Evaluating the Effectiveness of Resilience Improvement Efforts on the Electric Grid

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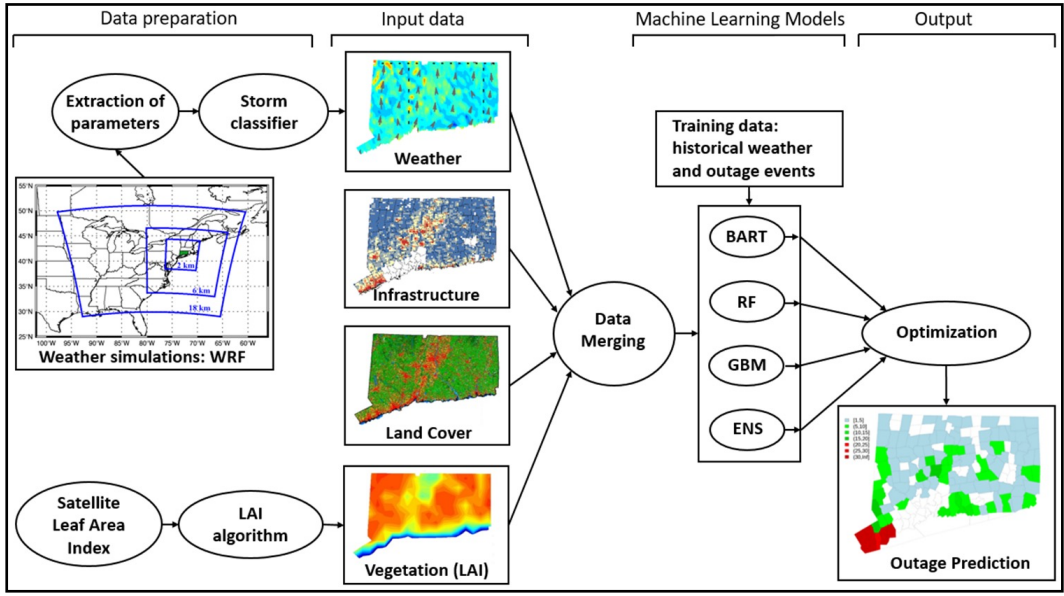
The UConn OPM Architecture - Adapted

- The UConn OPM architecture is adapted from a grid cell resolution to a circuit resolution, to incorporate resilience data

- Statistics and machine learning are used to evaluate the effectiveness of vegetation management on reducing outages



Adapted from: Cerrai et al., 2019

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Vegetation Management Analysis

1. **Machine Learning Model -** mechanistic model that allows for the incorporation of numerous weather and climate conditions, as well as information on the infrastructure and vegetation management
   - Demonstrates the importance of tree-trimming on system resilience
   - Visualizes how increased tree trimming has resulted in increased reduction in power outages

2. **Statistical Model –** allows for analysis of the lower-frequency more-extreme events
   - Demonstrates how the interaction between tree trimming and outages varies with storm severity

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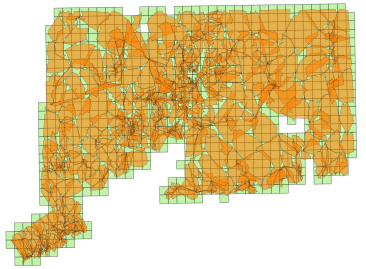
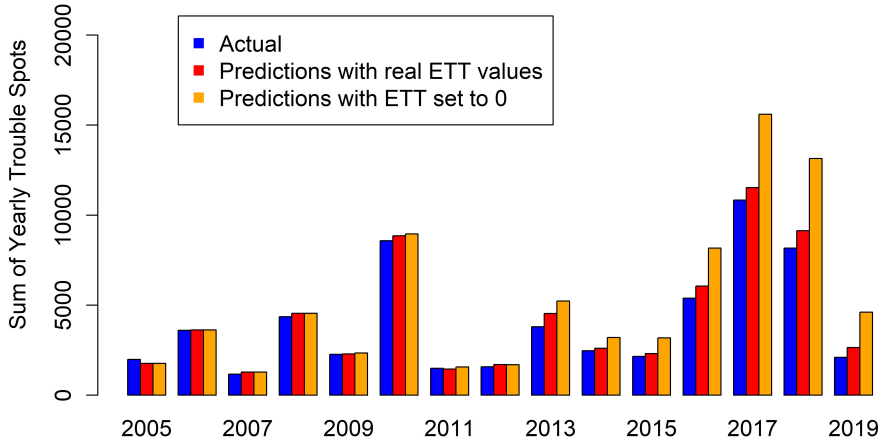
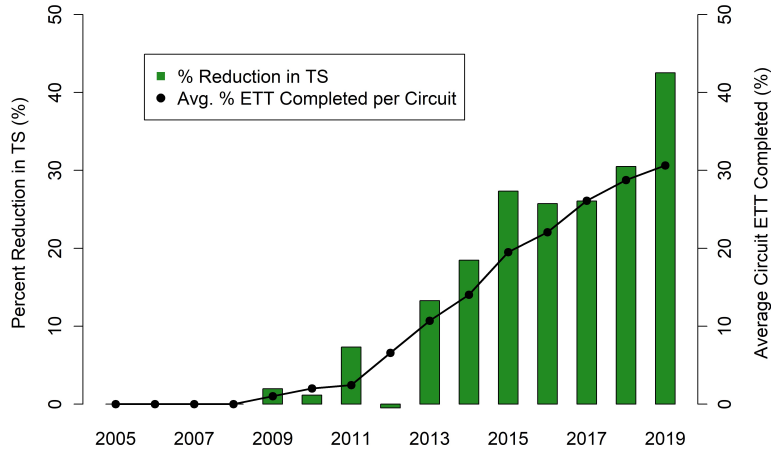
Vegetation Management Analysis



- Model was run twice:
  - Event being predicted having its actual ETT values
  - Event being predicted had ETT set to 0
  - Right-hand plot is the percent difference between the two models

- Over the years, as ETT has been performed, we see divergence in model
  - Model with ETT set to 0 tends to overpredict worse
  - The difference in model overpredictions is attributable to the ETT performed





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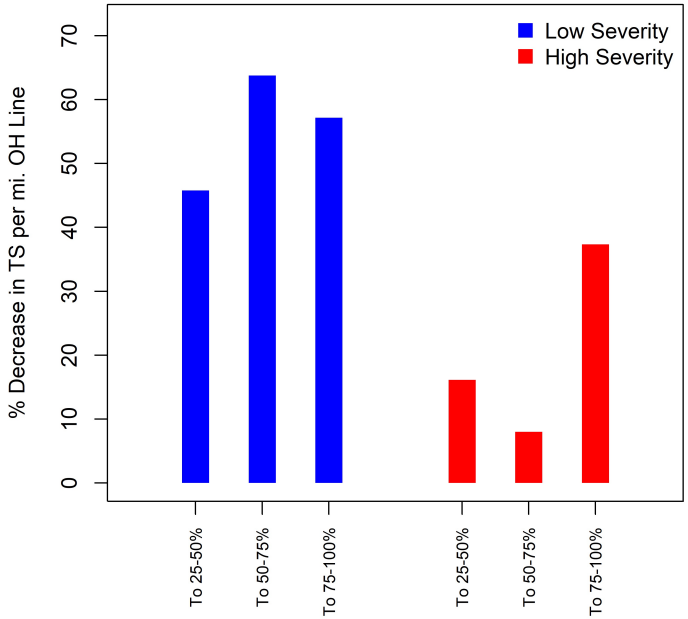
Vegetation Management Analysis

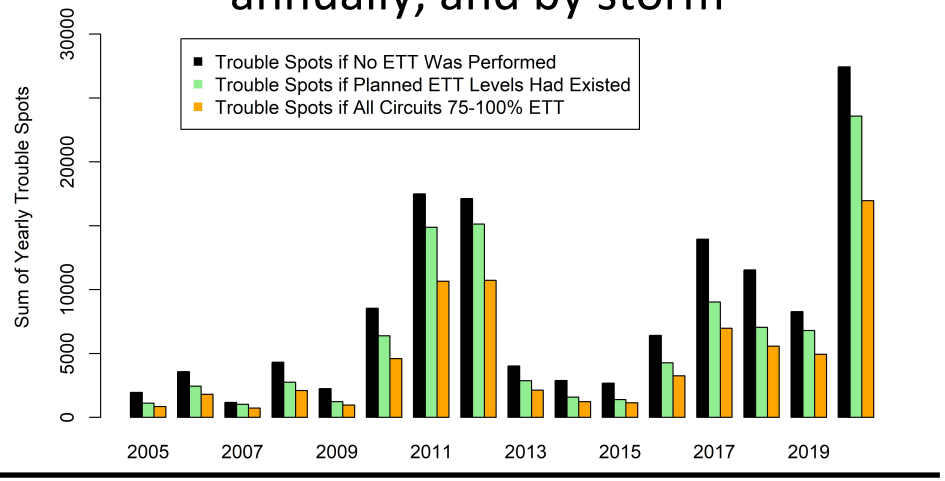
Normalized the average TS per mile of OH line by dividing by a kinetic energy proxy (Avg of (Max 10m Wind Spd.)^2)

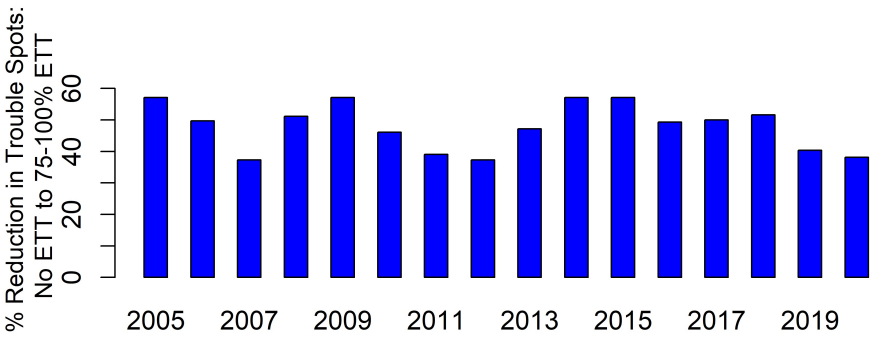
% Reduction of Weather Normalized Actual Trouble Spots

Comparing Circuits with Changing ETT % Over Time



Using statistical analysis and applying future ETT Plan retroactively, we see a strong reduction in trouble spots annually, and by storm





Thank you!