Title of Presentation:

Broad-scale mapping of Eastern Hemlock decline in the southern Appalachians using vegetative phenology.

Names of Presenter and Collaborators:

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Abstract (150-300 words):

The damage to forests caused by insects and pathogens and the financial costs for detecting them are at unprecedented levels. This study focuses on one particularly devastating threat, the invasive hemlock woolly adelgid (*Adelges tsugae*). The hemlock woolly adelgid (HWA) is currently dramatically altering eastern forests by ravaging its hosts, Eastern and Carolina hemlocks, *Tsuga canadensis and Tsuga caroliniana*. First reported in the Pisgah and Nantahala National Forests in 2001, HWA now exists throughout the southern Appalachians. As with many other pest infestations, there is no comprehensive and detailed analysis of HWA-induced damage below the county level. The number of known locations of hemlock mortality due to HWA is growing, but is far from all-encompassing. This study attempts to create a moderate-resolution hemlock decline map for the entire southern Appalachian region using vegetative phenology, 231-meter 16-day MODIS satellite NDVI (Normalized Difference Vegetation Index), from 2003-2009. Wintertime NDVI values were analyzed to depict the percent change in evergreen photosynthetic activity over a 7-year period. Areas showing a distinct phenological signature with a 5-22% decrease in NDVI from 2003 to 2009 correlated with hemlock stands and areas of known hemlock mortality. Results were confirmed with visual observation, FHM sketchmaps, and by comparing trends in NDVI from one site to another. The analysis performed in this study provides a comprehensive, up-to-date, qualitative and quantitative method for detecting and mapping hemlock decline at a regional level, and will assist scientists and forest resource managers to assess risk and prioritize future management efforts.