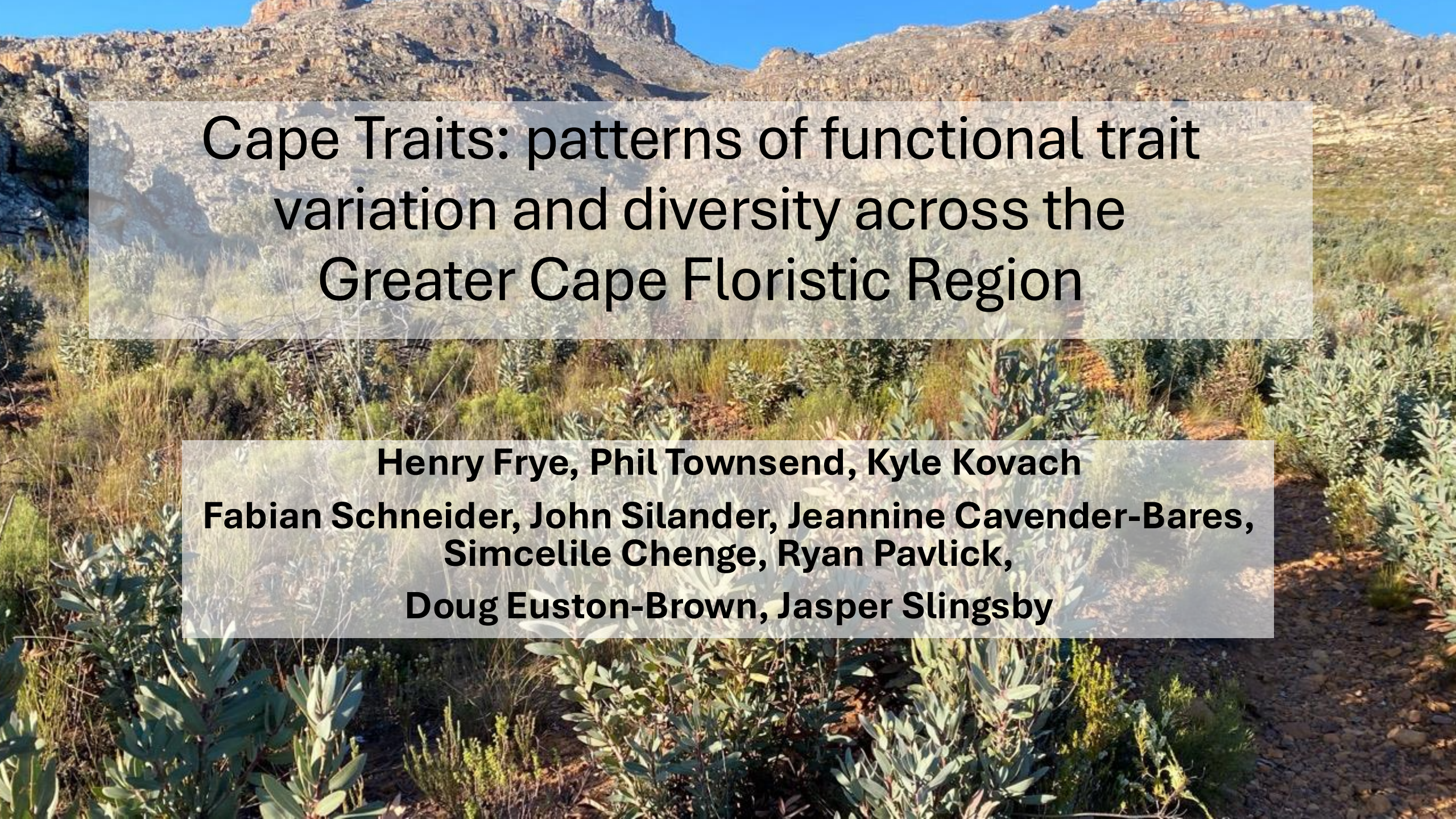
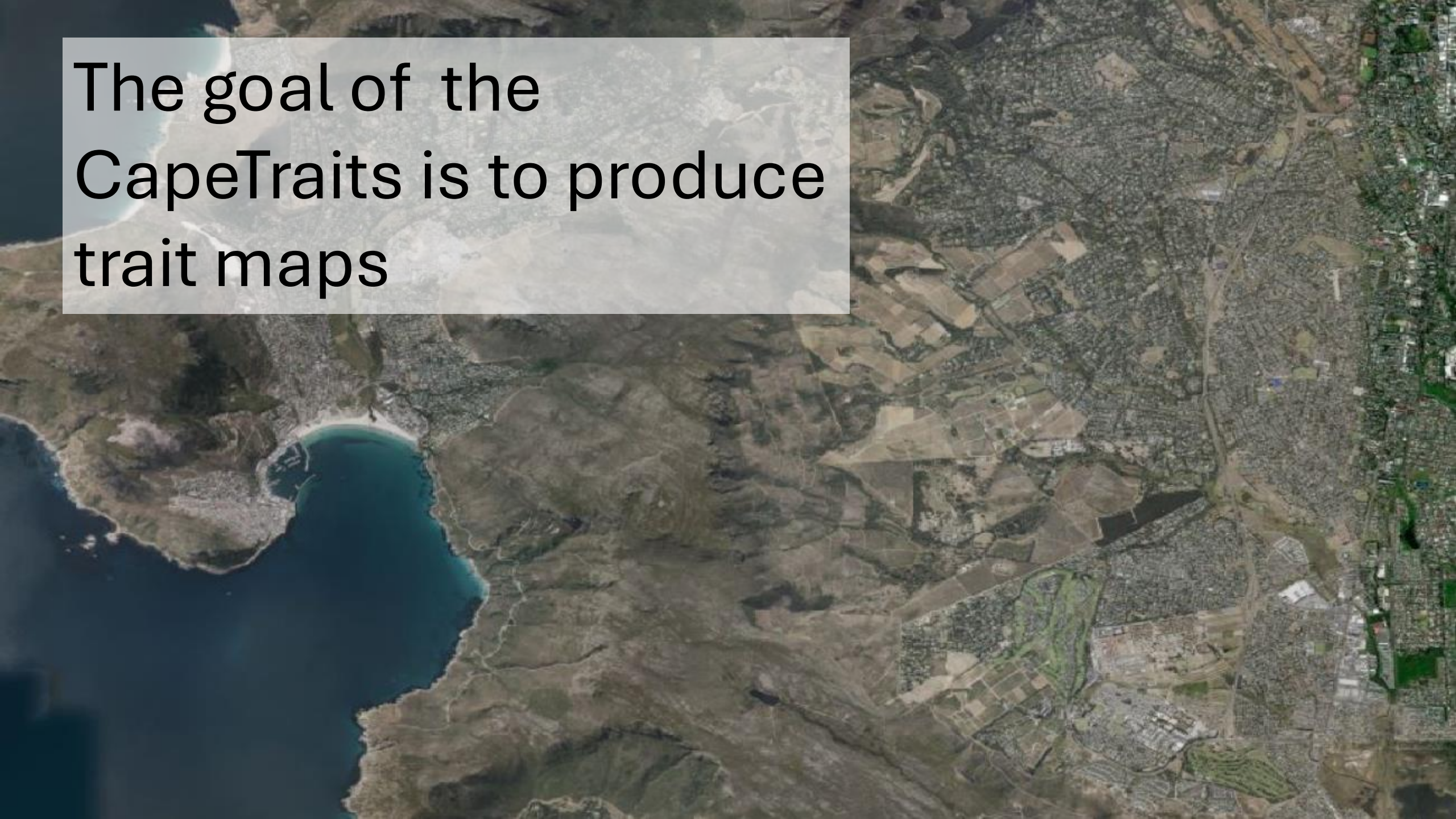


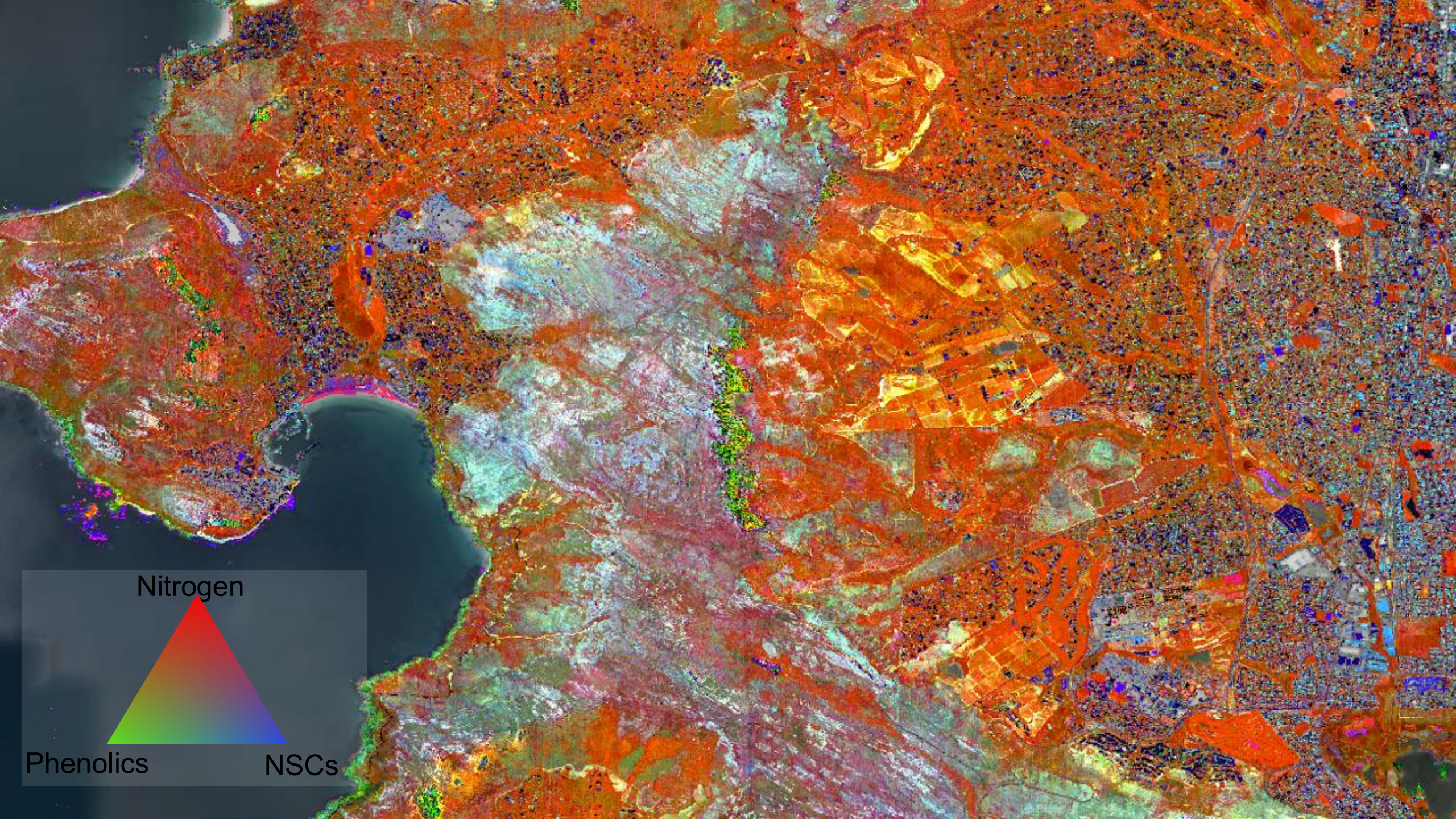
# Cape Traits: patterns of functional trait variation and diversity across the Greater Cape Floristic Region

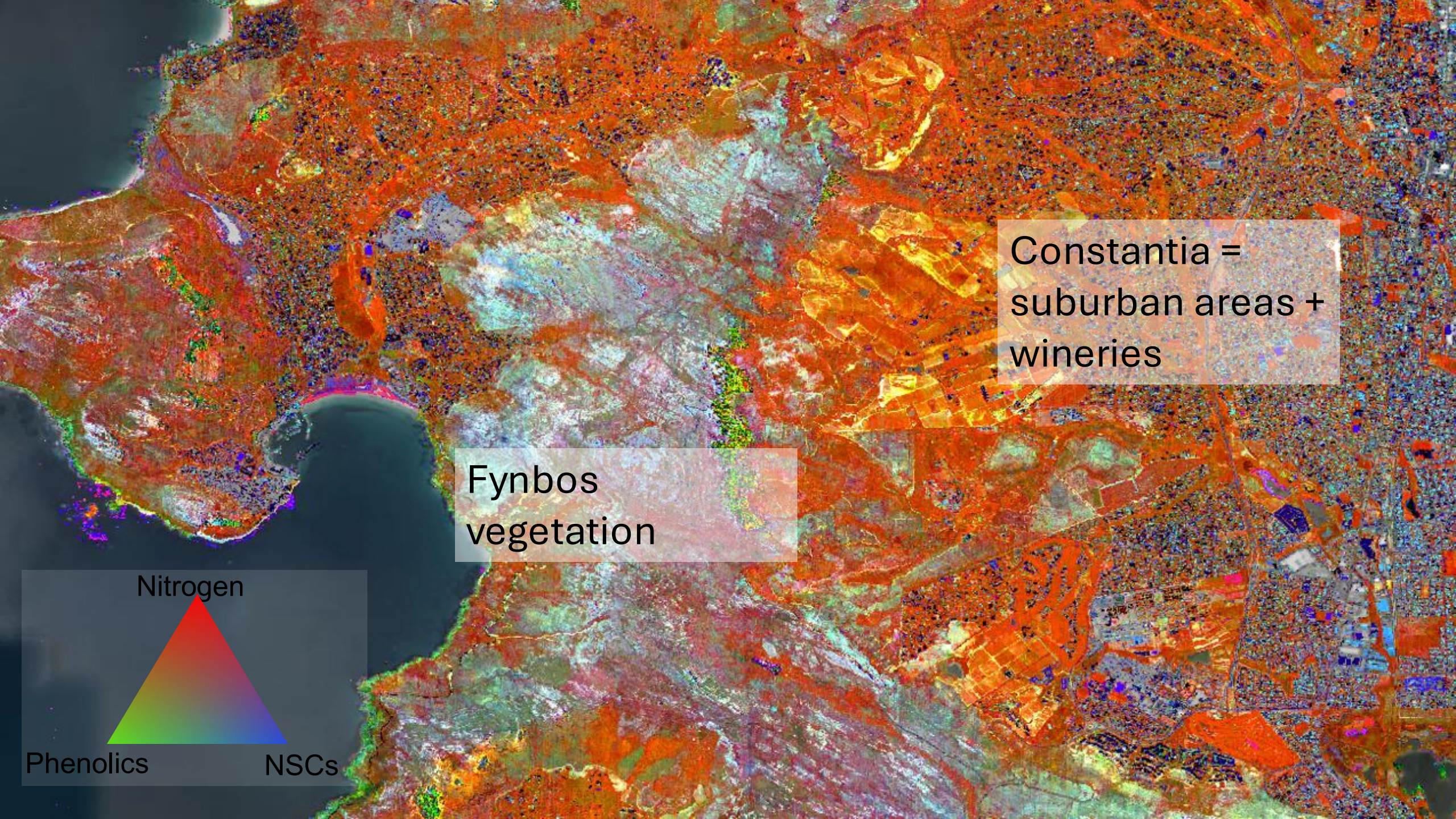
**Henry Frye, Phil Townsend, Kyle Kovach**

**Fabian Schneider, John Silander, Jeannine Cavender-Bares, Simcelile Chenge, Ryan Pavlick,**

**Doug Euston-Brown, Jasper Slingsby**


The goal of the CapeTraits is to produce trait maps


Nitrogen
Phenolics
NSCs

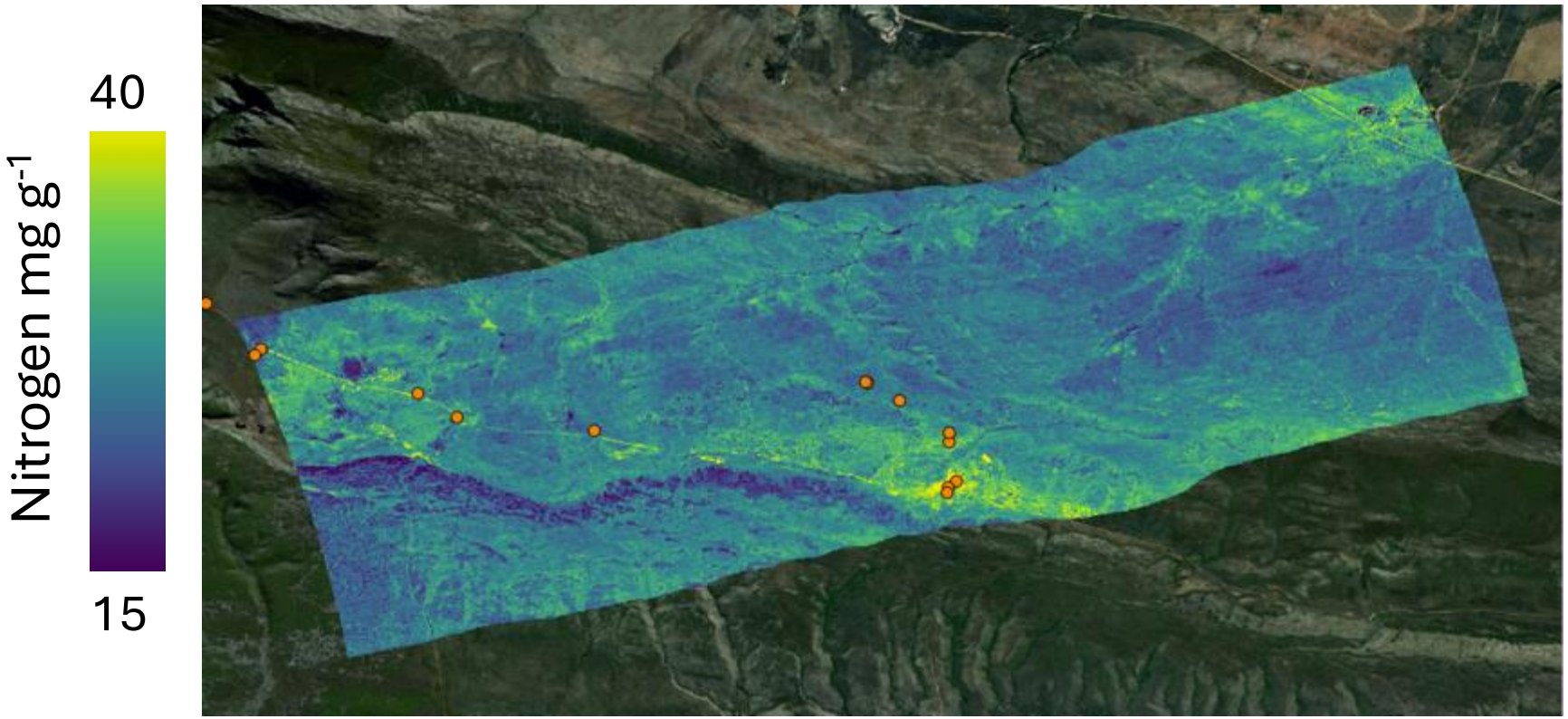

Constantia = suburban areas + wineries
Fynbos vegetation
Nitrogen
Phenolics
NSCs

# Overarching science goals

- What are the landscape-scale trait tradeoffs that we can observe?
  - Do they match known bivariate tradeoffs?
  - What can they tell us in multivariate space?
- Updates on imagery and traits maps

# Initial analyses exploring trait space

- Generated trait maps based on PLSR models trained using data from NEON
- Extracted trait values from  4-pixel neighborhood using BioSCape survey locations



# Overarching science goals

- What are the landscape-scale trait tradeoffs that we can observe?
  - Do they match known bivariate tradeoffs?
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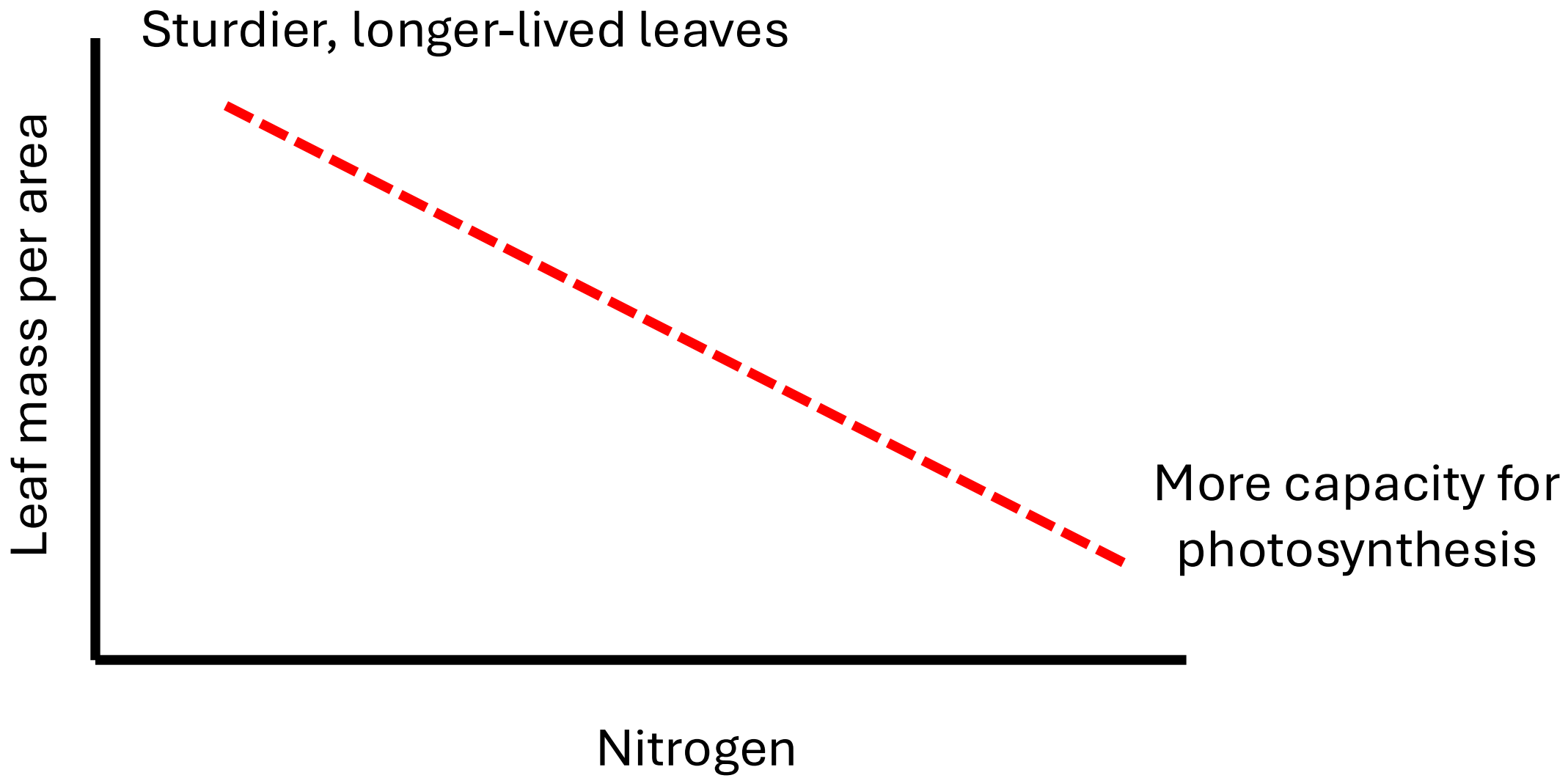
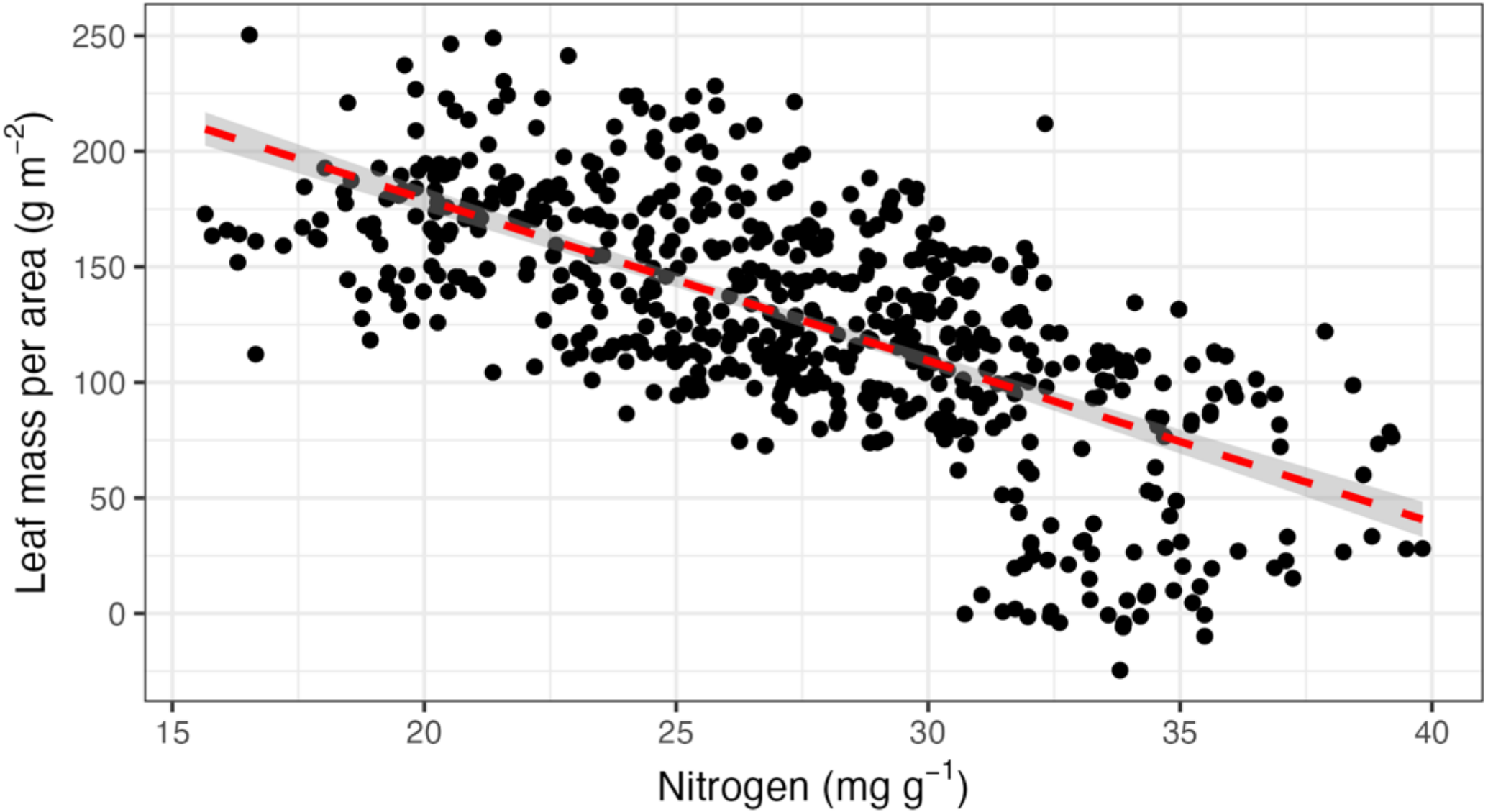
- Updates on imagery and traits maps

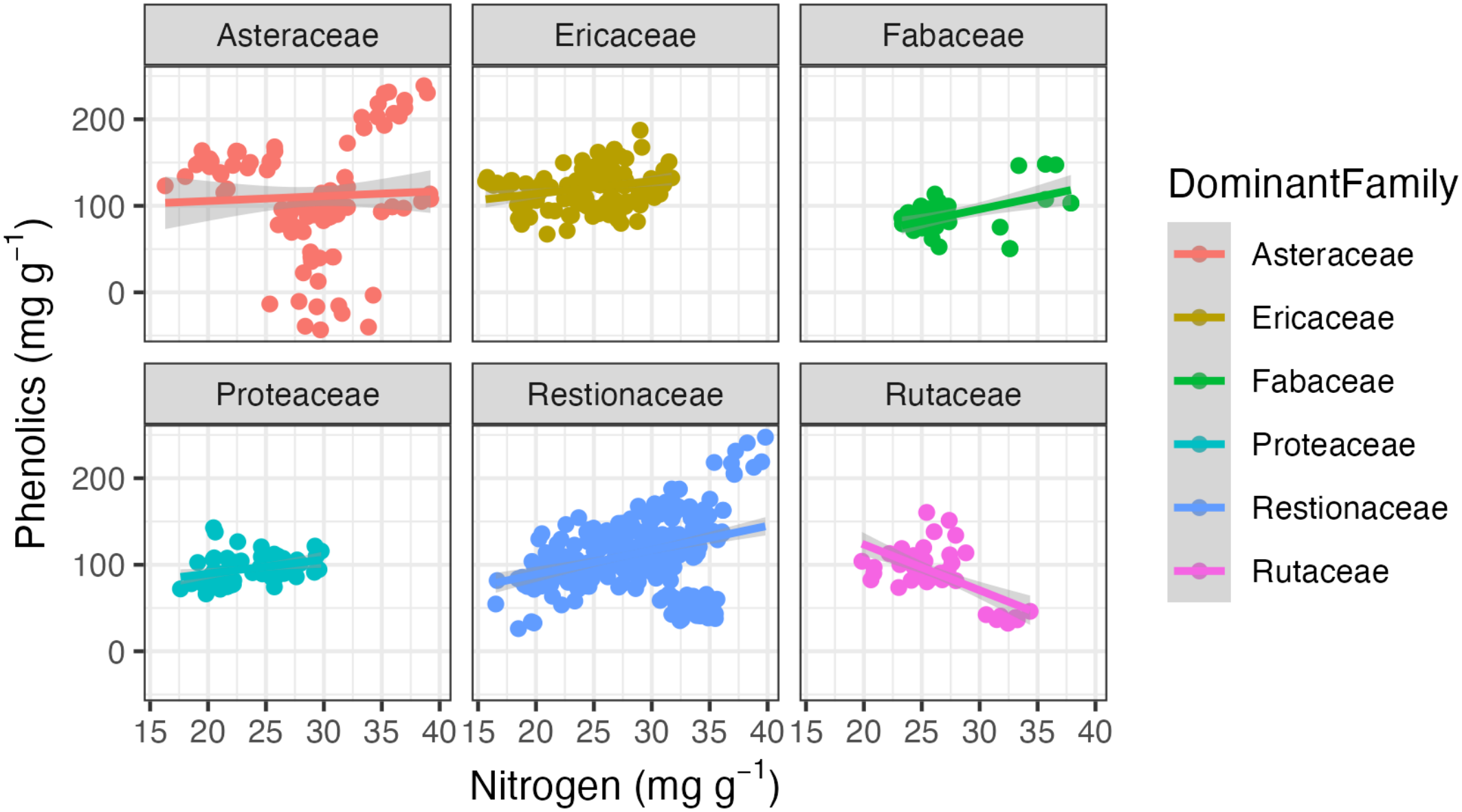
# Does fynbos follow the leaf economics spectrum?



# Fynbos vegetation observes the leaf economics spectrum.



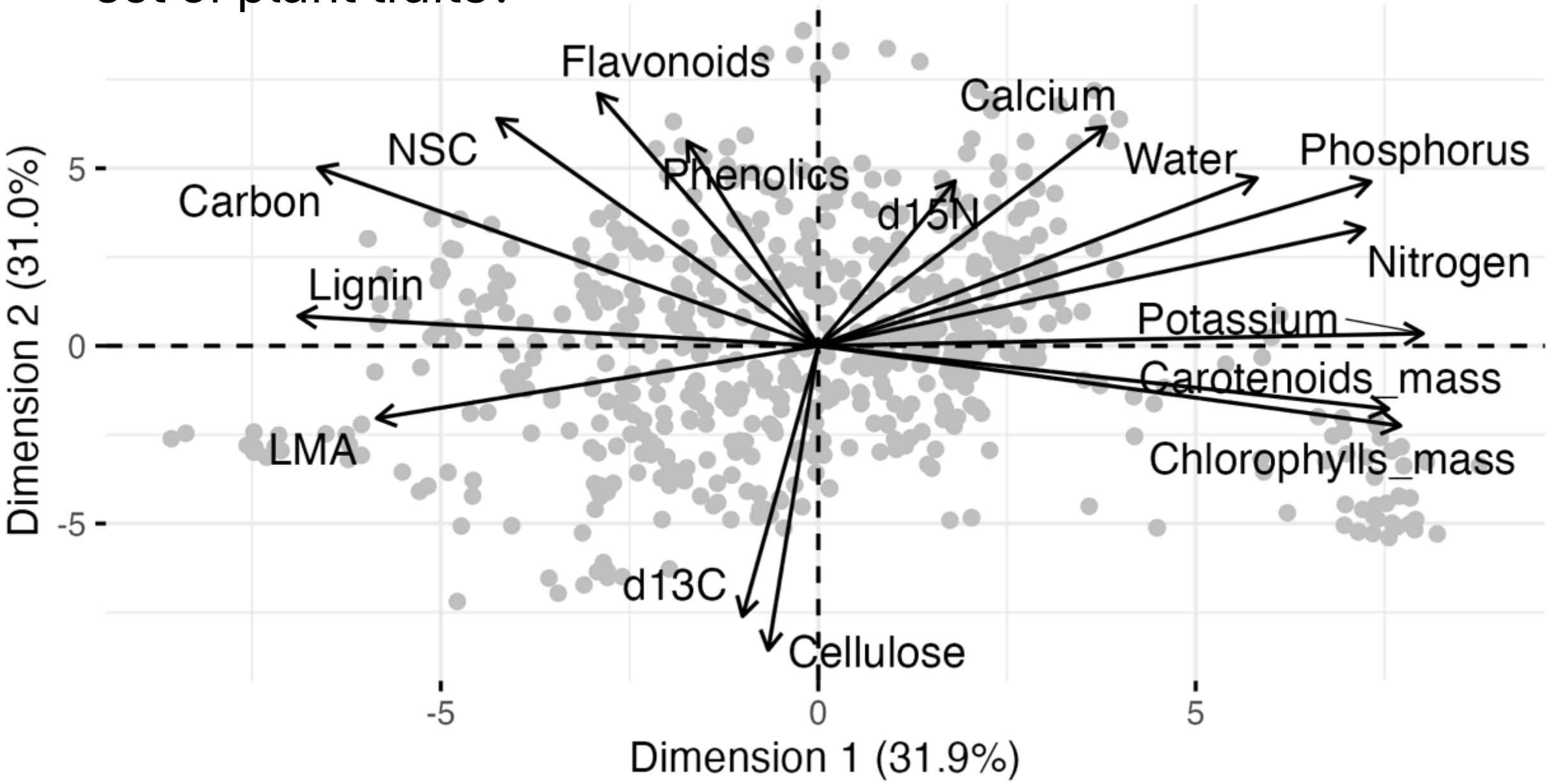
# Slopes of the N – LMA relationship differ among families.



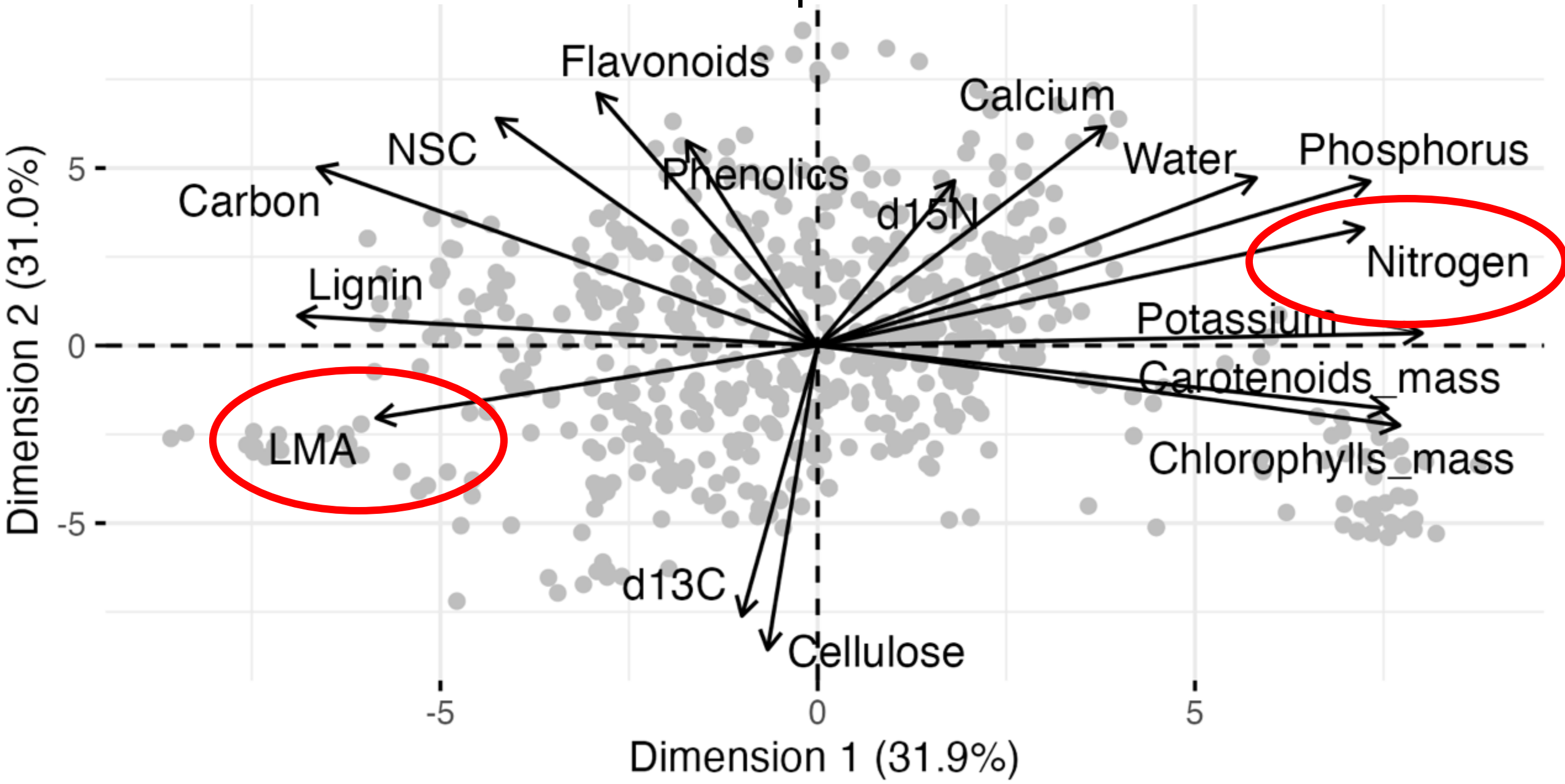
# Overarching science goals

- What are the landscape-scale trait tradeoffs that we can observe?
  - Do they match known bivariate tradeoffs?
  - What can they tell us in multivariate space?
- Updates on imagery and traits maps

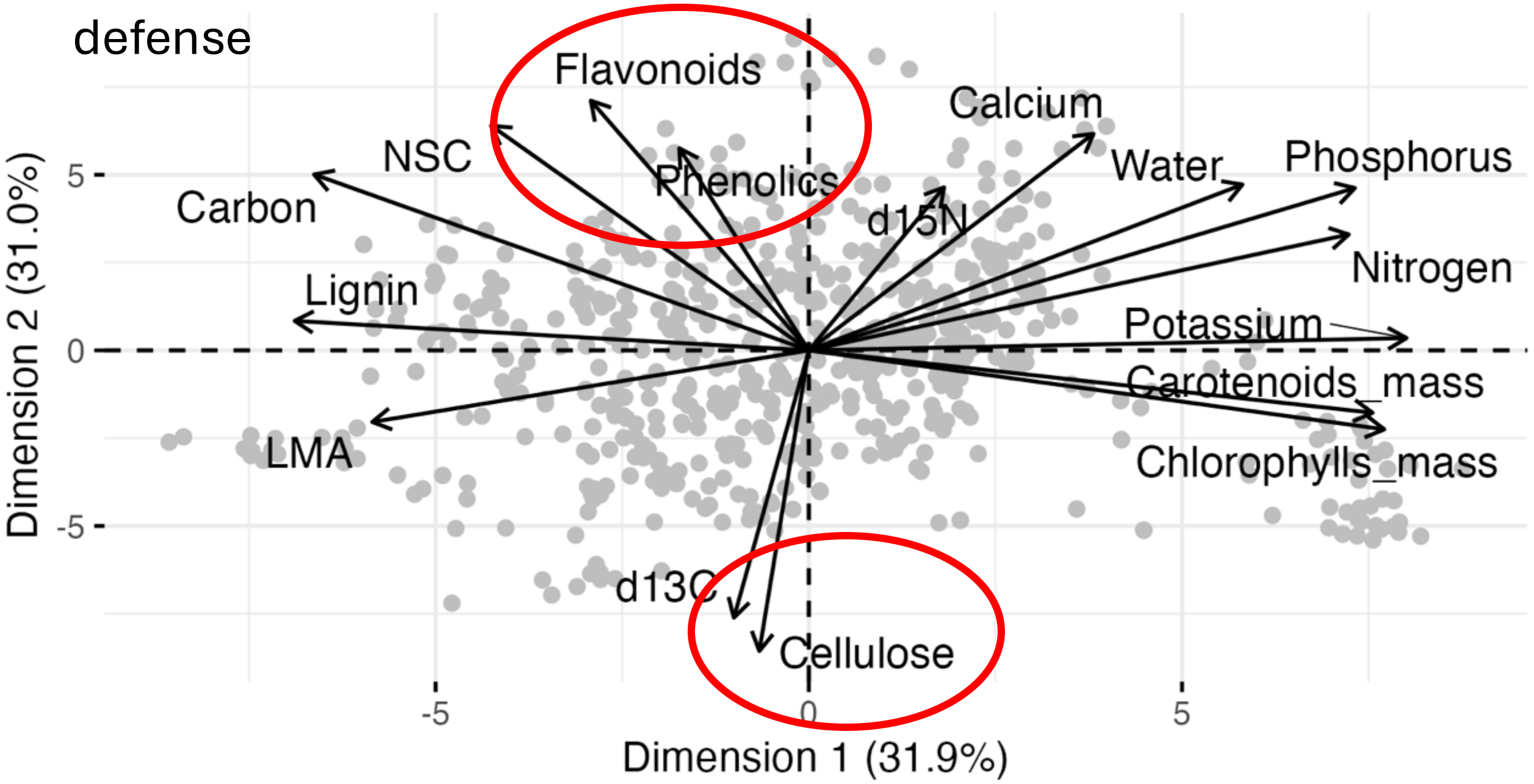
What are possible trait-tradeoffs when we examine a larger set of plant traits?



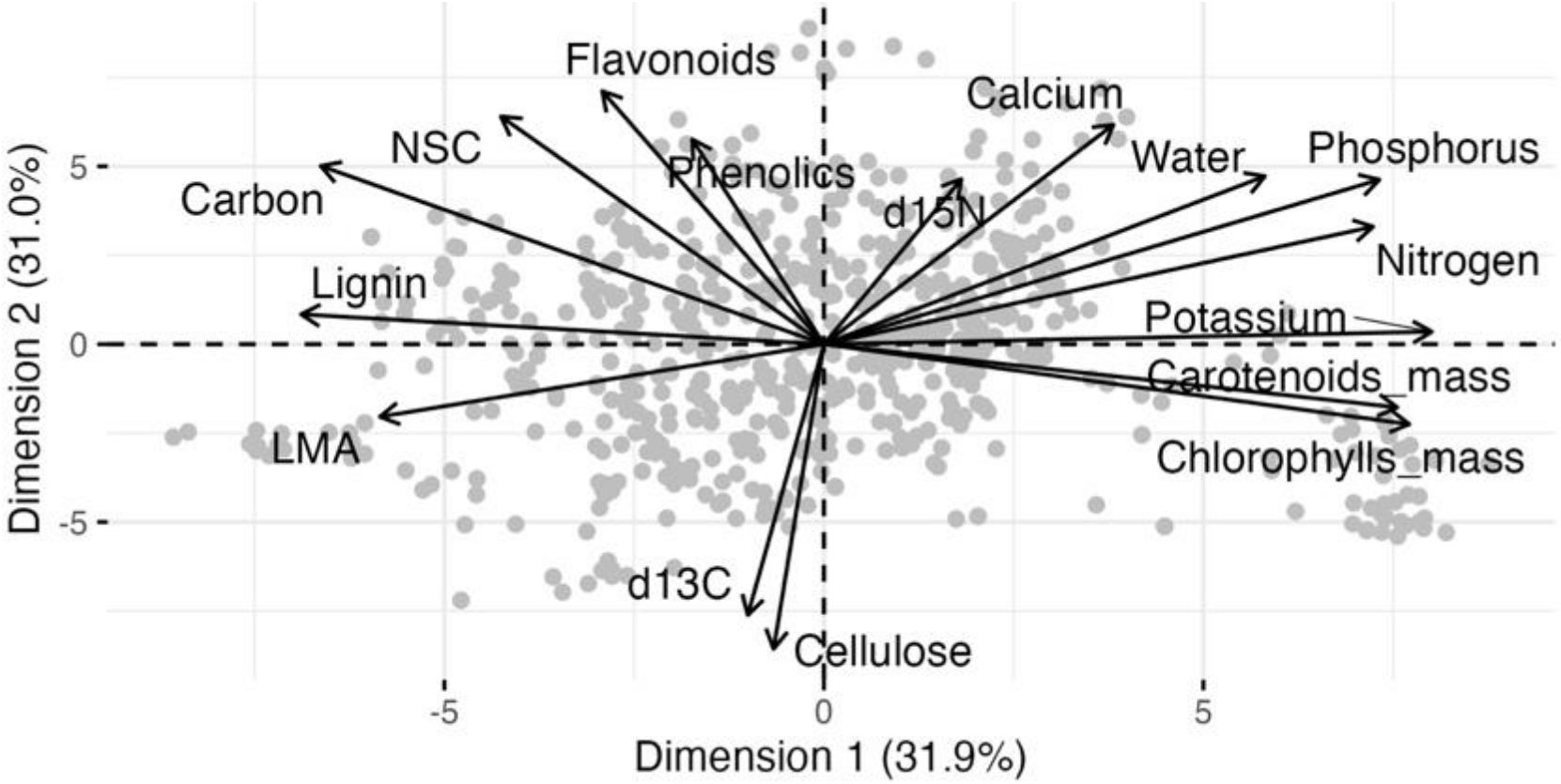
# PC 1: related to leaf economic spectrum tradeoffs



PC2: is possible related to a tradeoff of structural and chemical defense

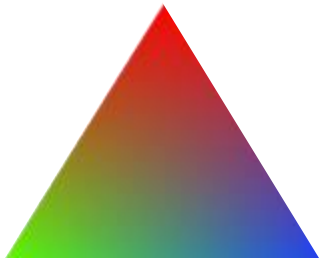


# Visualizing multivariate trait tradeoffs with imagery




Leaf Economics (acquisitive)

PC1

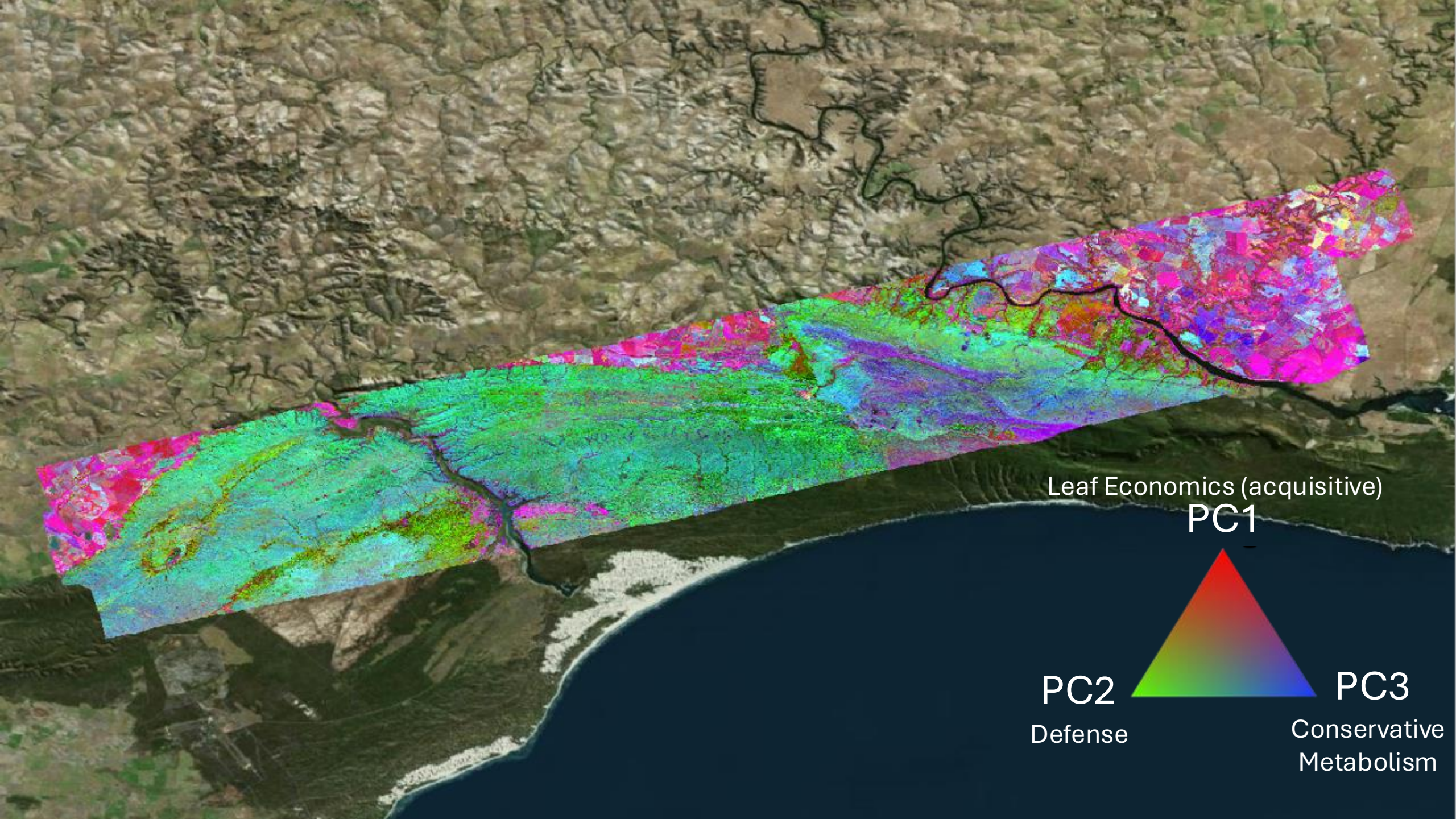


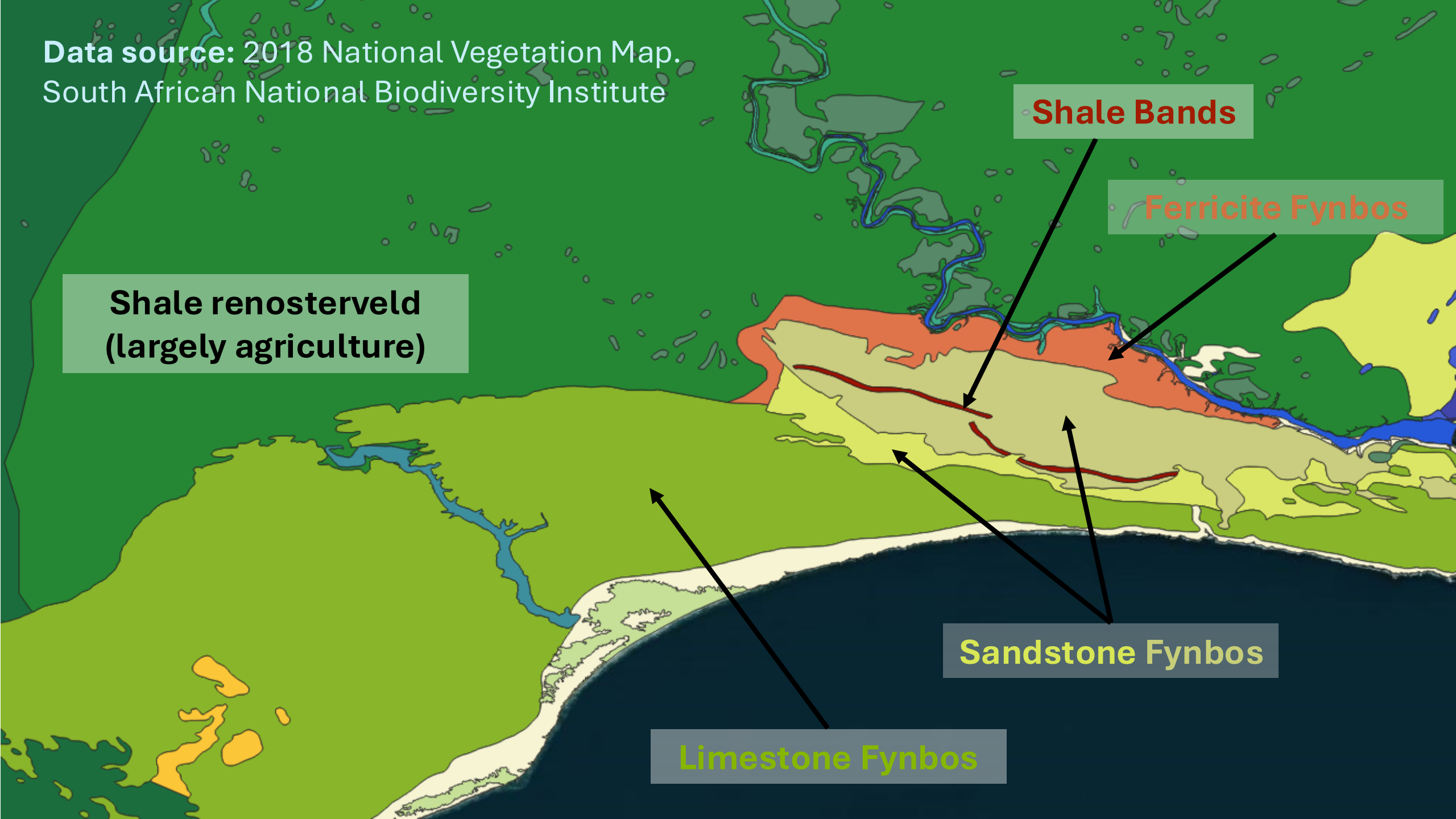
PC2

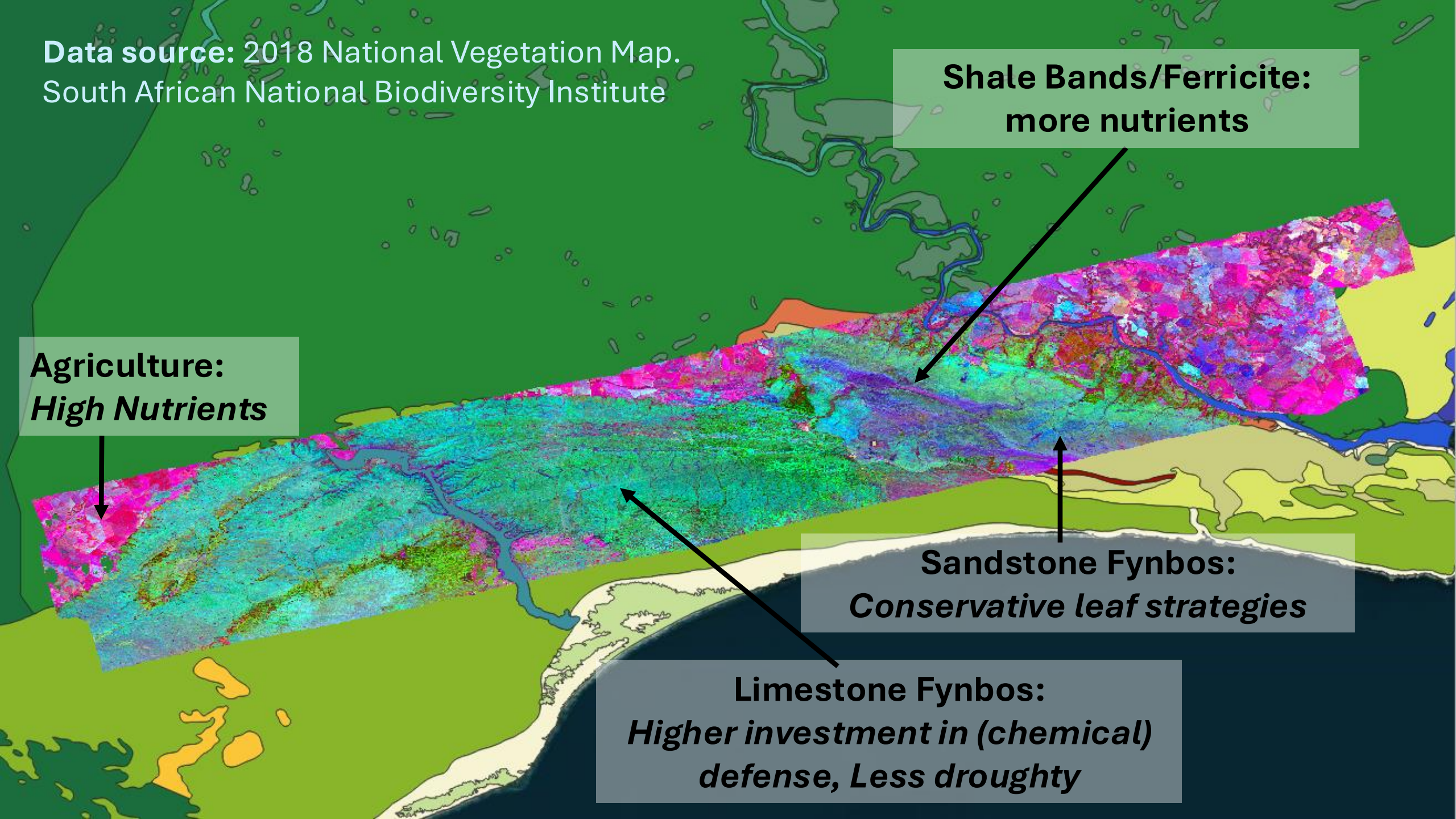
Defense

PC3

Conservative Metabolism (hypothesized)


Leaf Economics (acquisitive)
PC1
PC2
Defense
PC3
Conservative
Metabolism


**Data source:** 2018 National Vegetation Map.
South African National Biodiversity Institute
Shale Bands
Ferricite Fynbos
Shale renosterveld
(largely agriculture)
Sandstone Fynbos
Limestone Fynbos


**Data source:** 2018 National Vegetation Map.
South African National Biodiversity Institute
**Shale Bands/Ferricite:**
**more nutrients**
**Agriculture:**
***High Nutrients***
**Sandstone Fynbos:**
***Conservative leaf strategies***
**Limestone Fynbos:**
***Higher investment in (chemical) defense, Less droughty***

# Overarching science goals

- What are the landscape-scale trait tradeoffs that we can observe?
  - Do they match known bivariate tradeoffs?
  - What can they tell us in multivariate space?
- Updates on imagery and traits maps

# Current/future imagery products

- Topo/BRDF corrected soon-to-be posted on DAAC

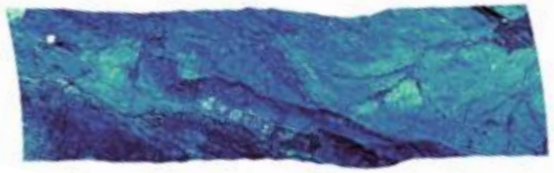

Kyle Kovach

# Current/future imagery products

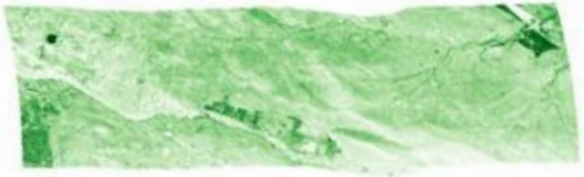
- Topo/BRDF corrected soon-to-be posted on DAAC
- Trained trait maps coming in late summer

# Trait map product overview

Manganese

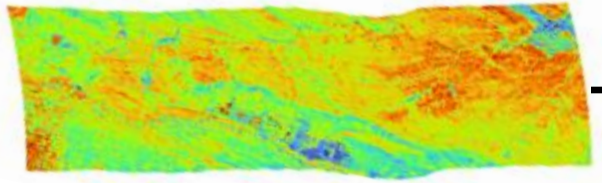


LMA



Chlorophyll

NSCs



Macronutrients/
Micronutrients

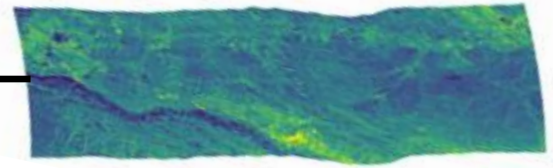
Fibers/Structure

Isotopes

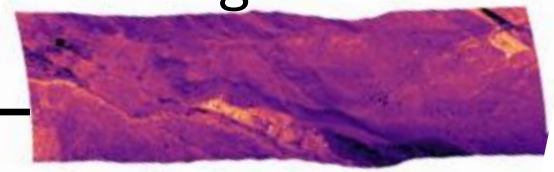
Pigments

Others

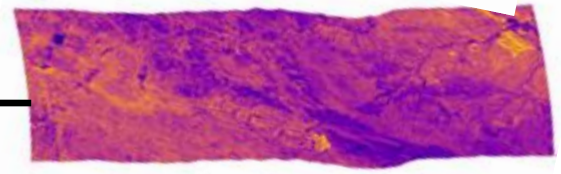
Nitrogen



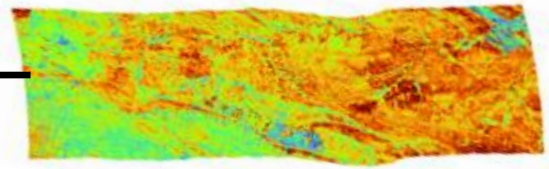
Lignin



N15

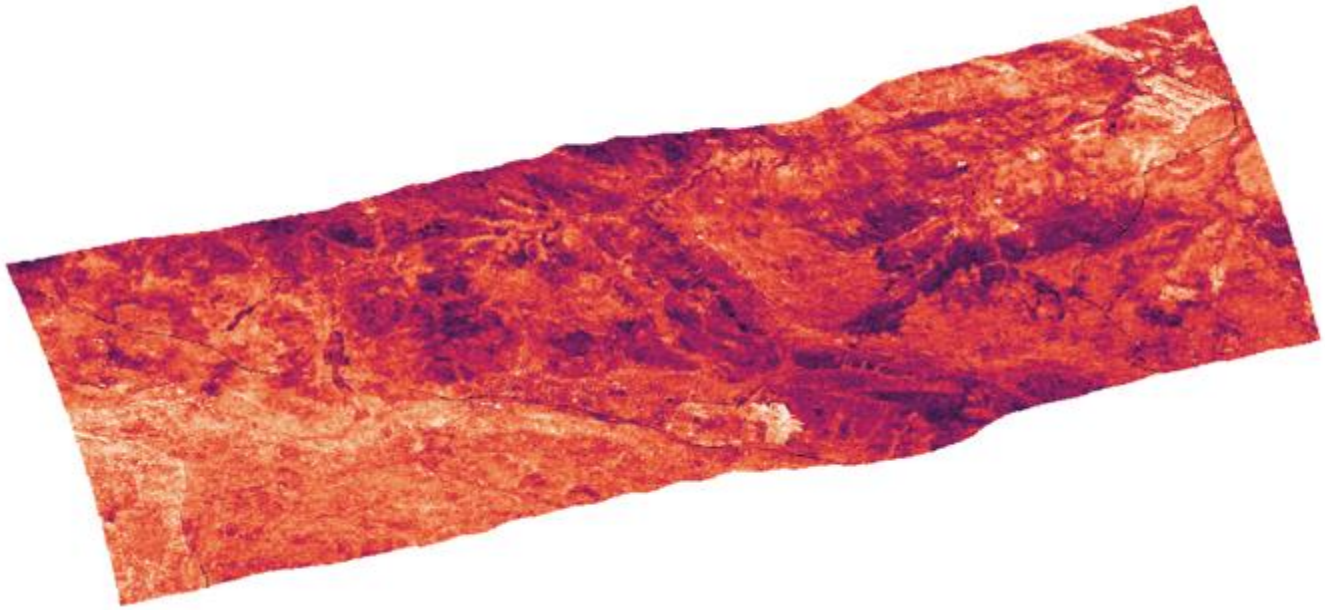


Phenolics



# Trait map layers

Predicted trait values (Calcium)



Uncertainty

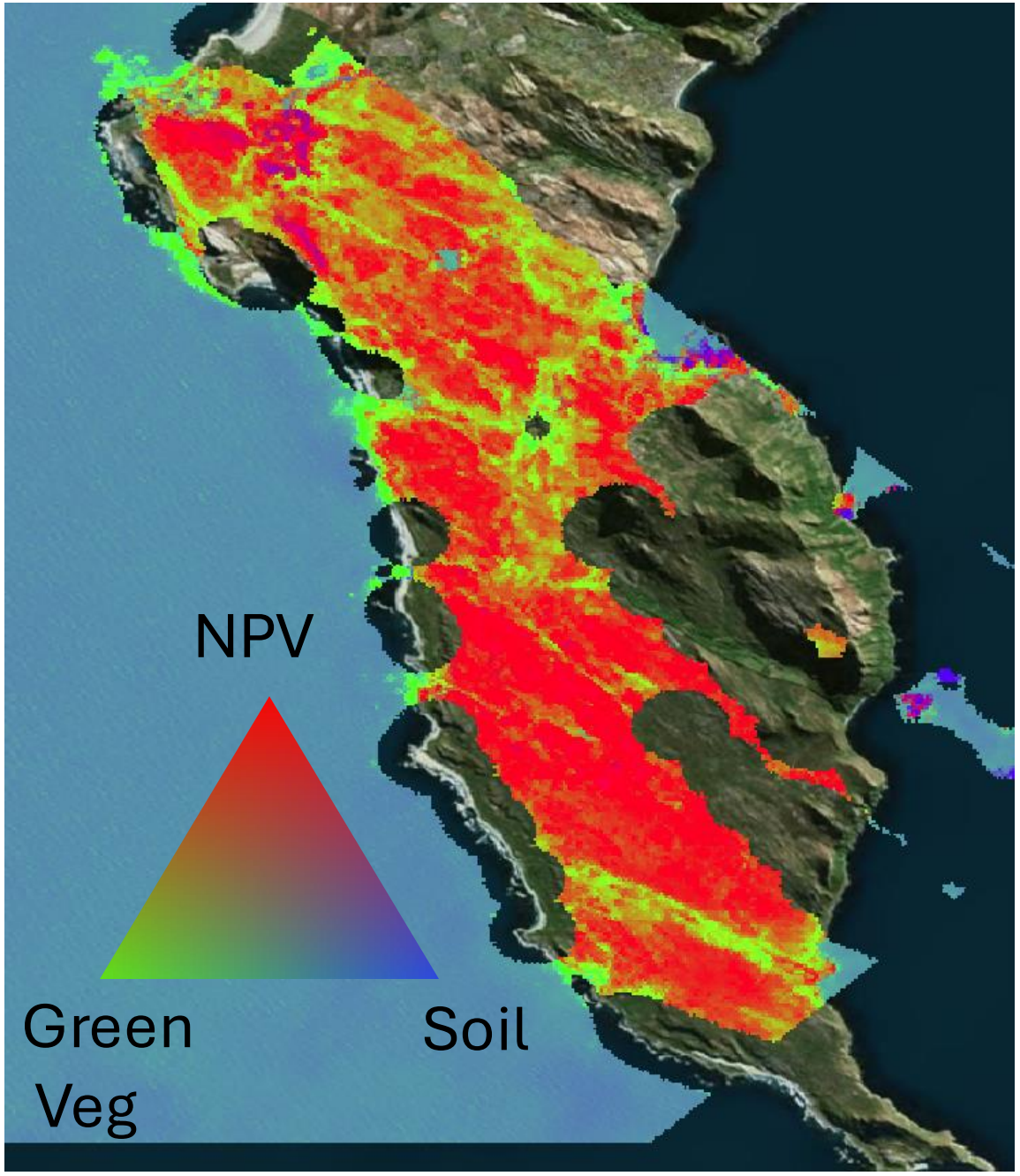
# Current/future imagery products

- Topo/BRDF corrected now on DAAC
- Trained trait maps coming in late summer
- Fractional cover products

# Fractional cover

Generated over EMIT tiles using Ochoa et al. method. Working on applying to AVIRIS-NG.

Shuwen Liu



# Acknowledgments


Jeannine Cavender-Bares

Steven Augustine

Doug Euston-Brown

Brendan Heberlein

Andy Hueni

Cynthia Jones

Kyle Kovach

Glenn Moncrieff

Kagiso Nhlapo

Maria Santos

Fabian Schneider

John Silander

Nancy Silander

Chenge Simcelile

Jasper Slingsby

Giulia Tagliabue

Emily Townsend

Phil Townsend

**Funding Institutions:**

NRF National Research Foundation

NASA

NSF

**Supporting Institutions:**

South African National Parks

CapeNature

SANBI Biodiversity for Life

South African National Biodiversity Institute