Real-time Fuel Moisture and Fire Danger Mapping in the Eastern States with Satellite Remote Sensing Measurements

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Fuel moisture content is a key parameter in many drought indices, fire danger rating systems, and fire behavior models. In the Keetch-Byram Drought Index (KBDI), for example, fuel moisture deficiency is a core quantity. KBDI is calculated using the value of fuel moisture deficiency on a previous day, maximum air temperature, and precipitation. Fuel type and moist conditions have large spatial variability in the eastern states (east of the Mississippi River), but the coverage of meteorological observations is often too sparse to determine atmospheric conditions at the specific forest sites across these regions. Satellite remote sensing has emerged as an advanced technique to provide high-resolution and frequent measurements of forest fuel type and wildfire properties. Great efforts have been made recently to develop algorithms for estimating fuel moisture using satellite remote sensing products. In this presentation, we demonstrate an application of the NASA Moderate Resolution Imaging Spectroradiometer (MODIS) products for estimating fuel moisture and fire danger in the eastern state regions. MODIS includes middle infrared bands where absorbance of water normally occurs, which makes MODIS products especially suitable for determining real-time forest fuel moisture, a critical parameter for predicting fire events and constructing fire danger indices. The MODIS Direct Broadcast (DB) system that can be used to obtain real-time measurements provides a capability to map real-time fuel moisture and fire danger in the eastern states. The following aspects will be presented: (1) Estimating real time fuel moisture using MODIS measurements; (2) Estimating real time fire danger indices using the fuel moisture and other fuel properties (type and loading)

retrieved from MODIS measurements; and (3) Mapping real time fuel moisture and fire danger indices over the eastern state regions.