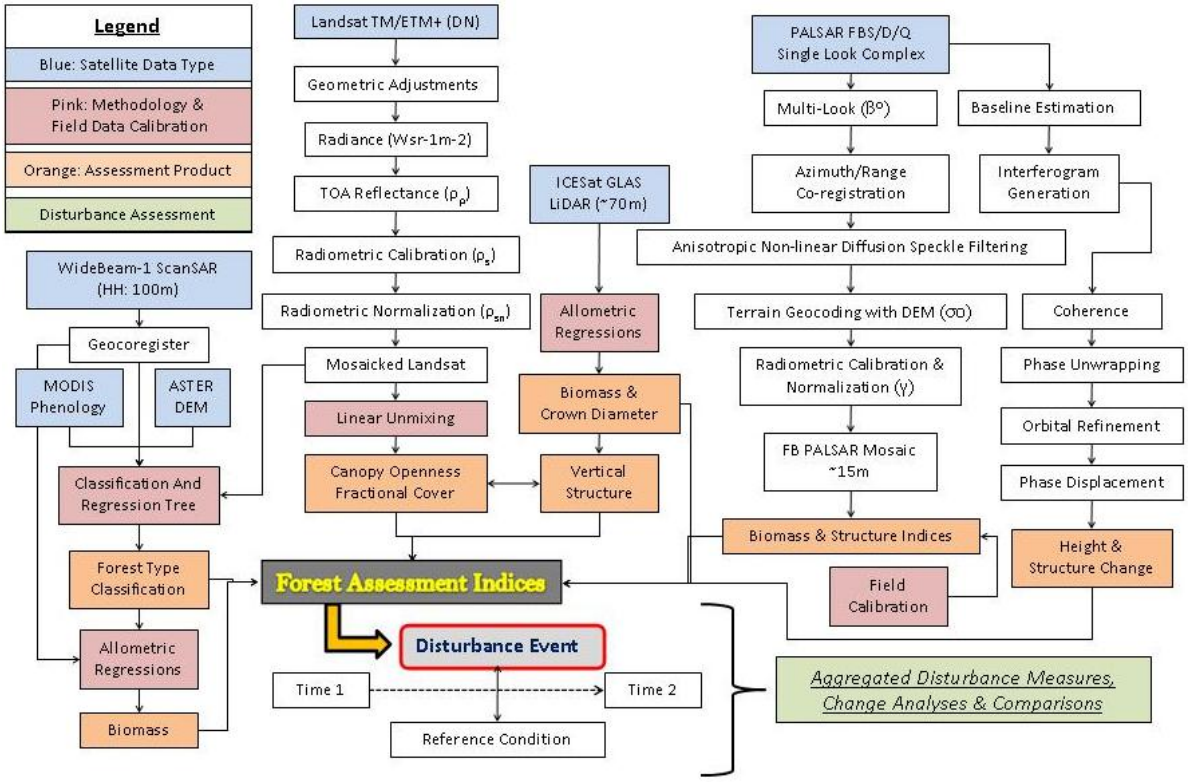
Project: Quantifying disturbance to forest structure with optical, LiDAR, and SAR remote sensing

Funding Sponsor: Northeastern States Research Cooperative

Overarching Goal: Develop a tool that utilizes multiple remote sensing platforms to characterize forest structure for rapid assessment of disturbance events.

Objectives:
(1) carry out a field campaign to collect calibration data from disturbance-impacted forests,
(2) assess the impact of disturbance events on forest attributes,
(3) evaluate our ability to characterize wide-ranging disturbance events,
(4) integrate remote sensing observations and generate a suite of geospatial products,
(5) develop image processing algorithms that could be used in an operational context, and
(6) work with stakeholders to integrate existing disturbance response thinking into our approach and end-products

Summary: Disturbance (such as wind, ice storms, disease, pollutants, climate change, and insect infestation) is a frequent occurrence in northern forest ecosystems. Timely and accurate assessment of disturbance events is critical for land managers to respond effectively and appropriately. In addition, assessing the severity of disturbance (*e.g.* magnitude of biomass and vertical structure change) is critical for broad-scale management and policy. New satellite remote sensing technologies such as synthetic aperture radar (SAR) and LiDAR, when combined with optical imagery, hold the potential to be able to identify disturbance and quantify its ecological effects more precisely than with optical imagery alone. Through a coordinated effort, we will combine field-collected forest structural metrics with remotely sensed imagery and work towards designing a blueprint operational image analysis system. Our specific objectives are to (1) carry out a field campaign to collect calibration data from disturbance-impacted forests, (2) assess the impact of disturbance events on forest attributes, (3) evaluate our ability to characterize wide-ranging disturbance events, (4) integrate remote sensing observations and generate a suite of geospatial products, (5) develop image processing algorithms that could be used in an operational context, and (6) work with stakeholders to integrate existing disturbance response thinking into our approach and end-products. The outcome of this project will be a blueprint for an operational remote sensing system to identify and quantify forest disturbance. End products will include our field metric database (open access), regional maps of forest type, biomass, and canopy fractional cover, as well as higher resolution products at numerous case study areas within the study region.



Framework for assessing disturbance

Outcomes:

The outcome of this project will be a framework for an operational tool for assessing forest disturbance. All framework components will be developed using cases study examples. Assessment maps with actionable information will be generated at multiple scales to share with end users. A follow on proposal will be created for implementing the framework in the northeast US.