Contribution of Near Real Time MODIS-Based Forest Disturbance Detection Products to a National Forest Threat Early Warning System

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This presentation discusses an effort to compute and post weekly MODIS forest change products for the conterminous US (CONUS), as part of national forest threat early warning system (EWS) known as the U.S. Forest Change Assessment Viewer (FCAV).  The US Forest Service, NASA, USGS, and ORNL are working collaboratively to contribute weekly change products to this EWS.  Large acreages of the nation's forests are being disturbed by a growing multitude of biotic and abiotic threats that can act either singularly or in combination.   When common at regional scales, such disturbances can pose hazards and threats to floral and faunal bio-diversity, ecosystem sustainability, ecosystem services, and human settlements across the conterminous US.   Regionally evident forest disturbances range from ephemeral periodic canopy defoliation to stand replacement mortality events due to insects, disease, fire, hurricanes, tornadoes, ice, hail, and drought. Mandated by the Healthy Forest Restoration Act of 2003, this forest threat EWS has been actively developed since 2006 and on-line since 2010.  This FCAV system employs 250-meter MODIS NDVI-based forest change products as a key element of the system, providing regional and CONUS scale products in near real time every 8 days.

Each forest change product in FCAV is based on current versus historical 24 day composite NDVI data gridded at 231.66 meter resolution.  Current NDVI is derived from USGS eMODIS expedited products.  MOD13 NDVI is used for constructing historical baselines.  CONUS change products are computed for all forests as % change in the current versus historical NDVI.  Change products are computed according to previous year, previous 3 years and previous 8 year historical baselines.  The use of multiple baselines enables disturbance anomaly phenology to be more fully assessed.

CONUS forest change products are posted each week on the FCAV, a web mapping service maintained by the National Environmental Modeling and Analysis Center.  The FCAV EWS has been used to aid multiple Federal and State agency forest management activities, including aerial disturbance detection surveys, as well as rapid response preliminary assessments of timber loss due to tornadoes, regional drought studies, and fire damage assessments.  The FCAV allows end-users to assess the context of apparent forest vegetation change with respect to ancillary data, such as land cover, topography, hydrology, climate variables, and administrative boundaries.  Such change products are being evaluated through case studies involving comparison with higher spatial resolution satellite, aerial, and field data. The presentation will include multiple examples in which regionally evident forest disturbances were successfully detected and monitored with the MODIS-based change products, as part of the FCAV. FCAV's MODIS forest change products enable end-users (e.g., resource managers) to monitor forest hazards at regional scales throughout the year and across the nation.