Progress Report

Multi-regional evaluation of new machine learning algorithms for mapping tree species distribution and abundance

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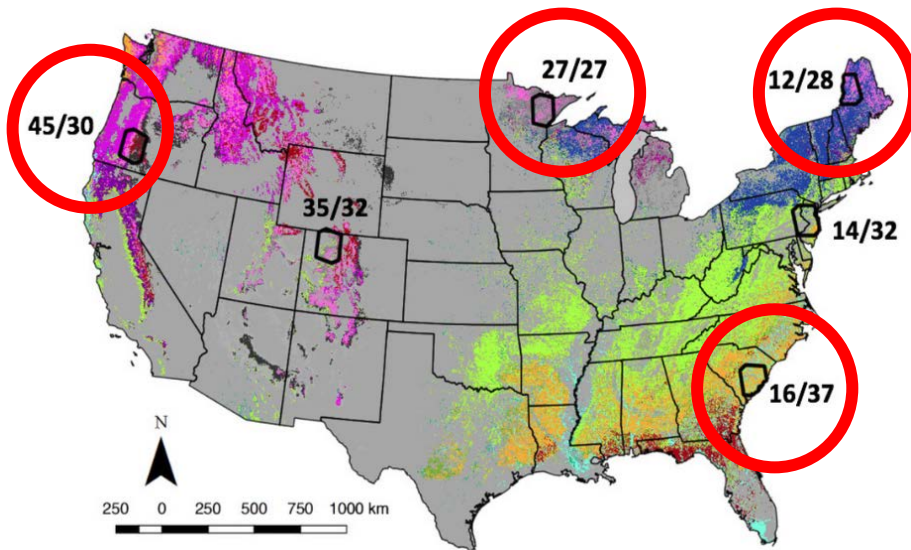
Presenter: Kasey Legaard

Goals:

Multi-regional validation of automated machine learning and remote sensing methods developed at UMaine

- 10 m species, overstory composition and forest type classes, disturbance history, and biomass

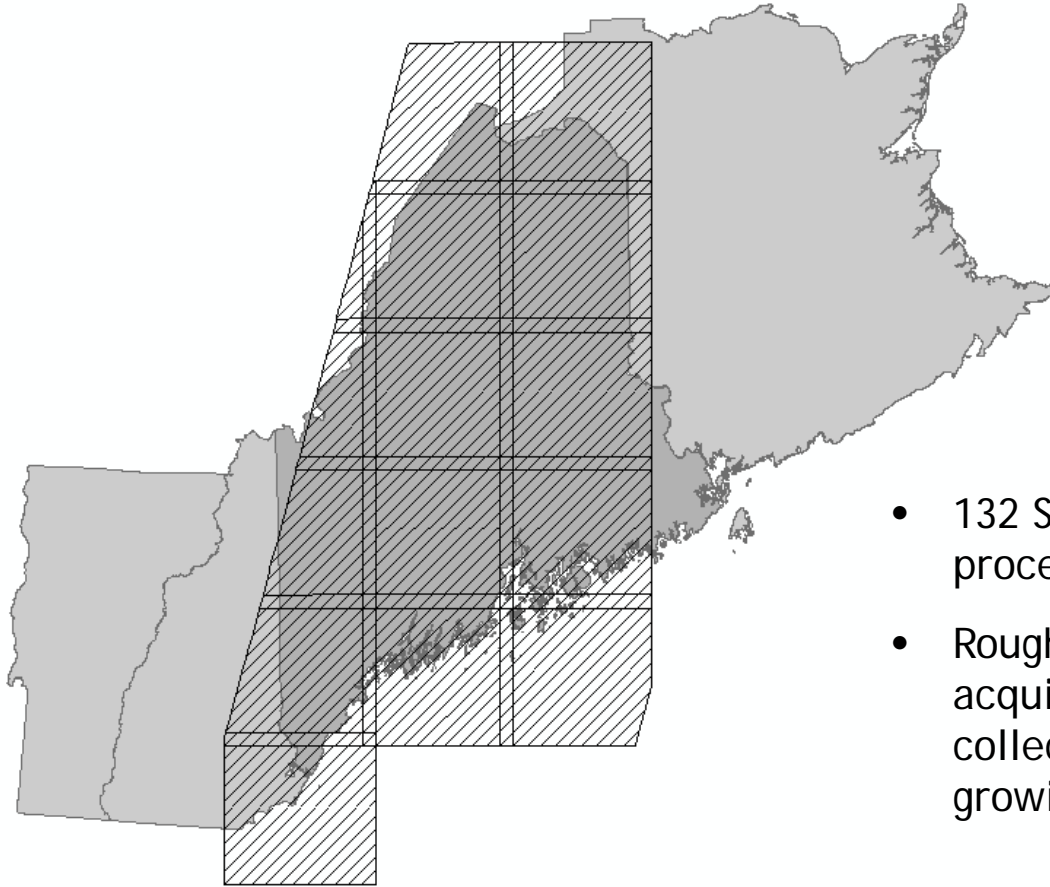- Algorithms, workflows integrated into high-volume production software

USDA FIA and NASA Carbon Monitoring System (CMS) data for benchmarking (CMS 2013, Cohen et al.)

Project activities, June – Nov. 2021:
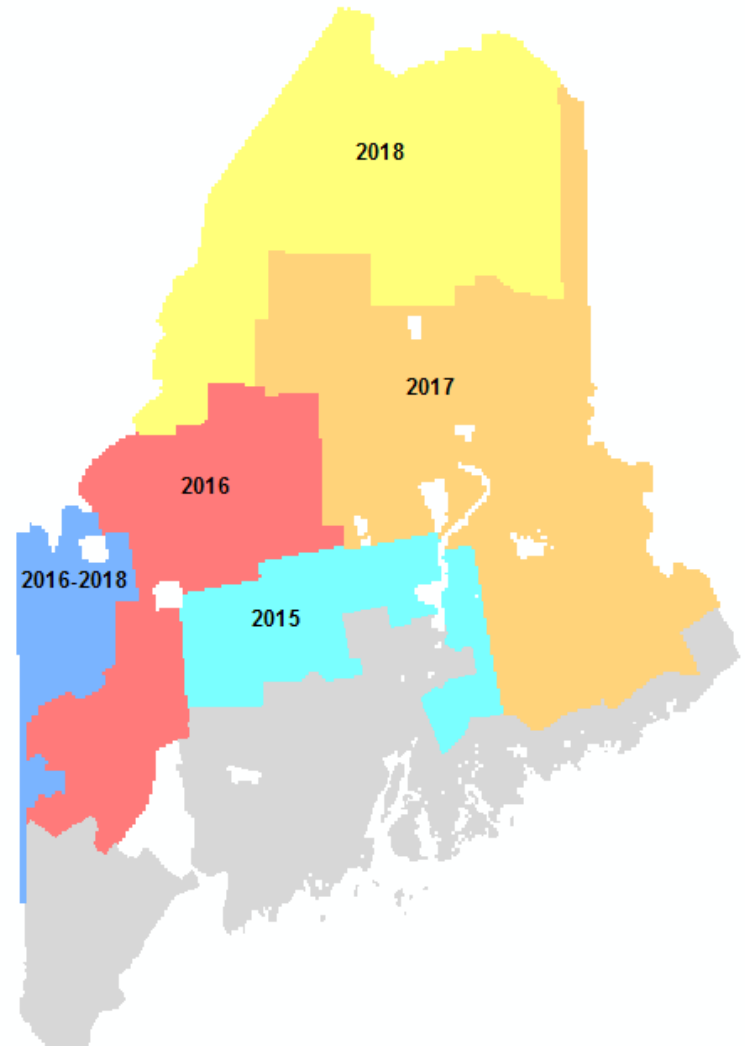
- Sentinel-2 image processing across Maine

- 132 Sentinel-2 images processed over Maine to-date

- Roughly 6-8 clear-view acquisitions at any location, collected throughout the growing season

Project activities, June – Nov. 2021:

- Sentinel-2 image processing across Maine

- Large-area LiDAR processing

  - Computation of 10 m gridded metrics from USGS QL2 LiDAR

  - Parallel processing on the UMaine computing cluster

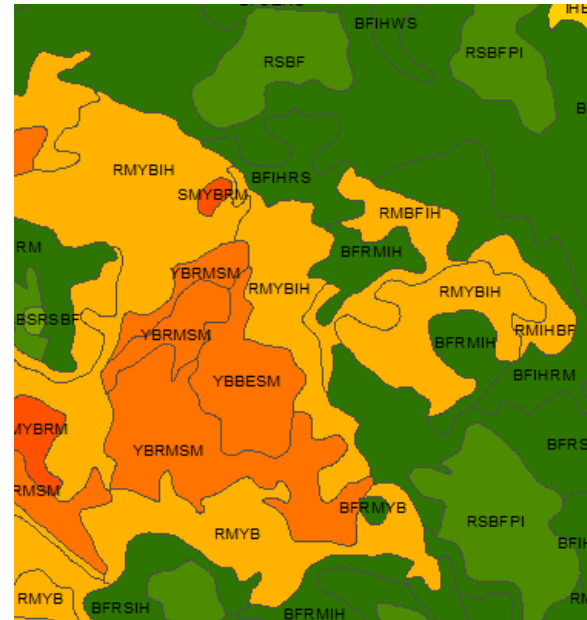 - 2018 acquisition just about complete; remainder queued for processing

Project activities, June – Nov. 2021:

- Sentinel-2 image processing across Maine
- Large-area LiDAR processing
- Software development to support map validation

- Our maps of species abundance, overstory composition, and forest types are derived from multiple individual ML models

- Validation and accuracy assessment is technically challenging

- Code nearly complete to support multiple validation strategies


Overstory composition classes

Project activities, June – Nov. 2021:

- Sentinel-2 image processing across Maine

- Large-area LiDAR processing

- Software development to support map validation

- Software development for change detection and disturbance mapping

  - Our ML methods control omission/commission error, but require a lot of reference data

  - Web app development to facilitate rapid image labeling on the cloud

  - Backend code to identify high-value reference locations
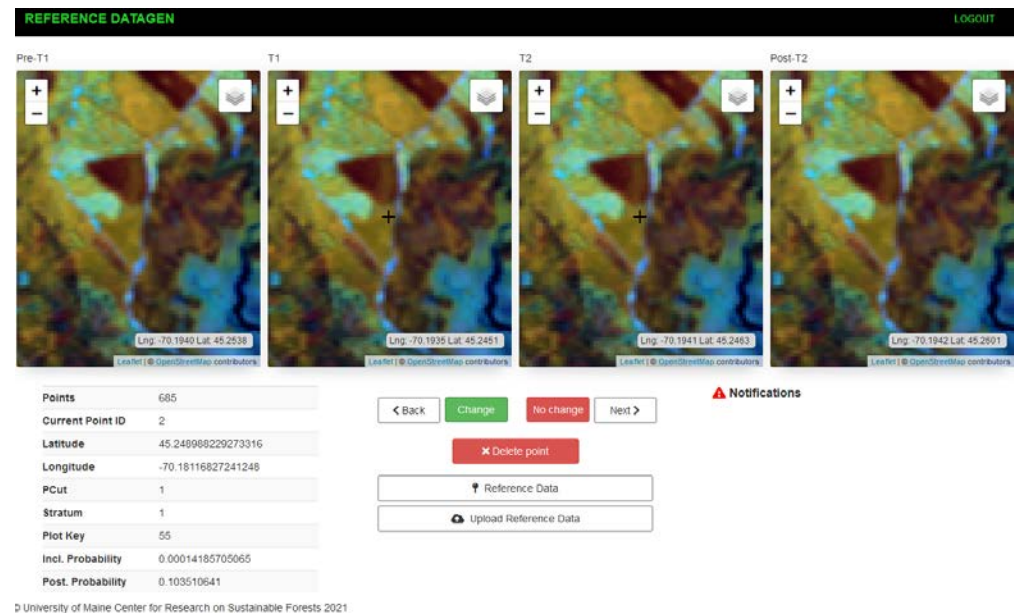
Next 6 months:

- Complete data processing over Maine

- Complete map validation software

- Iteratively implement and evaluate strategies for species, forest type, and biomass mapping.

- Transition toward data processing for study areas in the NW, SE, and Upper Midwest.