BioSCape Overview

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NASA
520
BIOSCAPE
Biodiversity Survey of the Cape
bioscape.io

Remote Sensing = Acquiring information from a distance

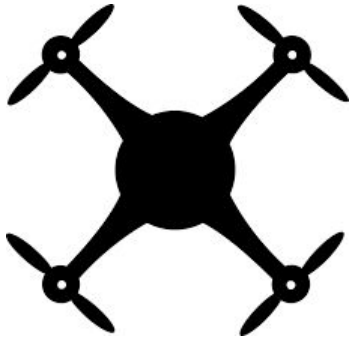
Satellites
(Orbital)

- Quick revisit time
- Best geographic coverage

Airplane Mounted
(Airborne)

- Smaller pixel size
- Long revisit times

Unoccupied Aerial Mounted
(Drone)



- Smallest pixel size
- On demand flights?

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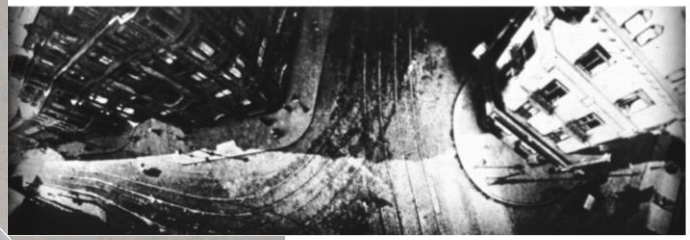
By Dr Julius Neubronner



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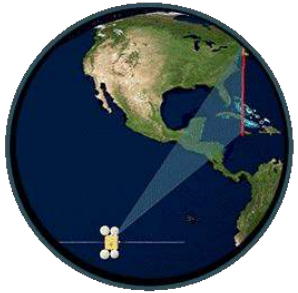

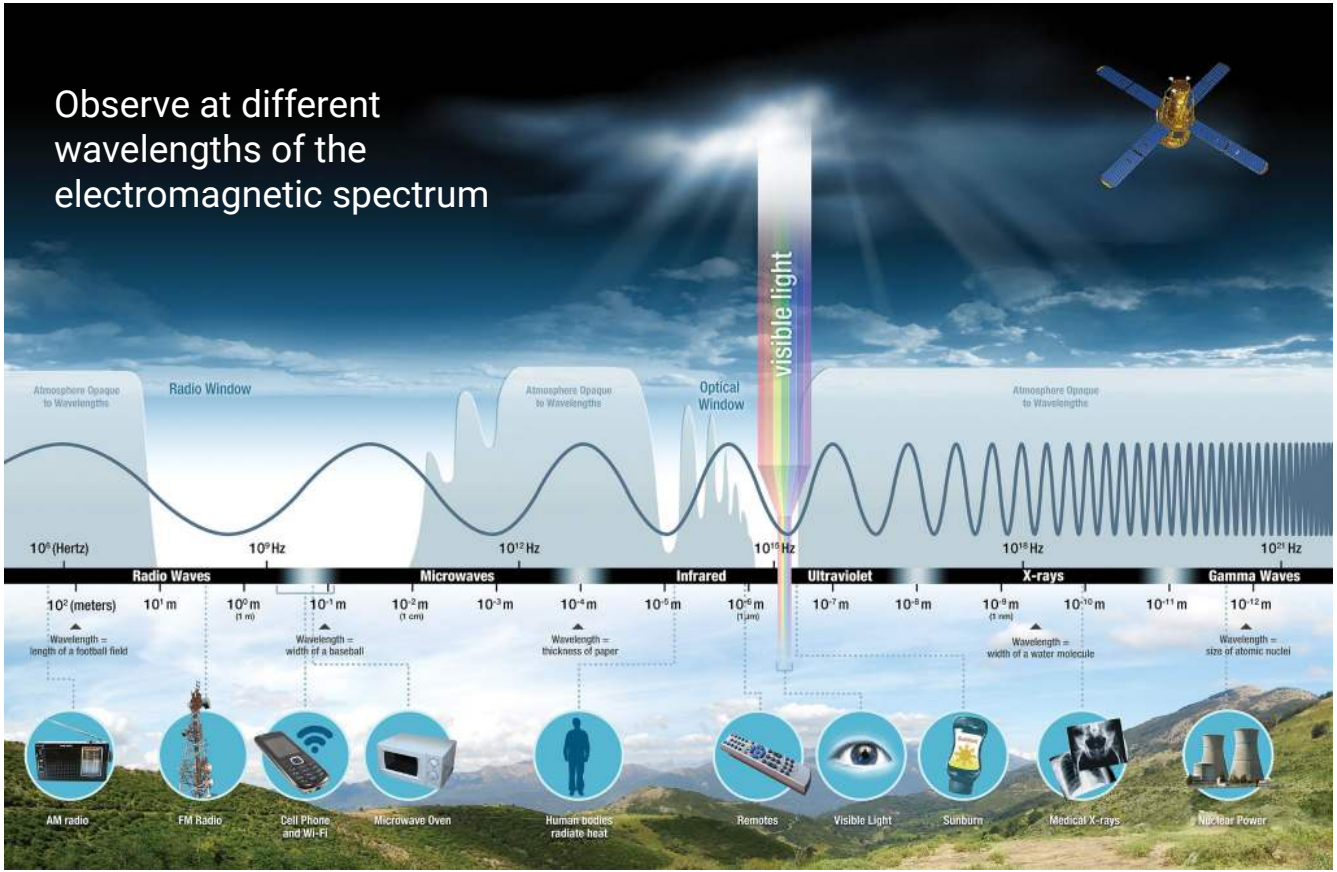

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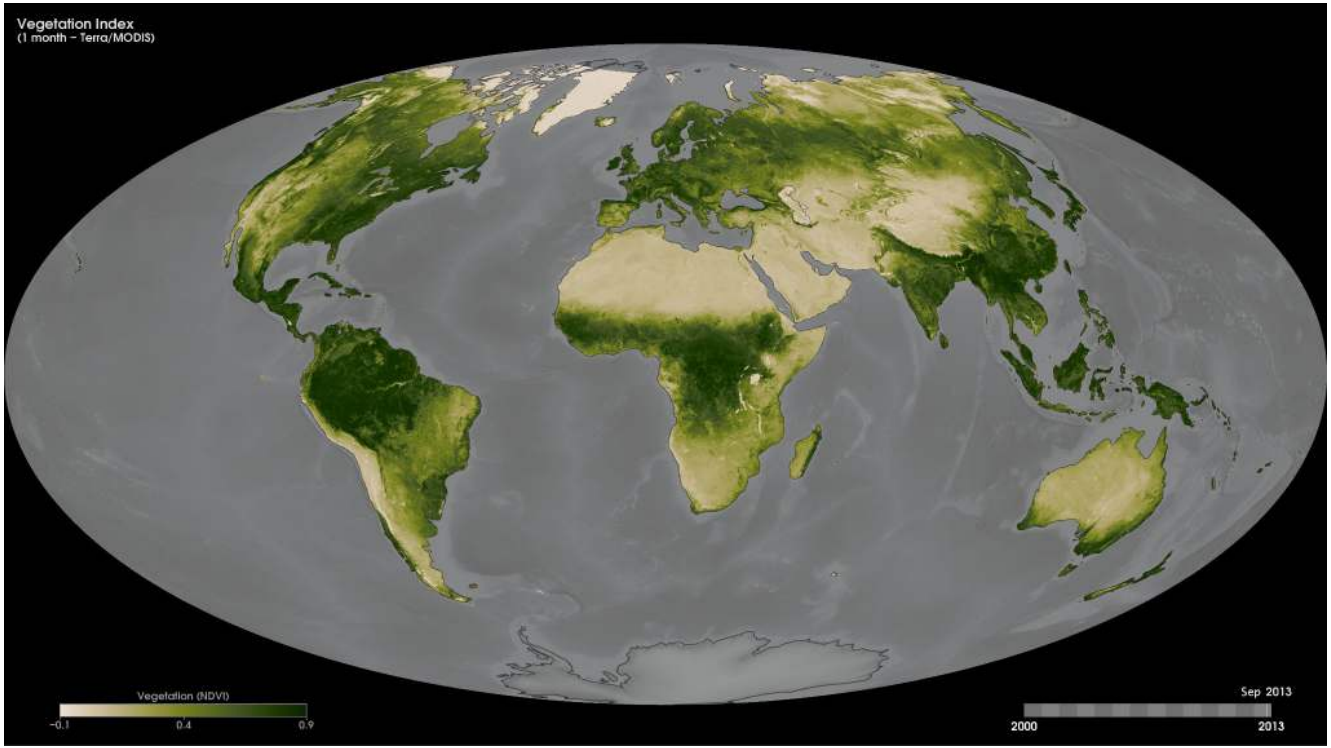
Remote sensing measures some ecosystem properties globally

MODIS: Normalized Difference Vegetation index (NDVI) or “Greenness”

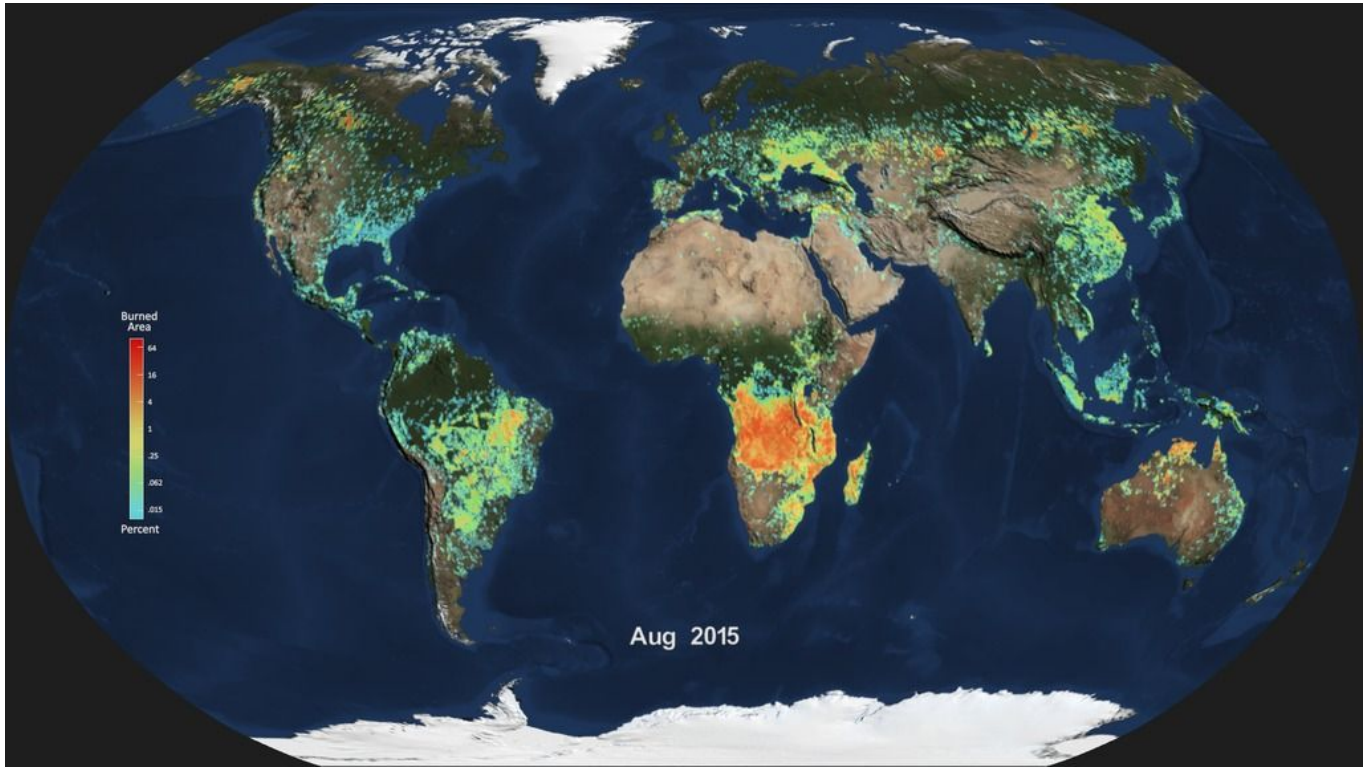


Remote sensing measures some ecosystem properties globally

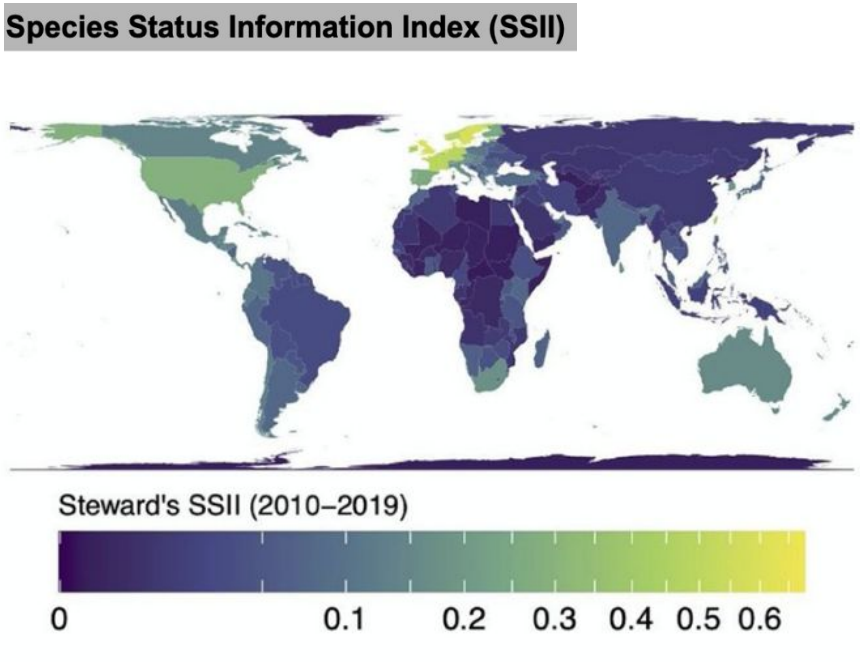
Landsat:
Surface water bodies

Remote sensing measures some ecosystem properties globally

VIIRS:
Global Burnt Area



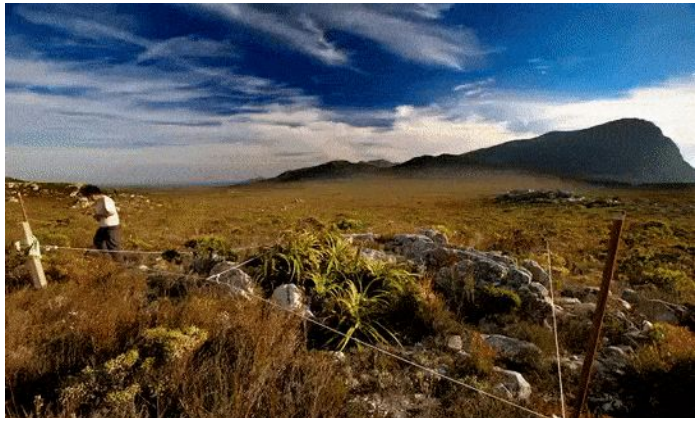
But we can’t yet measure and monitor biodiversity globally



Oliver et al.. PLoS Biol., 2021

Why not?

- Biodiversity is site specific, we need field data. But - Field measurements are difficult to do at the scale needed.
- Remote sensing technology has not been advanced enough to fill the gaps.



A new age for remote sensing of biodiversity

PACE

EARTH SURFACE MINERAL DUST SOURCE INVESTIGATION
EMIT

ECOSTRESS
ECOsystem Spaceborne Thermal Radiometer Experiment on Space Station
NASA | JPL

GEDI
ECOSYSTEM LIDAR

ASI AGENZIA SPAZIALE ITALIANA
LEONARDO
OHB ITALIA
PRISMA

EnMAP
Hyperspectral Imager

DLR
DESIS

CHIME
Copernicus Hyperspectral Imaging Mission

Future missions

SBG

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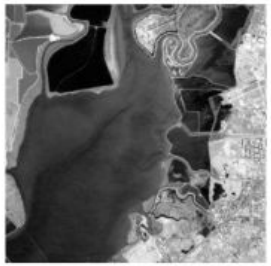
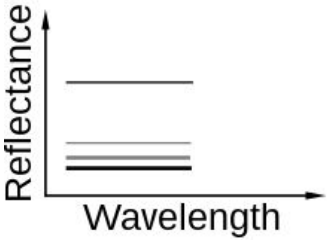
What makes these new satellites different?

Single Band





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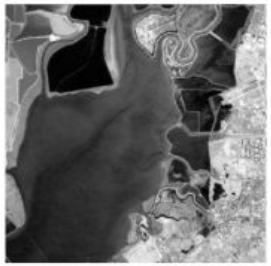
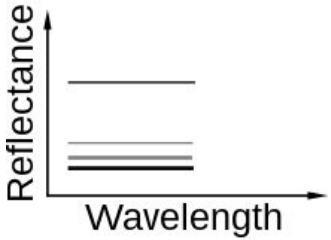
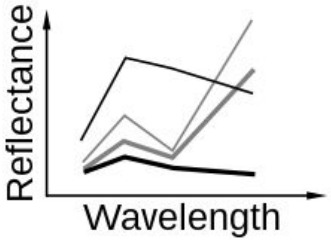


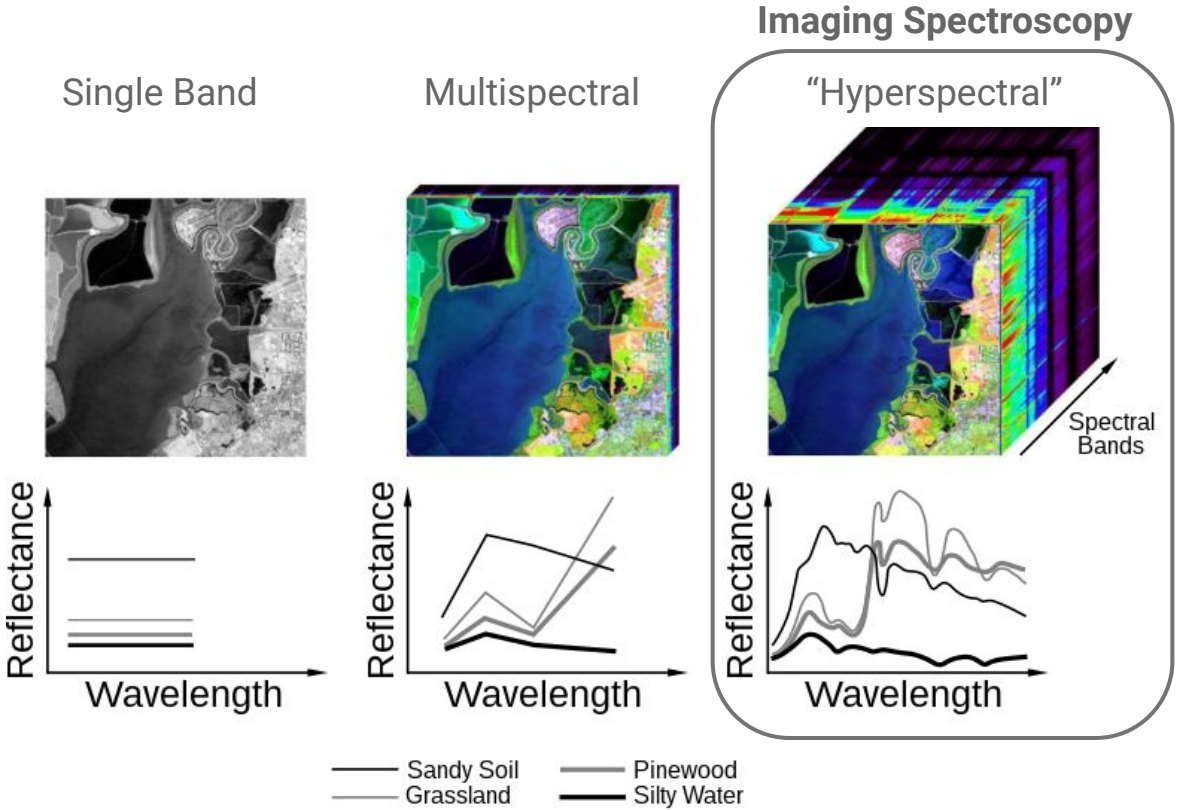


Multispectral



Landsat
MODIS
etc.

What makes these new satellites different?



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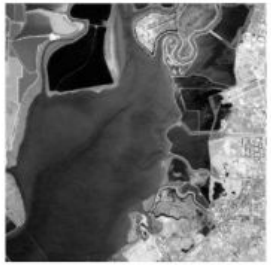

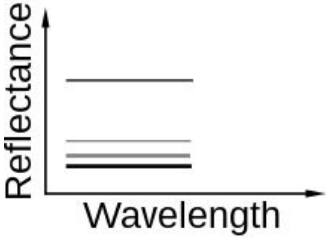

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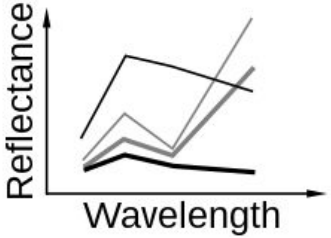
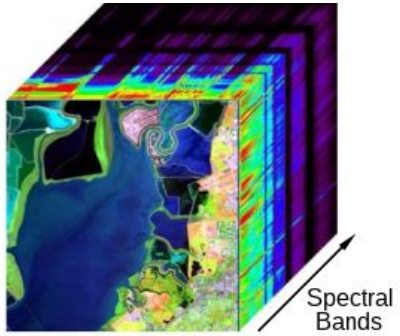
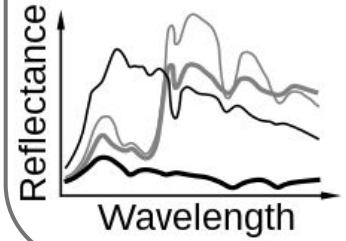


Imaging Spectroscopy

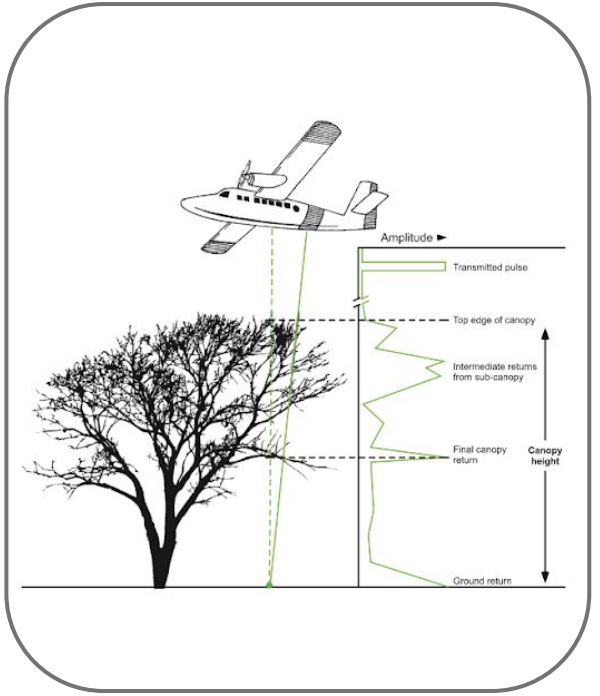
"Hyperspectral"





Sandy Soil
Grassland
Pinewood
Silty Water

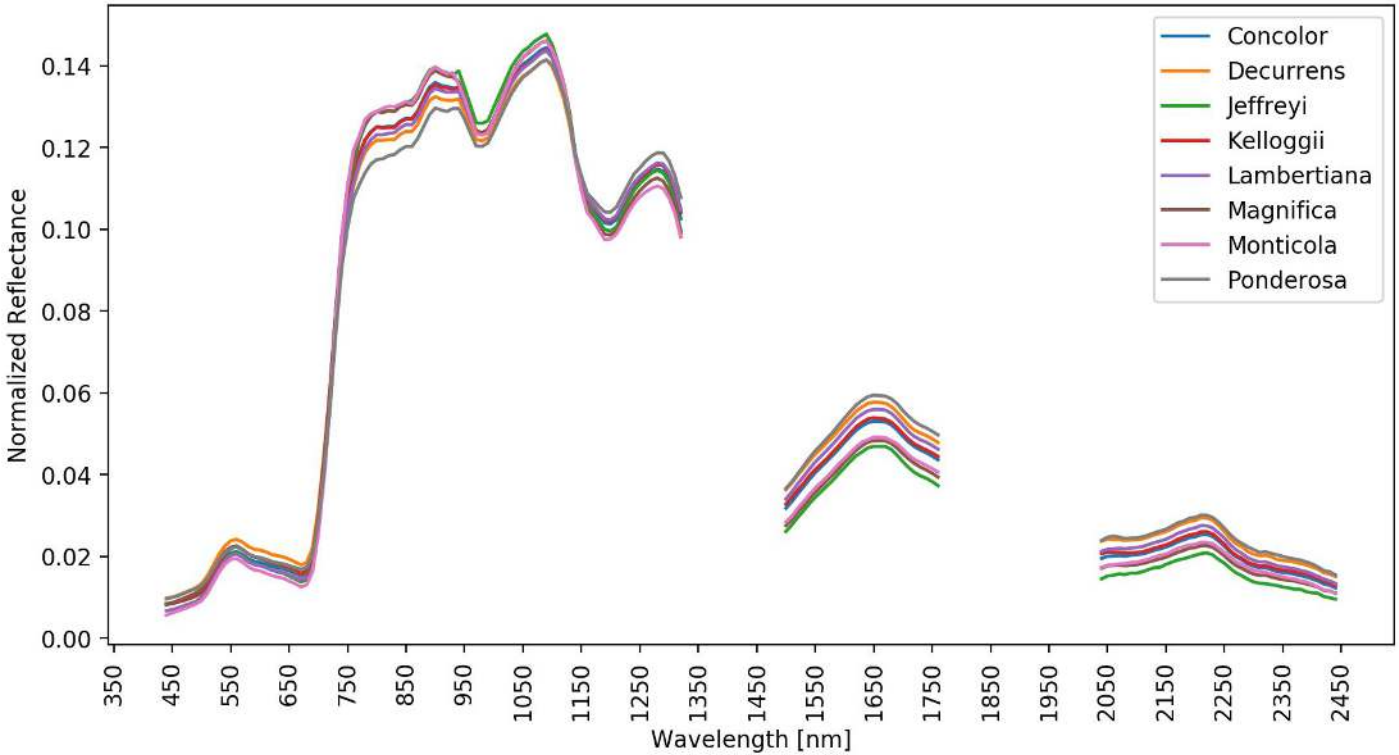
Lidar



Lucas van den Bosch (commons.wikimedia.org)
Purkis & Klemas (2011)

What makes these new satellites different?

Imaging spectroscopy gives you subtle signatures that facilitate species mapping



P.Brodrick

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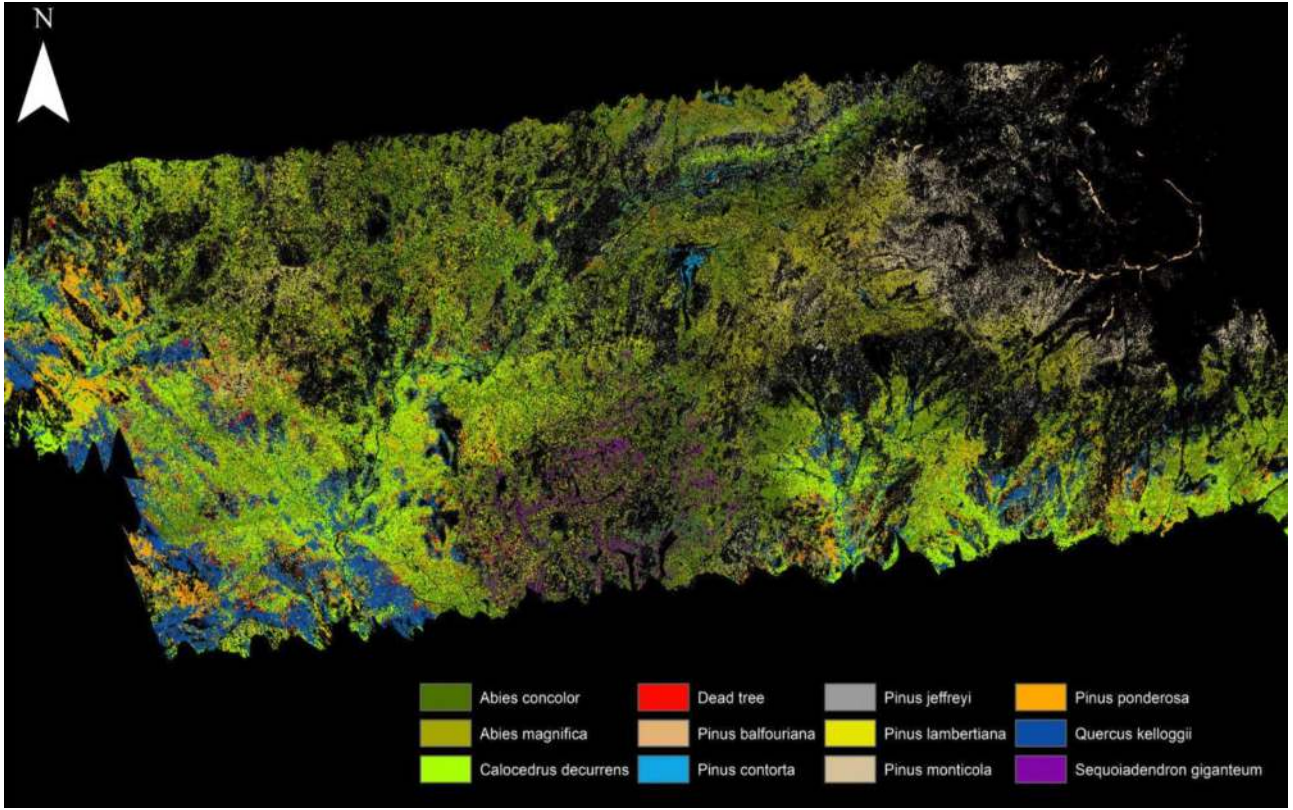
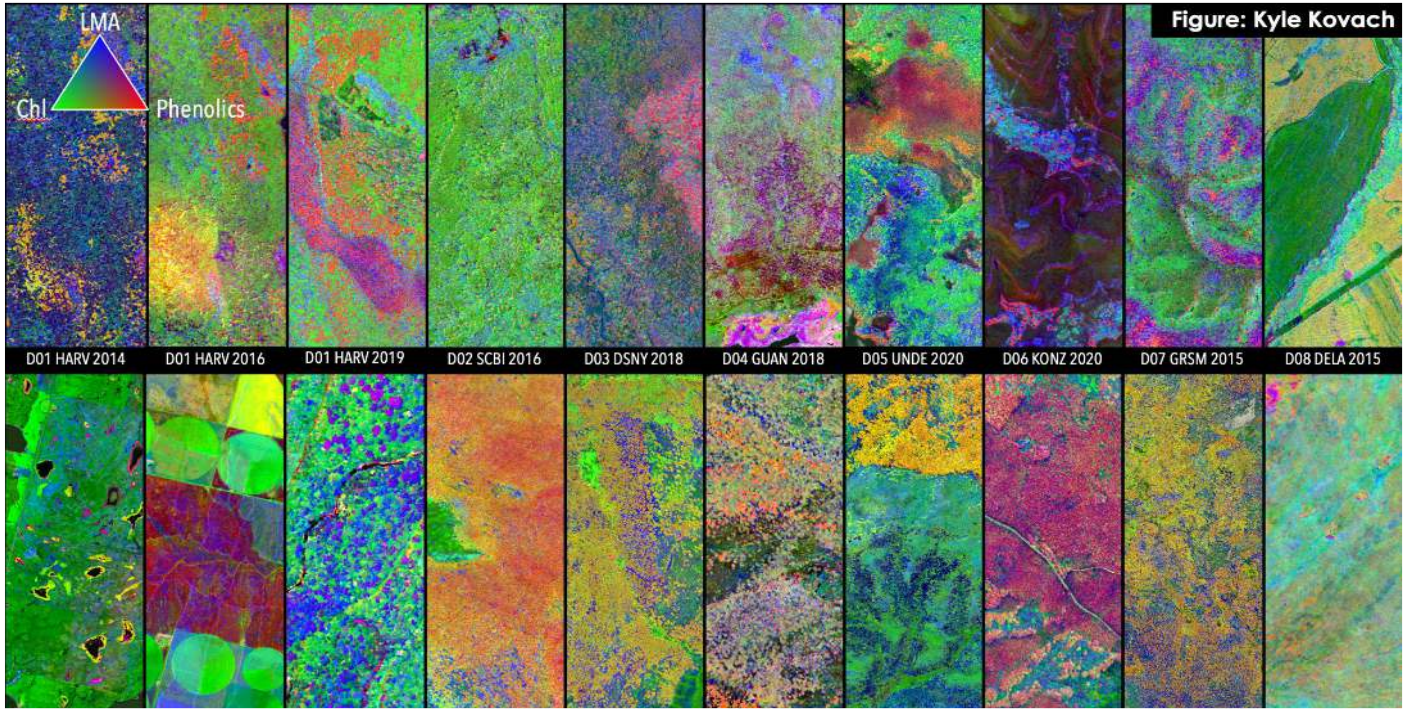


Paz-Kagan et al., Ecol. App., 2017

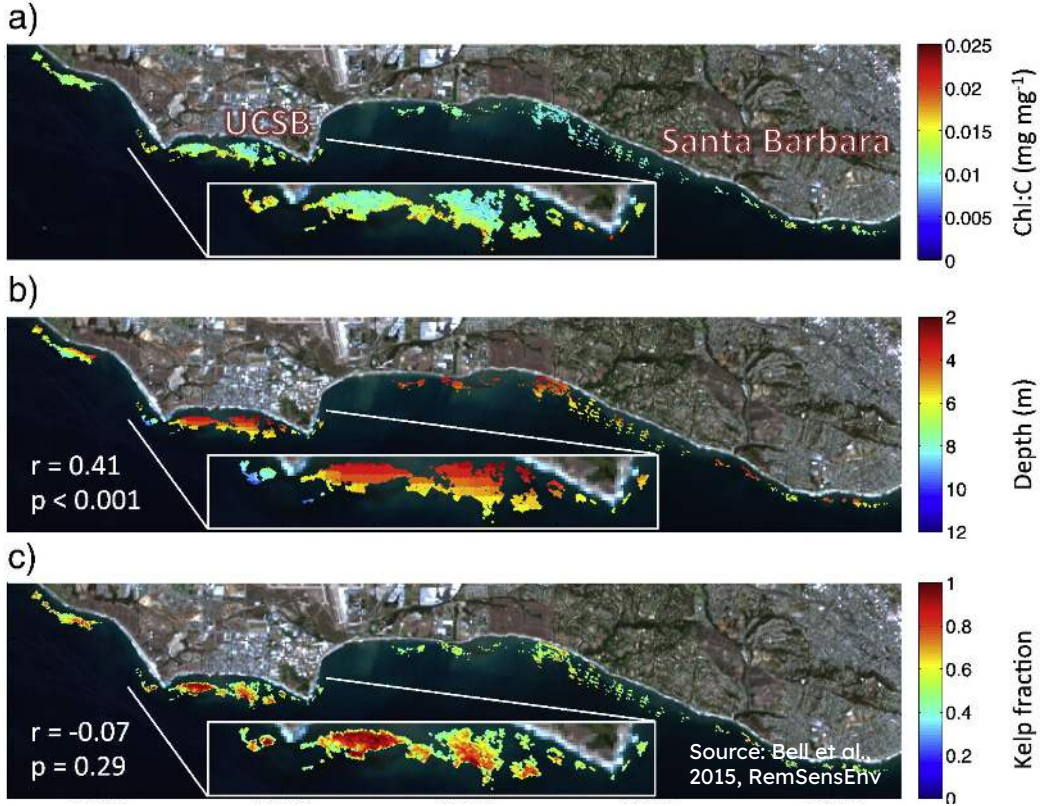
What makes these new satellites different?

Can map plant functional traits



What makes these new satellites different?

Can map kelp forest extent and physiological condition



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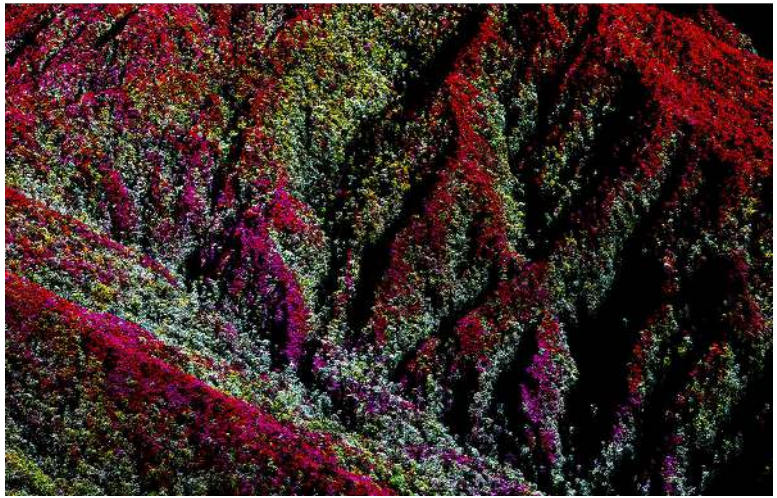
What makes these new satellites different?

When coupled with LiDAR, you can learn more by coupling structure and function



Tropical forest in Malaysian Borneo

Mixed upper montane area in Colorado USA

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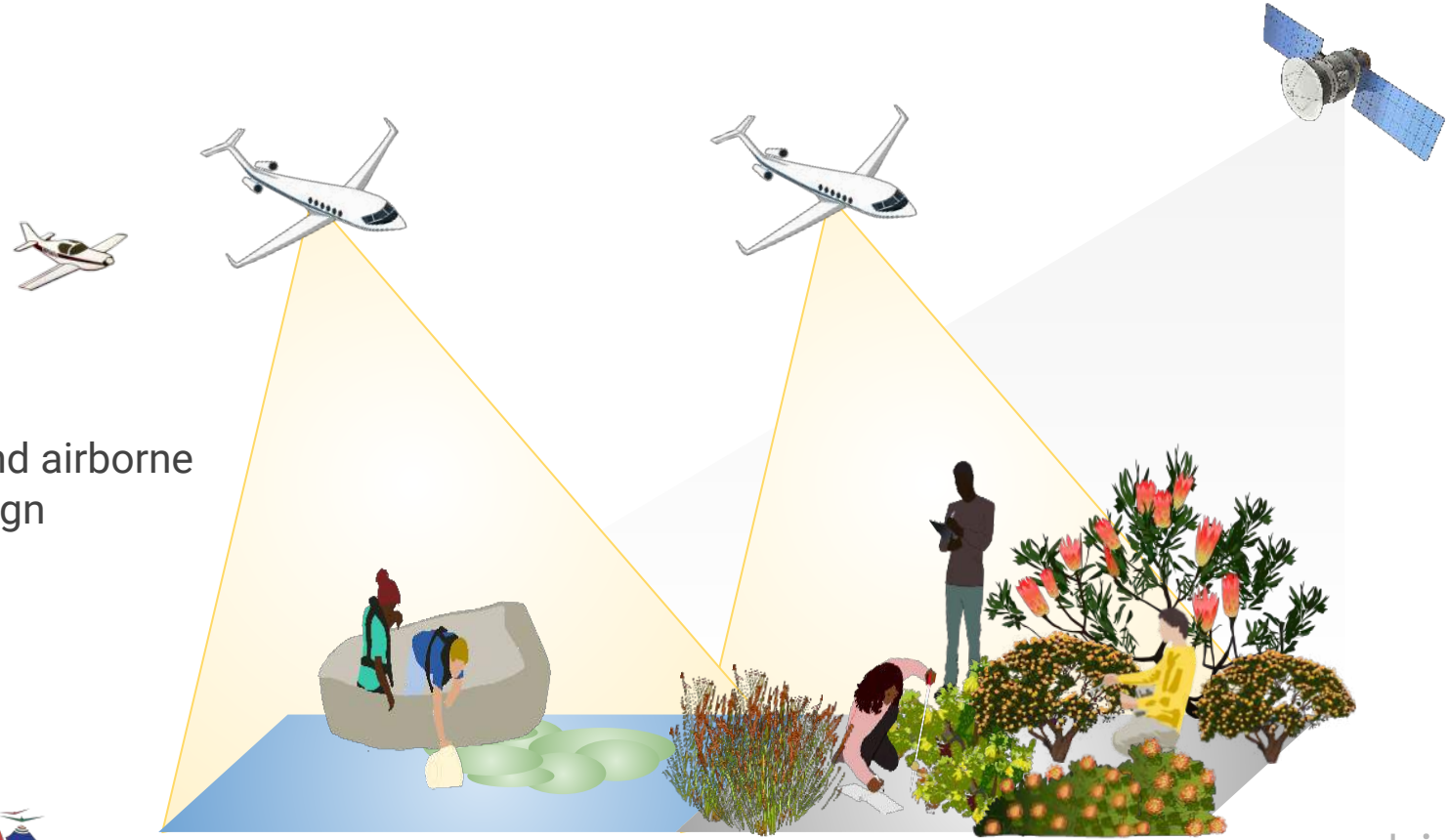
Lots of potential - but we still need to define what's possible!

Field and airborne campaign



BIOSCAPE: Biodiversity Survey of the Cape

1. WE COLLECT DATA: REMOTE & IN-FIELD

REMOTE: landsat, sentinel, EMIT, ECOSTRESS

IN-FIELD: Phytoplankton functional types

IN-FIELD: Plant functional traits & species composition

IN-FIELD: Leaf & canopy spectra

IN-FIELD: Animal counts

IN-FIELD: DNA & eDNA samples

REMOTE: Imaging spectometry (UVSWIR & thermal) and laser altimeter

2. TO STUDY BIODIVERSITY

FUNCTIONAL DIVERSITY

TAXONOMIC DIVERSITY

PHYLOGENETIC DIVERSITY

SPECTRAL DIVERSITY

3. TO BETTER CONSERVE NATURE & ITS CONTRIBUTIONS TO PEOPLE

SHIFTING COMMUNITY COMPOSITION

ECOSYSTEM DISTURBANCE, RESILIENCE & RECOVERY

ECOSYSTEM FUNCTION & CONTRIBUTION TO PEOPLE

Data is Findable, Accessible, Interoperable, and Reuseable (FAIR)

OPEN ACCESS

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Biodiversity Survey of the Cape (BioSCape)

Overview

The Biodiversity Survey of the Cape (BioSCape) is an international collaboration between South Africa and the United States to study biodiversity in South Africa's Greater Cape Floristic Region (GCFR). The GCFR was selected due to two exceptional hotspots of both terrestrial and aquatic biodiversity. The GCFR is listed among the World's 200 Significant Ecoregions. The BioSCape is an integrated field and airborne campaign occurring in 2023. The campaign will collect UV/visible to short wavelength infrared (UVSWIR) and thermal imaging spectroscopy and laser altimetry LiDAR data over terrestrial and aquatic targets using four airborne instruments: Airborne Visible InfraRed Imaging Spectrometer - Next Generation (AVIRIS-NG), Portable Remote Imaging SpectroMeter (PRISM), Land, Vegetation, and Ice Sensor (LVIS), and Hyperspectral Thermal Emission Spectrometer (HyTES). The anticipated airborne data set is unique in its size and scope and unprecedented in its instrument combination and level of detail. These airborne data will be accompanied by a range of biodiversity-related field observations. BioSCape's primary objective is to understand the structure, function, and composition of the region's ecosystems, and to learn about how and why they are changing in time and space.

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BioSCAPE Project Website

Welcome to BioSCape Cloud!