

Remote sensing of Spring Phenology: Method development and temporal trends

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Abstract:

The timing of vegetation development, or phenology, is primarily influenced by temperature and therefore changes in plant phenology are one of the most clearly observed responses to increasing temperature associated with climate change. Studies indicate that warming trends have extended the growing season with an earlier spring and later autumn throughout the northeastern United States. Previous studies utilizing remote sensing satellite data have monitored timing of foliage emergence. However, these efforts have been limited to coarse spatial or temporal resolution, and often lacked a direct link to field measurements.

Addressing this gap, multiple remote sensing approaches have been compared to extensive field measurements to establish a robust method of quantifying phenology. Results include a four parameter nonlinear model that best fits observed phenology and a threshold to define day of spring that matches meaningfully to ground measures. Understanding what spectral measurements capture in field measured phenology metrics will help with the interpretation of remote sensing coverages. Using this new methodology, we are currently working to quantify historical phenology across the region based on a 27 year archive of Landsat TM 5 and 7 data. This work will inform the investigation of both inter-annual decadal changes and regional microclimate patterns in phenology for northern Vermont and New York.