

## SATELLITE REMOTE SENSING AND GROUND-BASED ESTIMATES OF FOREST BIOMASS AND CANOPY STRUCTURE

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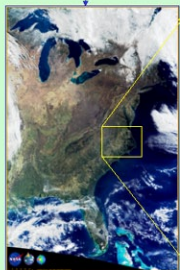
Collecting vegetation reflectance spectra for calibration of satellite images.

### ENVIRONMENTAL SCIENCE ISSUES

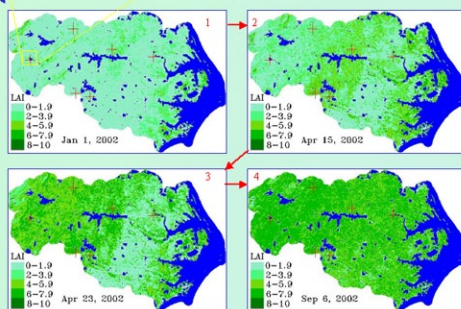
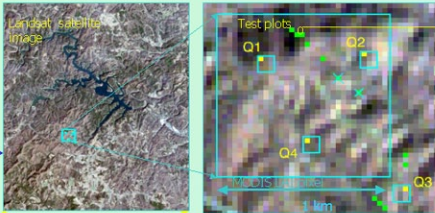
- Landscape characterization and change detection
- Biogenic emissions, nutrient and sedimentation processes
- Remotely characterize landscape structure and monitor ecosystem processes
- Detect patterns of forest productivity and changes over time due to stressors
- Forest carbon sequestration potential

### SATELLITE REMOTE SENSING

- Measure leaf area index (LAI) (biomass surrogate) using NASA MODIS sensor
- Measure and monitor vegetation dynamics over time
- Use vegetation dynamics for land-cover mapping and change detection
- Input LAI to biogenic emissions and nutrient process models



Research Watershed: Albemarle-Pamlico Basin



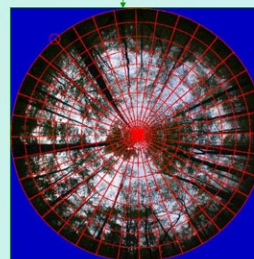
MODIS Leaf Area Index time series in Albemarle-Pamlico watershed showing vegetation green up January-September 2002. Red crosses are field validation sites.

### FIELD VALIDATION STUDIES

- Satellite measurements must be validated by *in situ* field studies
- Forest research sites are surveyed for species, size, canopy/understory structure (biometrics)
- Repeat measurements of leaf area index:
  - hemispherical (fish eye) photography and
  - TRAC sunfleck profiling
- Output: quantify LAI and canopy structure



Digital Image Processing

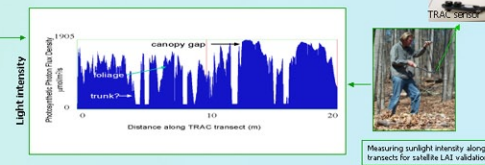


## Emerging Technologies



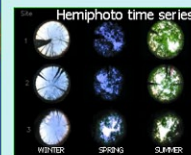
### IMPACT

- Dynamic parameterization of landscape process models
- Automate satellite-based landscape change detection
- Validate NASA MODIS derived standard products for EPA applications



### PARTNERS

- NASA: satellite imagery
- State of NC: Umstead State Park research site
- State of VA: Fairystone State Park, Gamelands research site
- Duke University: FACE methods validation site
- NC State University: South Hill methods validation site
- NERL / NCEA: principal investigators



**KEYWORDS:** vegetation, LAI, biomass, landscape change detection, remote sensing, land-cover mapping, ecosystem assessment, biogenic emissions, nutrient processes

Notice: The U.S. Environmental Protection Agency funded and conducted the research described here. It has been subject to the Agency's programmatic review and has been approved for publication. Mention of any trade names or commercial products does not constitute endorsement or recommendation for use.

