3D Fuels Project

- Susan Prichard, project lead
- Adam Watts, federal PI
- Andrew Hudak, co-I
- Louise Loudermilk, co-I
- Russ Parsons, co-I
- Eric Rowell, co-I
- Nick Skowronski, co-I
- Grad students: Gina Cova, Jonathan Batchelor, Michelle Bester

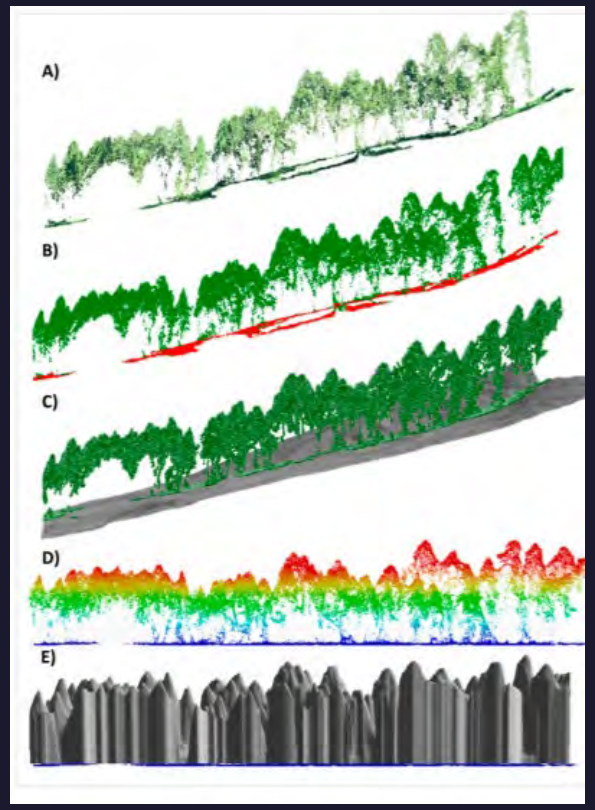
Hierarchically scaled imagery

Coarse scale – ALS canopy & modeled surface fuels
(1-5 m^3)

Meso scale – canopy and understory fuels
(10 cm^3 to 1m^3)

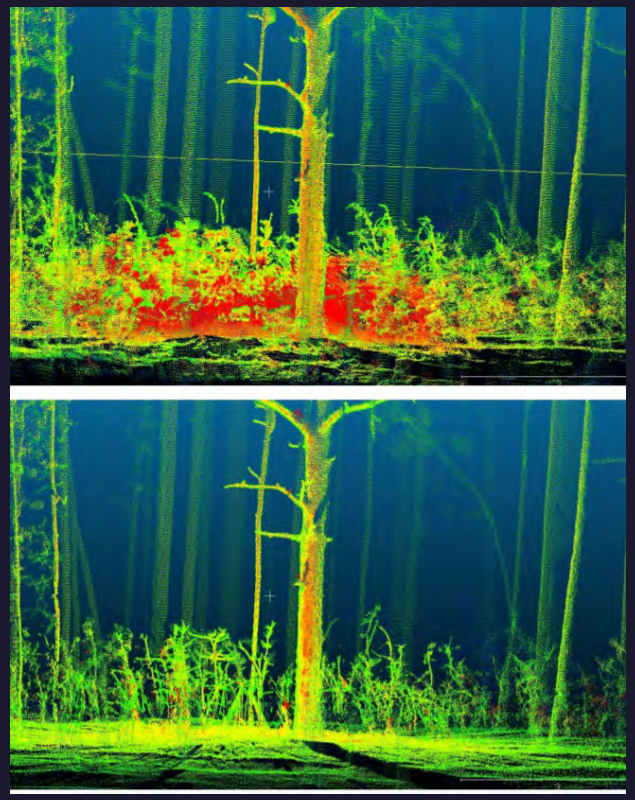
Fine scale – TLS and close range photogrammetry
(< 1 m^3)

Individual Tree Detection (Mohan et al. 2017)



High-Resolution TLS, Photogrammetry (Rowell et al. 2020)

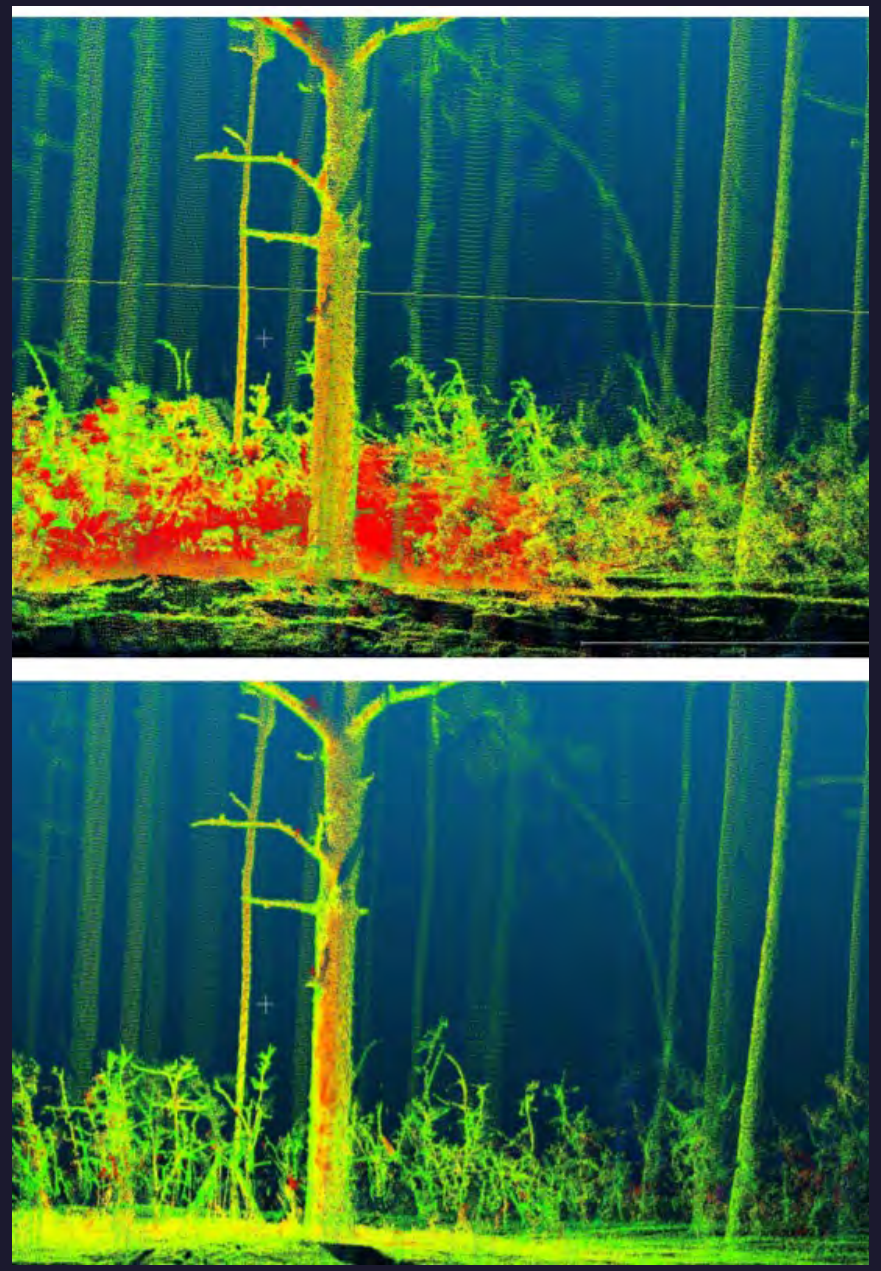
High-Resolution TLS (Hudak et al. 2020)



Objectives

Evaluate sampling methods for 3D fuel characterization required for computational fluid dynamics (CFD) models of fire behavior and smoke production

- Develop building blocks for next-generation fuels mapping of SE pine and western pine/grasslands
- Advance our understanding and application of 3D fuel characterization



Fire-Adapted Pine Forests

Southern pine (FL)

Western pine (MT)

SE flatwoods (completed)

Osceola NF, FL

Tate's Hell A, FL

Tate's Hell B, FL

Aucilla, FL

SE loblolly/sweetgum forests (2 completed, 1-2 planned)

Hitchiti, GA

1 year

TTRS, FL

2 year

Hitchiti, GA

3 year

TBD

> 4 year

Additional 3D Fuels Sites (completed)

Blackwater, FL

Pebble Hill, FL

Fort Stewart, GA

Western ponderosa pine forests (completed)

Sycan, OR

LANL, NM

Methow, WA

Lubrecht, MT

Western grasslands (completed)

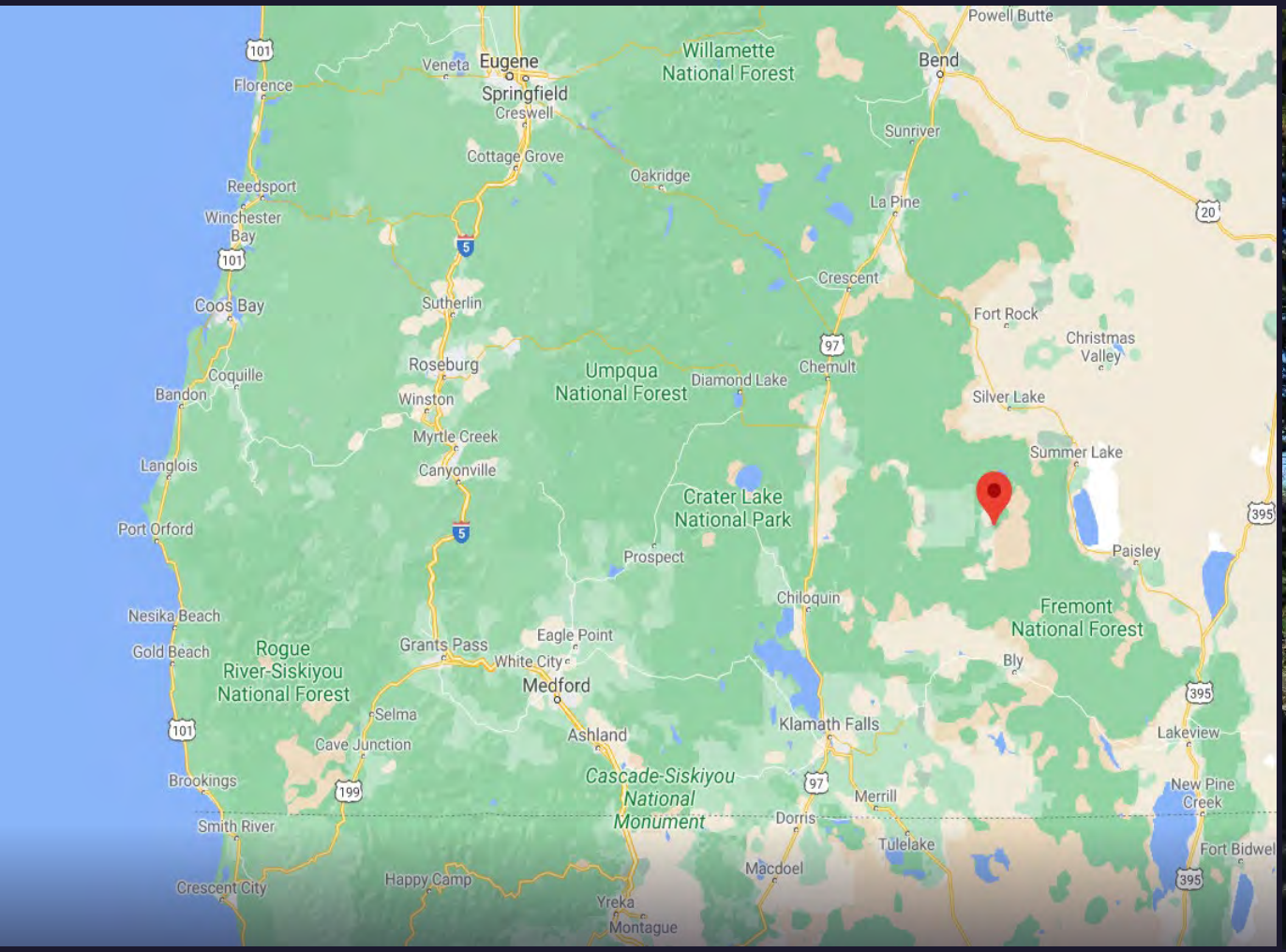
Sycan, OR

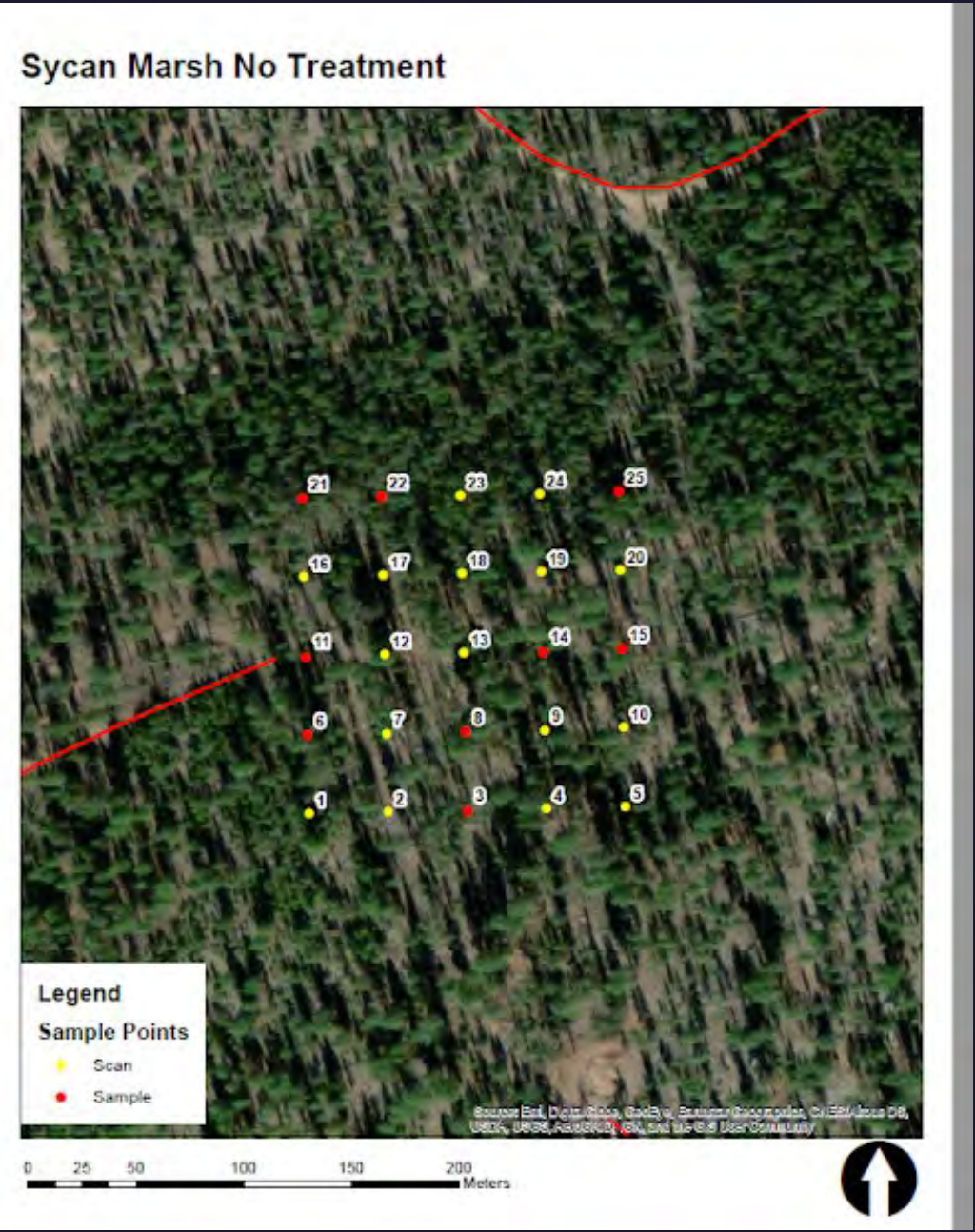
LANL, NM

Tenalquot, WA

Glacial, WA

Example Field Site – Sycan Marsh, OR





Scaled Imagery

Synoptic (200 x 200 m)

- Terrestrial lidar scanning (TLS)
- UAS SfM photogrammetry

Plot (5 x 5 m)

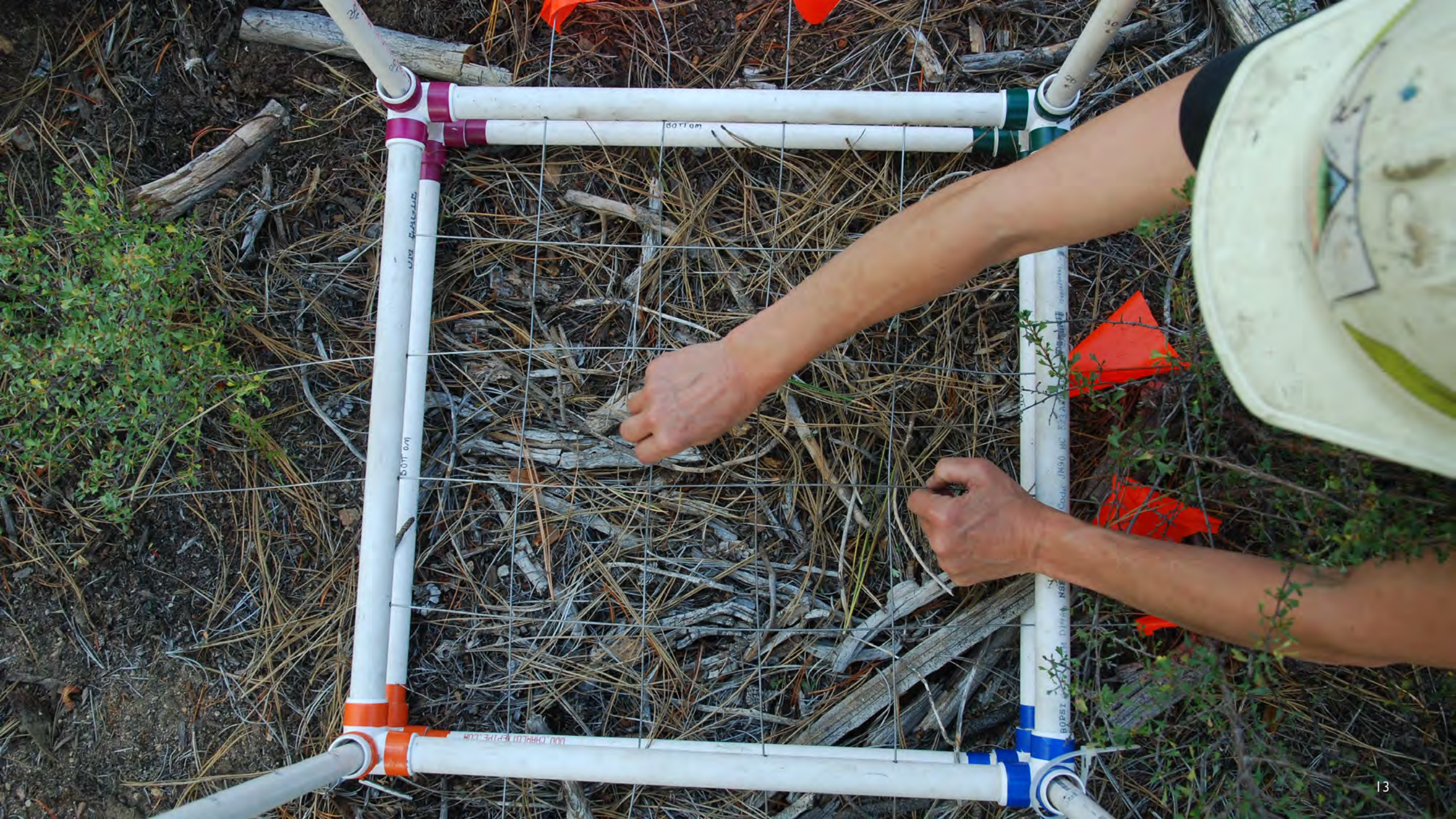
- TLS
- UAS SfM photogrammetry

Destructive voxel plot (< 1 m)

- Close-range photogrammetry

5 x 5 m Scan Plots

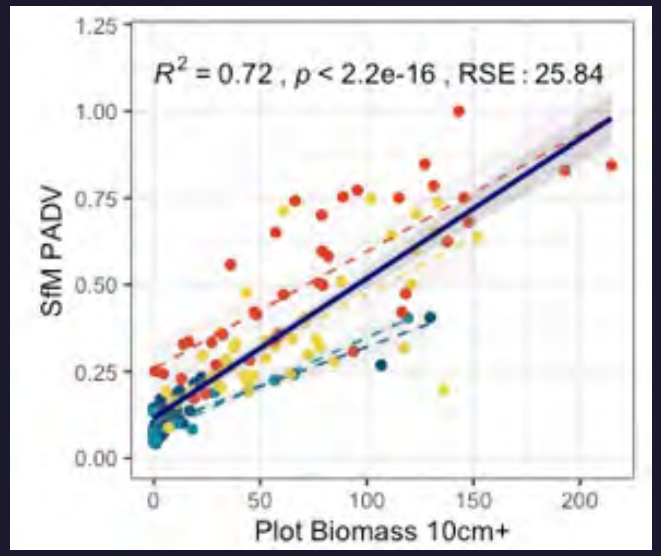
Destructive Sampling (voxel plots)

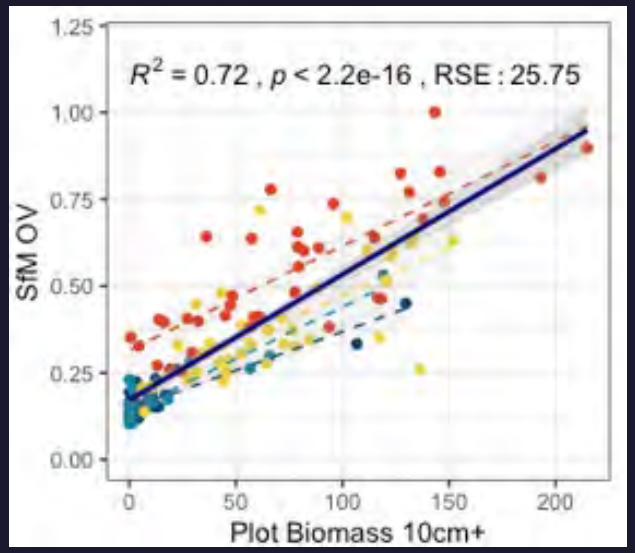


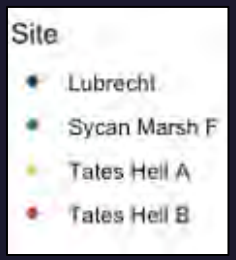

40 AW
SW
FOREST
(PRE)
Litter +
9/27/19

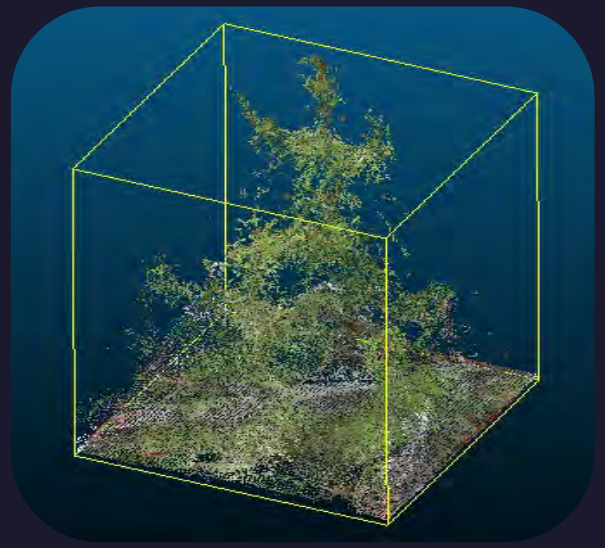
Close-Range Photogrammetry

Close-Range Photogrammetry Models



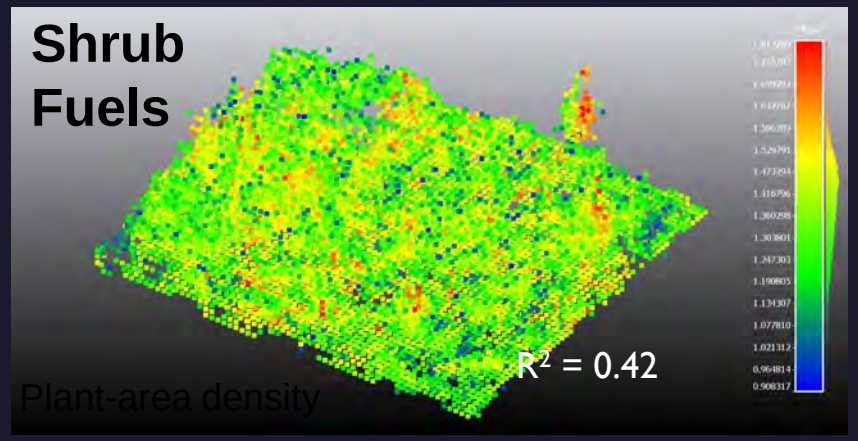


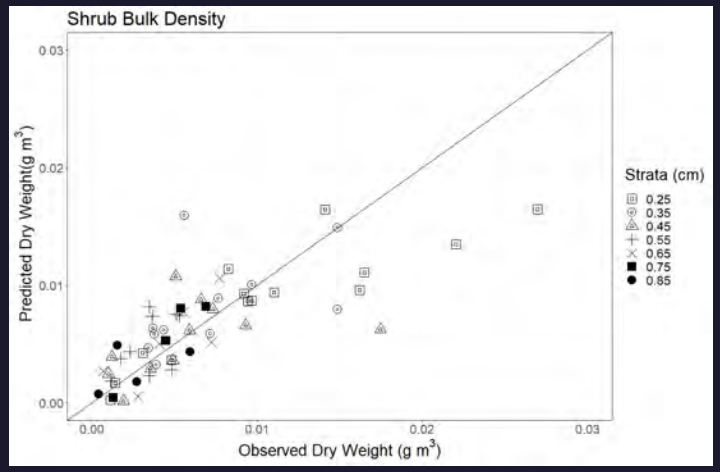


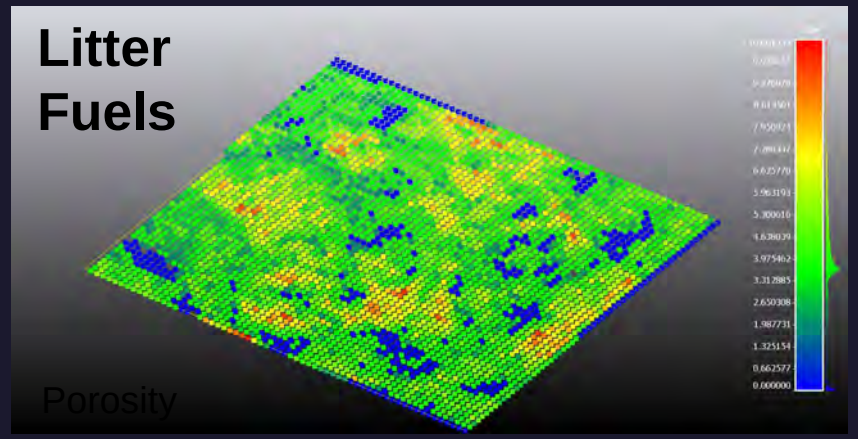


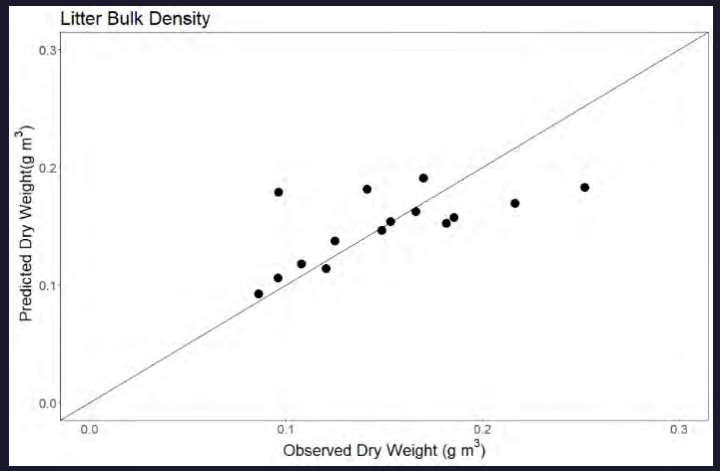
Slide credit - Gina Cova

Terrestrial Lidar Scanning Models



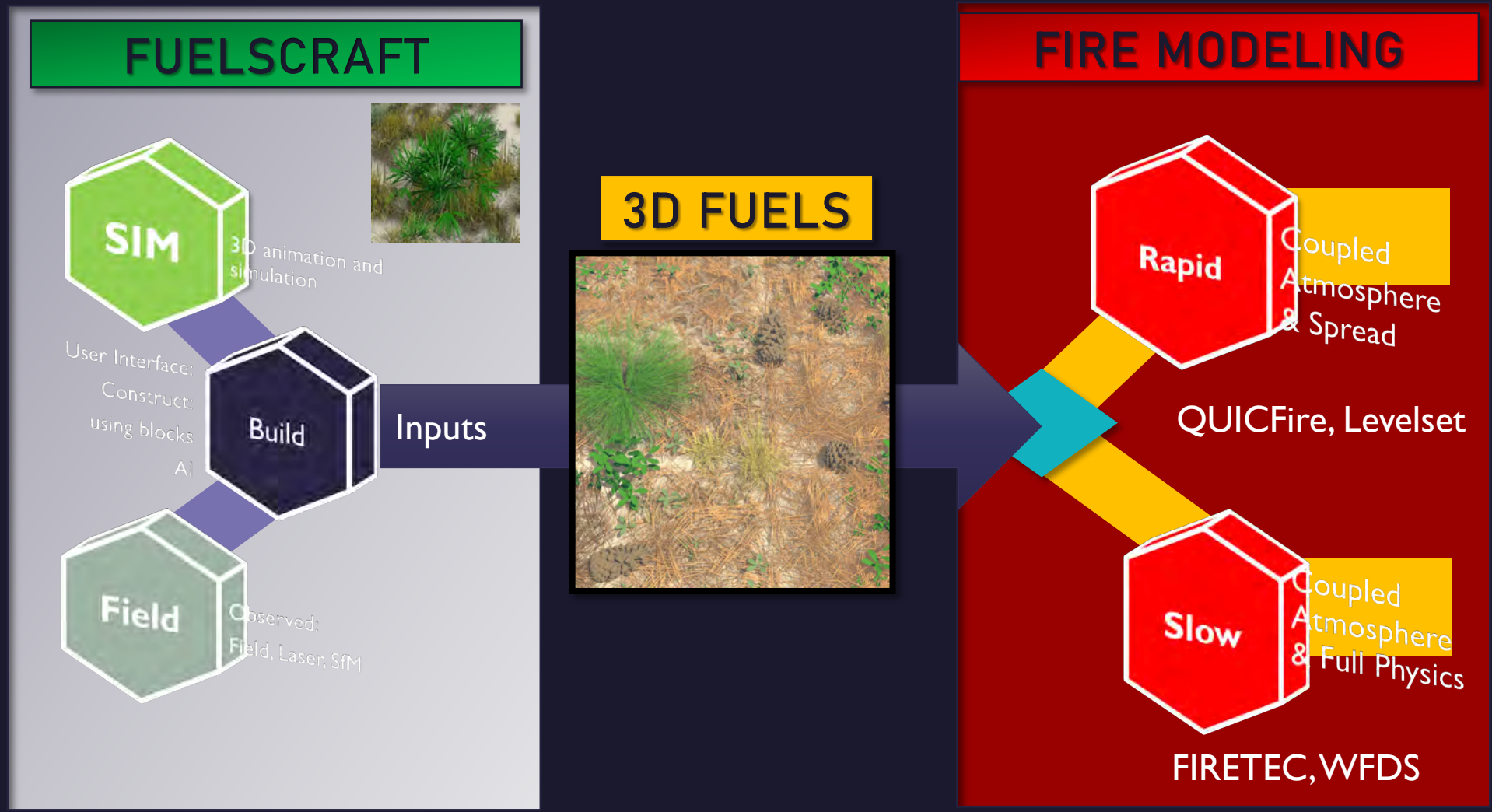




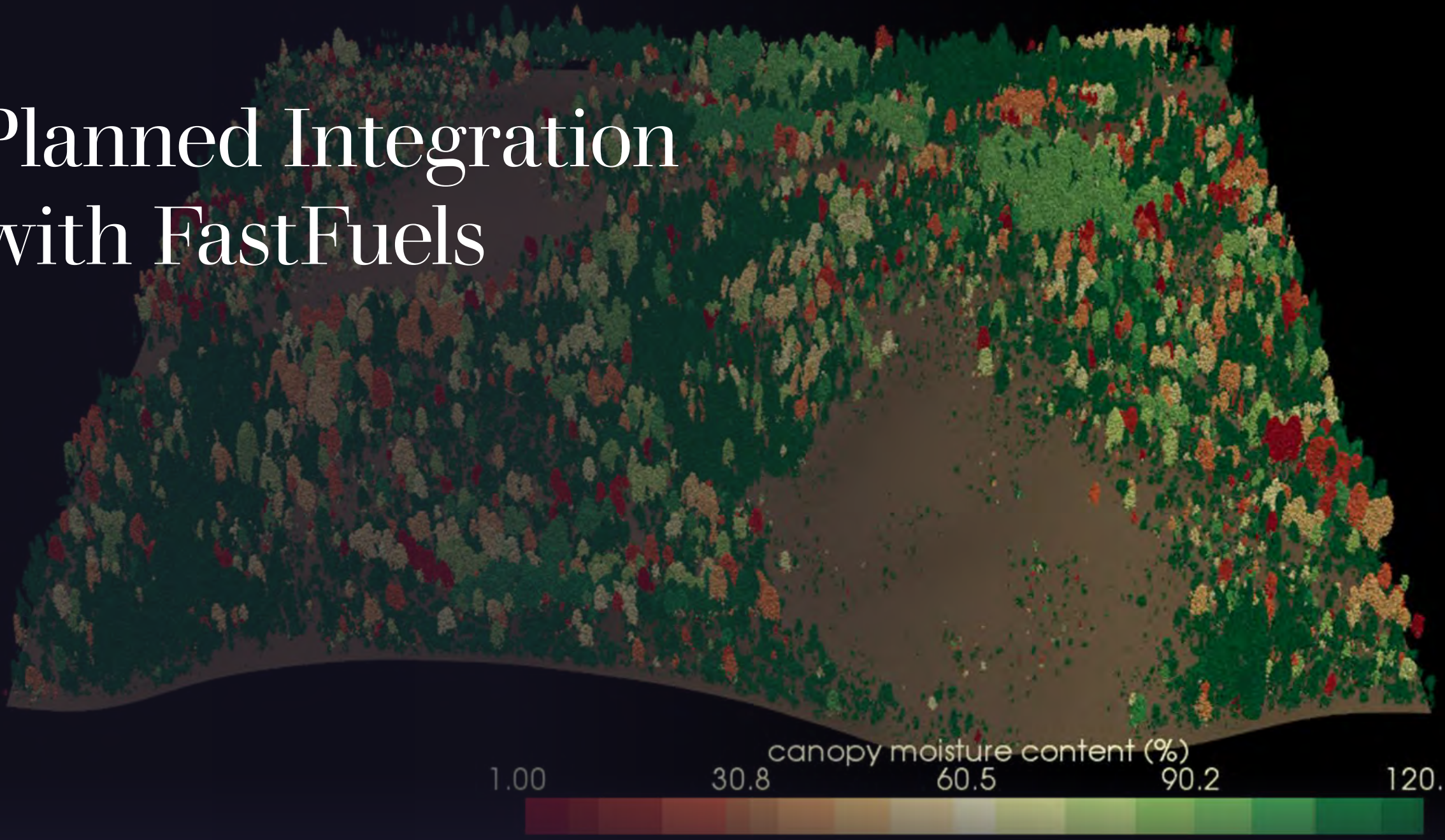


Slide credit – Eric Rowell

Inputs to CFD models

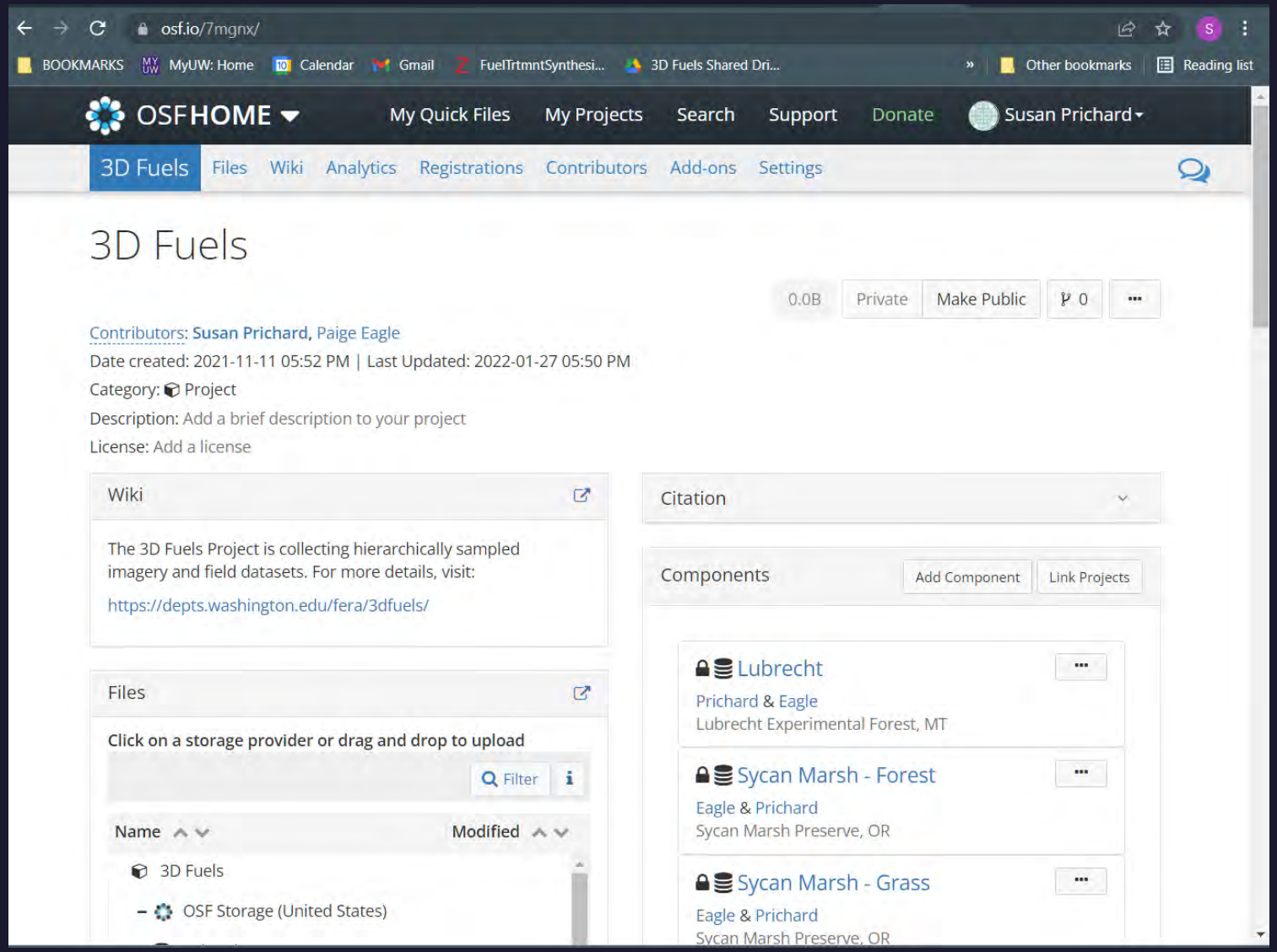


Planned Integration with FastFuels

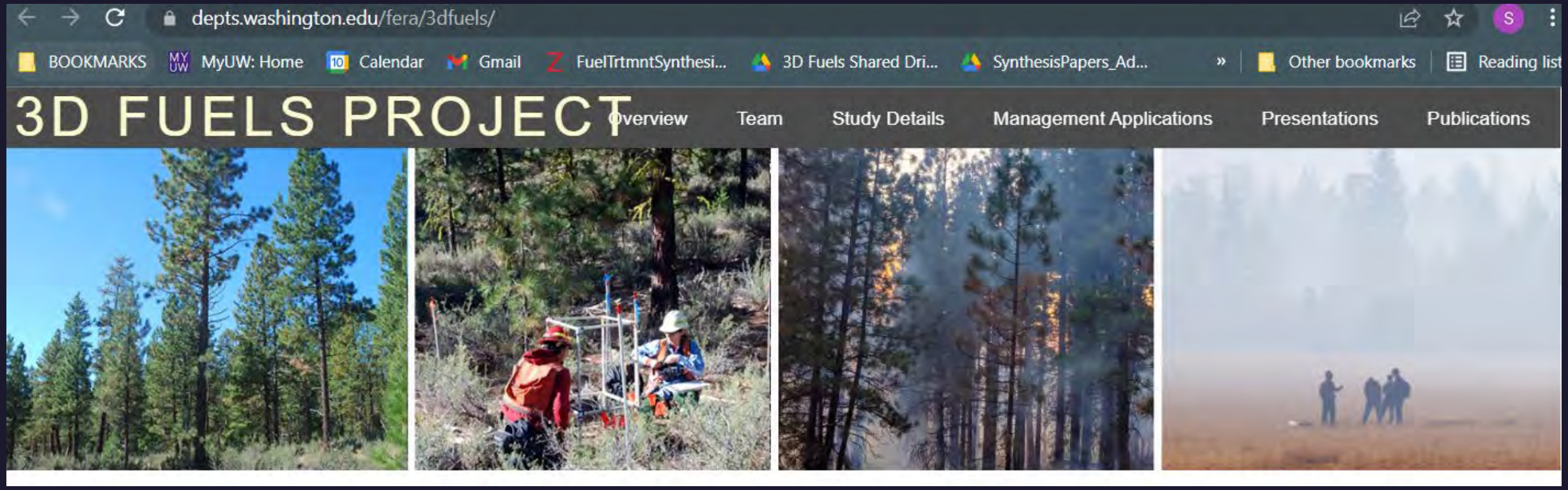


Open Science Framework – Integrated 3D datasets

https://osf.io/7mgnx/



Project Website



https://depts.washington.edu/fera/3dfuels/