Integrating Remote Sensing and Biodiversity Observations to Map and Monitor Plant Taxonomic, Phylogenetic, and Functional β-diversity in the Greater Cape Floristic Region

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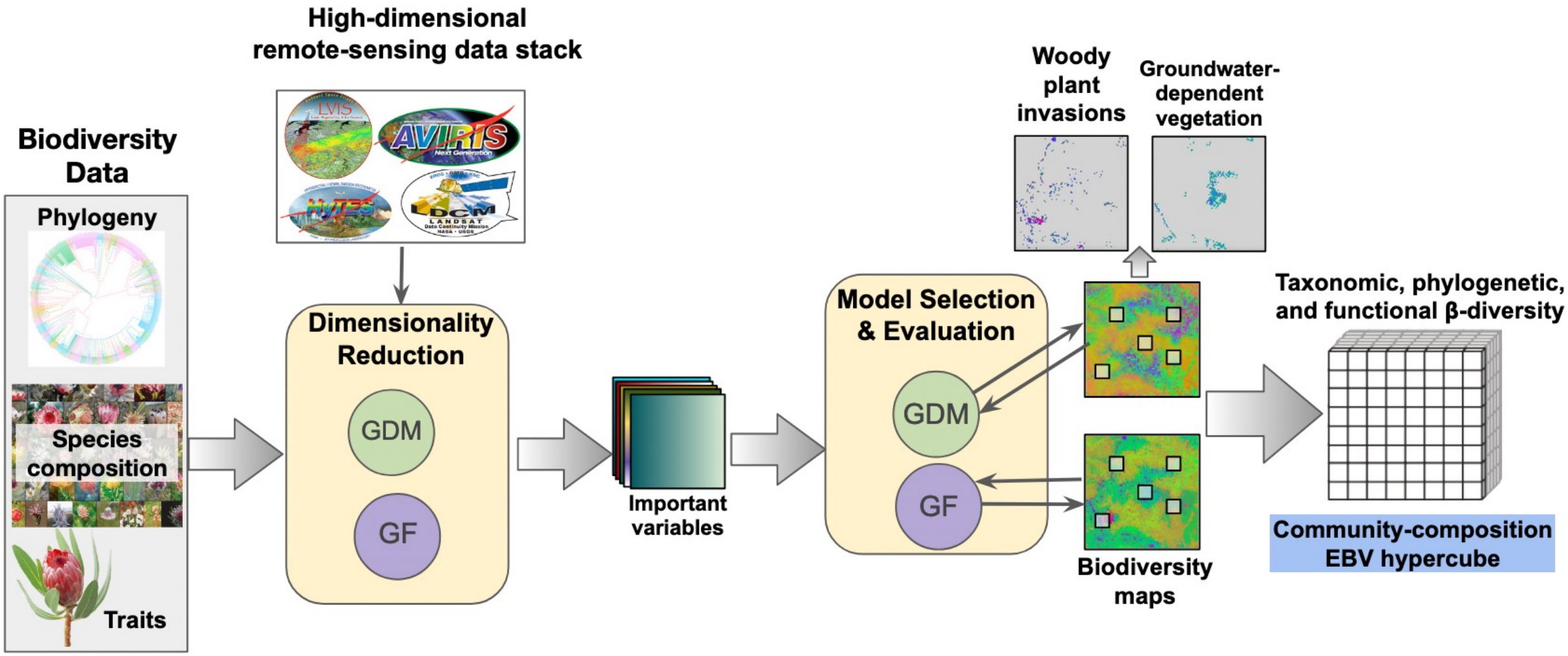
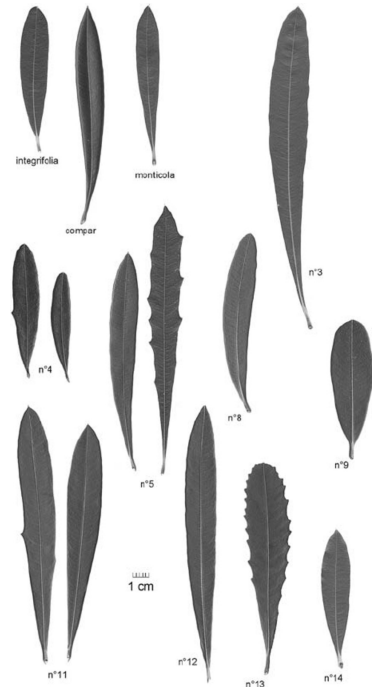
Biodiversity modeling pipeline to map community-composition *Essential Biodiversity Variables*



How does our ability to measure community composition using remote sensing vary across levels of biological organization?

Functional β-diversity



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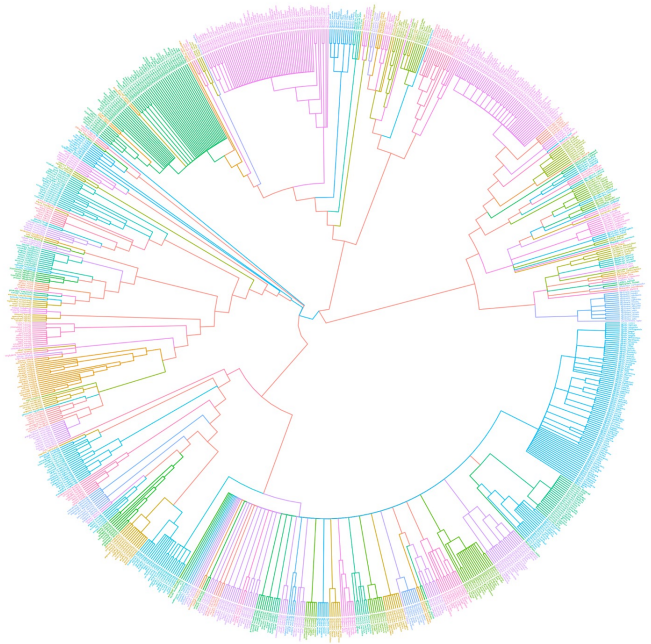
Phylogenetic β-diversity



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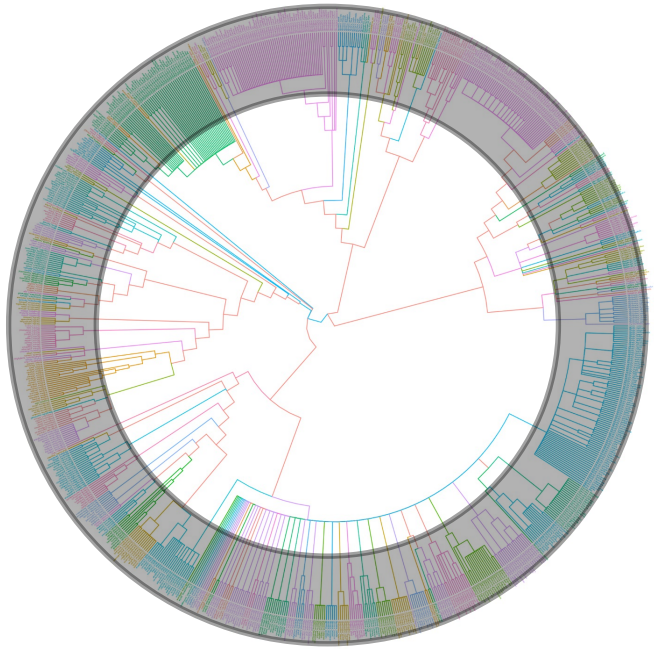
Species β-diversity

How does phylogenetic scale influence remote sensing of community composition?

Family-level Phylo-β-diversity



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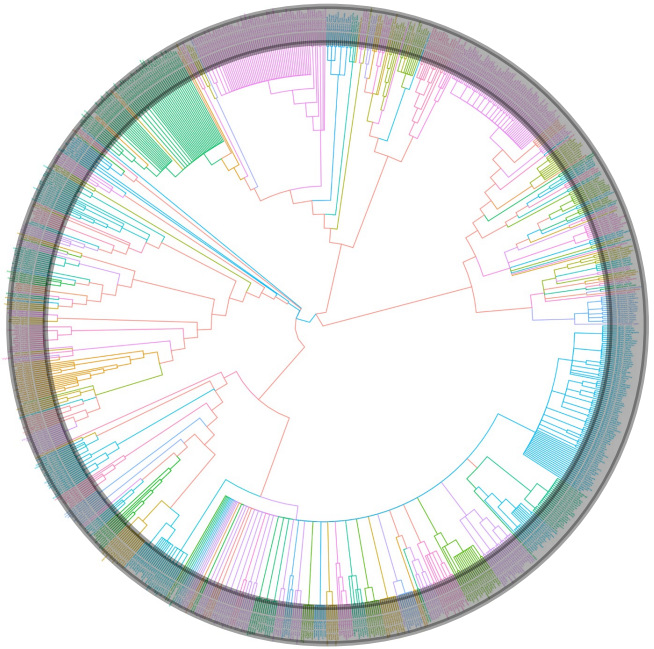
Genus-level Phylo-β-diversity



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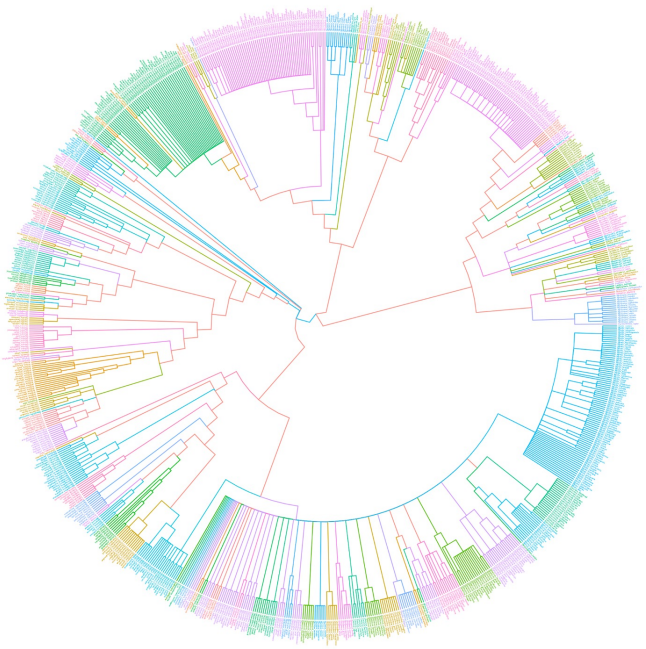
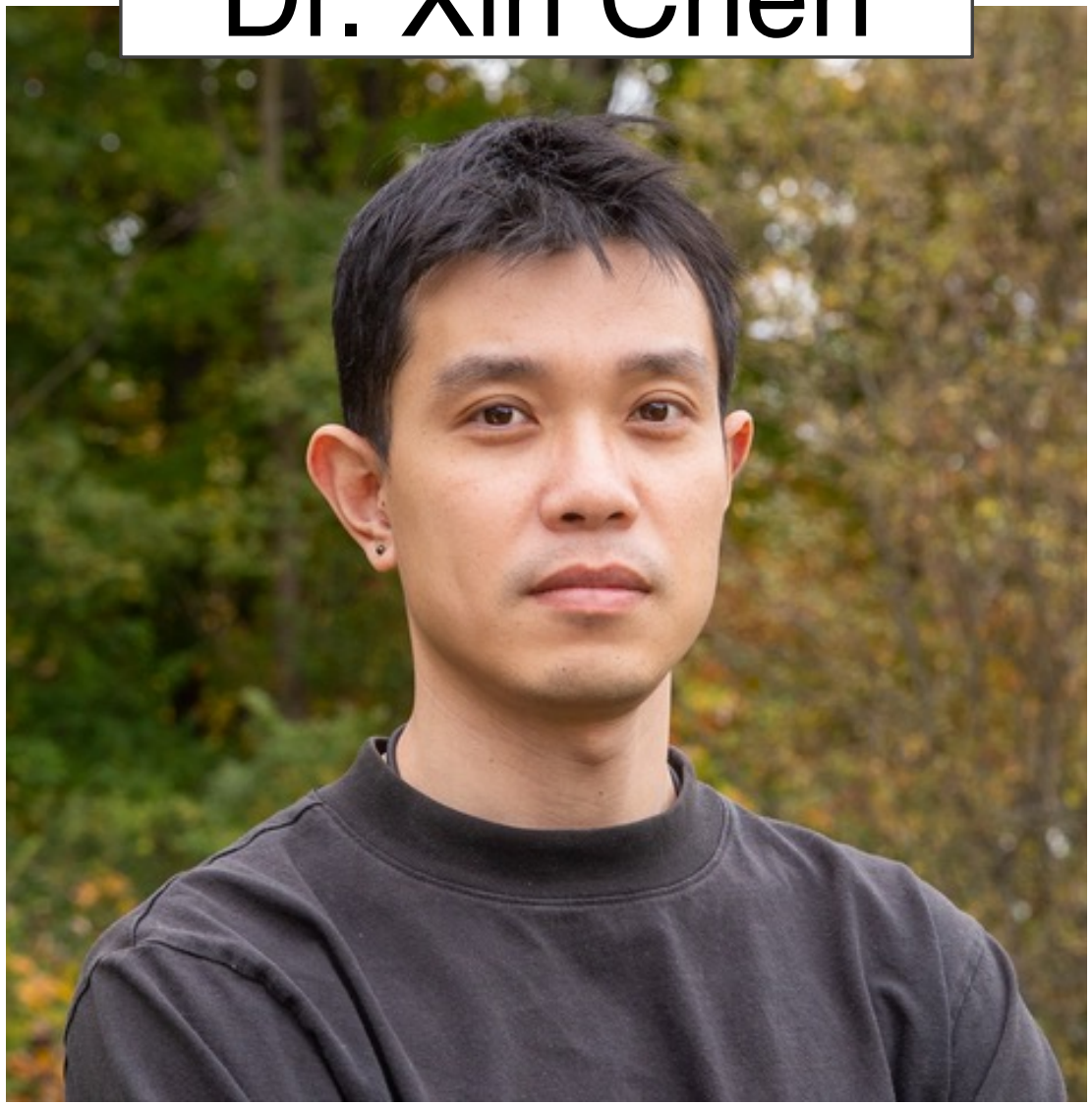
Species-level Phylo-β-diversity



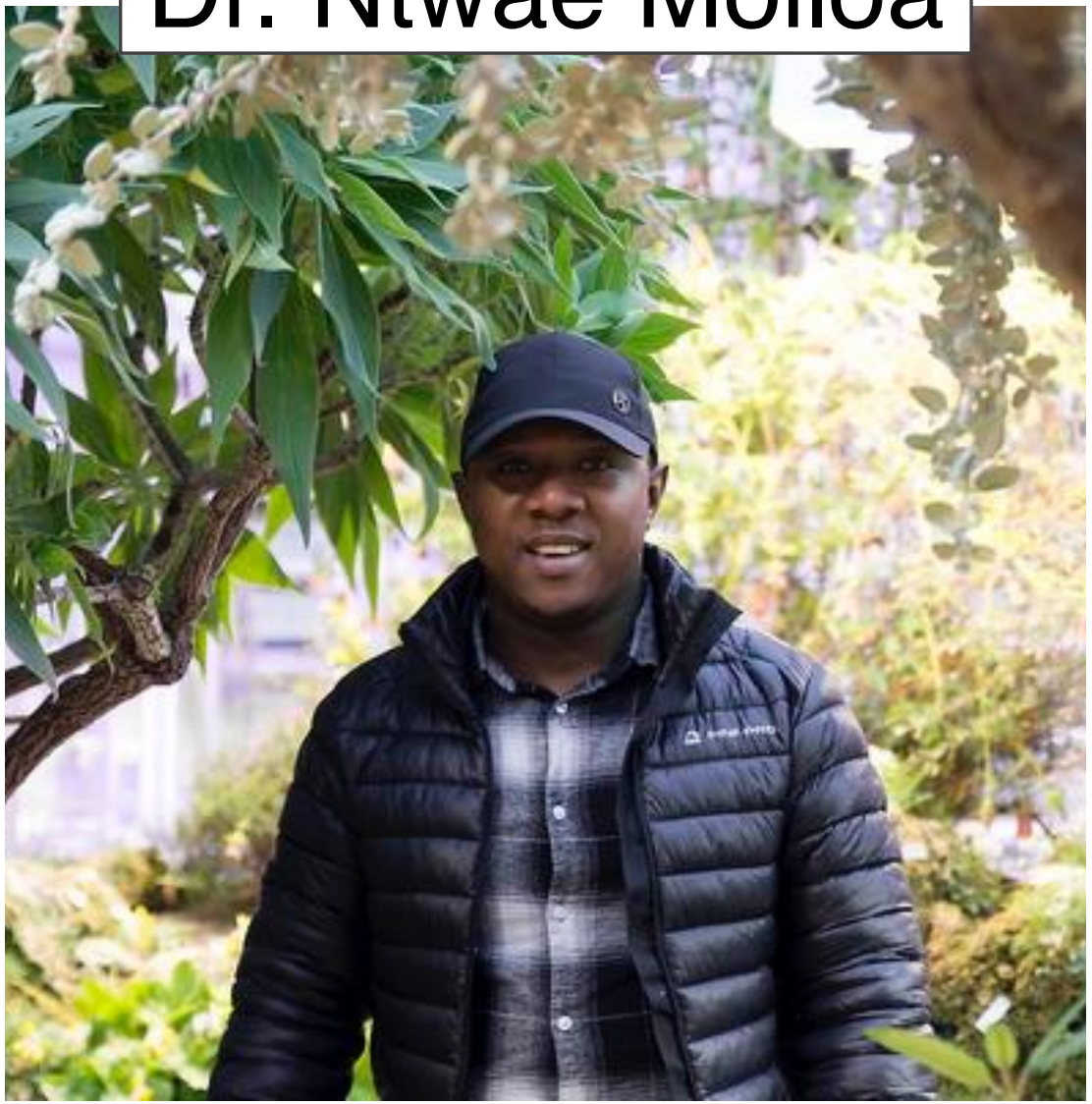
Dr. Xin Chen



Spatial Modeling

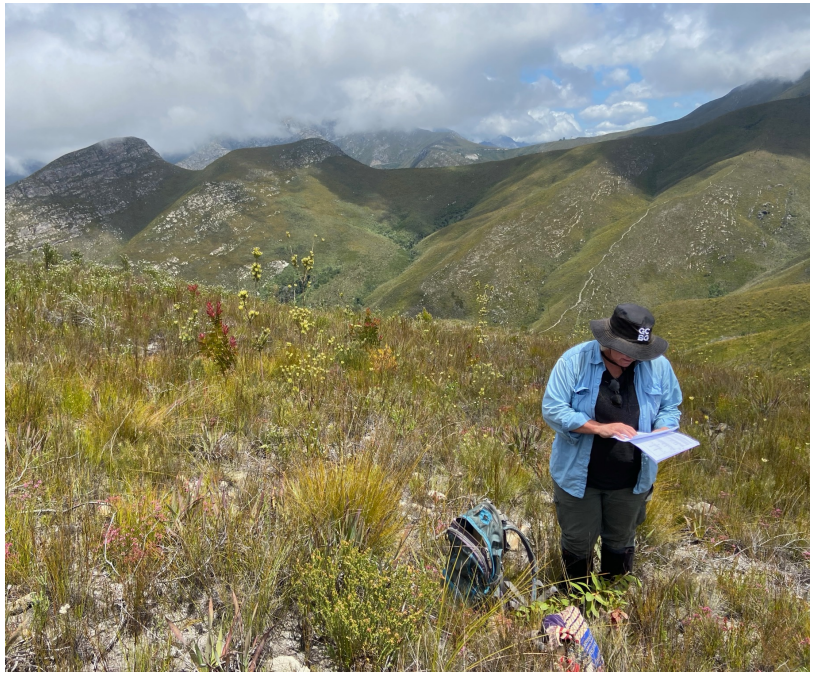
UMCES – Appalachian Lab

Dr. Ntwae Moiloa



Plant Phylogenetics

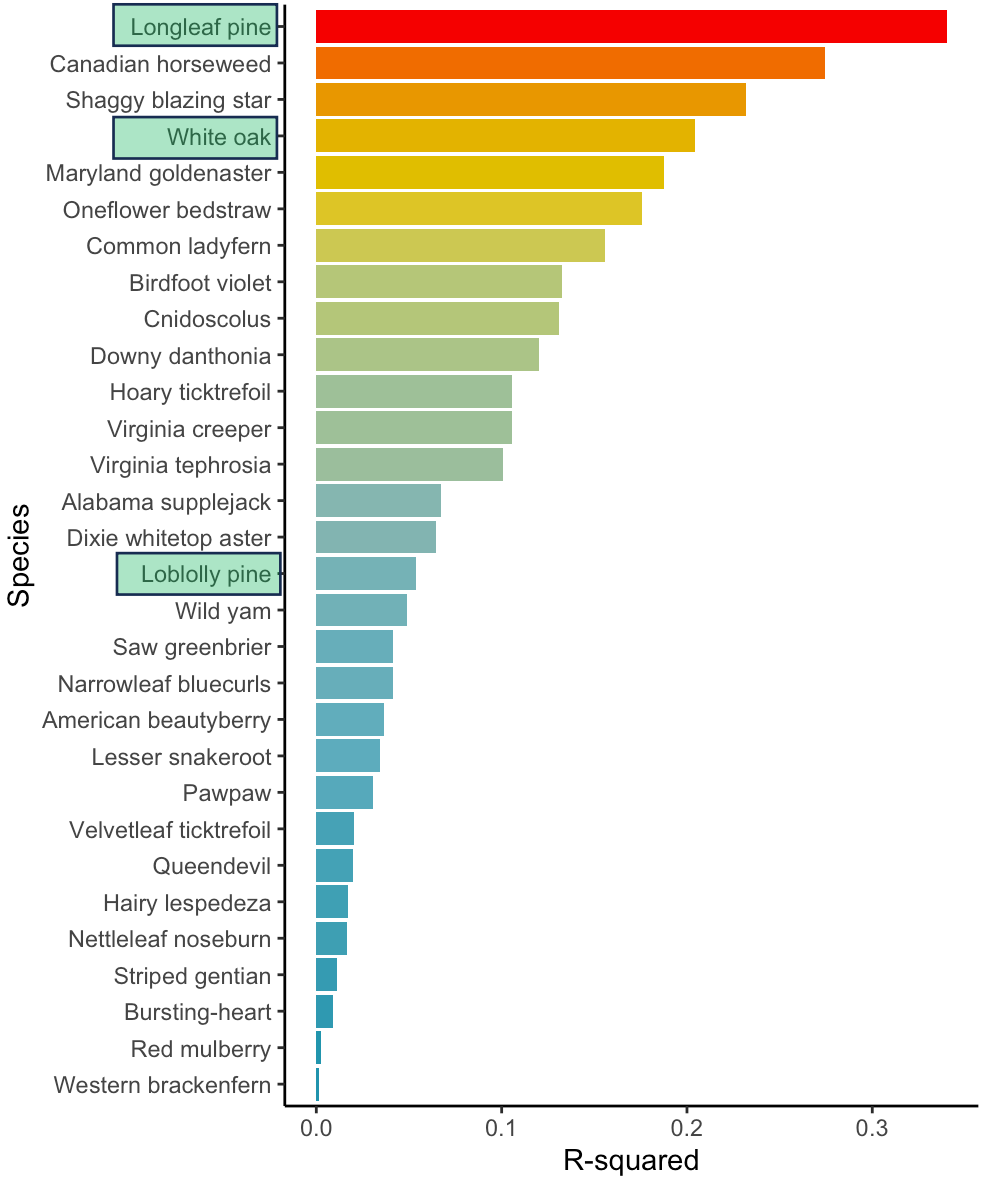
Texas A&M

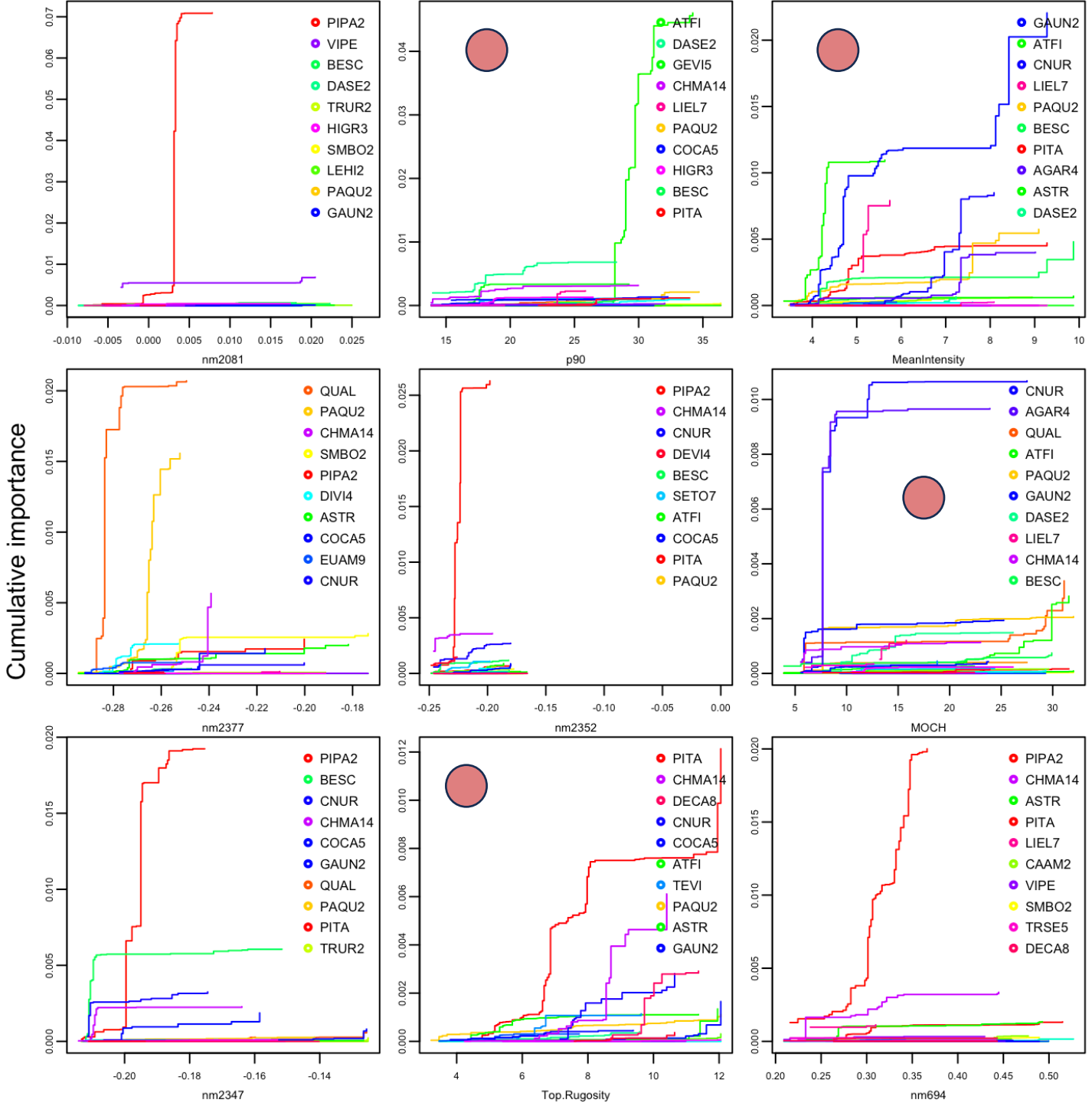


Modeling achievements

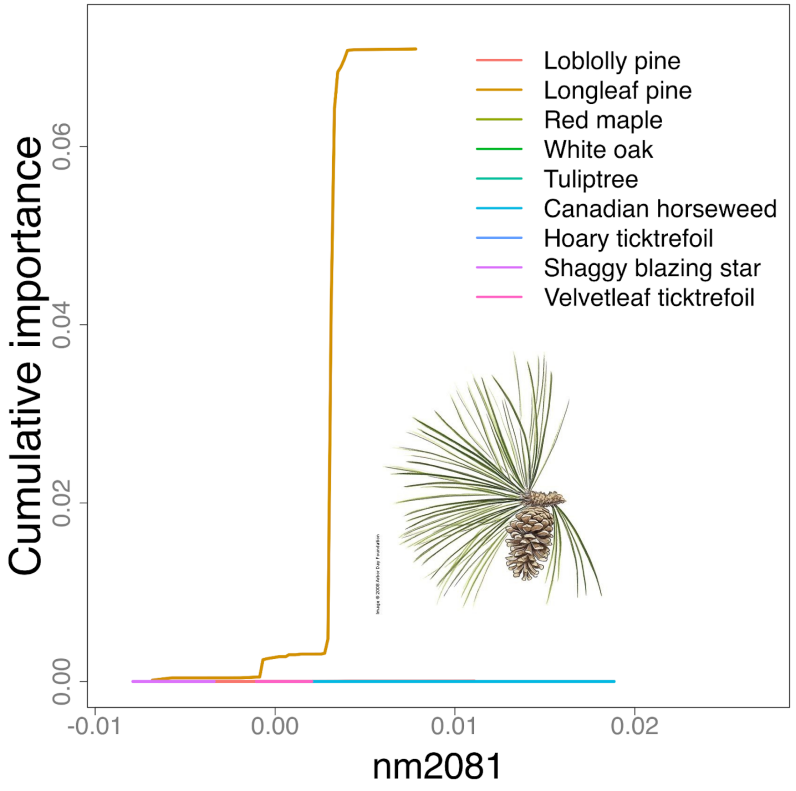
- “Balanced” Gradient Forest (bGF) algorithm
- Updates to “sparse” GDM algorithm for use with different species occurrence data types (presence-absence, abundance)
- Transitioned the GDM R package to *terra* functionality for much faster processing of large remote sensing datasets
- Processing NASA Harmonized Landsat and Sentinel-2 (HLS) remote sensing data
- Developing our modeling pipeline using NEON vegetation plots and AOP (Imaging spectroscopy and LiDAR) data

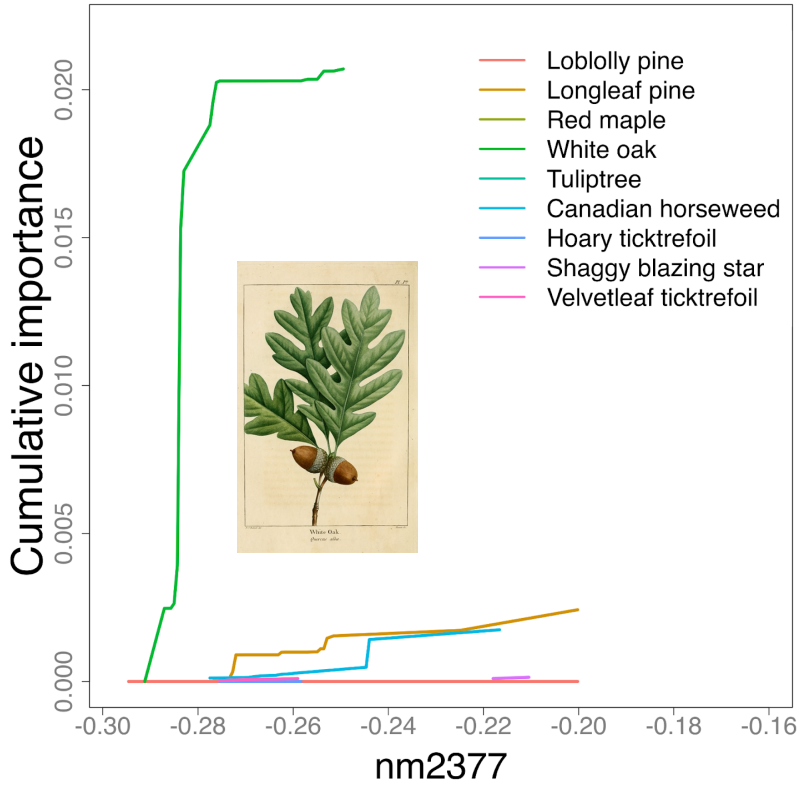
Gradient Forest Models

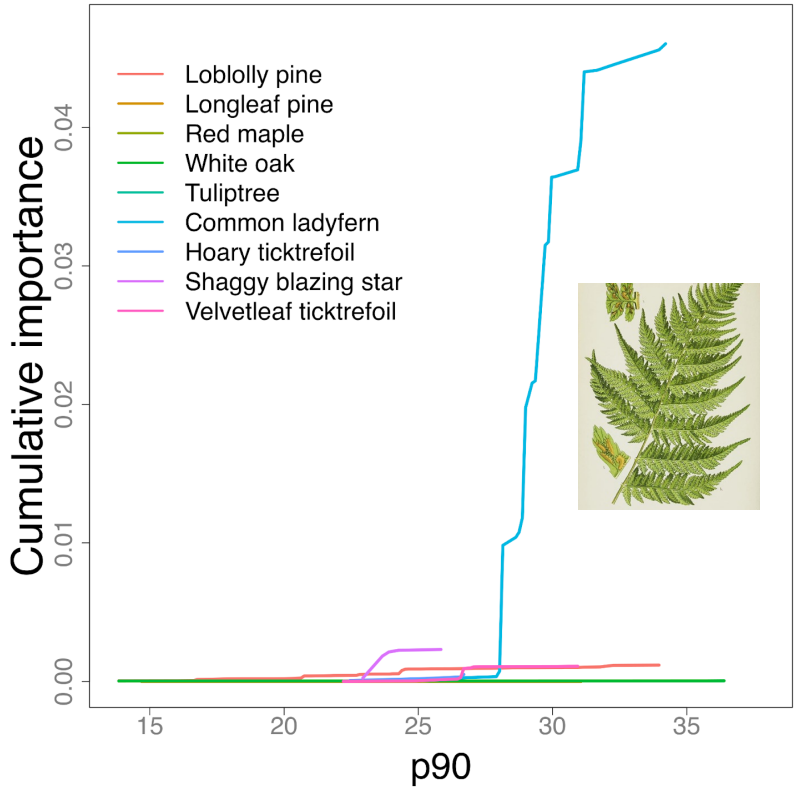




Gradient Forest model provides inference on which remote sensing variable is most important for each species & the community overal

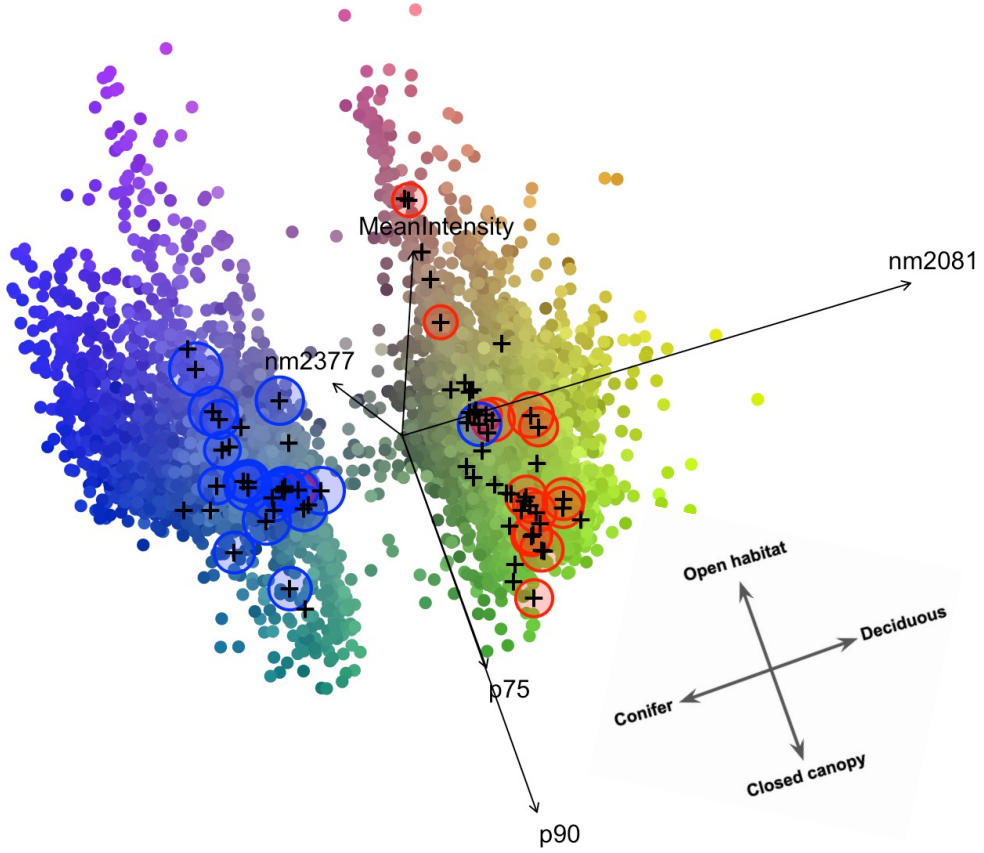




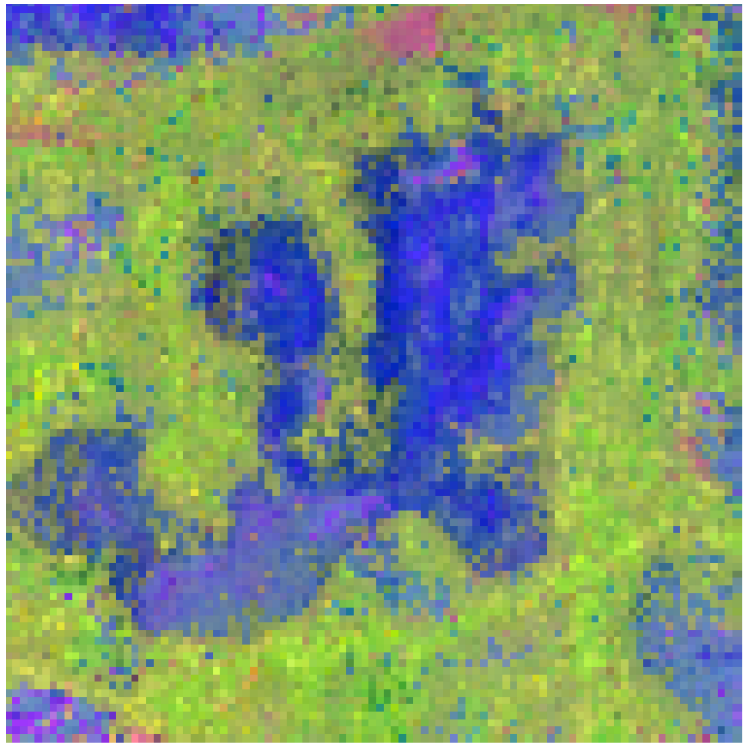


Fitted functions rescale remote sensing data to represent overall emergent patterns of community composition

Bi-plot of expected community composition in each pixel



Map of expected community composition in each pixel



RGB image