

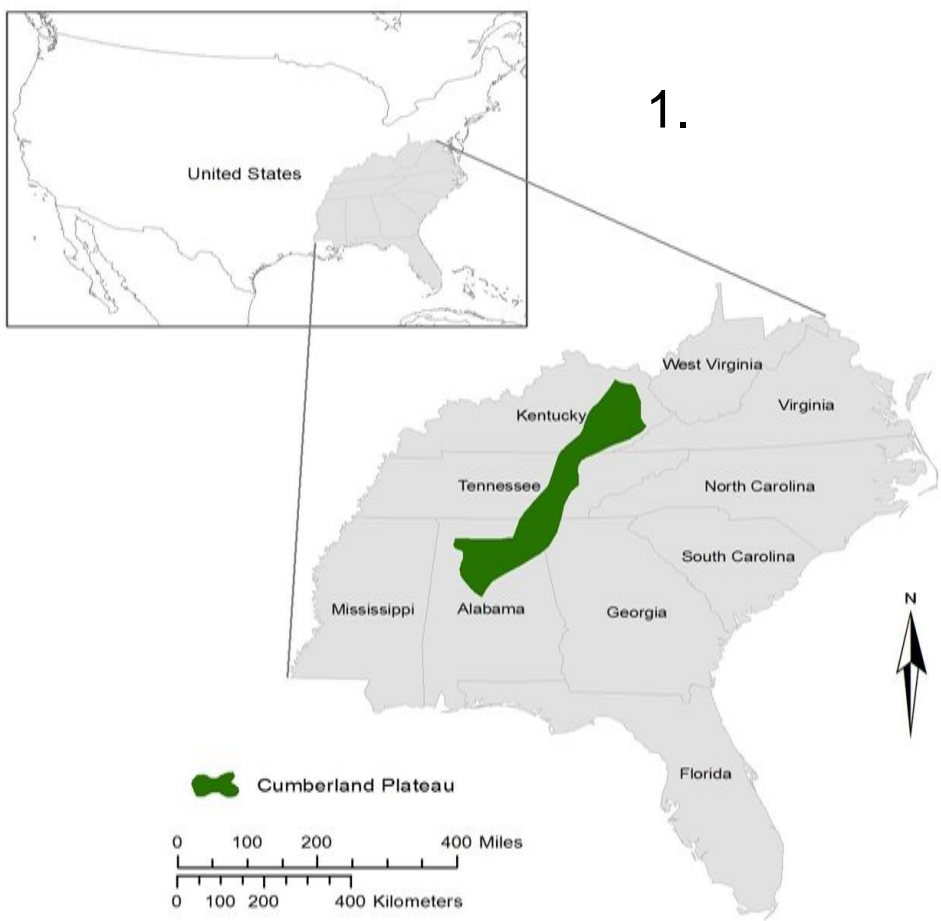
Use of NASA Earth Observations as Calibration to Model White Oak Future Geographic Distribution in the Cumberland Plateau

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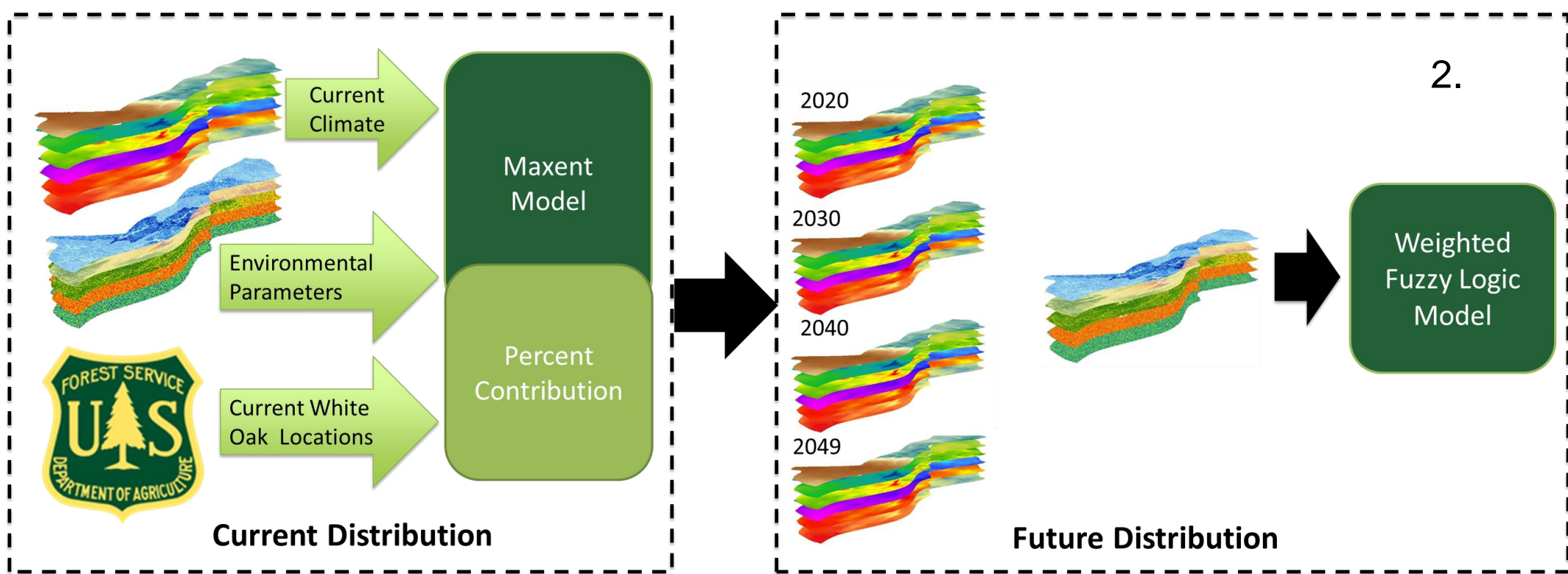
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Overview

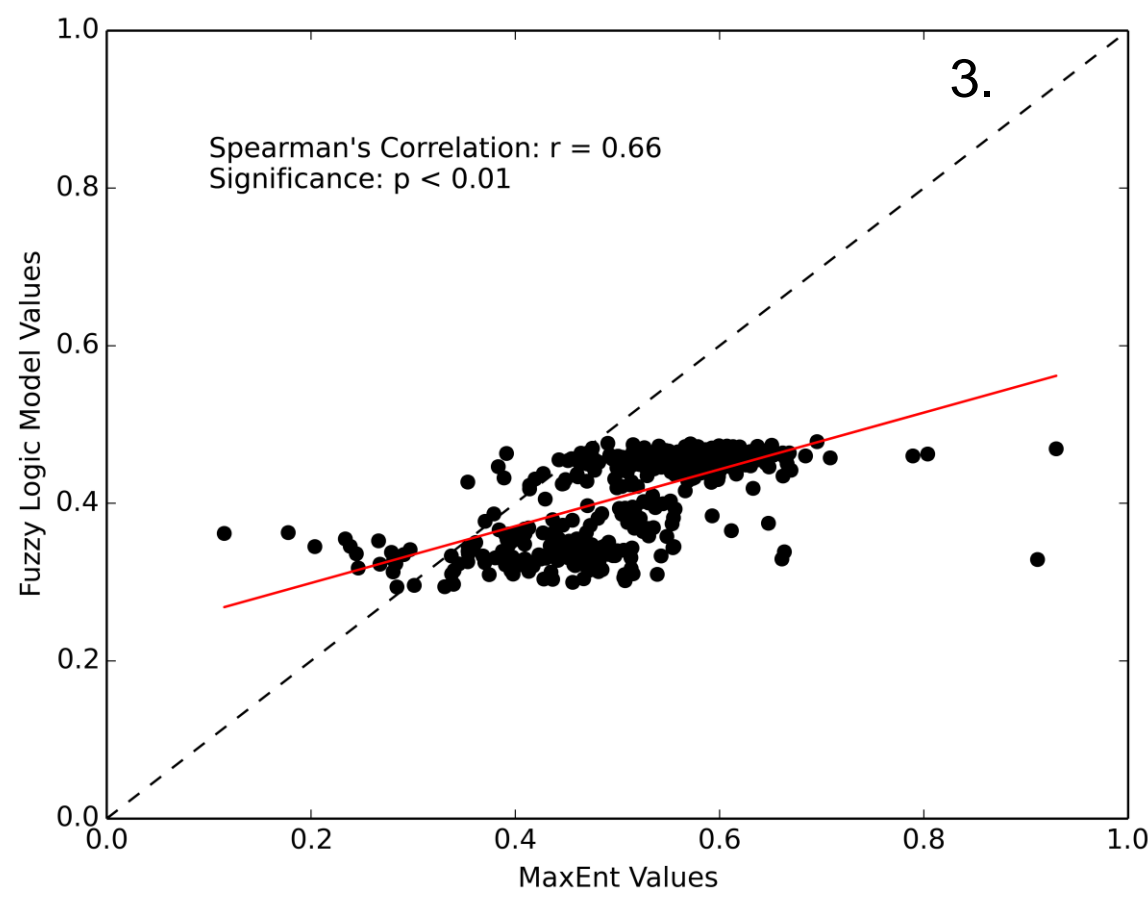
This study examined the spatial distribution of White Oak, a representative species for the Cumberland Plateau ecoregion, using future climatic and current physical environmental parameters. Satellite-derived climate and biophysical parameters variables were used with the Maximum Entropy Species Distribution Model (MaxEnt) as calibration to create a fuzzy logic model where future climatic conditions and biophysical features were used to simulate potential favorable locations for White Oak to thrive.



1. Geographic location of Cumberland Plateau



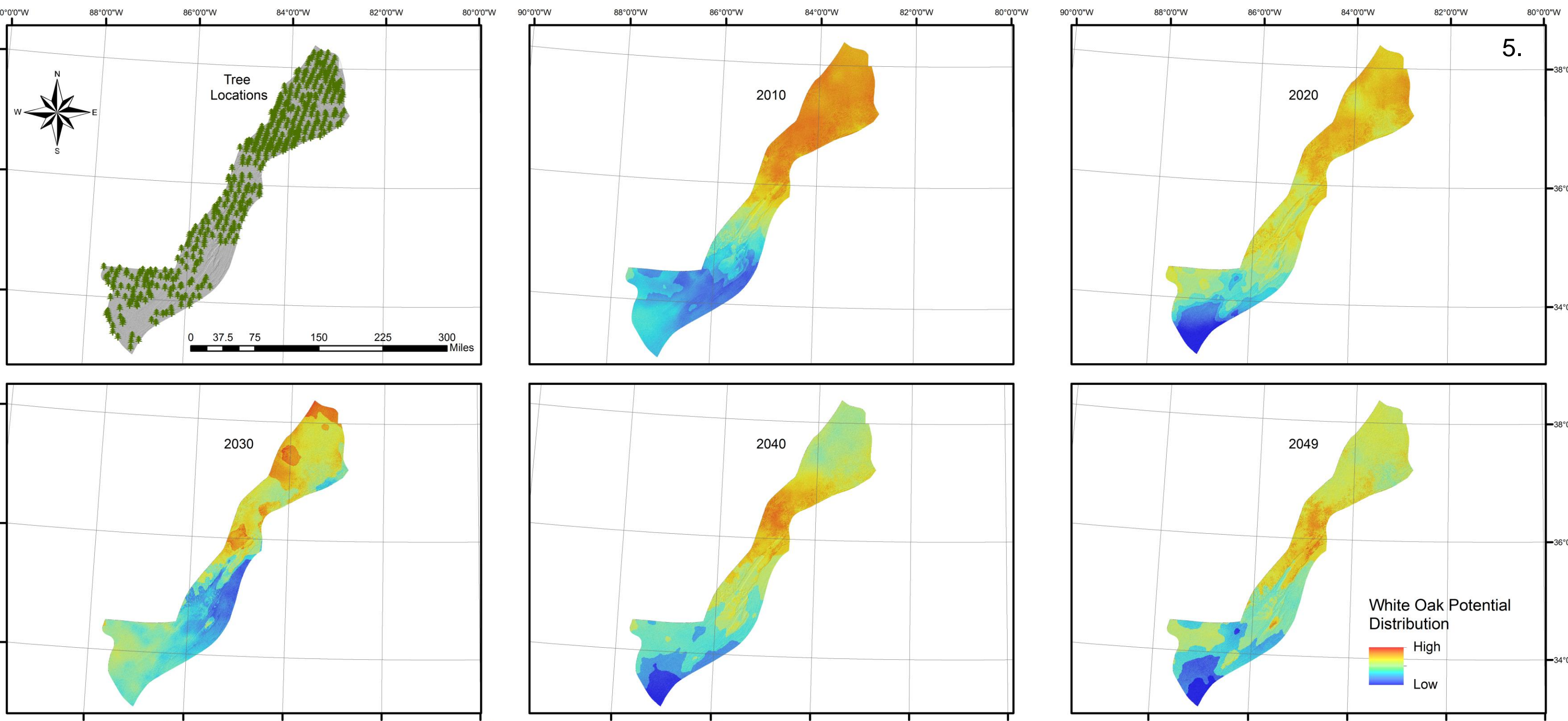
2. Flowchart of methodology used in analysis



3. Correlation between MaxEnt model outputs and Fuzzy Logic model outputs

Variable	Percent Contribution
Minimum Temperature	32.4
Minimum Precipitation	20.5
Maximum Precipitation	10.8
Eastness	8.9
Elevation	7.7
Maximum Temperature	7.2
Average Temperature	3.9
Stream Density	3.0
Northness	2.9
Slope	2.0
Annual Precipitation	0.7
Total	100

4. Variables used and weighting of each variable in the Fuzzy Logic model



5. Final results of Fuzzy Logic modeling displaying the potential distribution of White Oak for years 2010-2049

Key Findings

Fuzzy logic modeling succeeded in mapping the distribution of White Oak for future climate conditions. It was found that the fuzzy logic model underestimated the species distribution when compared with MaxEnt model, but did capture the general distribution of White Oak. NASA satellite remote sensing datasets have proved to be an important aspect for the calibration of the predictive White Oak distribution model.

Impact

The Cumberland Plateau supports forests that have arguably the highest biodiversity in North America. The results of this study were used by the Nature Conservancy and the U.S. Fish and Wildlife Service to aide in prioritizing locations to establish nature preserves in this ecologically important region.

Acknowledgements

A special thanks is given to Dr. Robert Griffin (UAH/ATS) for his support and guidance on the project. Another thanks is given to the NASA DEVELOP National Program for funding the project and the UAH Earth System Science program for allowing use of their facilities.

