Estimating spatial and temporal variations of Fuel properties using MODIS data set: the experience of Cyberpark project

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This paper presents significant results obtained in the context of Cyberpark project focused on the use of satellite data for pre-operational monitoring of natural protected area. In particular, the use of MODIS measurements was manifold, we used them for obtaining:

(1) Estimating fuel moisture
(2) mapping fuel properties (type and loading)
3) Estimating and Mapping fire danger indices using both MODIS-based fuel properties and fuel moisture

Fuel moisture content is one of the most important fuel properties and it is a critical parameter for fire danger estimation and fire event forecasting. Ground measurements of fuel moisture are difficult, costly and limited in spatial distribution extension. Satellite remote sensing provides effective data to quantify spatial differences of live fuel moisture over extensive forest areas. In particular, the NASA Moderate Resolution Imaging Spectroradiometer (MODIS) acquires data in a number of spectral bands including middle infrared where absorbance of water normally occurs, and this makes MODIS products especially suitable for determining real-time forest fuel moisture and fire danger.
Modis data were also used for identifying and mapping fuel properties in terms of type and loading.
Fuel moisture, Fuel properties, and Fire danger maps obtained for the investigated area were compared with forest fire data archive in order to evaluate the performance, integrate them into a single index and calibrate the model developed for the North-East area of the Apulia Region. Results suggested that the model adopted identified the main fire risk zone in the study area. In particular, the integration of the three danger layers into a single, integrated model properly described fire-proneness.