

DETECTION OF POTENTIAL FOREST DISTURBANCES OF THE APPALACHIAN MOUNTAINS FROM SPATIOTEMPORAL PATTERNS OF LANDSCAPE DYNAMICS USING MULTI-SENSOR REMOTE SENSING DATA

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ABSTRACT:

Disturbance events commonly exist in ecosystems worldwide. Disturbance events have been reported to have significant impacts on structure, function and processes of forest ecosystems. Appalachian Mountains in the eastern United States sustain a variety of forest ecosystems and native biological diversity. The forest ecosystems experience impacts from natural and human disturbances throughout the history. In this study we used time-series of MODIS EVI and LST to compose MODIS Global Disturbance Index (MGDI) of Mildrexler for detecting the annual forest characteristic of disturbance across the Appalachian Mountains between 2003 and 2012. Forest Inventory and Analysis (FIA) plots data are referenced to confirm type of disturbance. Meanwhile, Disturbance Index (DI) derived from Landsat TM/ETM+ data is used to identify the extent of typical and high severity impacts from insect, ice storm, and wind disturbed areas. The MGDI indicates that about an annual mean 5.58% (14,083km²) of the forested areas within Appalachian Mountains was disturbed during 2003 and 2012. The least and most area of disturbance occurred in 2007 and 2008, respectively. There are approximate 40% of the forested area was disturbed once at least. The FIA plots confirmed locations and types of disturbances occurred. Landsat imageries verified the result of MGDI detection and improved accuracy of spatial extent of disturbance.

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