Estimating Real-time Fire Danger Potential Using MODIS Reflectance Measurements in Eastern States

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Fire danger is a conjunction of different factors, both physical and human caused. Forest fire danger potential is very important for fire management and fire plan. Satellite remote sensing may be very valuable in different aspects of fire danger potential estimations which can provide risk conditions (Chuvieco and Martin, 1994), which can provide nearly global coverage of the Earth with high spatial resolutions and repetition rates. The requirements for analyzing and forecasting wildfire at a national scale necessitate that remote sensing research and applications develop spatial information and technology to assess and forecast fire danger over large areas (USGS 2002). A forest and rangeland fire danger potential determination is the cumulative effects of weather, fuel types, the status of both live and dead fuel moisture, and soil and ambient air temperature. Among these factors affecting fire danger potential, the amount of fuel moisture in vegetation, land surface and ambient temperature set conditions for fire development. A Fire Potential Index (FPI) was initially developed by Burgan (1998). Currently there are limited fuel and soil moisture information from satellite measurements. There is a need for improved methods of remote estimation of moisture content of wildland fire fuels (USGS 2002). Vegetation indices can provide an indication of vegetation stress and deterioration of vegetation health. Therefore, estimated intensity and duration of vegetation index and/or land surface anomalies can be used as a proxy for prediction of fire danger potential.. Based on fuel spectral characterization, this study proposes a newly defined Fire Danger Potential Index (FDPI) using the Moderate Resolution Imaging Spectroradiometer (MODIS) reflectance measurements and analyzes it with the wildland fires in Florida during 2004. The simple FDPI index is found to be able to identify fuel drought conditions (Brownness). Real-time FDPI data processing, FDPI applications and limitations are also discussed in this paper.