Using Satellite Data and Python Tools to Explore Earth's Biomass

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NASA

JPL
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Overview

> Definitions

> Demo

Biomass monitoring

"Aboveground biomass refers to the total amount of plant based organic matter on the surface of the Earth, playing a role in the terrestrial carbon cycle"

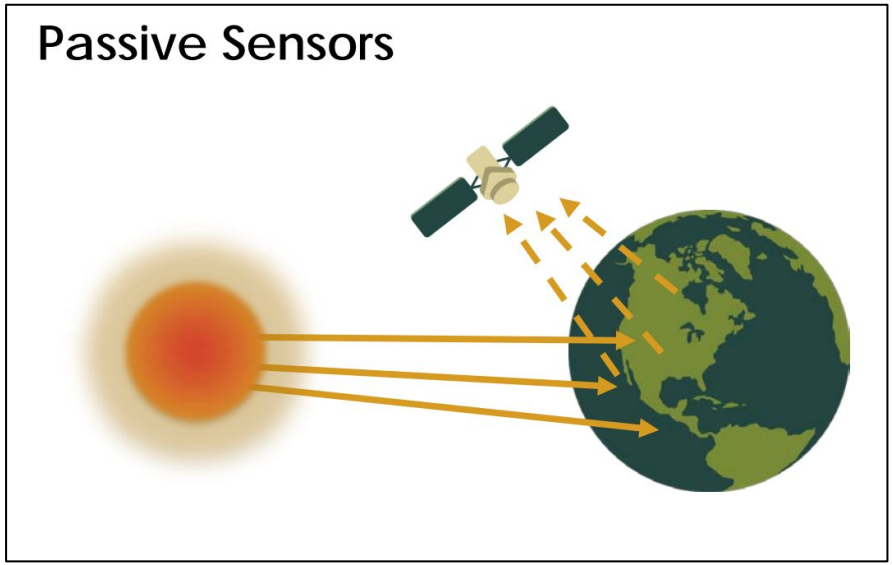
Biomass monitoring

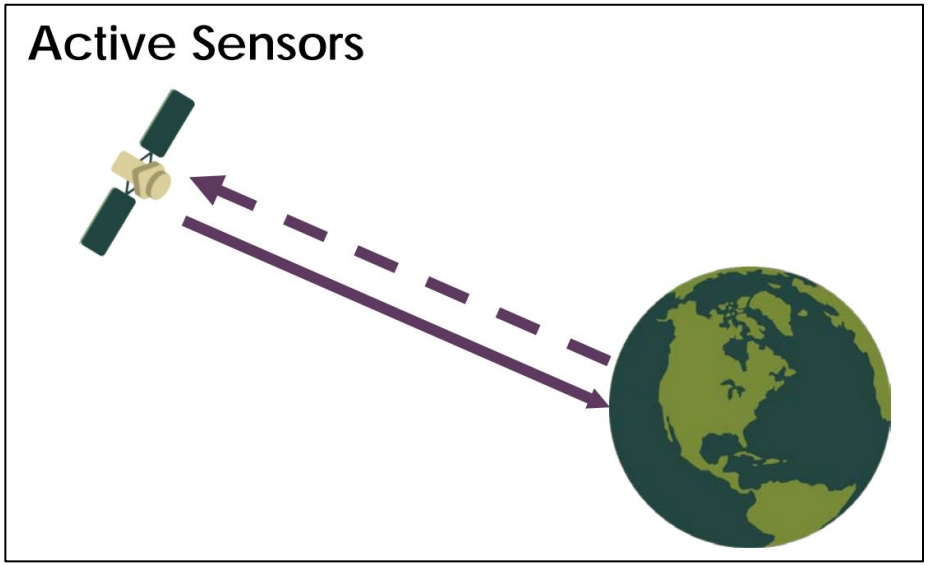
1. Estimating canopy heights (Radar, LIDAR)
2. Monitoring crop/vegetation health (Optical)
3. Monitoring vegetation disturbance (Optical, Radar)

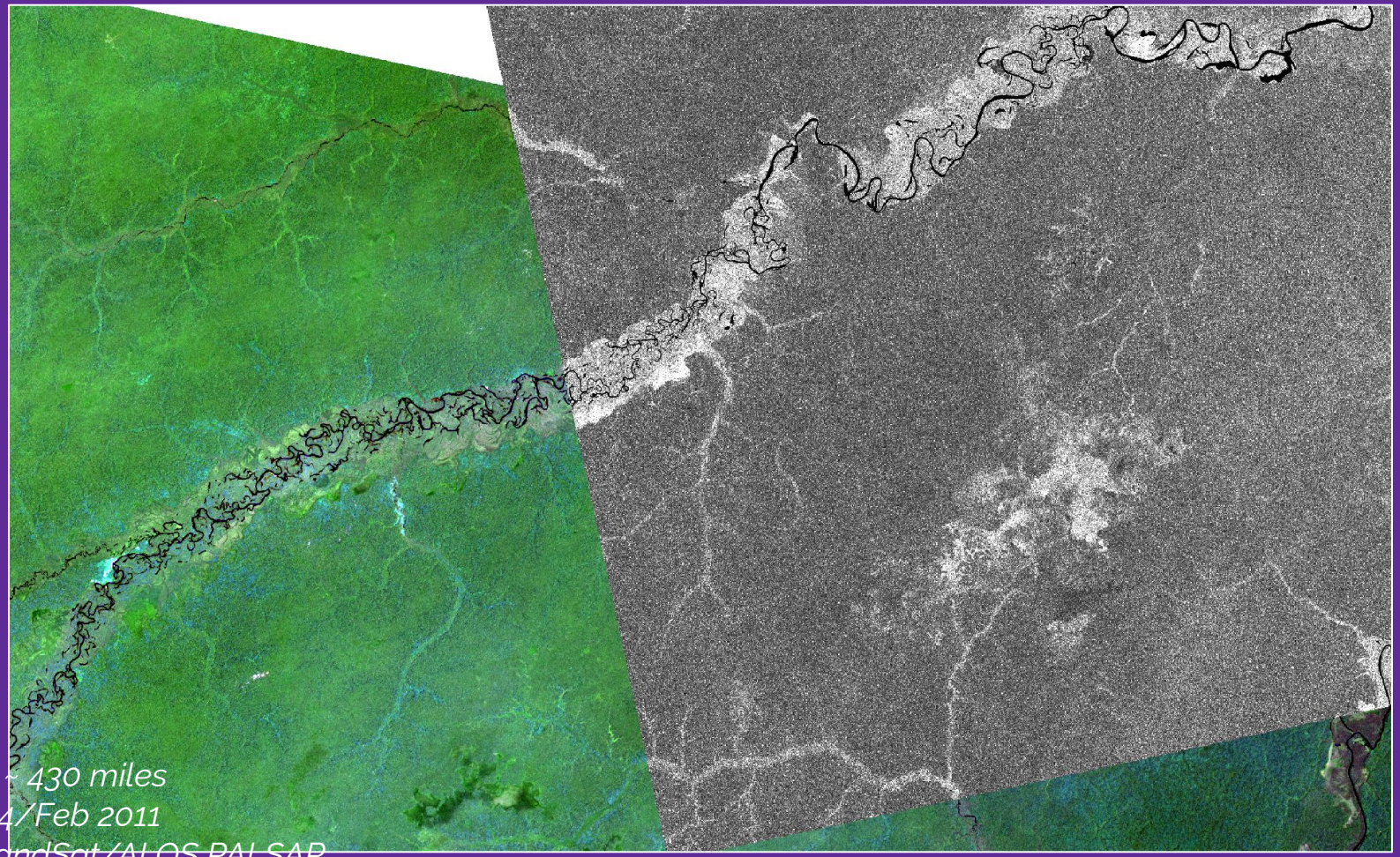
Remote sensing

"Remote sensing is the process of detecting and monitoring the physical characteristics at a distance"

Sensor types

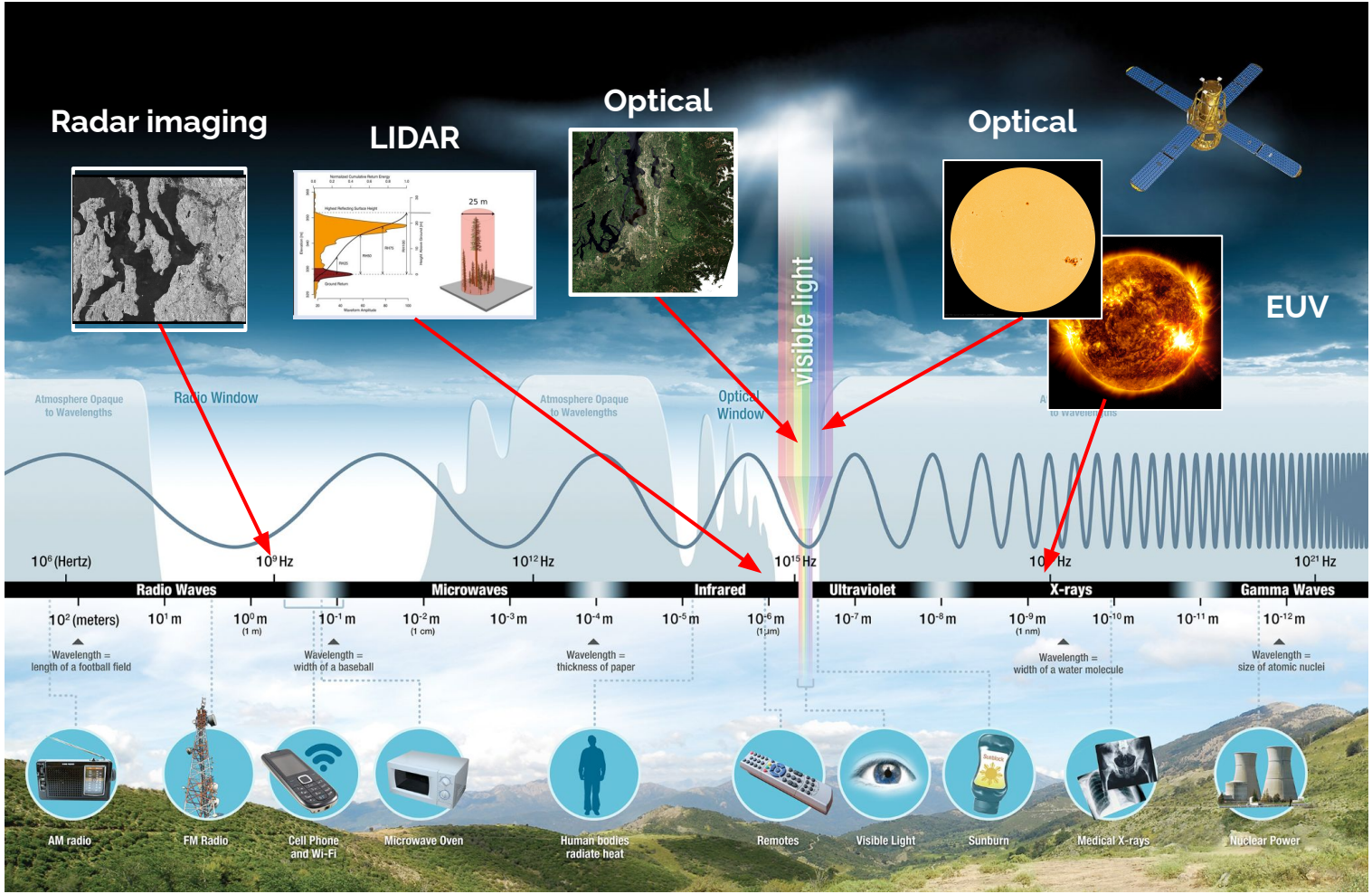






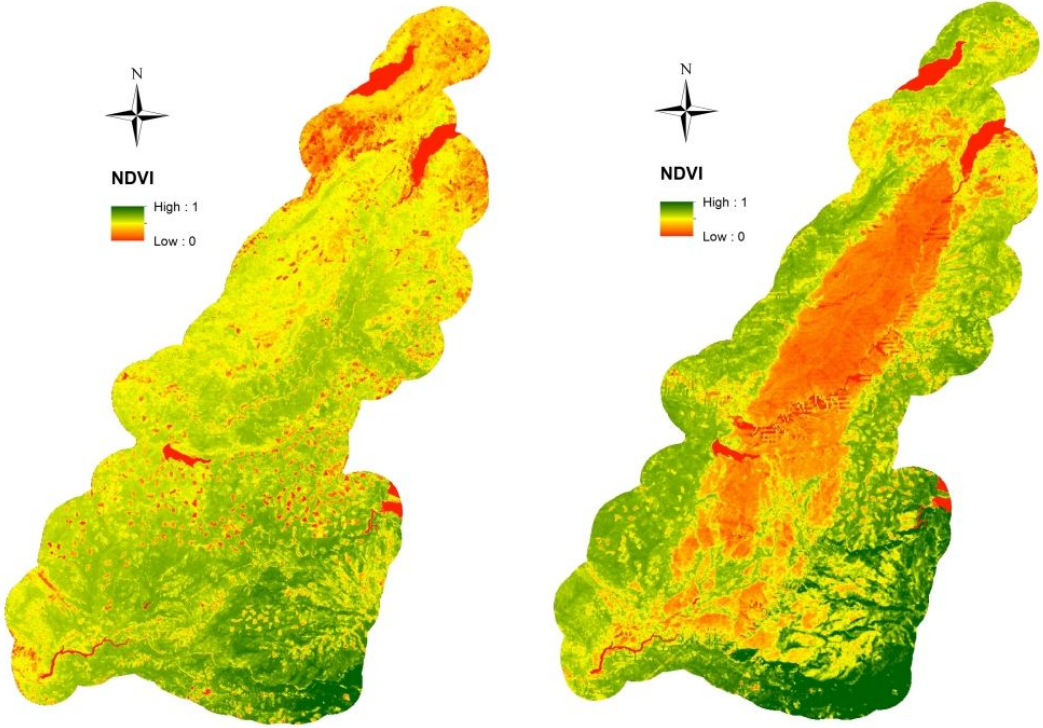
Earth @ ~ 430 miles
Feb 2024/Feb 2011
USGS LandSat/ALOS PALSAR

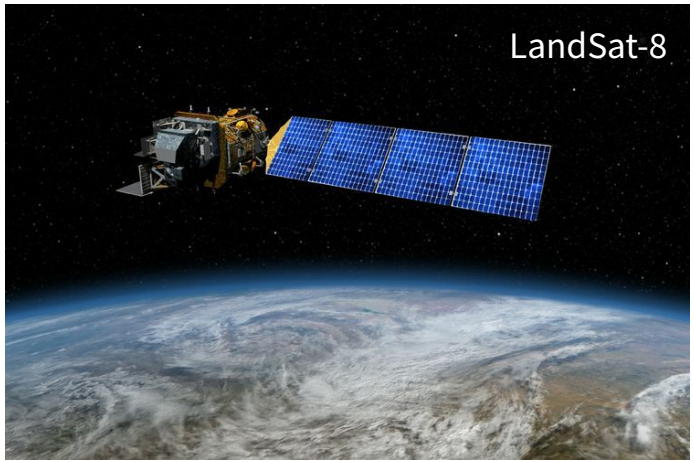
Jau River, Brazil



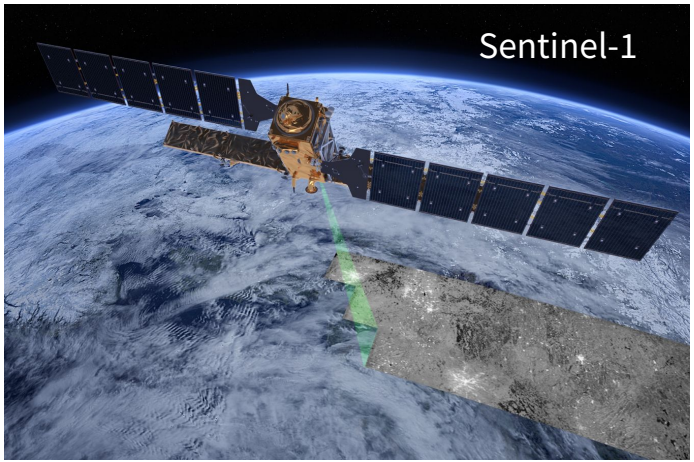
NASA Earthdata, "What is remote sensing?"

Using optical data to measure of vegetation

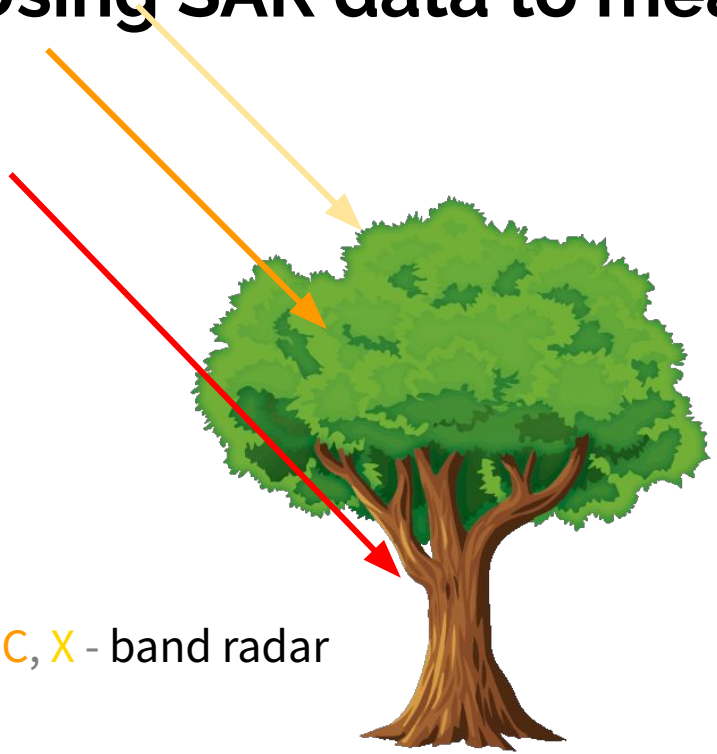




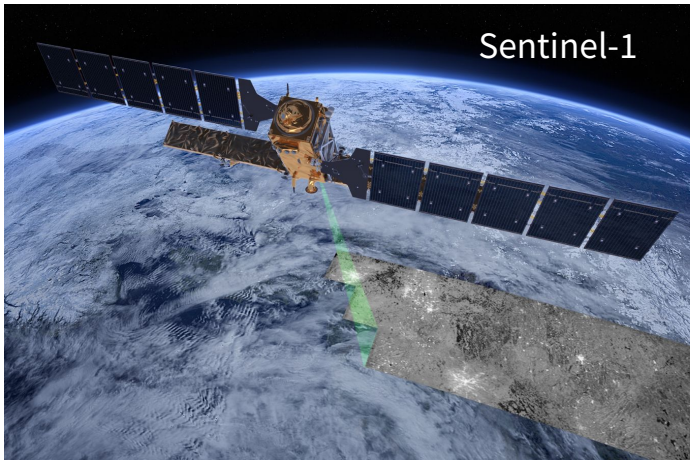
Using SAR data to measure vegetation



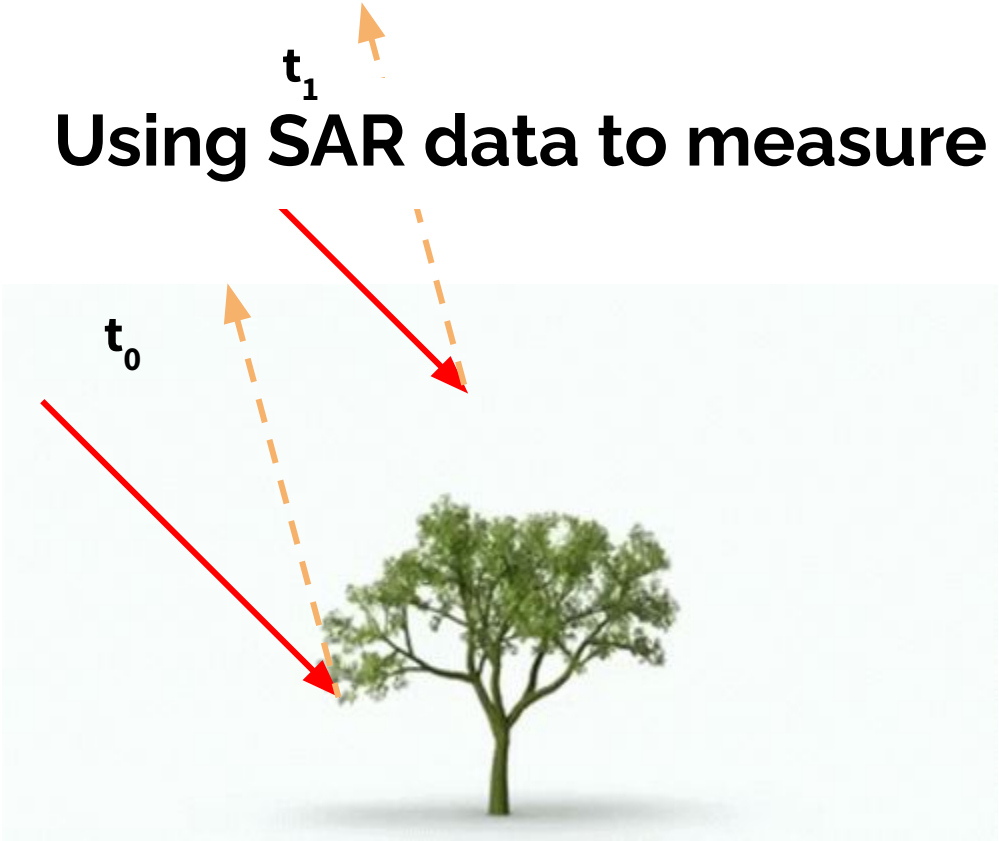
Using SAR data to measure vegetation height

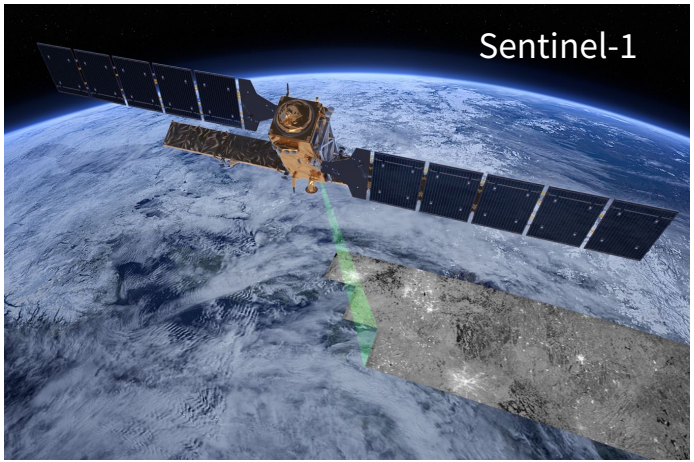


L, C, X - band radar

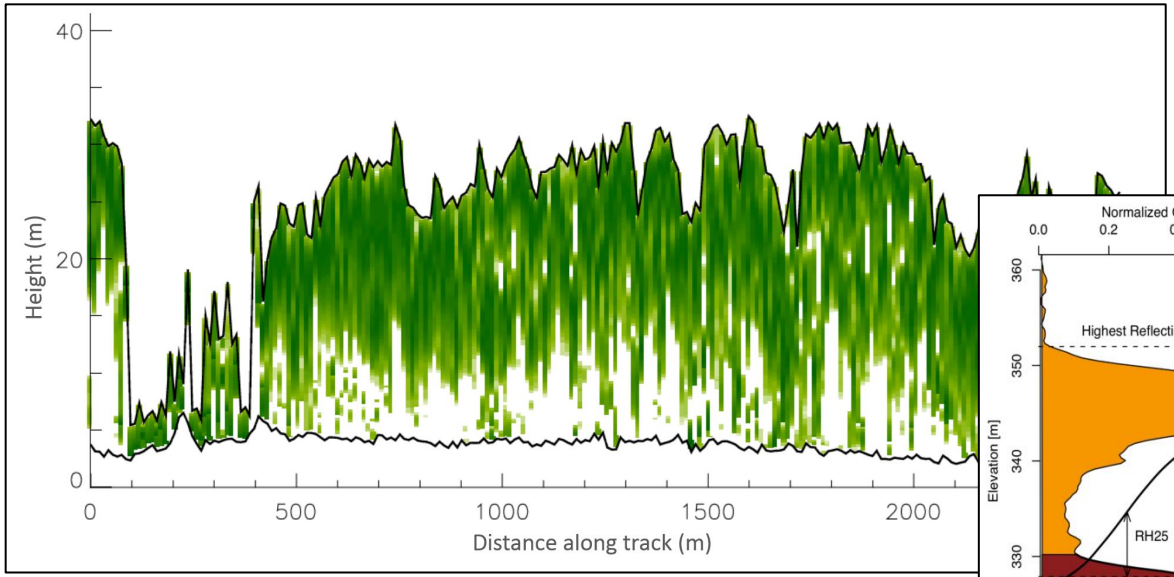


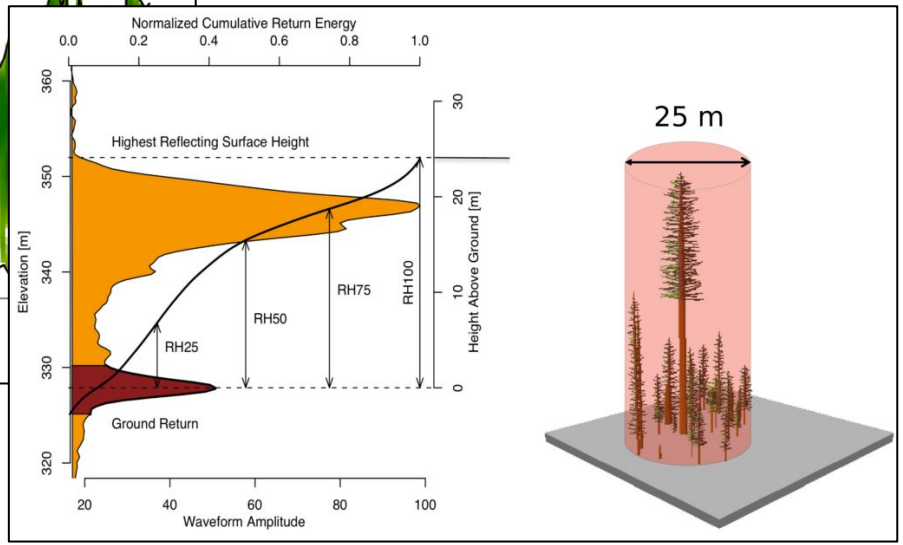
Using SAR data to measure vegetation change



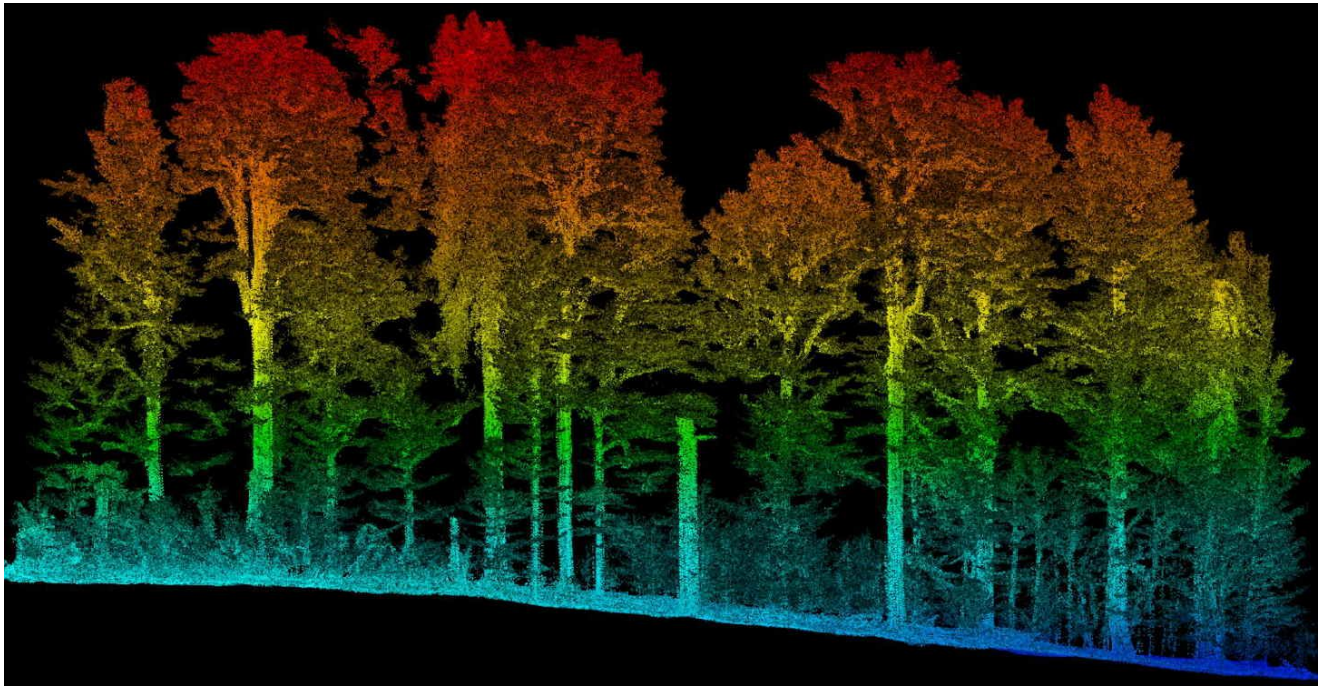


Using LIDAR data to estimate canopy height



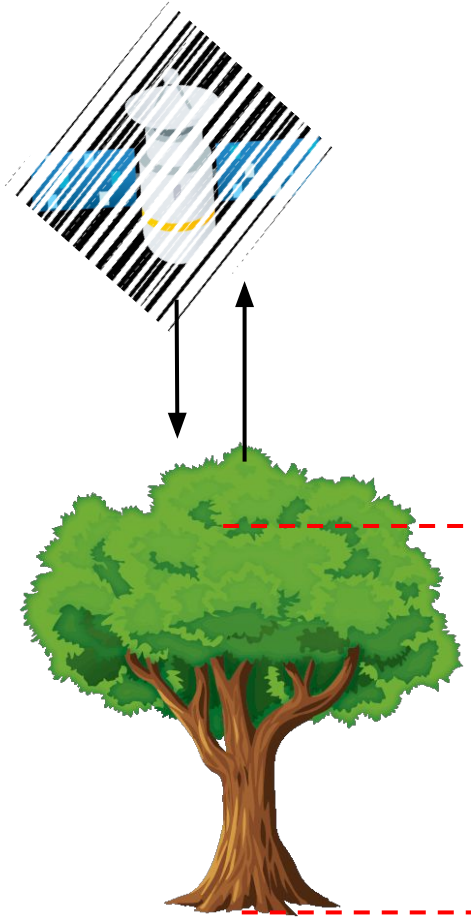


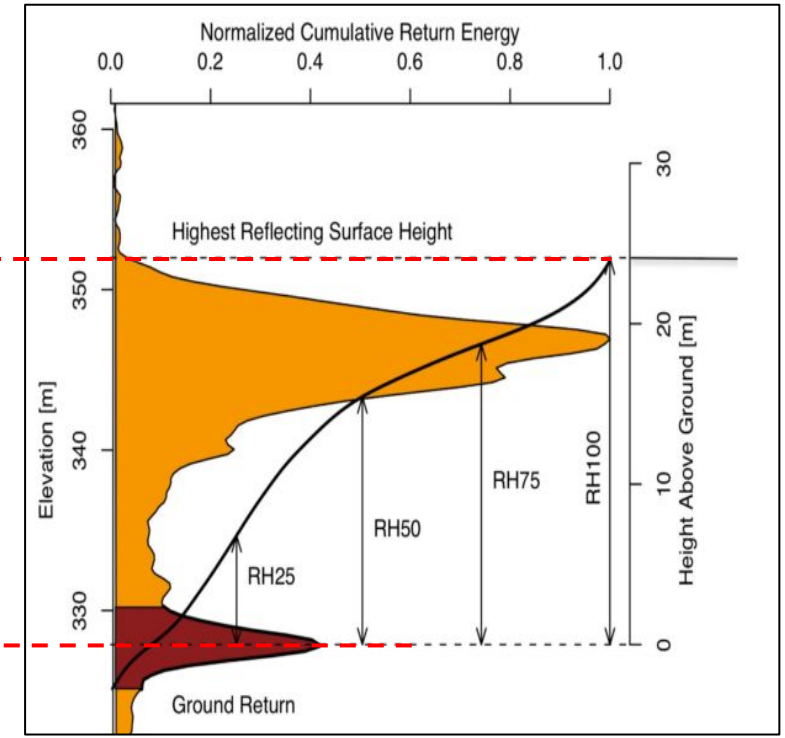
Using LIDAR data to estimate canopy height

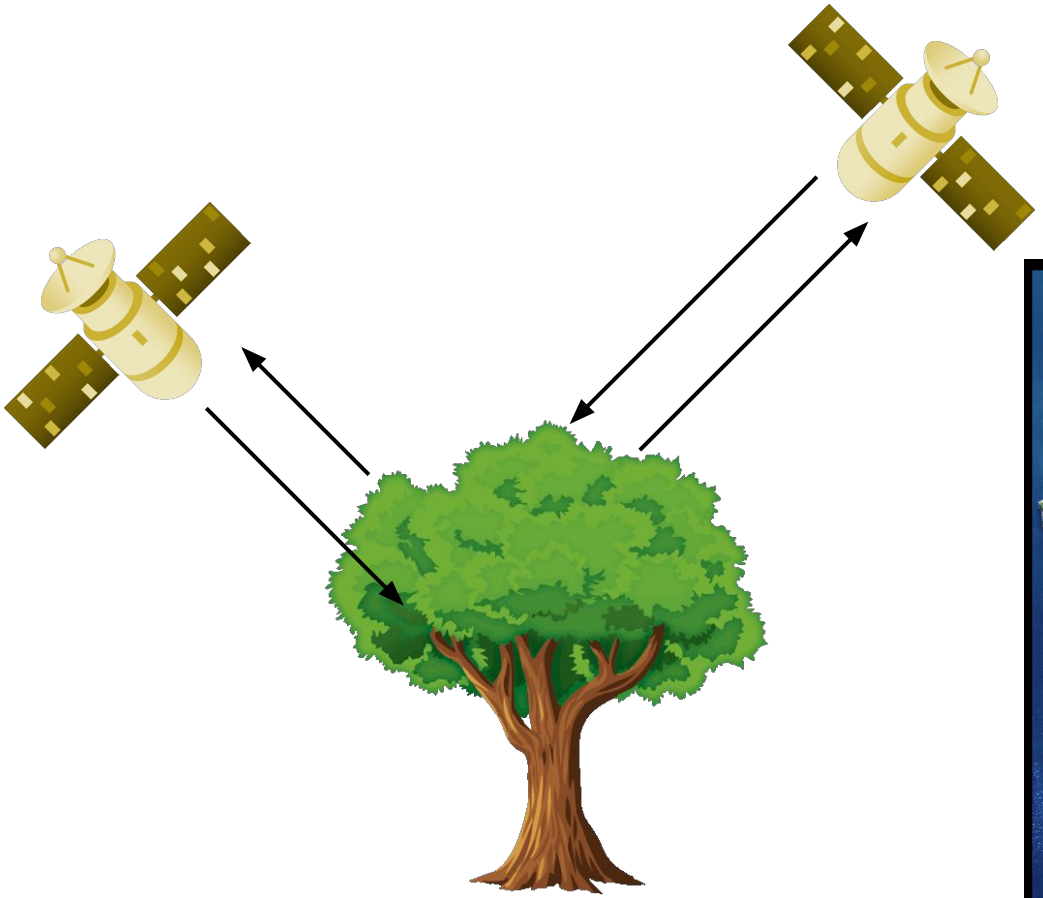


Using machine learning to refine surface models

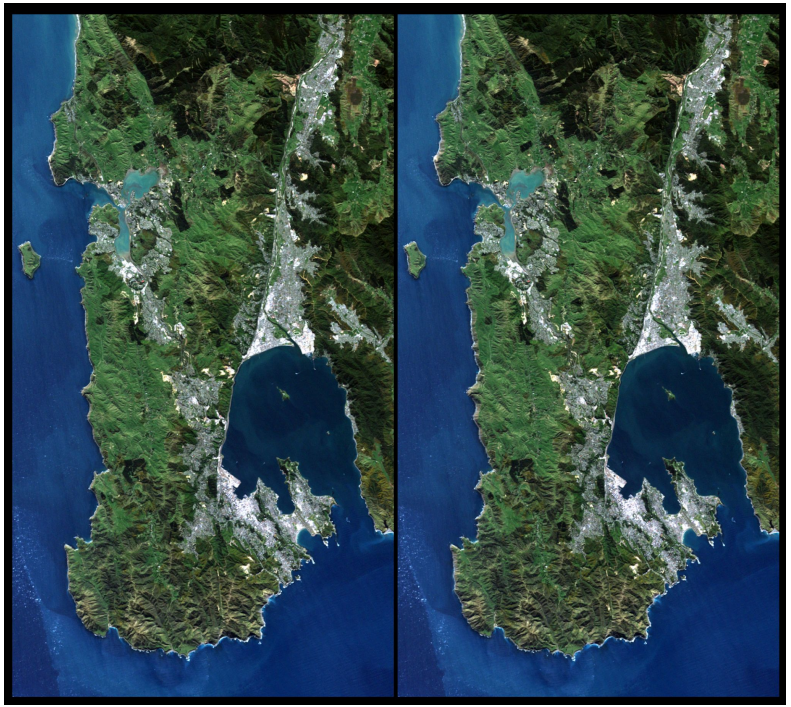
LIDAR is expensive!

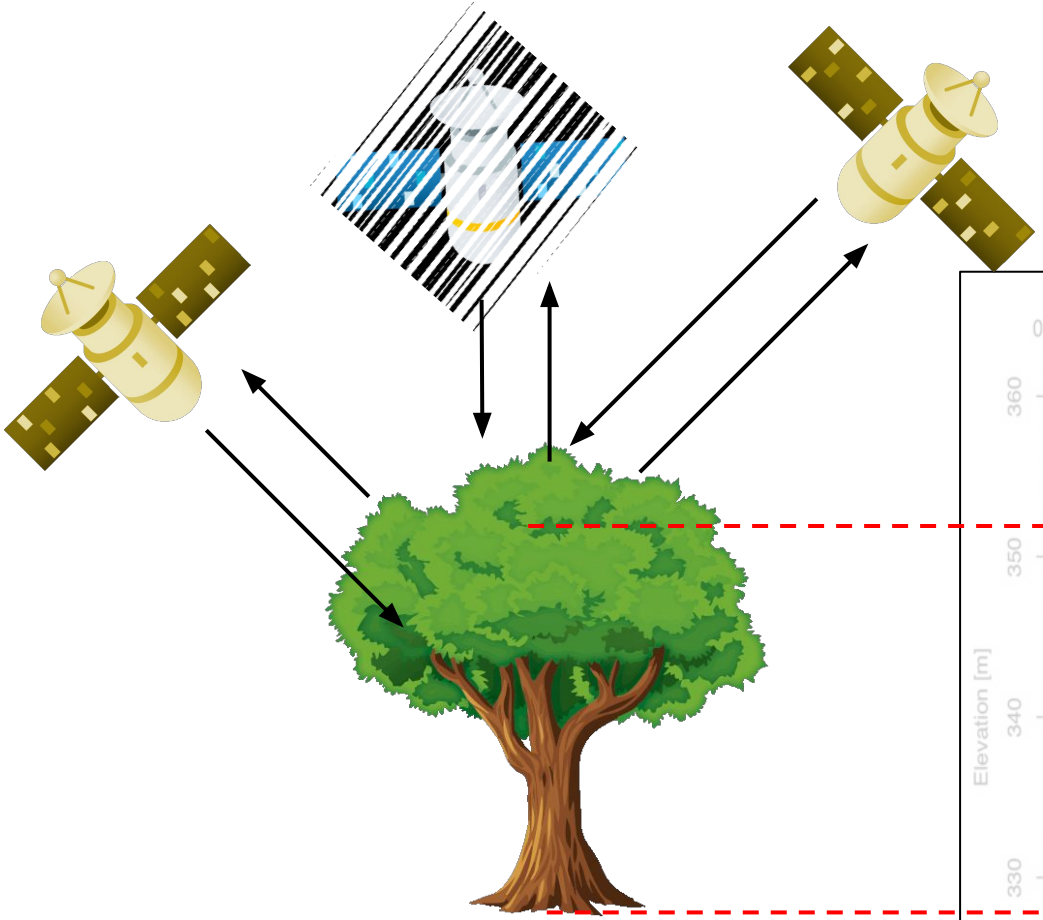




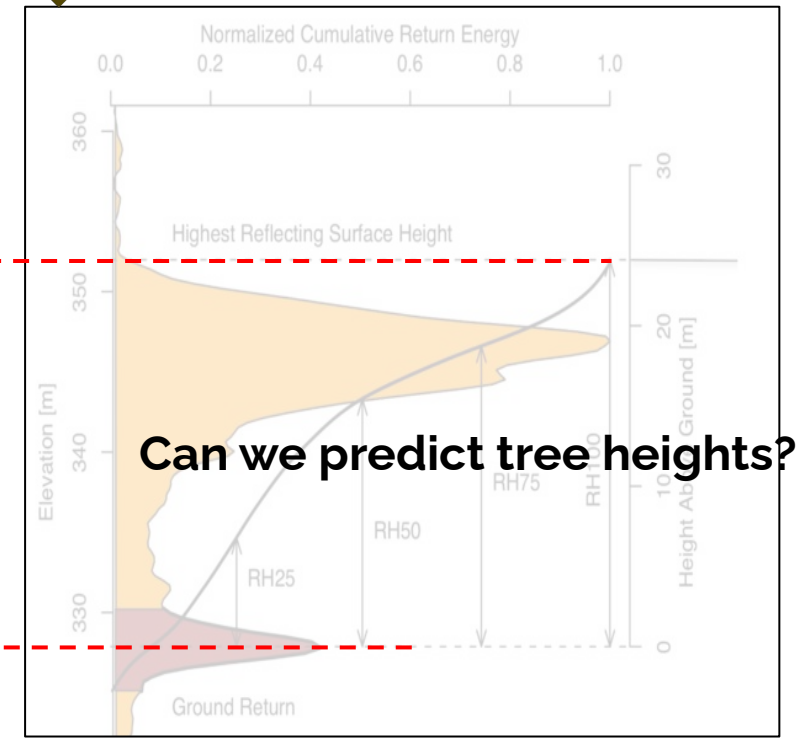


Optical imagery is relatively cheaper!





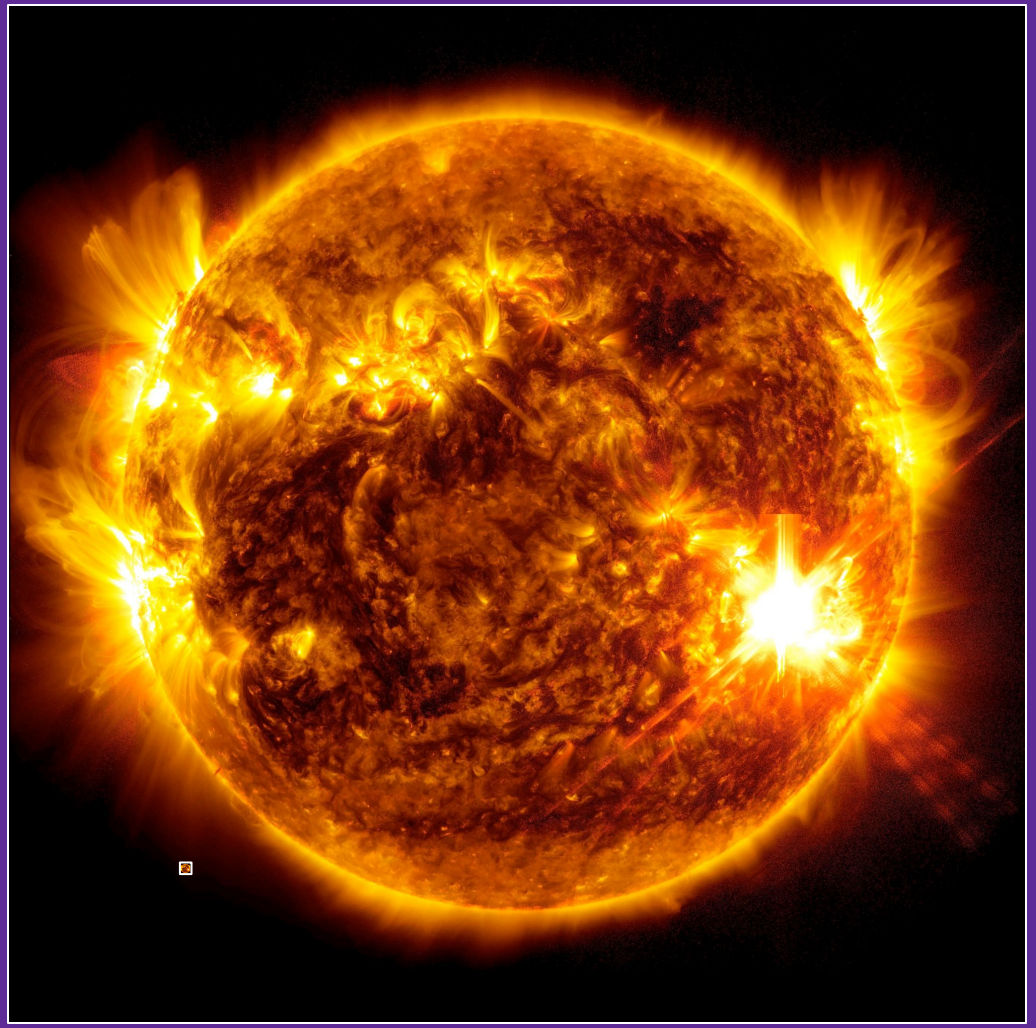
In the absence of LIDAR ..



Can we predict tree heights?

Demo time!

And now for something completely different -



Sun @ ~ 93M miles
X-class flare;
NASA, May 10 2024

Thanks!

Slides and code available on GitHub

https://github.com/kvenkman/pydata-seattle-2024

https://kvenkman.github.io/our-sun-now/

https://github.com/ScienceCore/scipy-2024-climaterisk

https://github.com/kvenkman