Examining the Relationship Between Temperature and Vegetation Phenology: Is Soil a Better Predictor than Air?

Plant phenology is the seasonal development of the annual cycle of a plant, driven by temperature, photoperiod, and precipitation. Observations of plant phenology over time will clarify the interactions and feedbacks between climate changes and vegetation. The objective of this research is to examine the relationship between soil temperature and forest growing season length. The start and end dates of the vegetation growing seasons were determined using soil temperature data from two sites (Michigan and Kentucky). In addition, vegetation phenology was modeled using air temperature and the results were compared to determine if the soil temperature method based phenology is more accurate than the air temperature method. The effectiveness of those methods was assessed by comparing both soil and air temperature data results to observational data of Leaf Area Index (LAI) for the Kentucky site and phenology metrics derived from eddy covariance flux tower for the Michigan site. Satellite phenology data from the Advanced Very-High Resolution Radiometers (AVHRR) were also used and compared to the results. The data analysis so far predicts that the soil temperature method is more accurate than the air temperature method in predicting the vegetation growing season.