REMEDY

BIODIVERSITY PATTERNS ALONG A CLIMATE GRADIENT IN PANAMA

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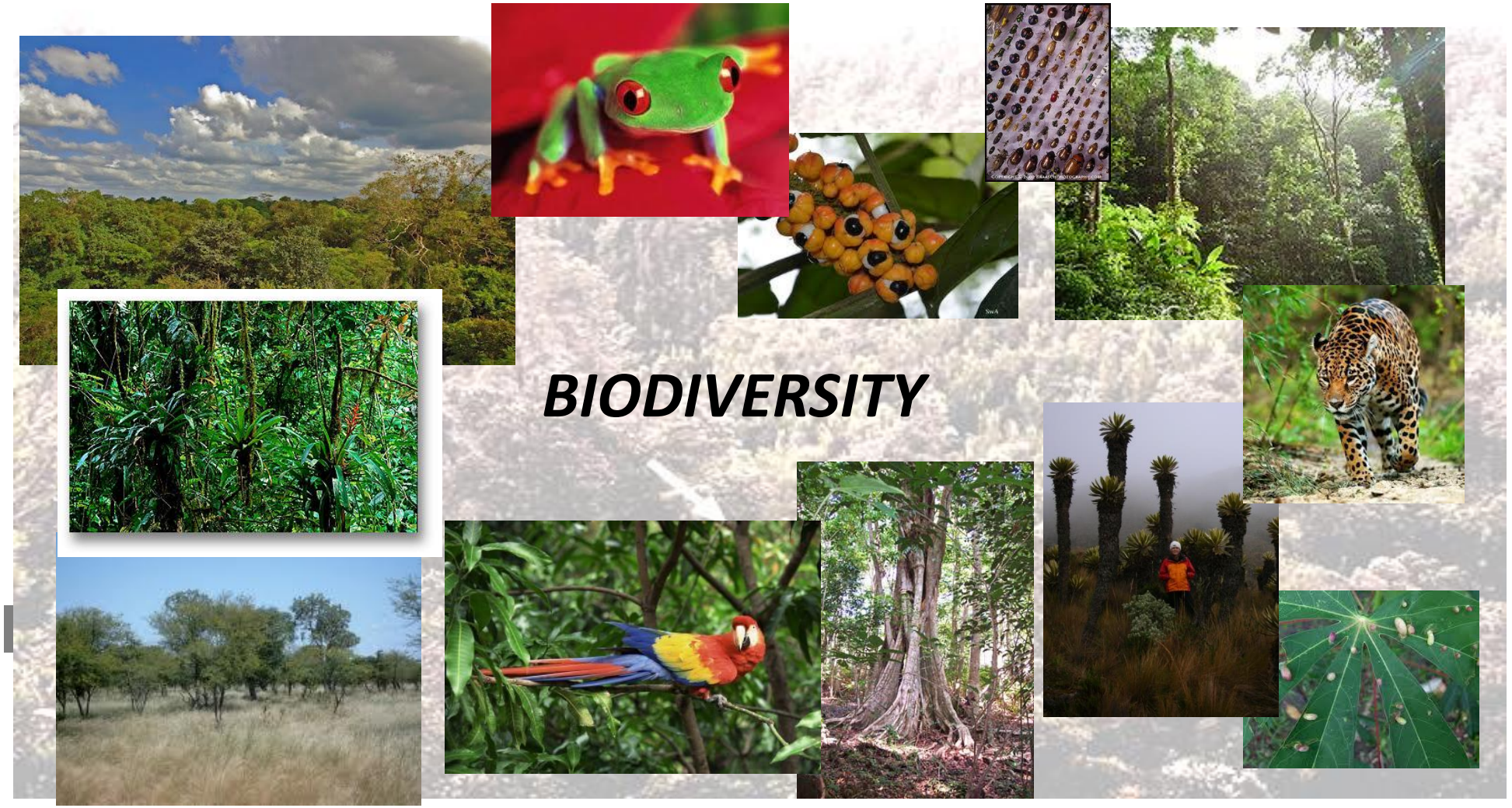
vito
vision on technology

CARNEGIE INSTITUTION FOR SCIENCE

KU LEUVEN

Division Forest, Nature & Landscape

VALUE OF TROPICS?



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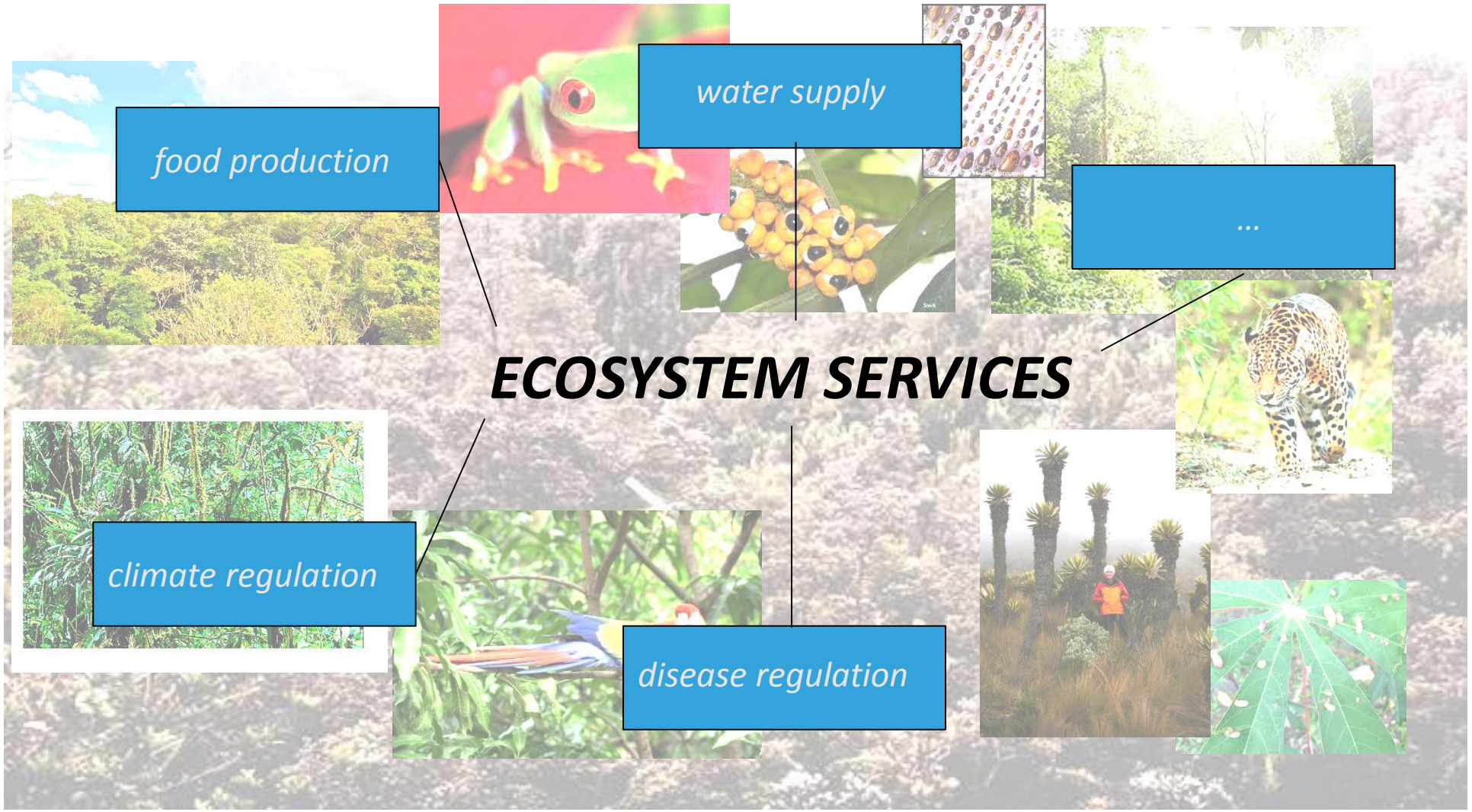

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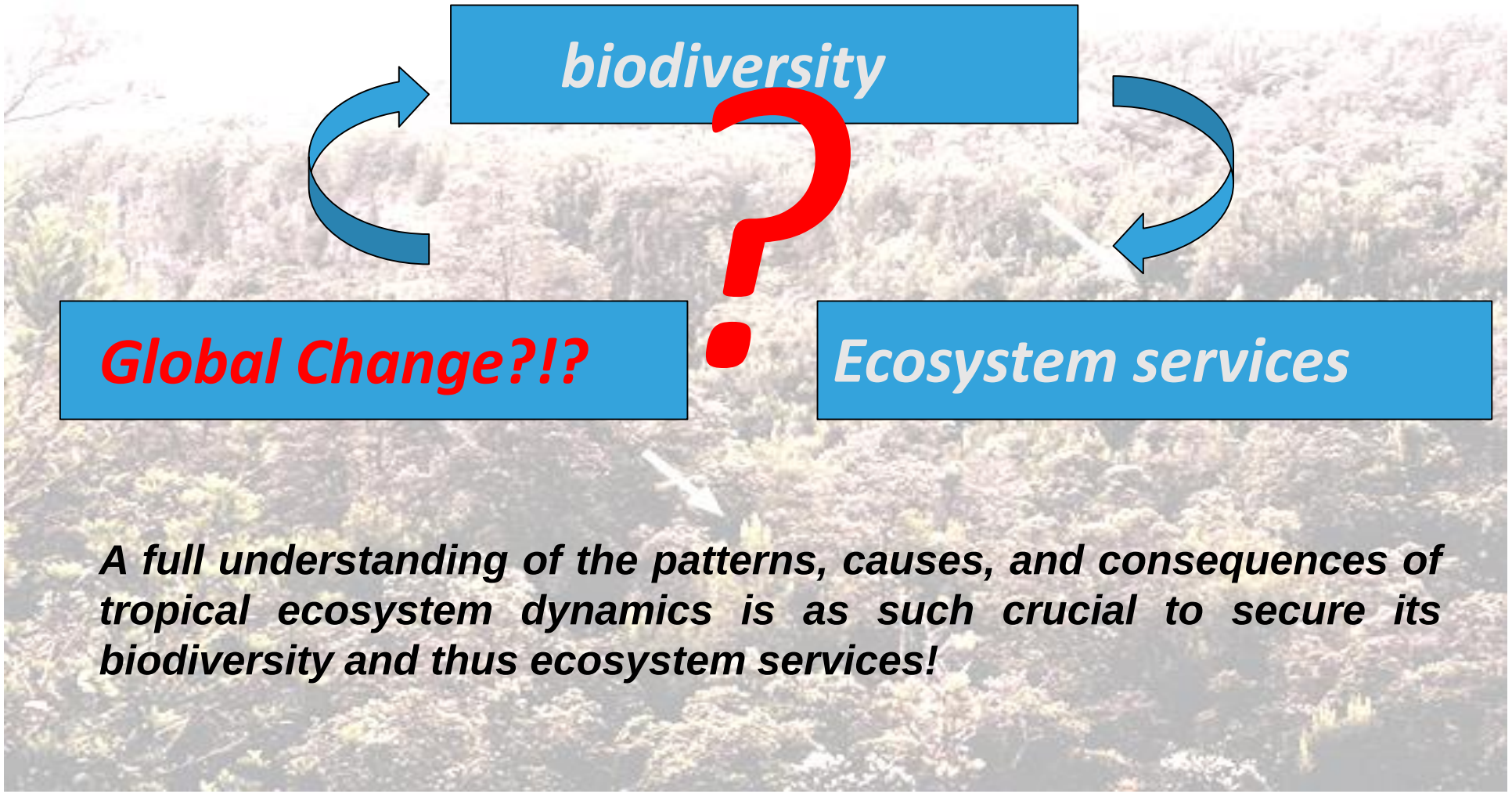

A full understanding of the patterns, causes, and consequences of tropical ecosystem dynamics is as such crucial to secure its biodiversity and thus ecosystem services!

IMPACT OF CLIMATE CHANGE ON BIODIVERSITY PATTERNS?

How do tropical forest respond to drought?

Study area – Panama

Isthmus

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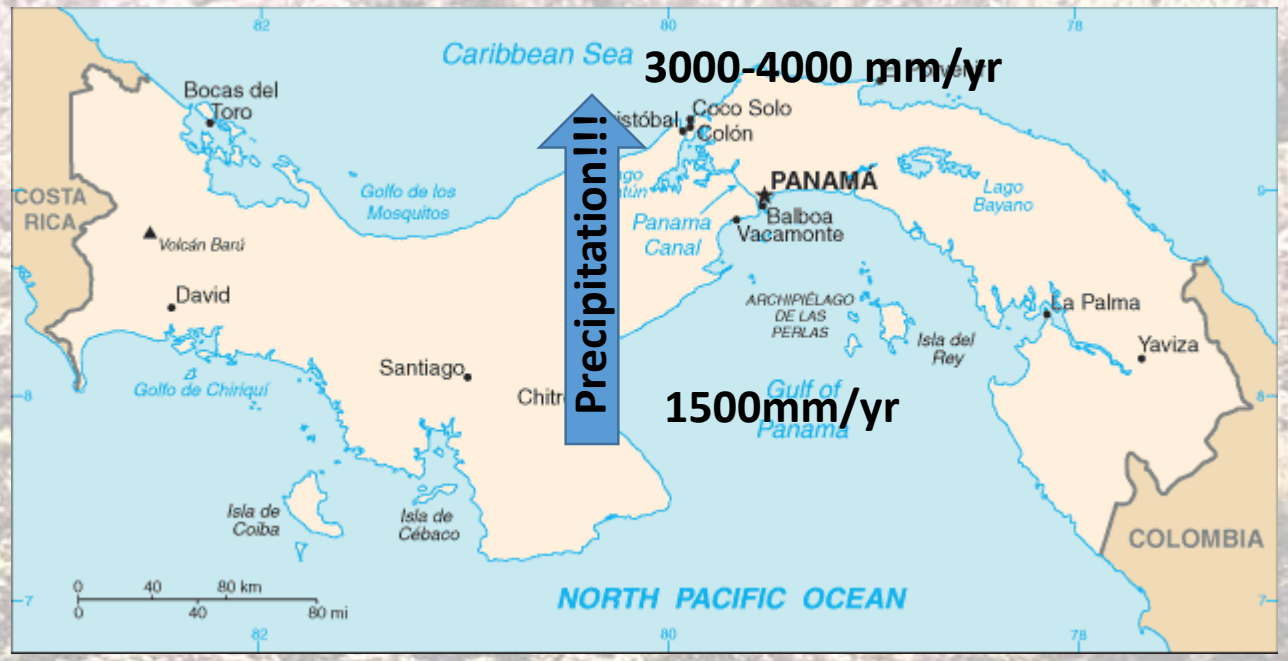


IMPACT OF CLIMATE CHANGE ON BIODIVERSITY PATTERNS?

data –

Carnegie Airborne Observatory

Airborne Taxonomic Mapping System

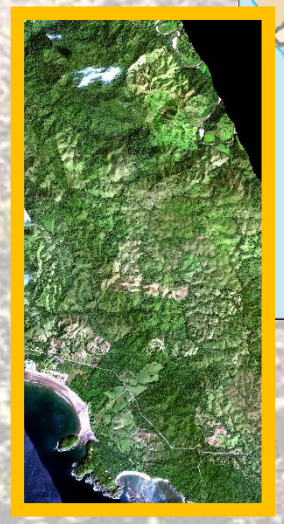
AToMS Technical Specifications

- **VSWIR Imaging Spectrometer:** A very high-fidelity imaging system providing contiguous spectral signatures of targets in the Visible and Shortwave-Infrared (VSWIR) range.
  - *Wavelength range*: 380 to 2510 nm
  - *Spectral resolution*: 5 nm
  - *Spatial resolution*: 0.5-2.0 m, depending upon aircraft altitude
  - *Sampling*: 14 bit
  - *Instantaneous field-of-view*: 1 milliradian
  - *Field-of-view*: 34 degrees
- **Multi-pulse Waveform LIDAR:** A high-resolution waveform Light Detection and Ranging (LiDAR) system providing contiguous ground coverage and full three-dimensional imaging.
  - *Wavelength*: 1064 nm
  - *Laser pulse repetition frequency*: up to 400 kHz
  - *Spatial resolution* (laser spot spacing): 0.25-1.0 m, depending upon aircraft altitude
  - *Sampling*: Dual laser
  - *Digitization*: Full waveform and discrete-return modes
  - *Instantaneous field-of-view*: 0.5 milliradian
  - *Field-of-view*: 40 degrees
- **VNIR Zoom Imaging Spectrometer:** A high-fidelity imaging system providing contiguous spectral signatures of targets in the Visible and Near-infrared (VNIR) range.
  - *Wavelength range*: 365 to 1060 nm
  - *Spectral resolution*: 3-10 nm, configurable
  - *Spatial resolution*: 0.25-1.0 m, depending upon aircraft altitude
  - *Sampling*: 14 bit
  - *Instantaneous field-of-view*: 0.5 milliradian
  - *Field-of-view*: 40 degrees

CAO AToMS

IMPACT OF CLIMATE CHANGE ON BIODIVERSITY PATTERNS?

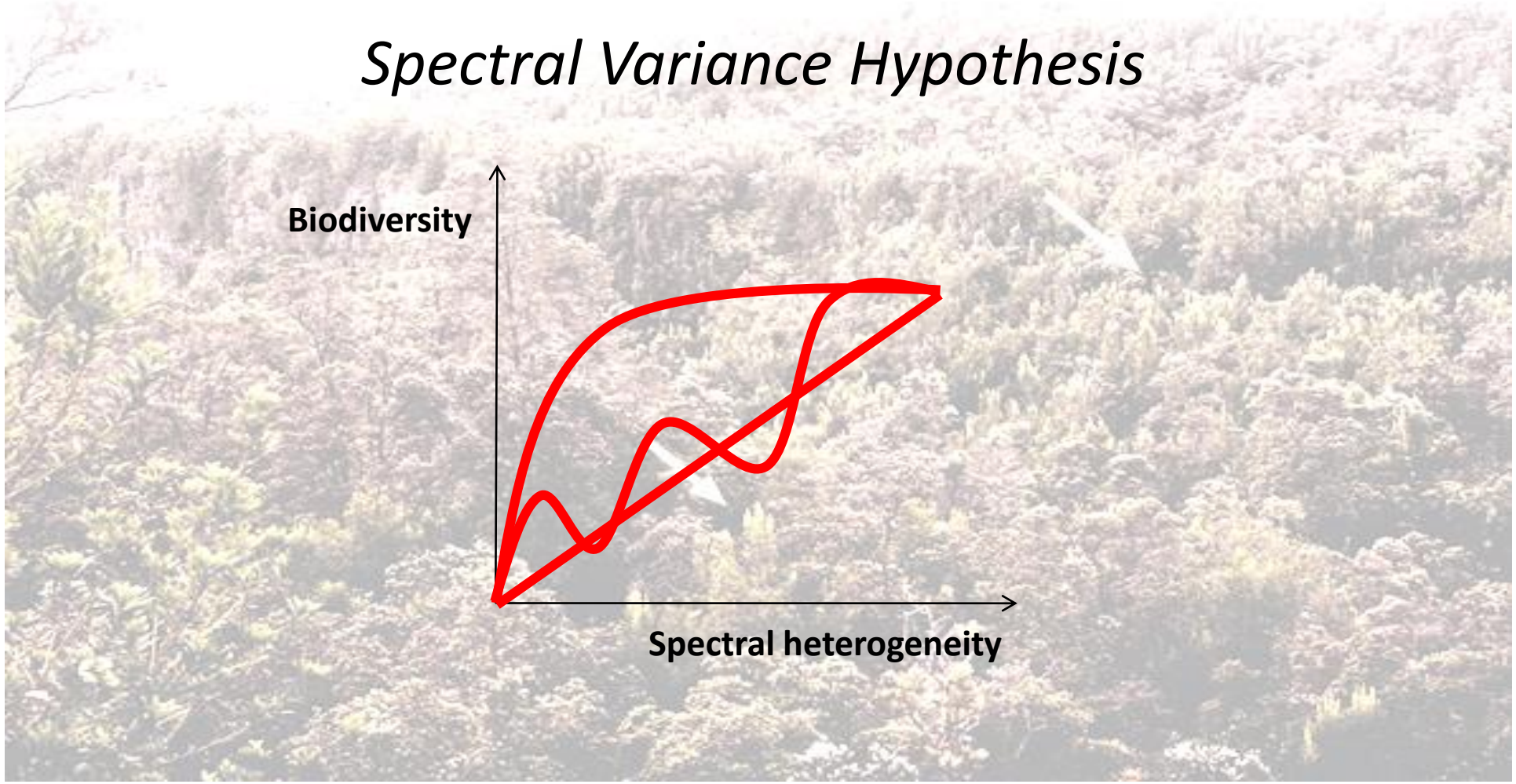
Wet forest



Dry forest

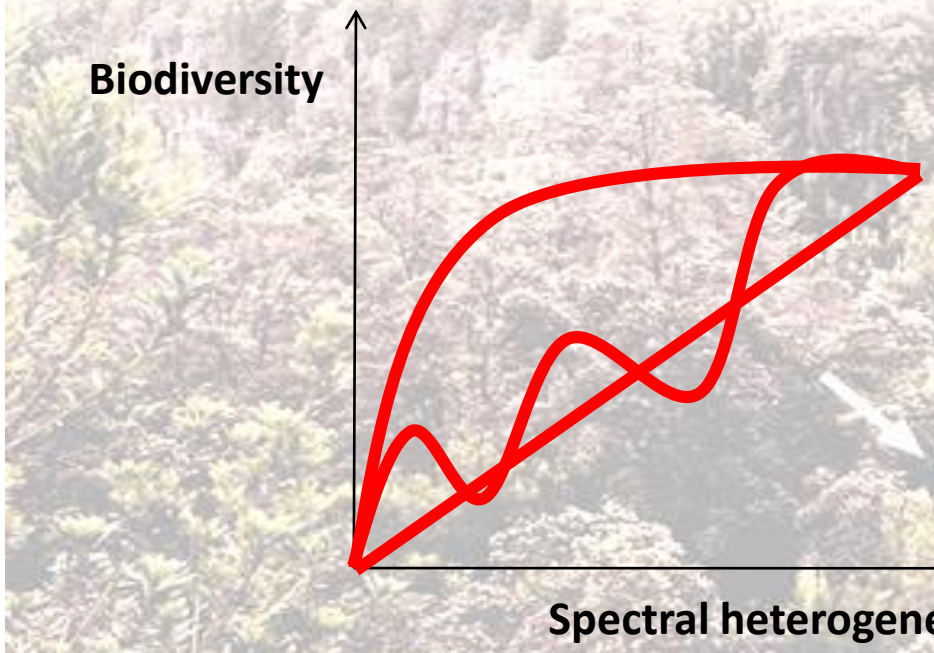
Moist forest

BIODIVERSITY FROM IMAGING SPECTROSCOPY?



BIODIVERSITY FROM IMAGING SPECTROSCOPY?

Spectral Variance Hypothesis



25	26
25	24

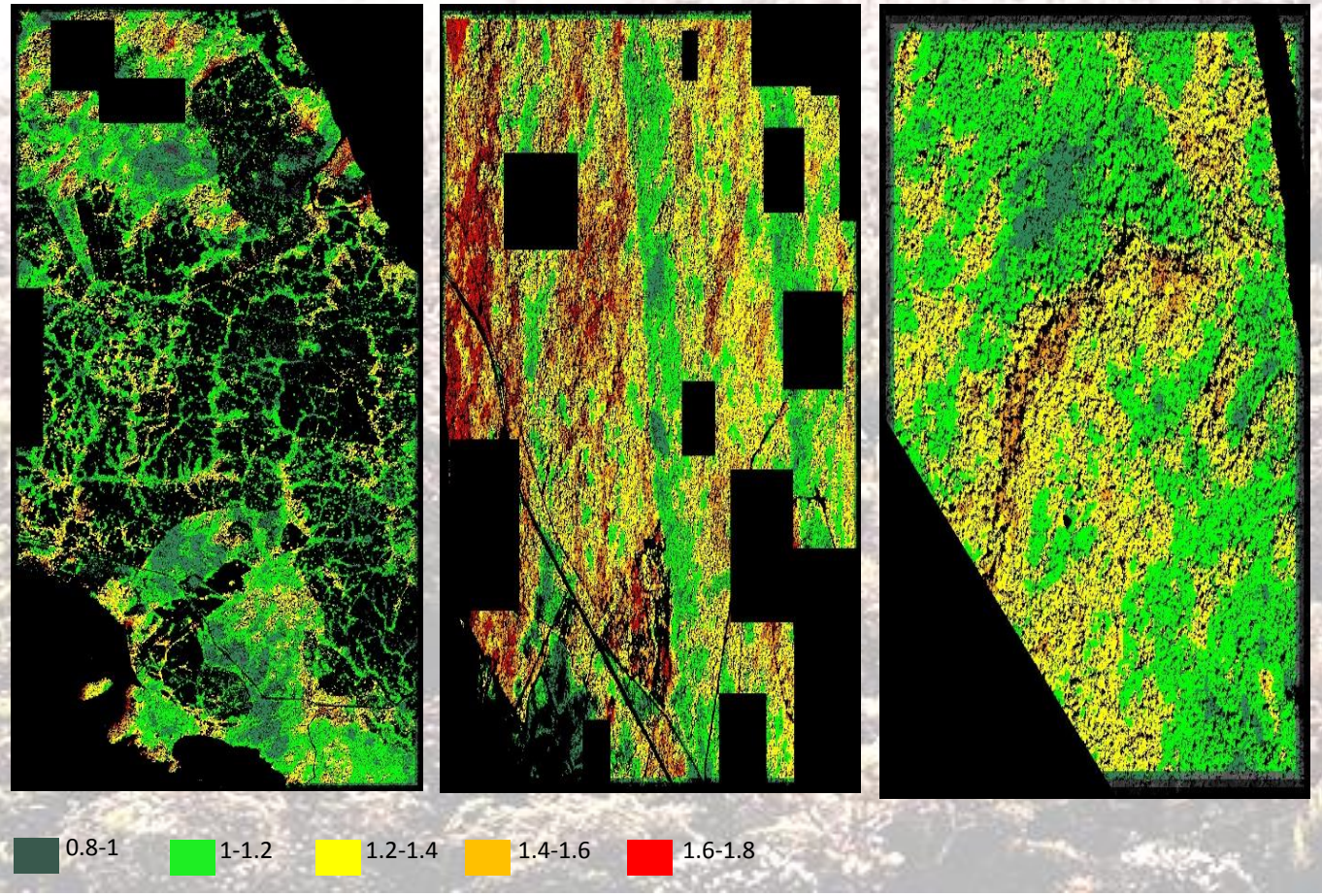
marginal diversity

25	50
75	100

high diversity

BIODIVERSITY FROM IMAGING SPECTROSCOPY?

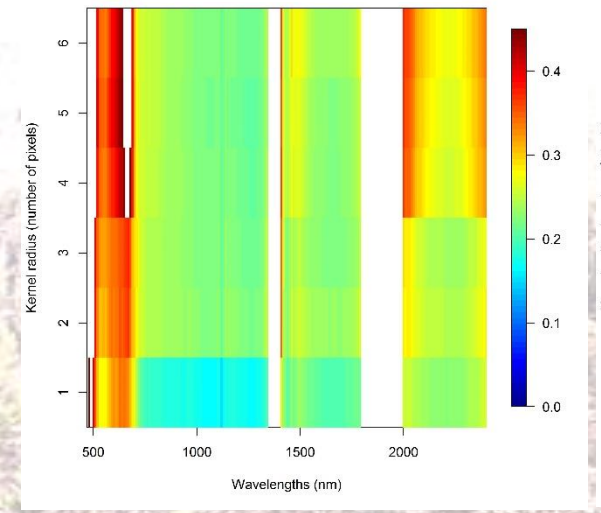
Species richness per ha



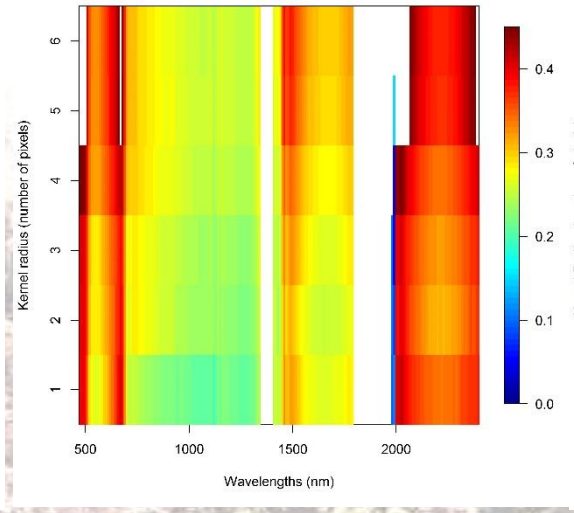
BIODIVERSITY FROM IMAGING SPECTROSCOPY?

Species Area Curves

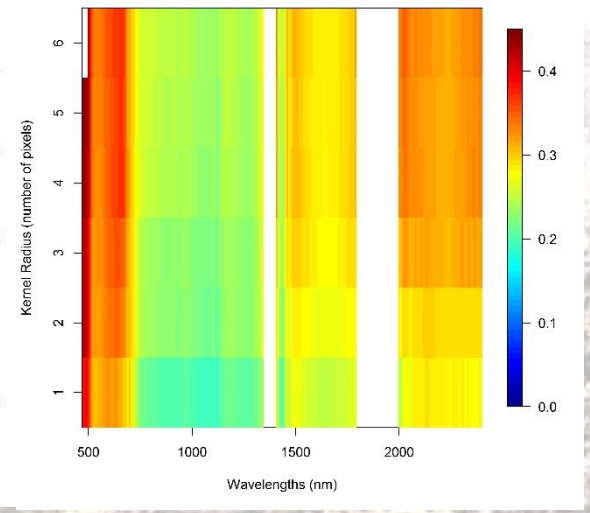
Dry forest site

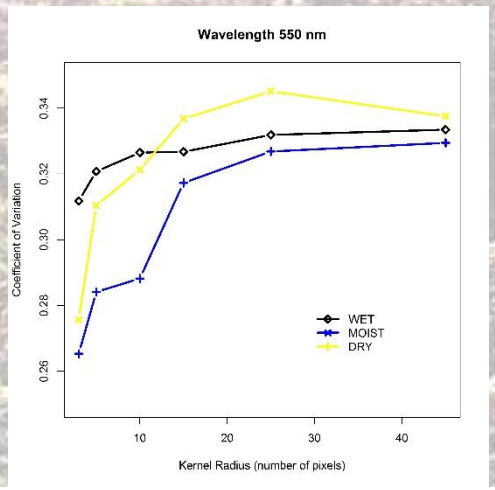


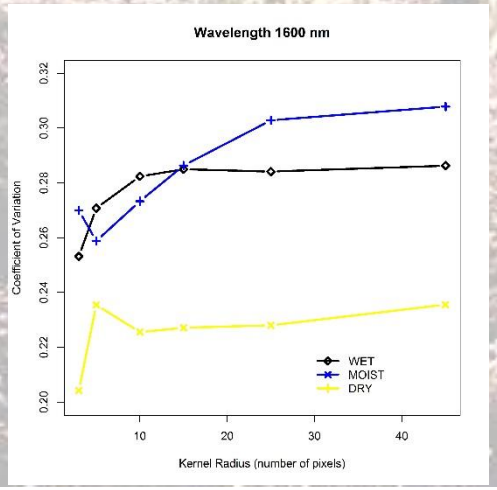
Moist forest site

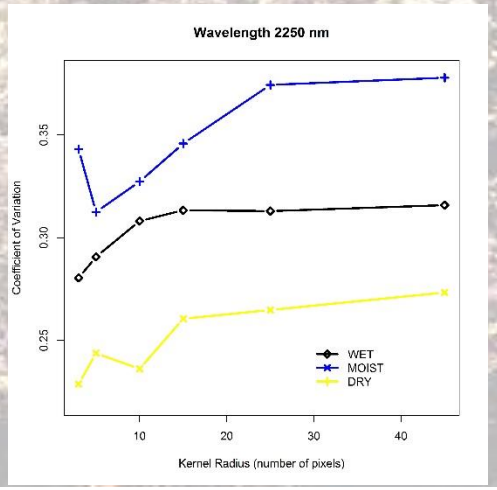


Wet forest site





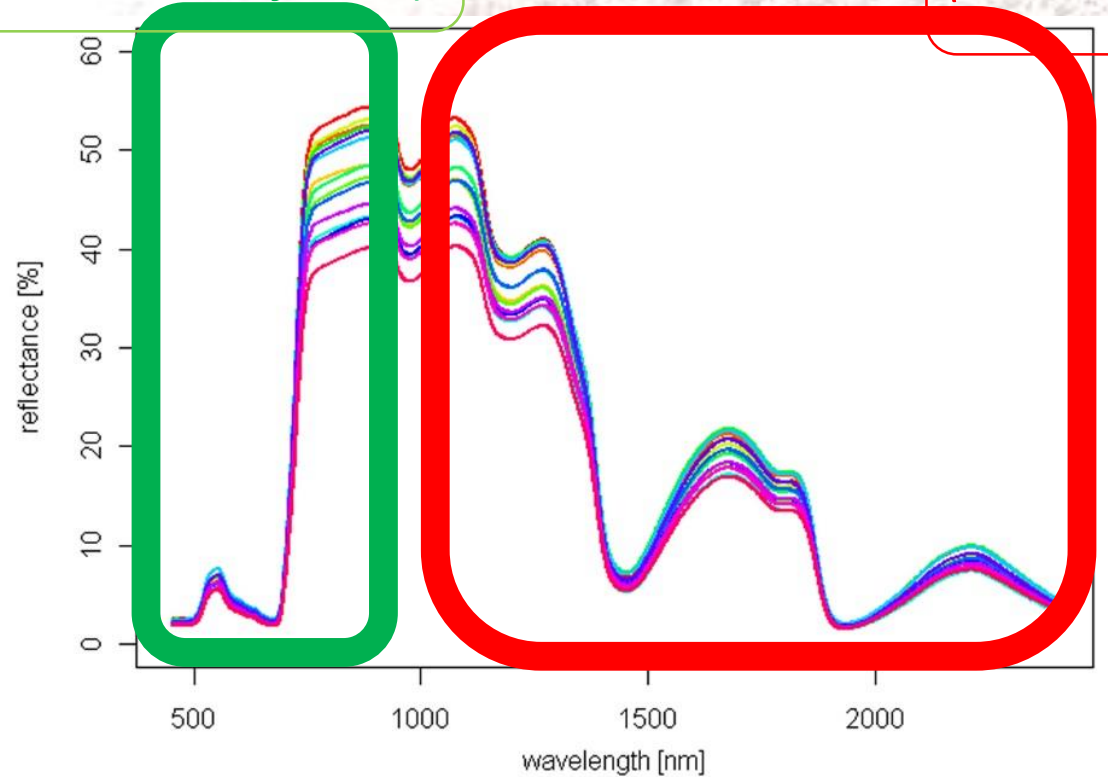


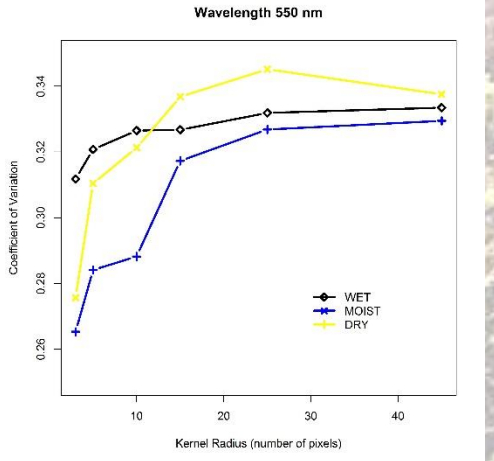


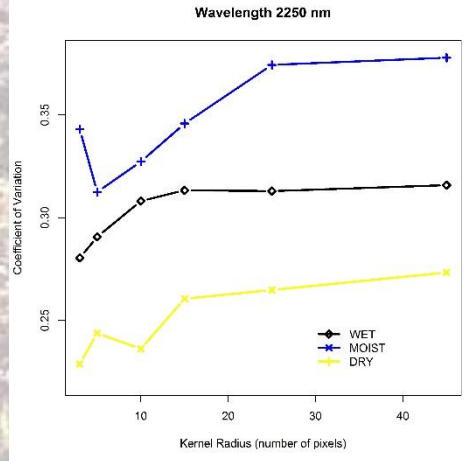
BIODIVERSITY FROM IMAGING SPECTROSCOPY?

Ligth Capture & growth
(pigments, nutrients, leaf mass)

Foliar defense & longetivity
(cellulose, lignin, phenols, tanins)







ONGOING RESEARCH…

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