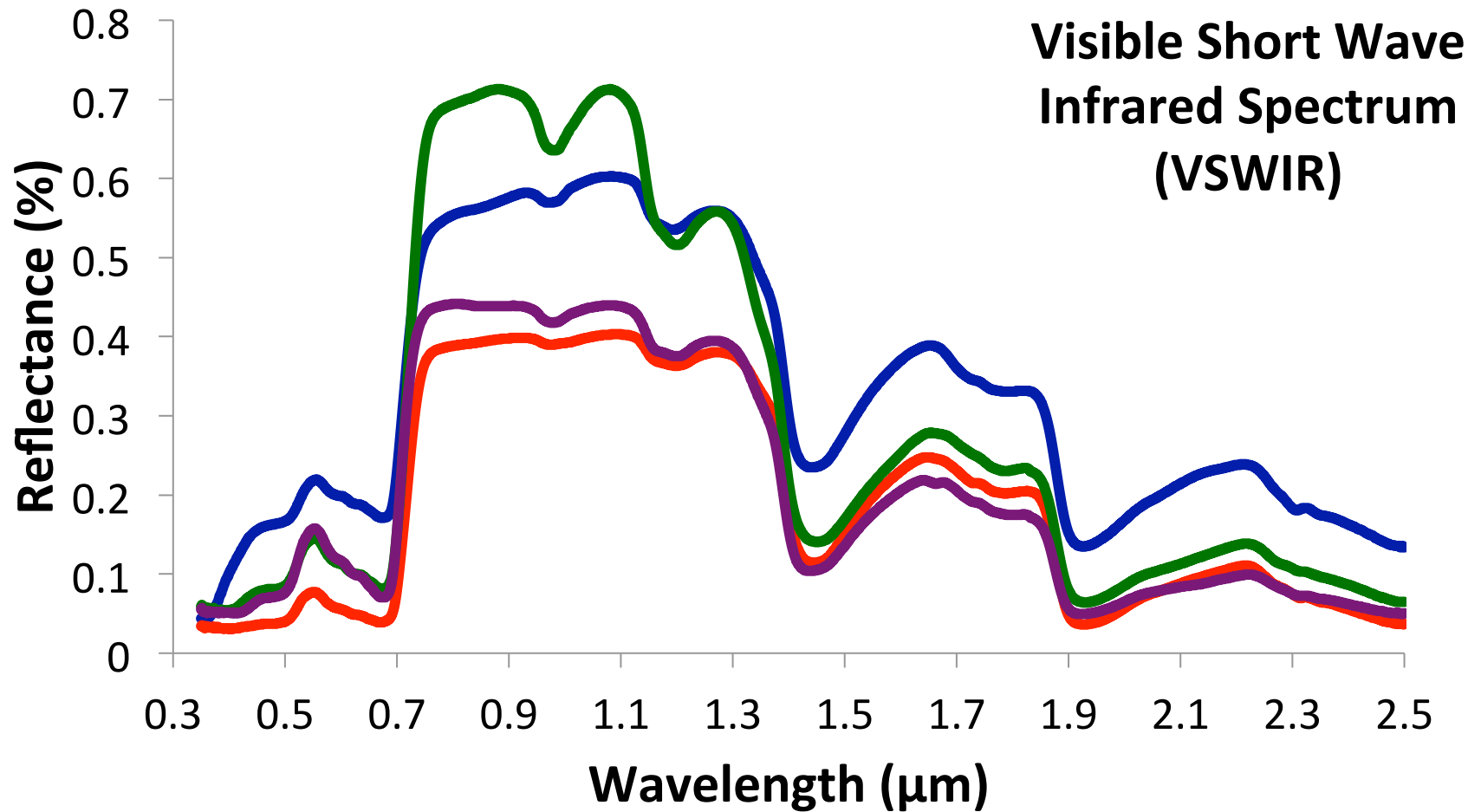
An aerial hyperspectral image of a landscape, showing a mix of green, brown, and blue areas. The image is overlaid with a grid of small, colored squares, likely representing different spectral bands or features. The text is overlaid on the top half of the image.

Spectral emissivity features of plants: Prospects for the Hyperspectral Thermal Emission Spectrometer (HyTES) sensor

Susan Meerdink, Simon Hook, Dar Roberts



Ponderosa Pine



Purple Sage



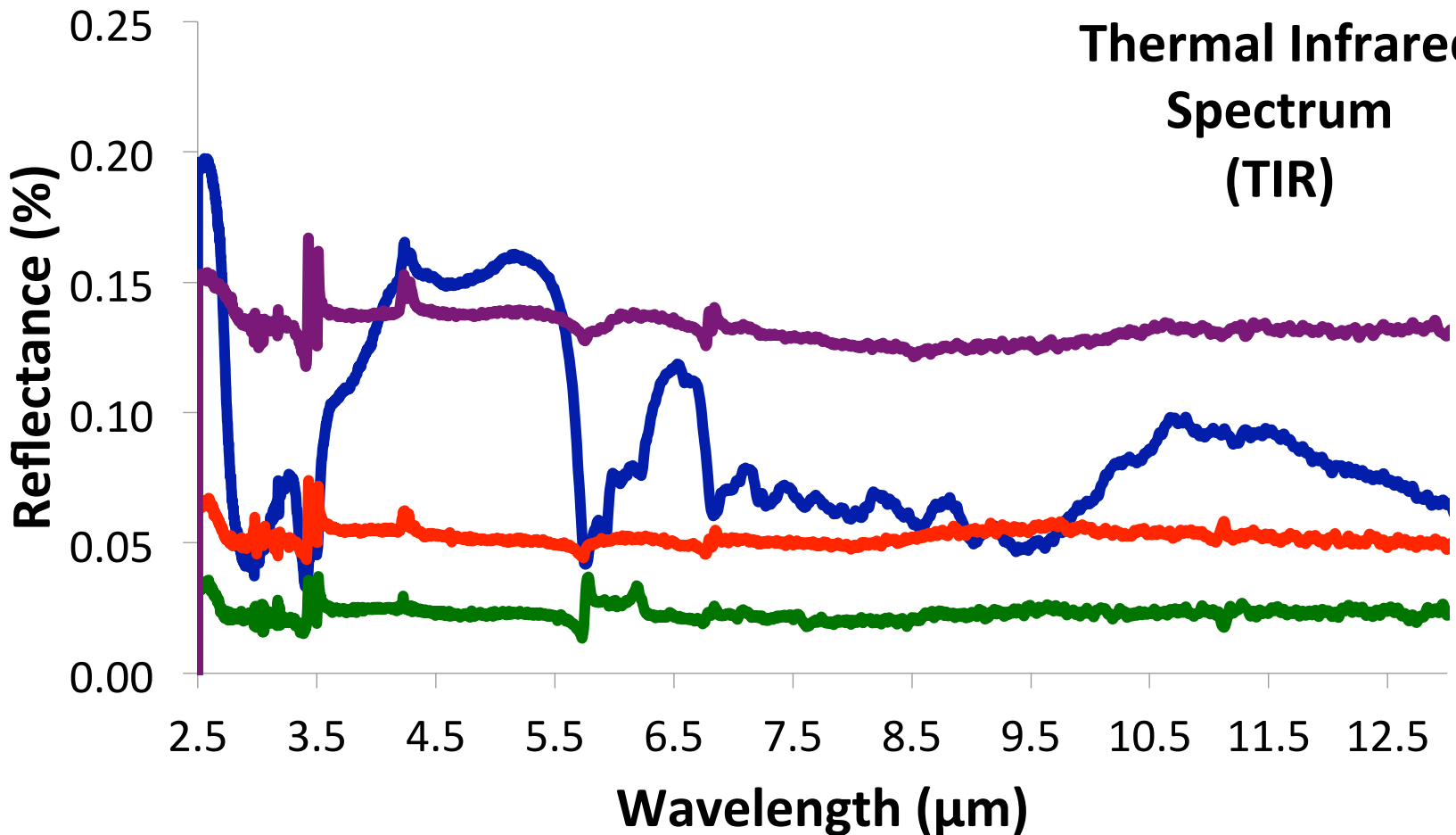
Manzanita



Coast Live Oak



Thermal Infrared Spectrum (TIR)



Ponderosa Pine



Purple Sage



Manzanita

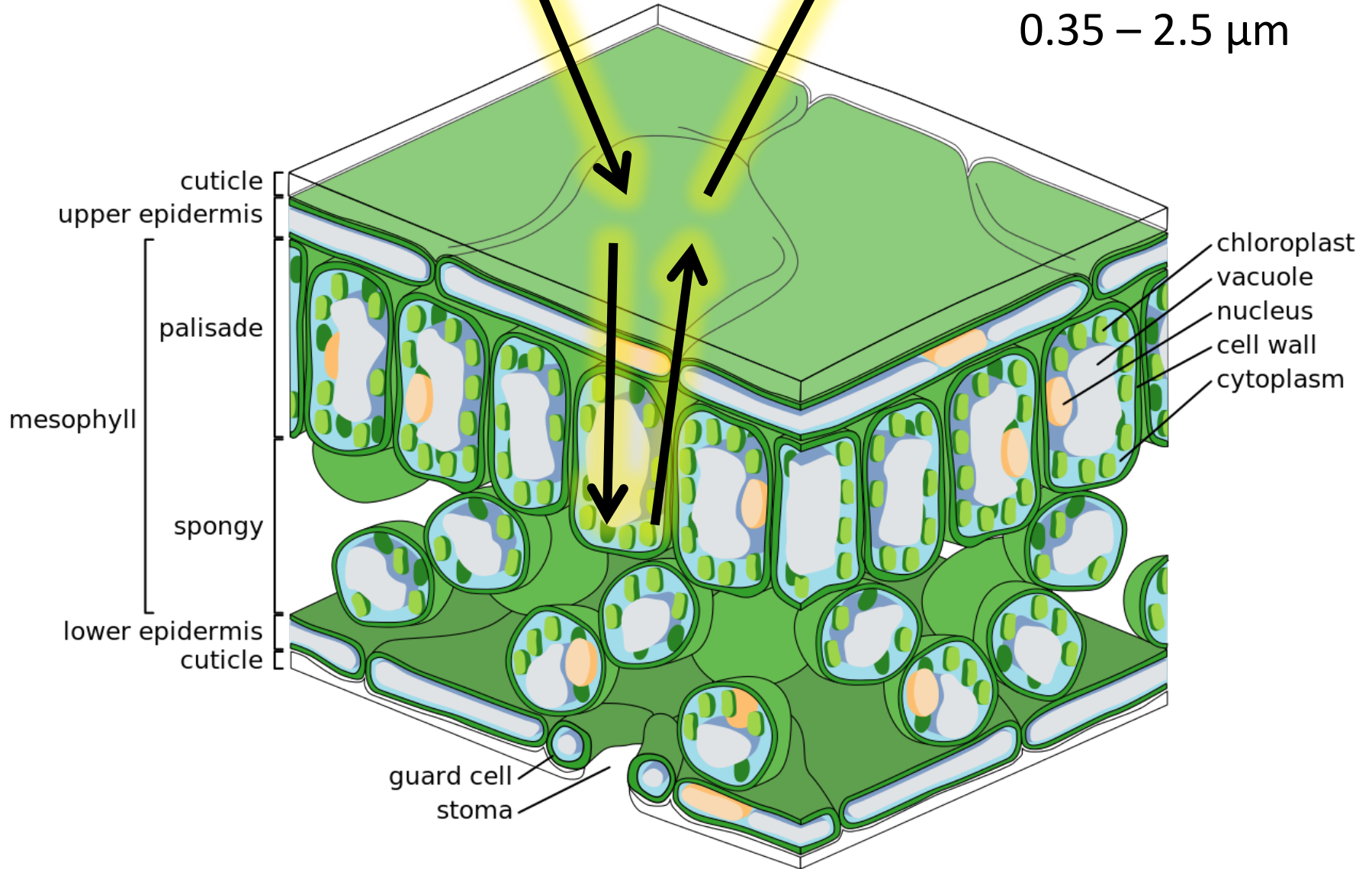


Coast Live Oak



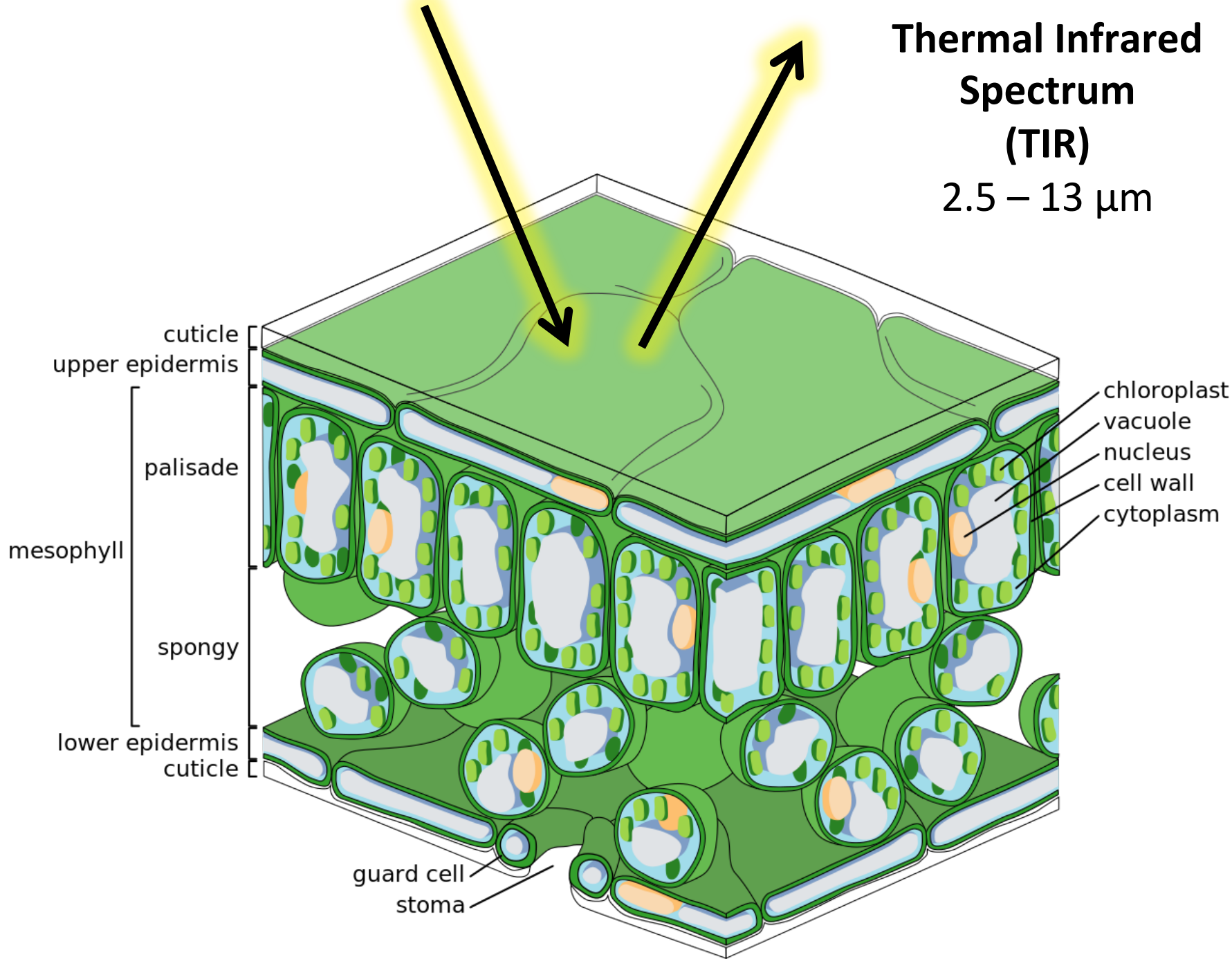
Visible Short Wave Infrared Spectrum (VSWIR)

0.35 – 2.5 μm

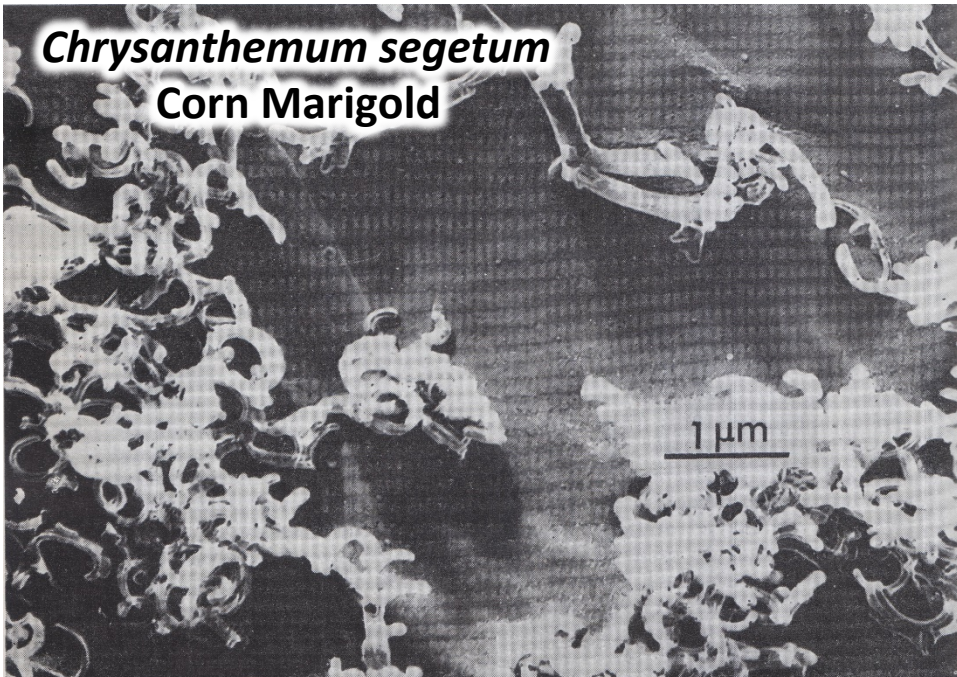


Thermal Infrared Spectrum (TIR)

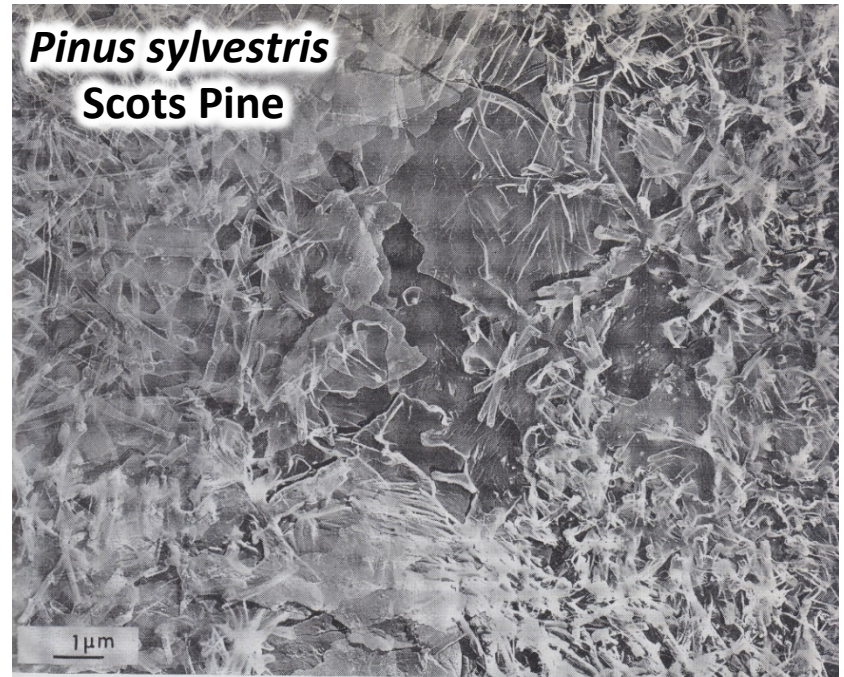
2.5 – 13 μm



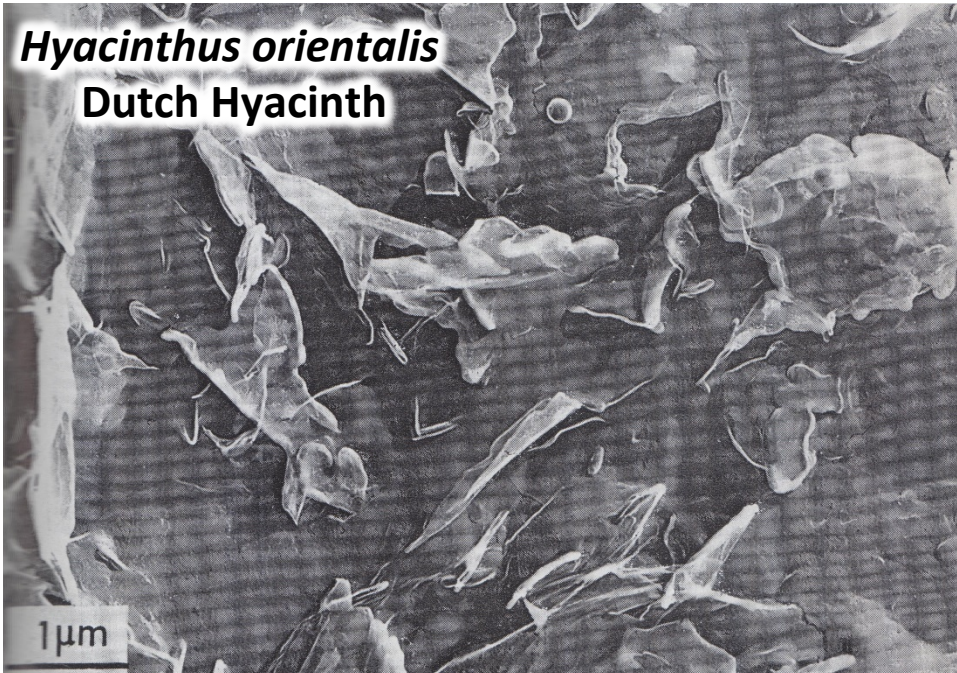
Chrysanthemum segetum
Corn Marigold



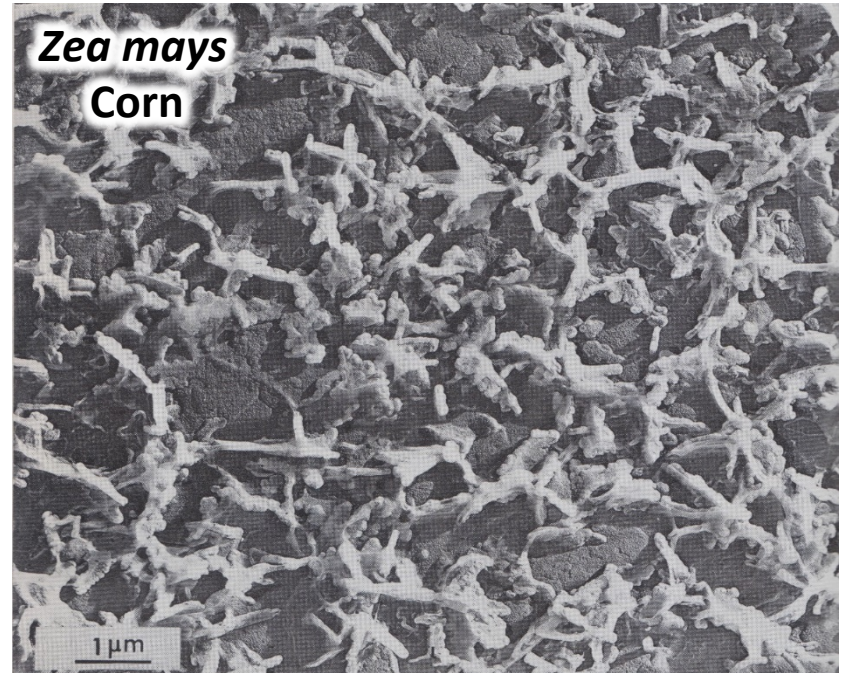
Pinus sylvestris
Scots Pine



Hyacinthus orientalis
Dutch Hyacinth



Zea mays
Corn



1. How do plant species vary at leaf scale in the TIR?



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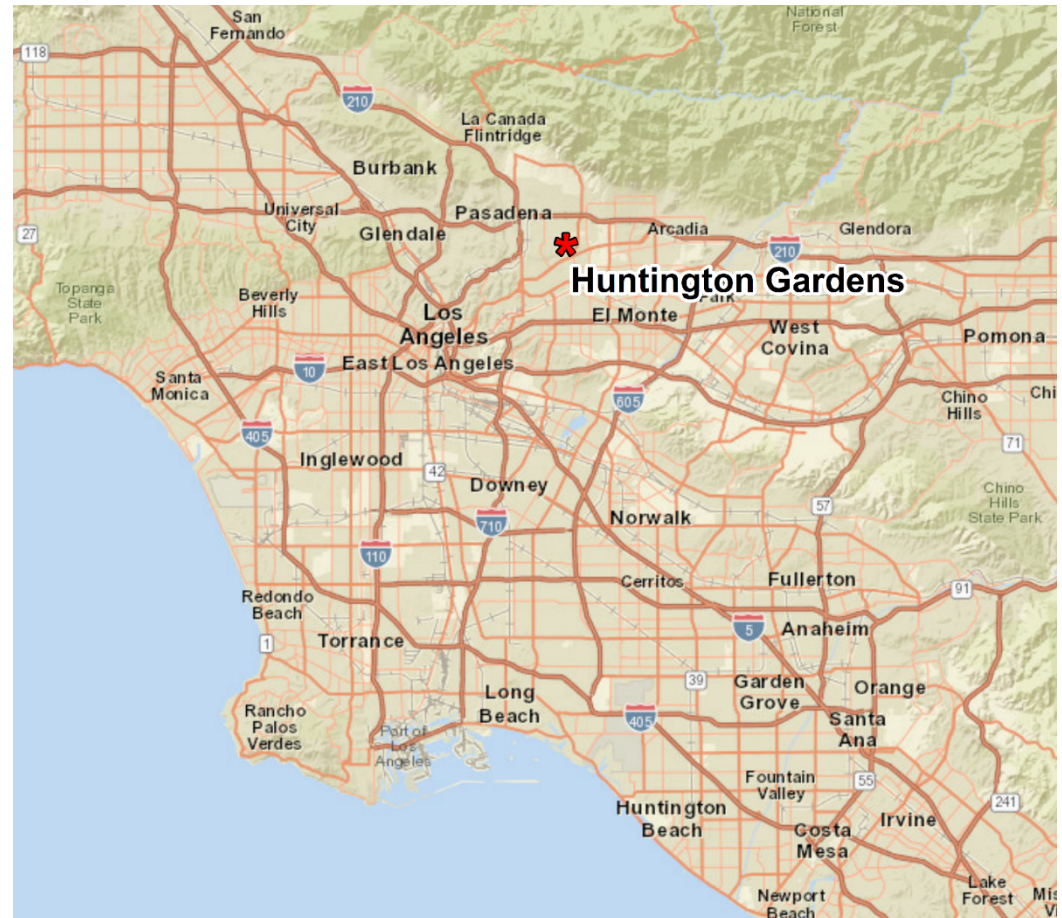


2. Using HyTES imagery, what is the spectral variation among plant canopies?



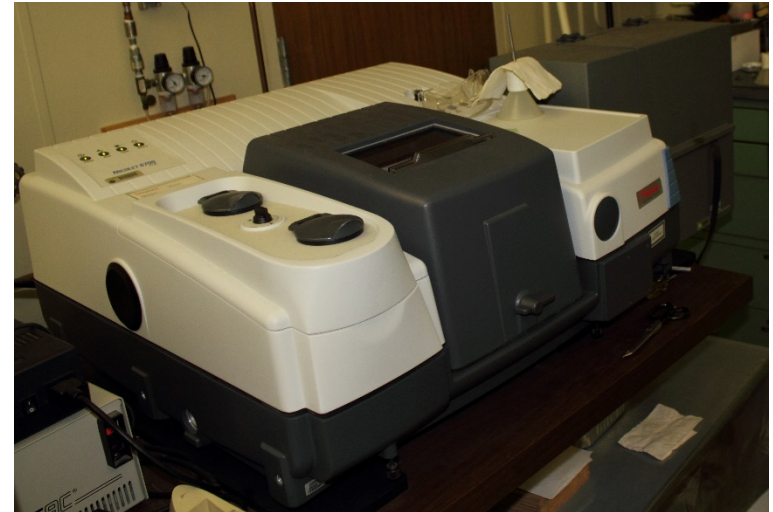
Study Site: Huntington Gardens

- 120 acres
- 138 samples
- 61 species



Nicolet

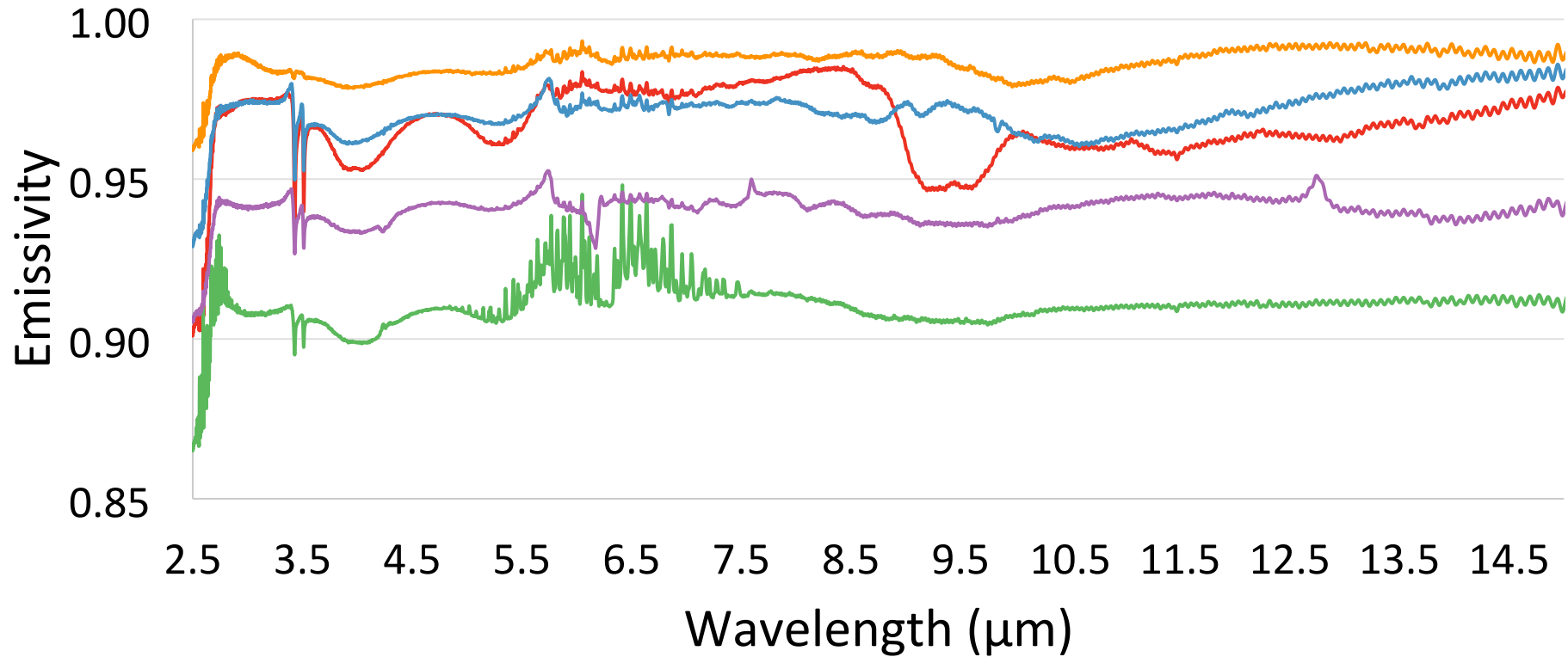
- Spectrum: 2.5 – 15 μm
- Emissivity: 1738 bands
- Collected: Feb. 2, Oct. 3, & Oct. 6



Hyperspectral Thermal Emission Spectrometer

- Spectrum: 7.5 – 12 μm
- Emissivity: 202 bands
- Collected: Jan. 25
- Spatial Resolution: 1.9 m

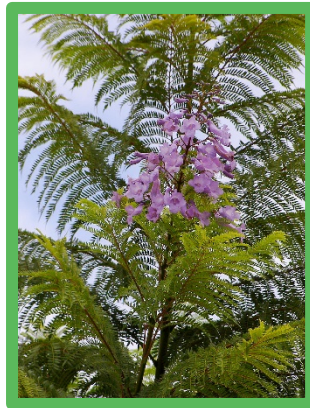




**Punting Pole
Bamboo**



**Golden Medallion
Tree**



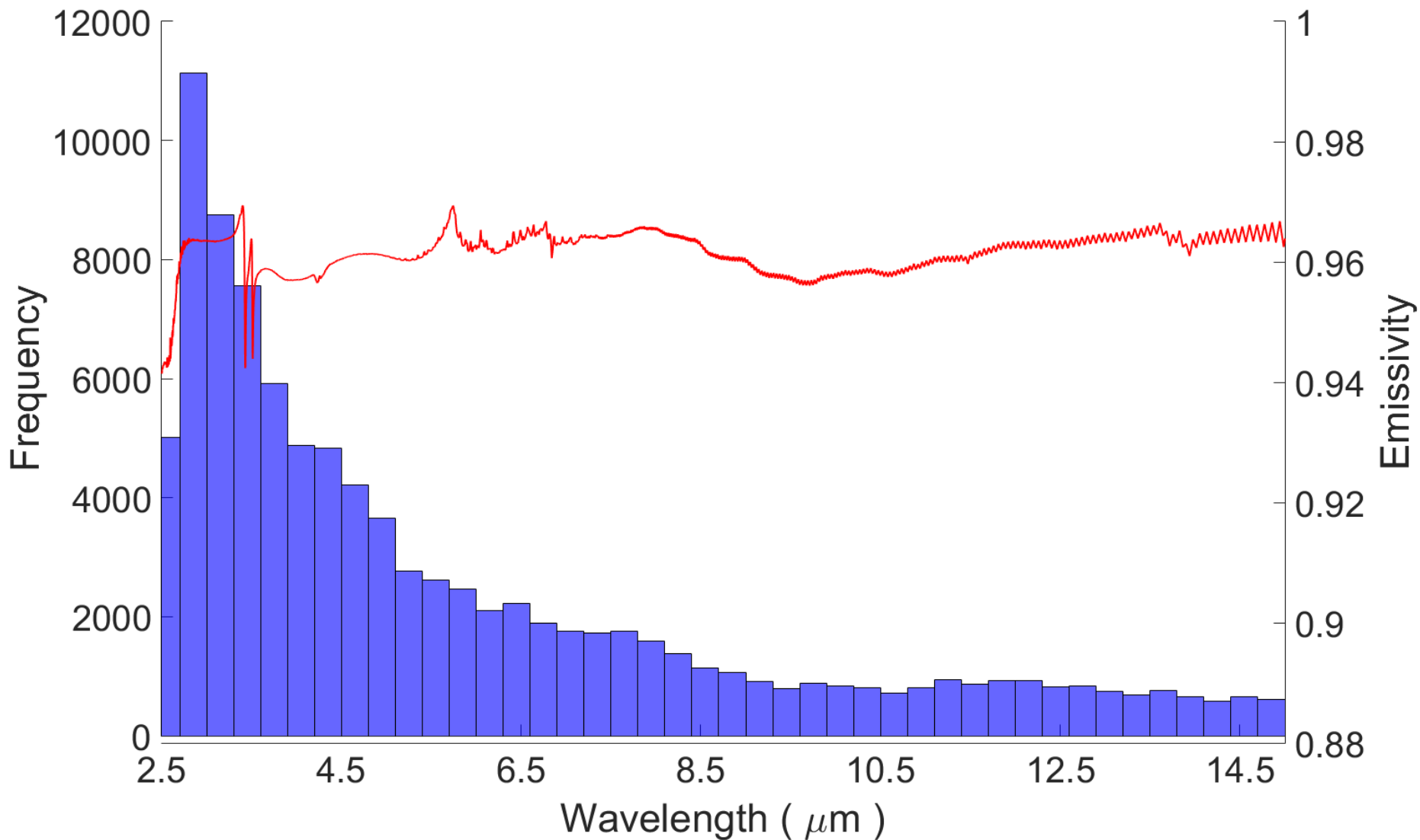
**Jacaranda
Tree**



**Fern Pine
Tree**



**Tipu
Tree**



Least Separable Species



White Silk Floss

Chorisia insignis



Queensland Bottle

Brachychiton rupestris



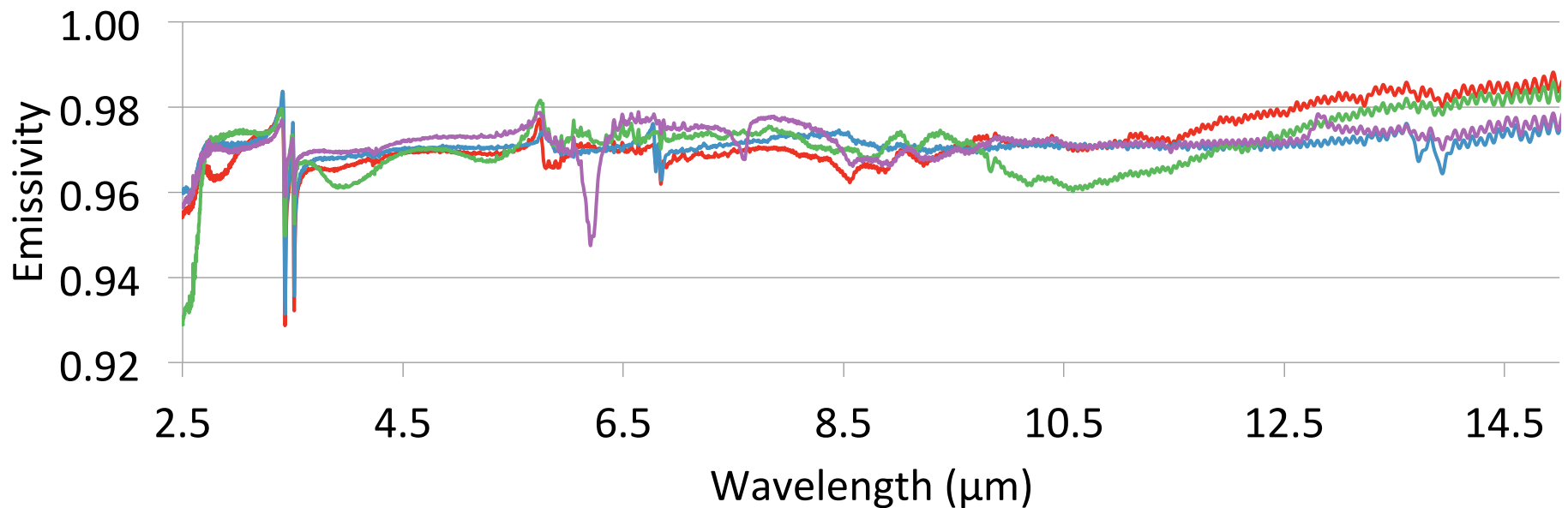
Golden Medallion

Cassia leptophylla



Casalote

Caesalpinia cacalaco



Most Separable Species



Crape Myrtle

Lagerstroemia indica



Holly Oak

Quercus ilex



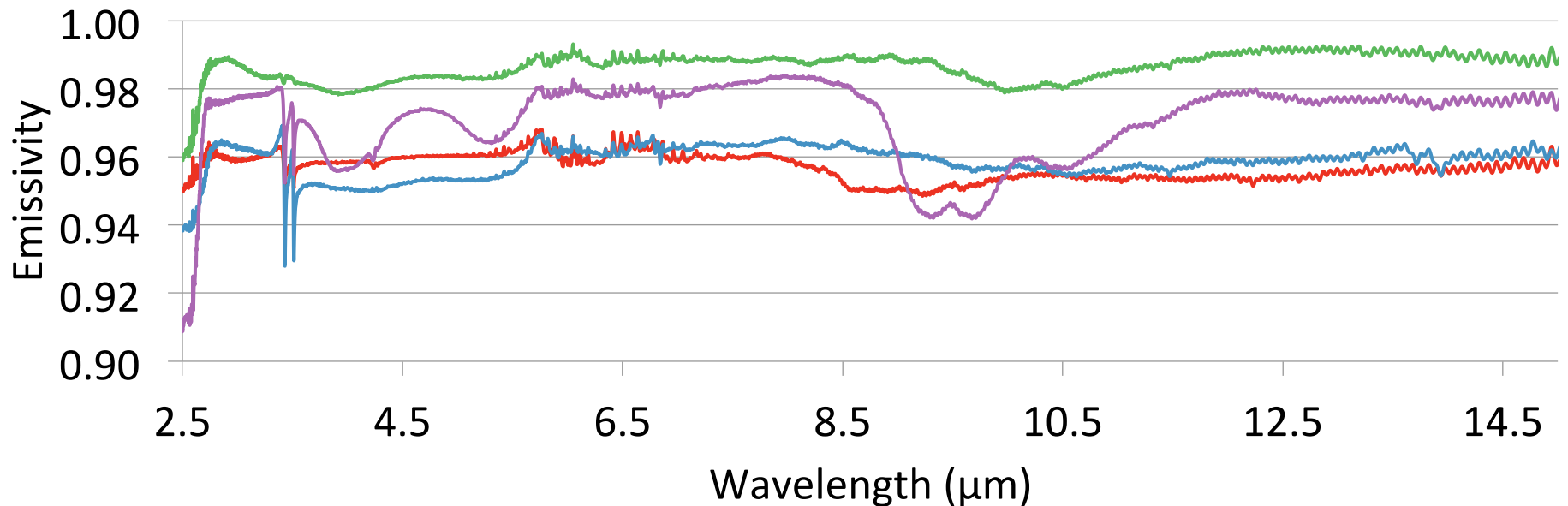
Tipu Tree

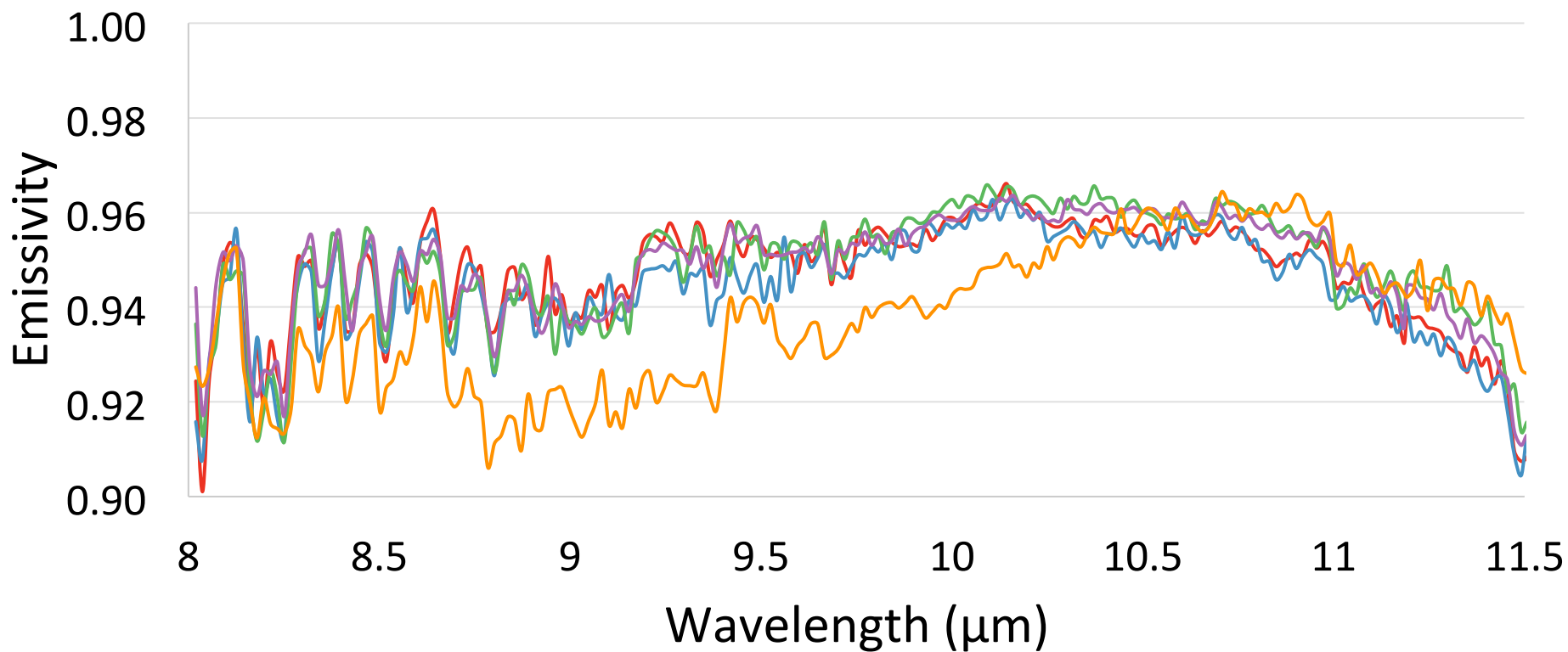
Tipuana tipu



Beechey Bamboo

Bambusa beecheyana





**Punting Pole
Bamboo**



**Golden Medallion
Tree**



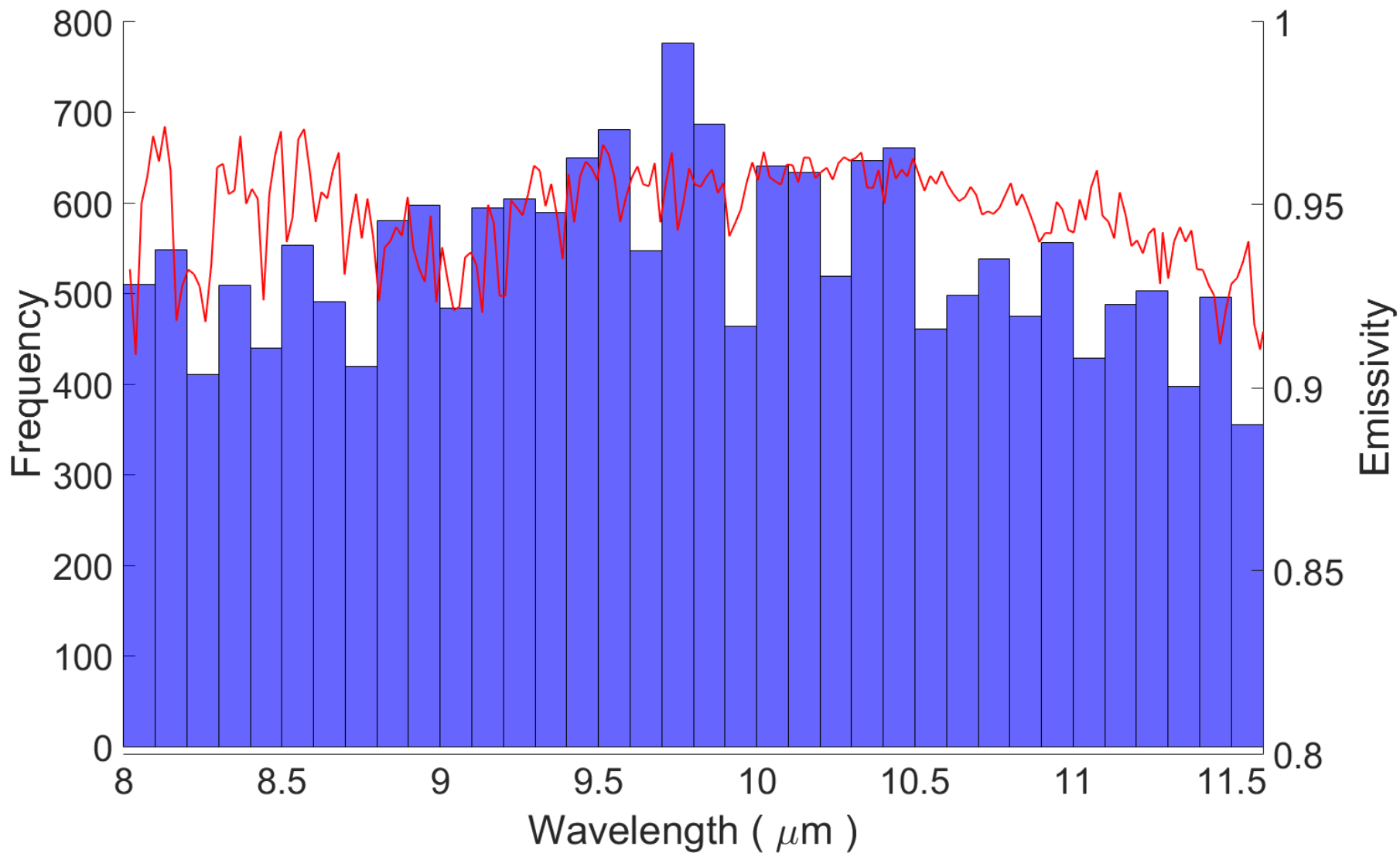
**Jacaranda
Tree**



**Fern Pine
Tree**



**Tipu
Tree**



Least Separable Species



Queensland Bottle

Brachychiton rupestris



Holly Oak

Quercus ilex



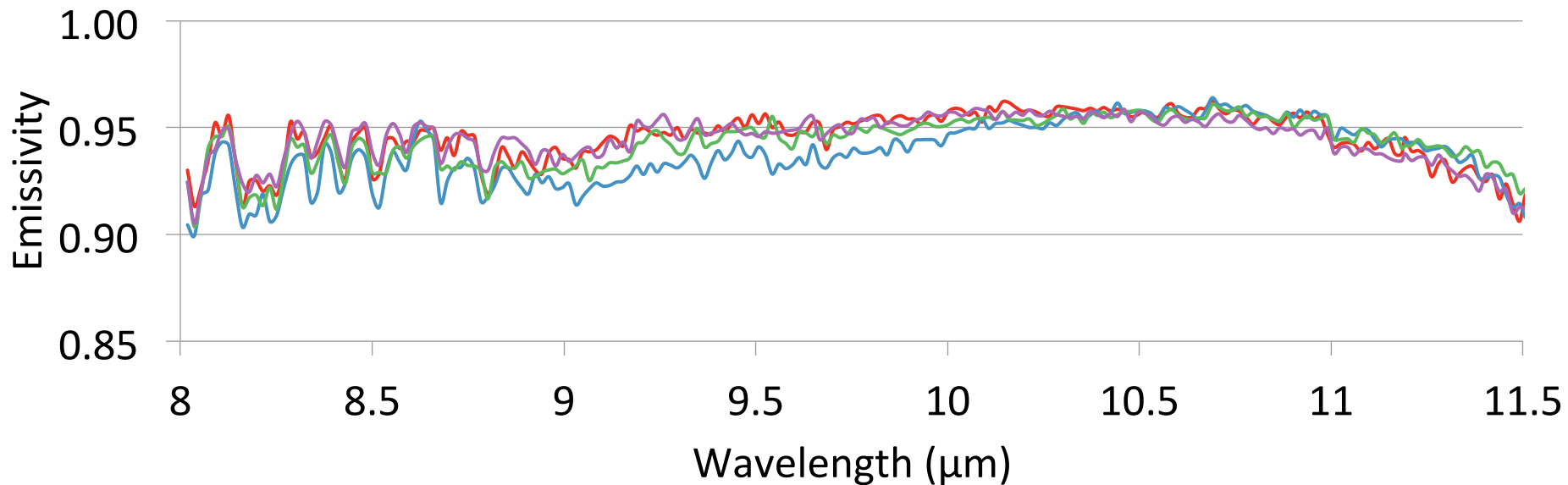
Crape Myrtle

Lagerstroemia indica



Montezuma Cypress

Taxodium mucronatum



Most Separable Species



Beechey Bamboo

Bambusa beecheyana



Weeping Wattle

Peltophorum africanum



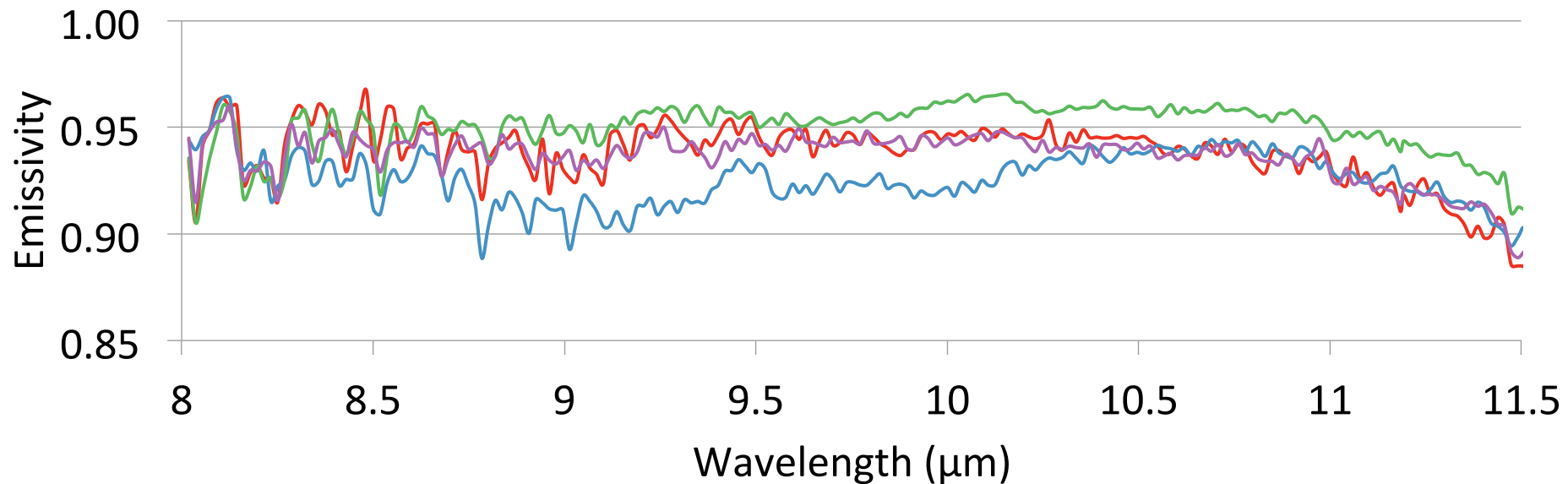
Timber Bamboo

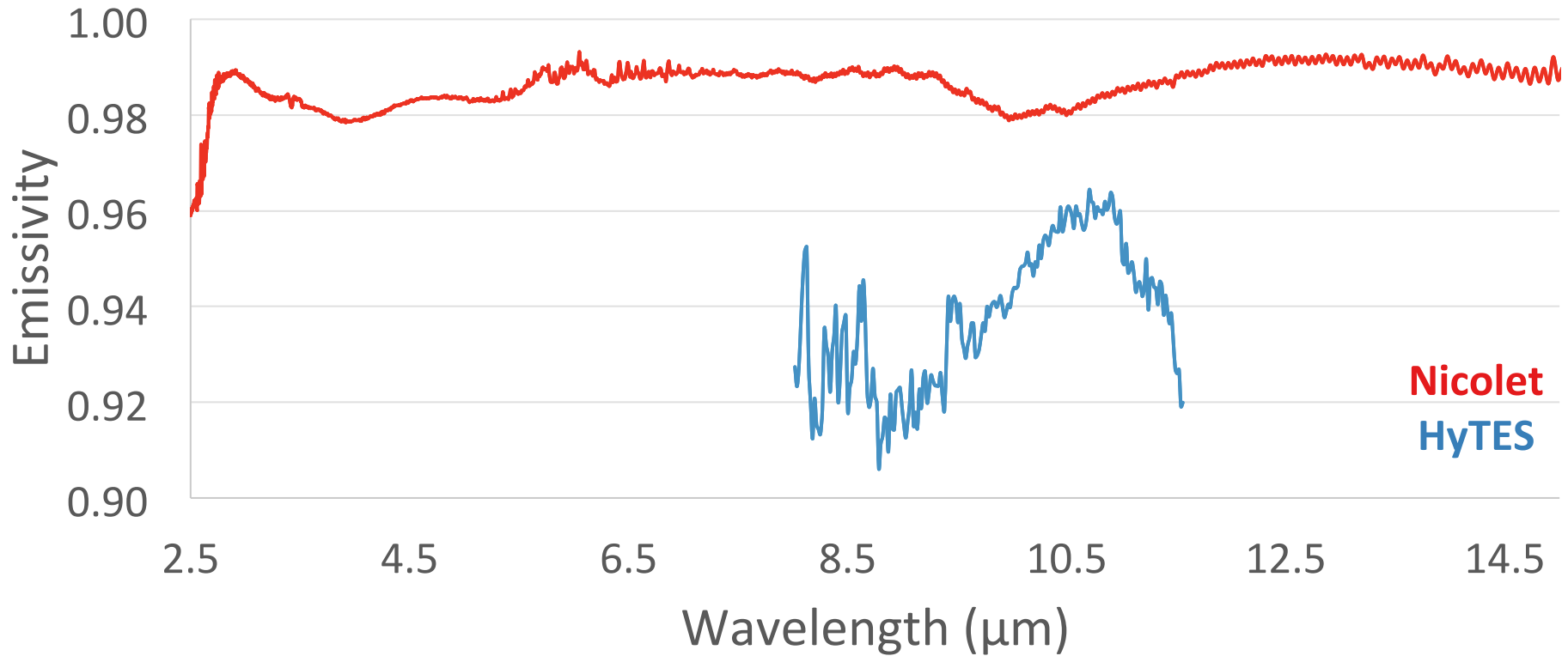
Phyllostachys vivax



Southern Live Oak

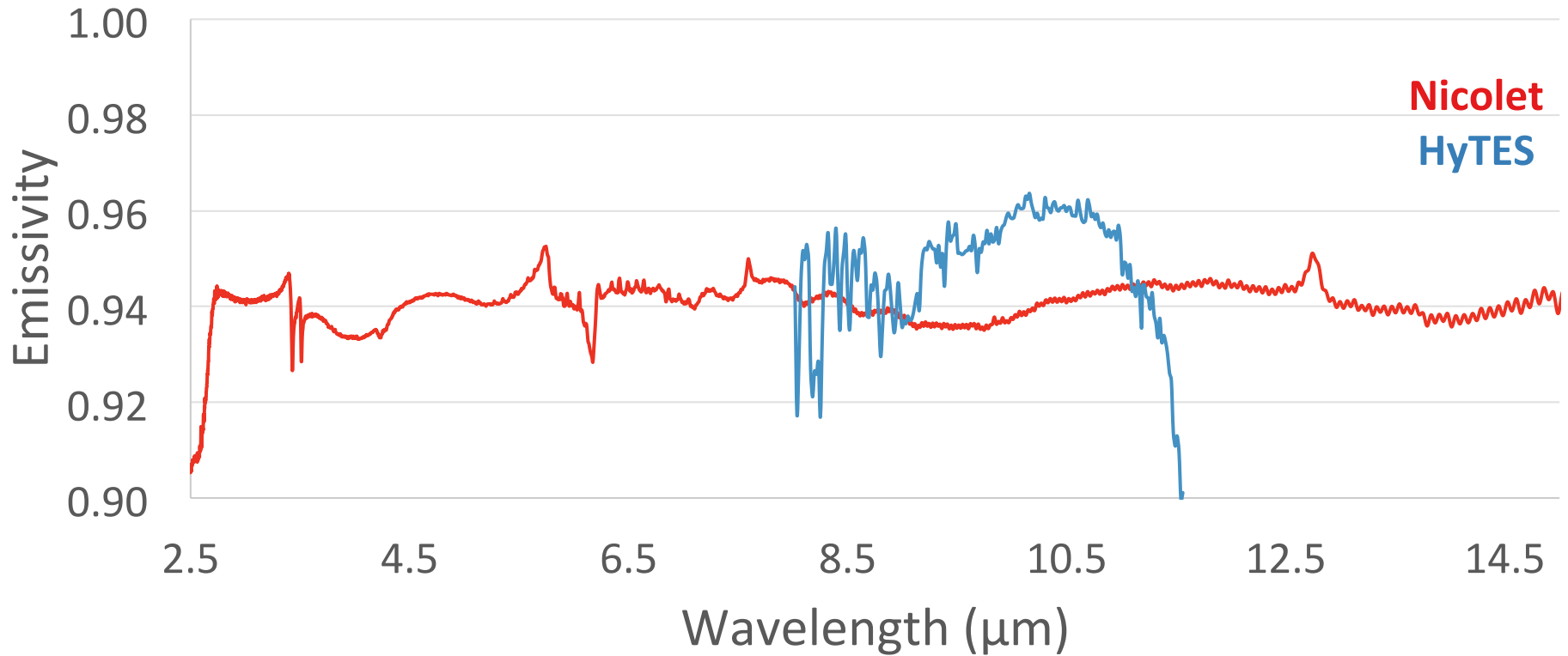
Quercus virginiana





Tipu Tree
Tipuana tipu





Fern Pine
Podocarpus gracilior



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 - Species show unique absorption features
 - Separability decreases with longer wavelengths

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Future Work

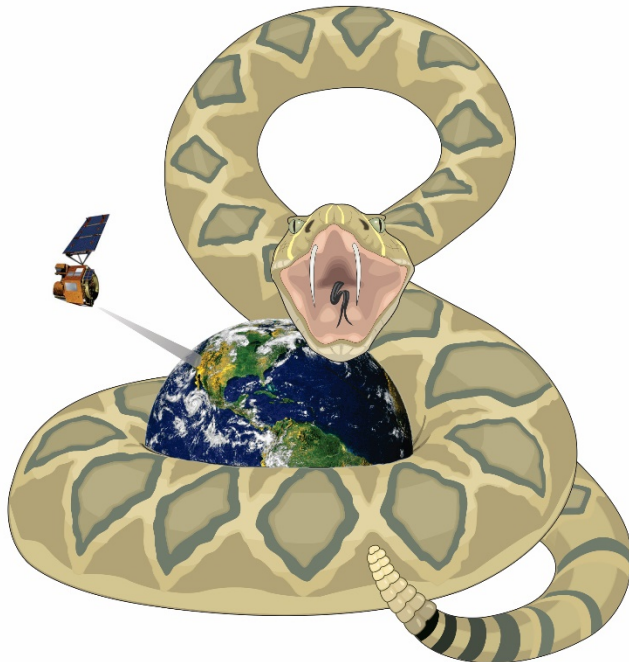
- Absorption features
- Leaf versus canopy
- Canopy temperature

Susan Meerdink*, Simon Hook, Dar Roberts

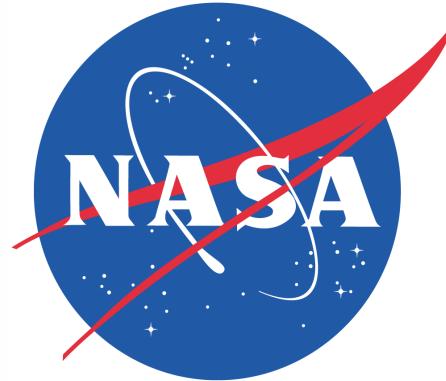
*susanmeerdink@geog.ucsb.edu

VIPER

Visualization & Image Processing for Environmental Research Lab



Department of Geography, University of California Santa Barbara



JPL
Jet Propulsion Laboratory

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