to climate change. This study delineates CSG and WSG based on their unique phenology features that could be extracted from time-series satellite imagery; and preliminarily examines their inter-annual variation responding to the changing climate conditions in this region.

Several spatial analysis methods are examined in this study. I have 1) built user-defined programs to perform time series analysis of 10 years' MODIS imagery, and extracted useful phenological parameters as innovative inputs of image classification; 2) Developed a sequential multivariate regression algorithm in SAS to classify crop and grass maps in the Great Plains; 3) compared the 10-year climatic data with the classified grass distributions to examine the relationship between climate change and vegetation dynamics. The achievements filled the gap of lacking detailed distribution of grass functional types in the Great Plains, and reported the credible analysis in climate-induced land cover changes.