

3D Fuels Project

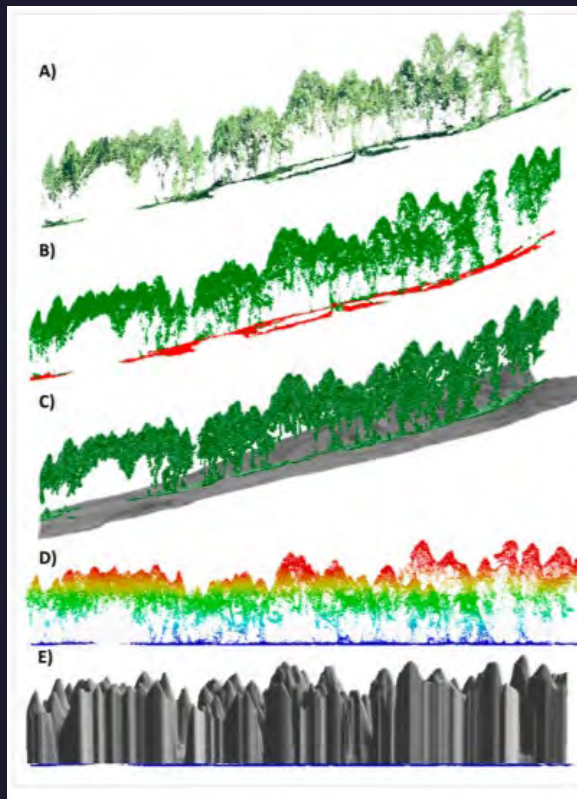
- Susan Prichard, project lead
- Adam Watts, federal PI
- Andrew Hudak, co-I
- Louise Loudermilk, co-I
- Russ Parsons, co-I
- Eric Rowell, co-I
- Nick Skowronski, co-I
- Grad students: Gina Cova, Jonathan Batchelor, Michelle Bester



Hierarchically scaled imagery

Coarse scale – ALS
canopy & modeled
surface fuels
(1-5 m³)

Individual Tree Detection
(Mohan et al. 2017)



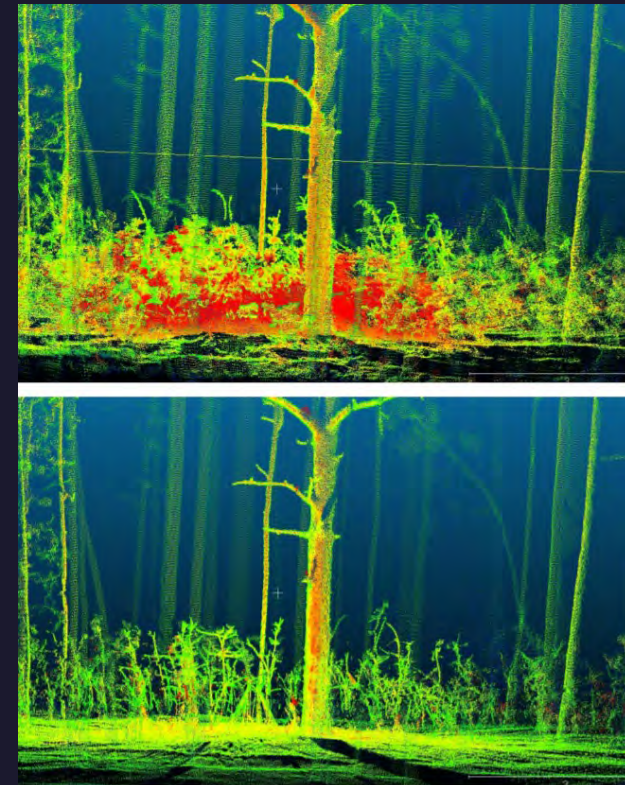
Meso scale – canopy
and understory fuels
(10 cm³ to 1m³)

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



Fine scale – TLS and
close range
photogrammetry
(< 1 m³)

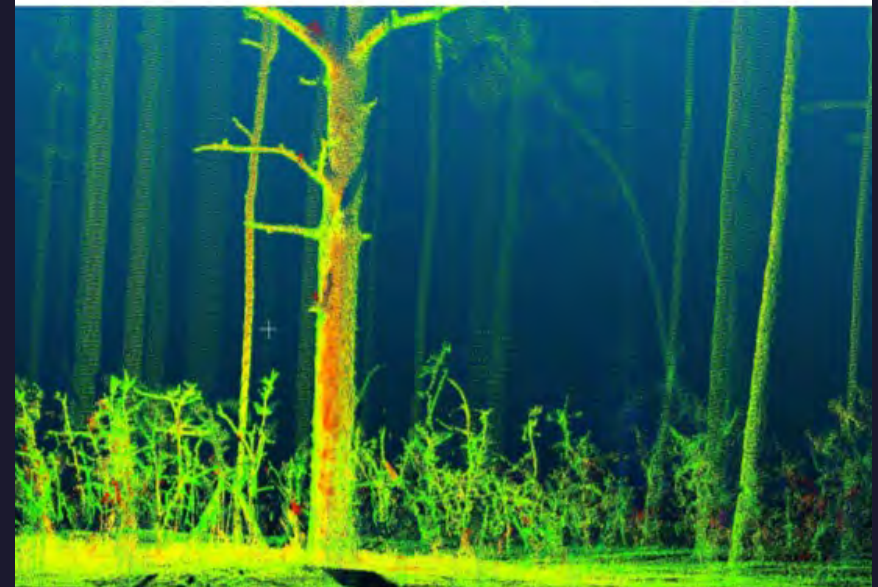
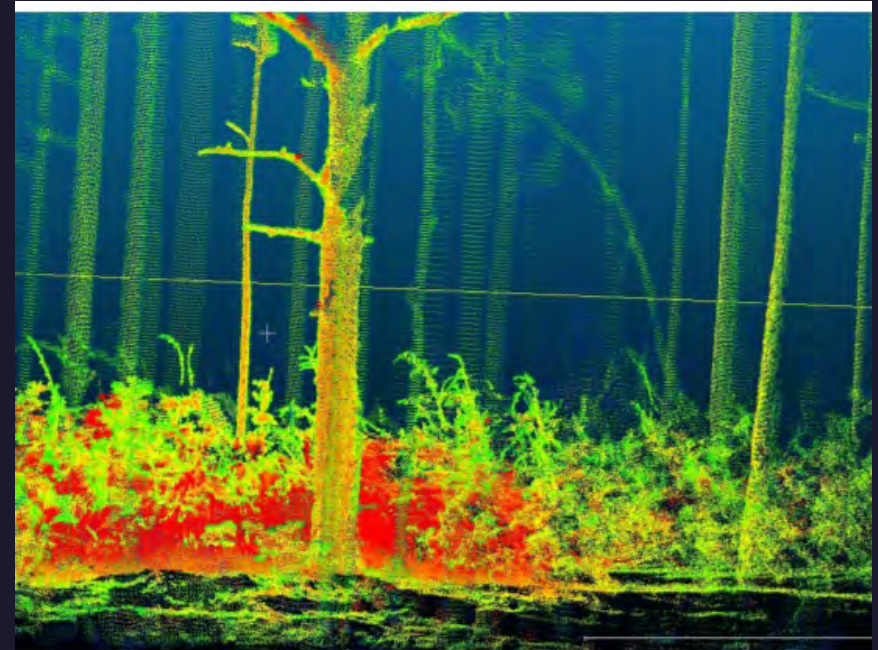
High-Resolution TLS
(Hudak et al. 2020)



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



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



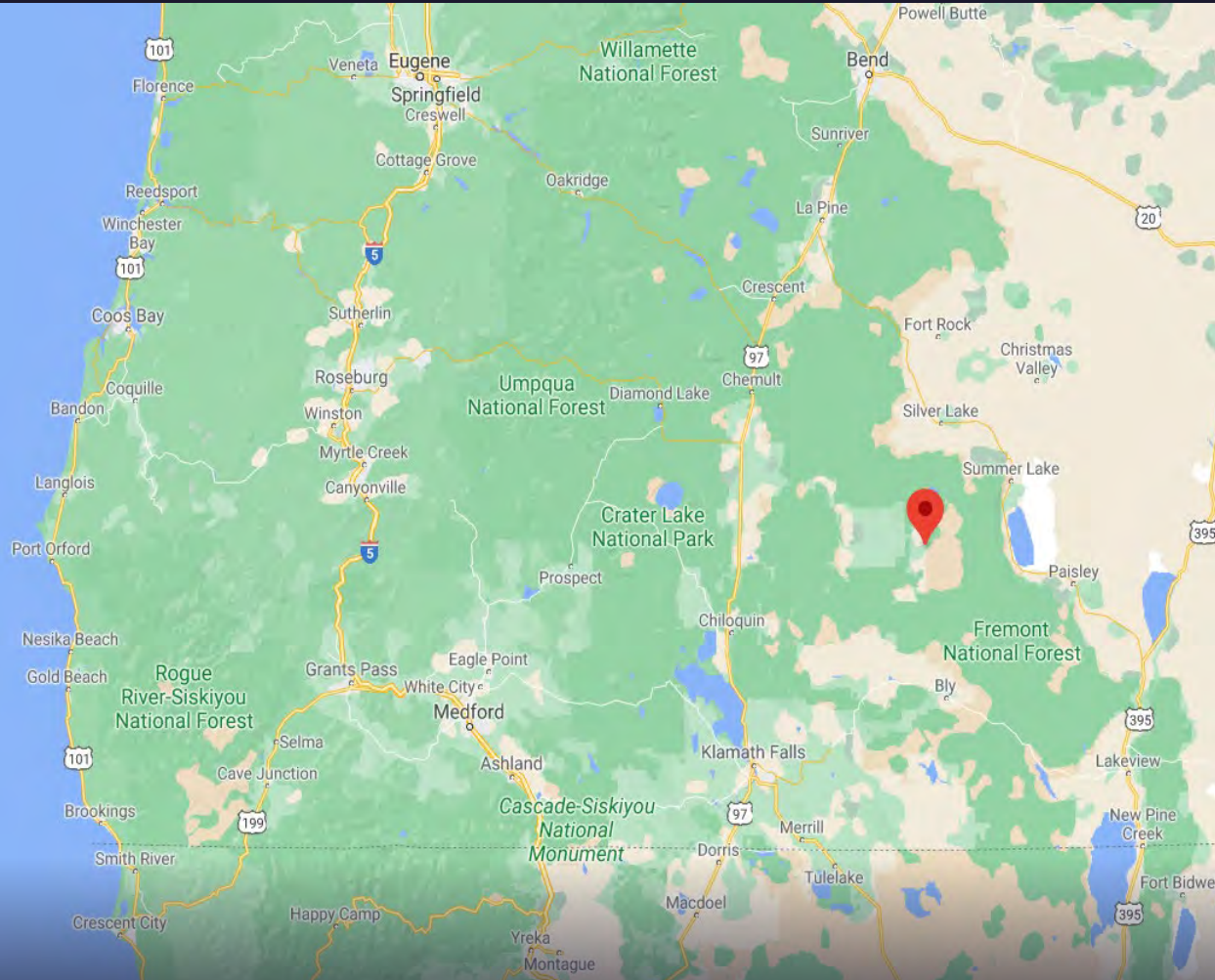
Tenalquot, WA



Glacial, WA



Example Field Site – Sycan Marsh, OR



Sycan Marsh No Treatment



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)













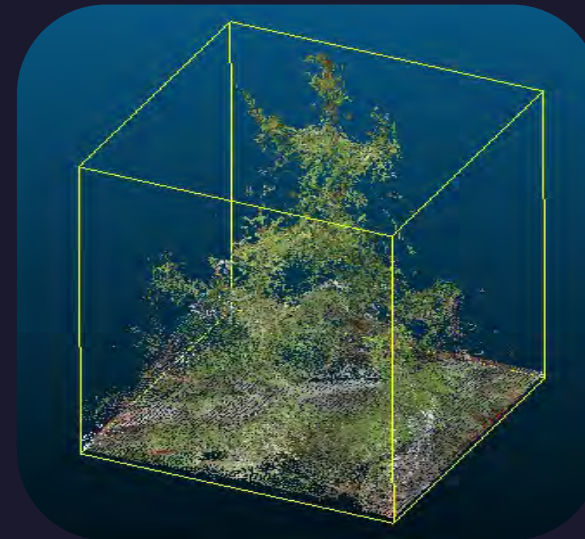
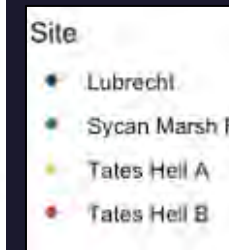
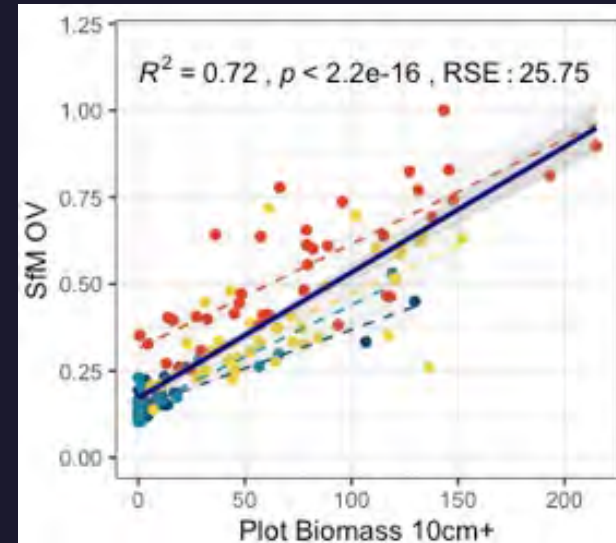
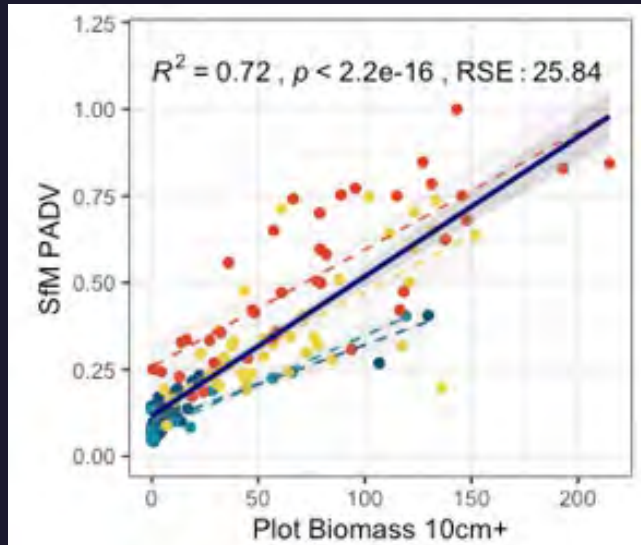
400 All Forest
SW (SPE)
L440x +
9/25/19

795

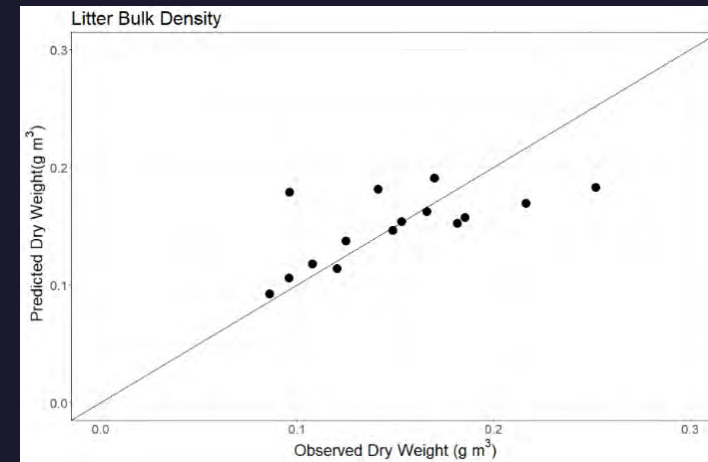
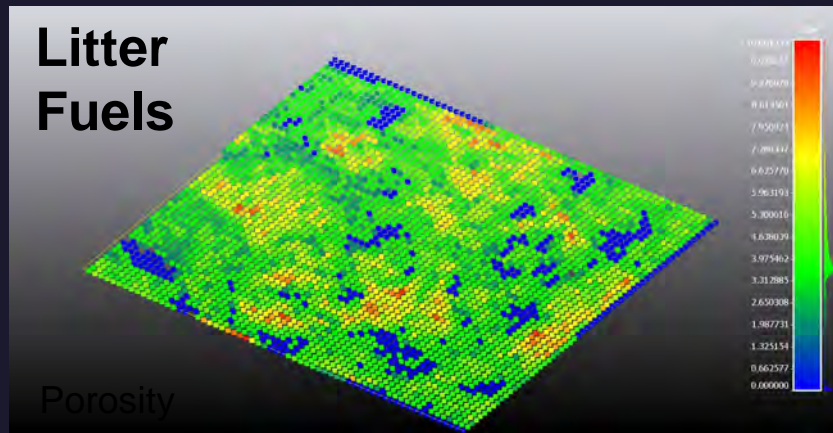
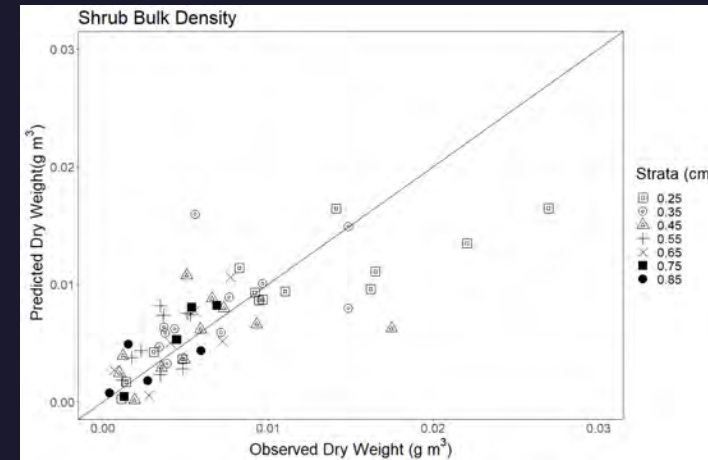
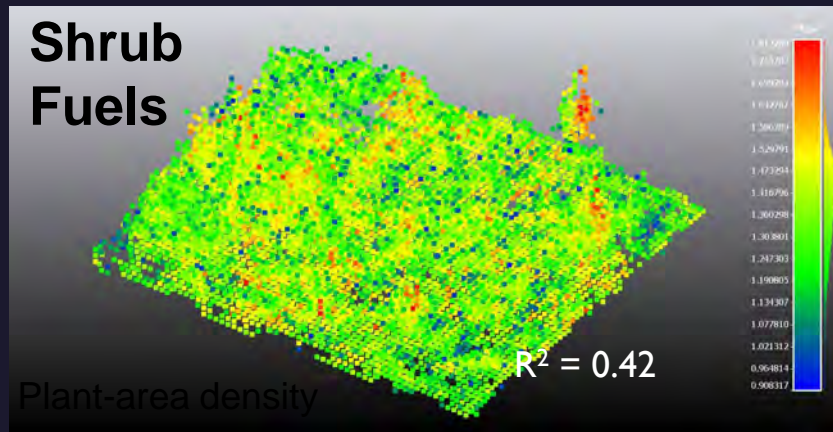
Close-Range Photogrammetry



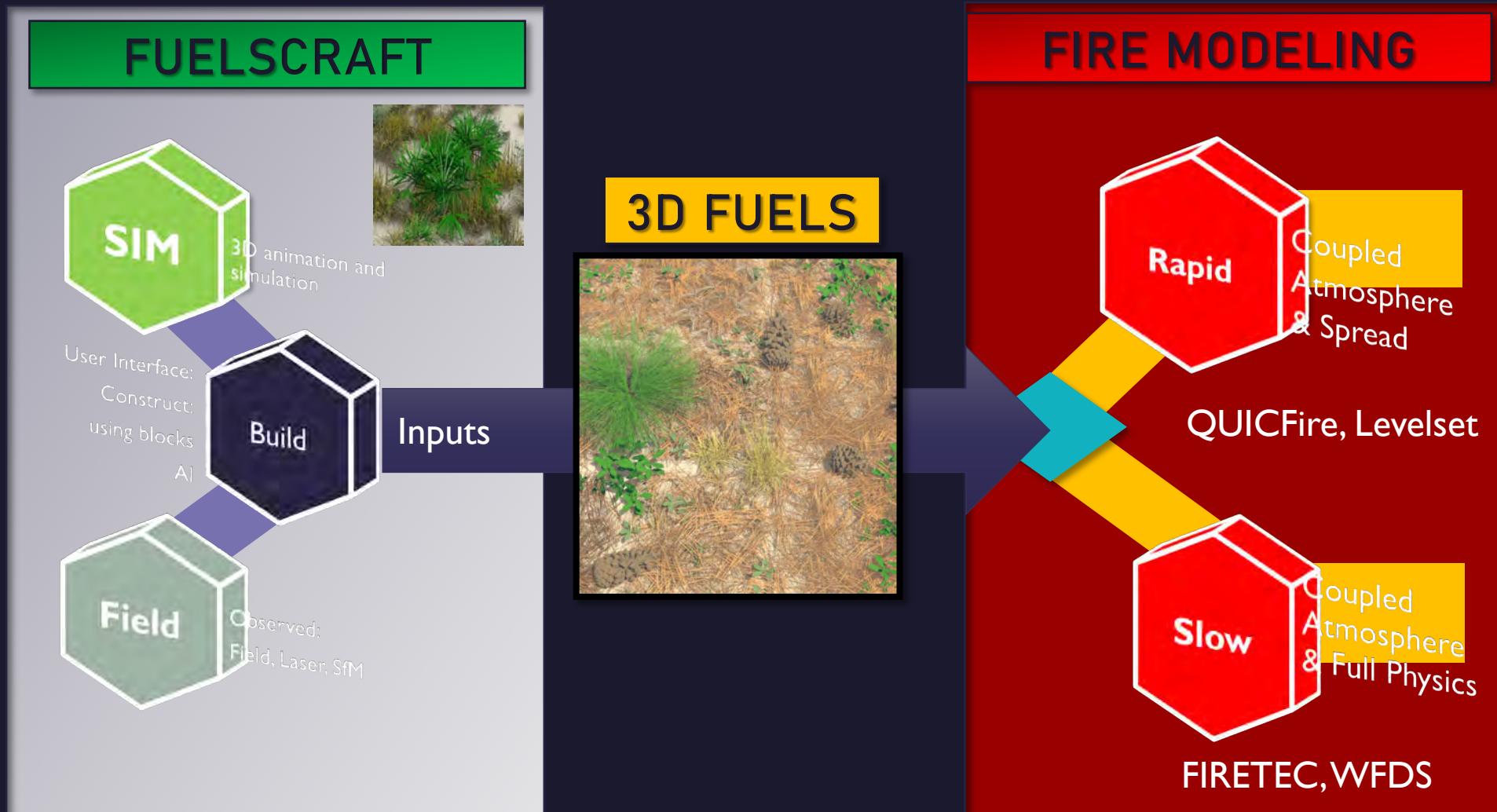
Close-Range Photogrammetry Models



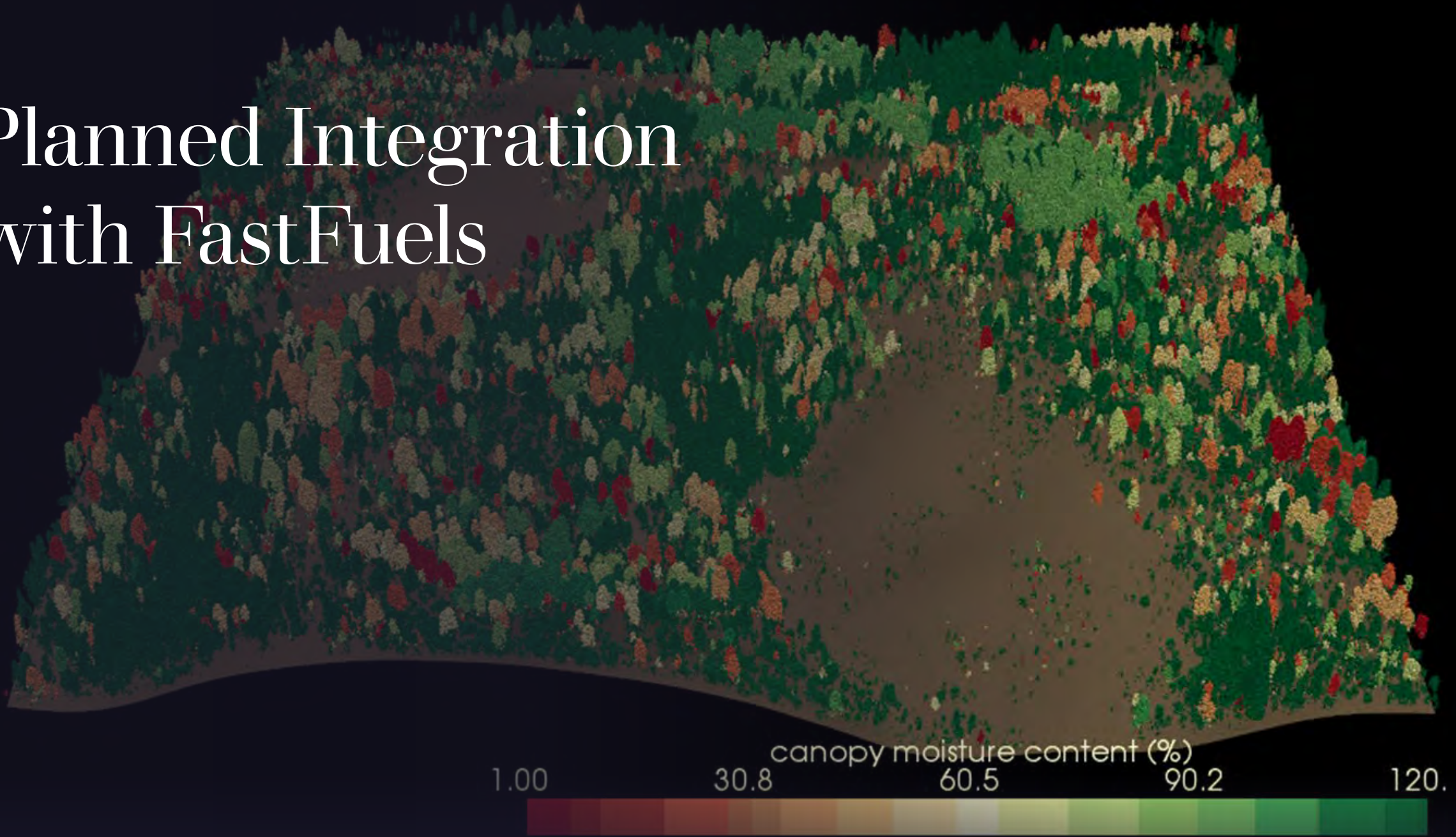
Terrestrial Lidar Scanning Models



Inputs to CFD models

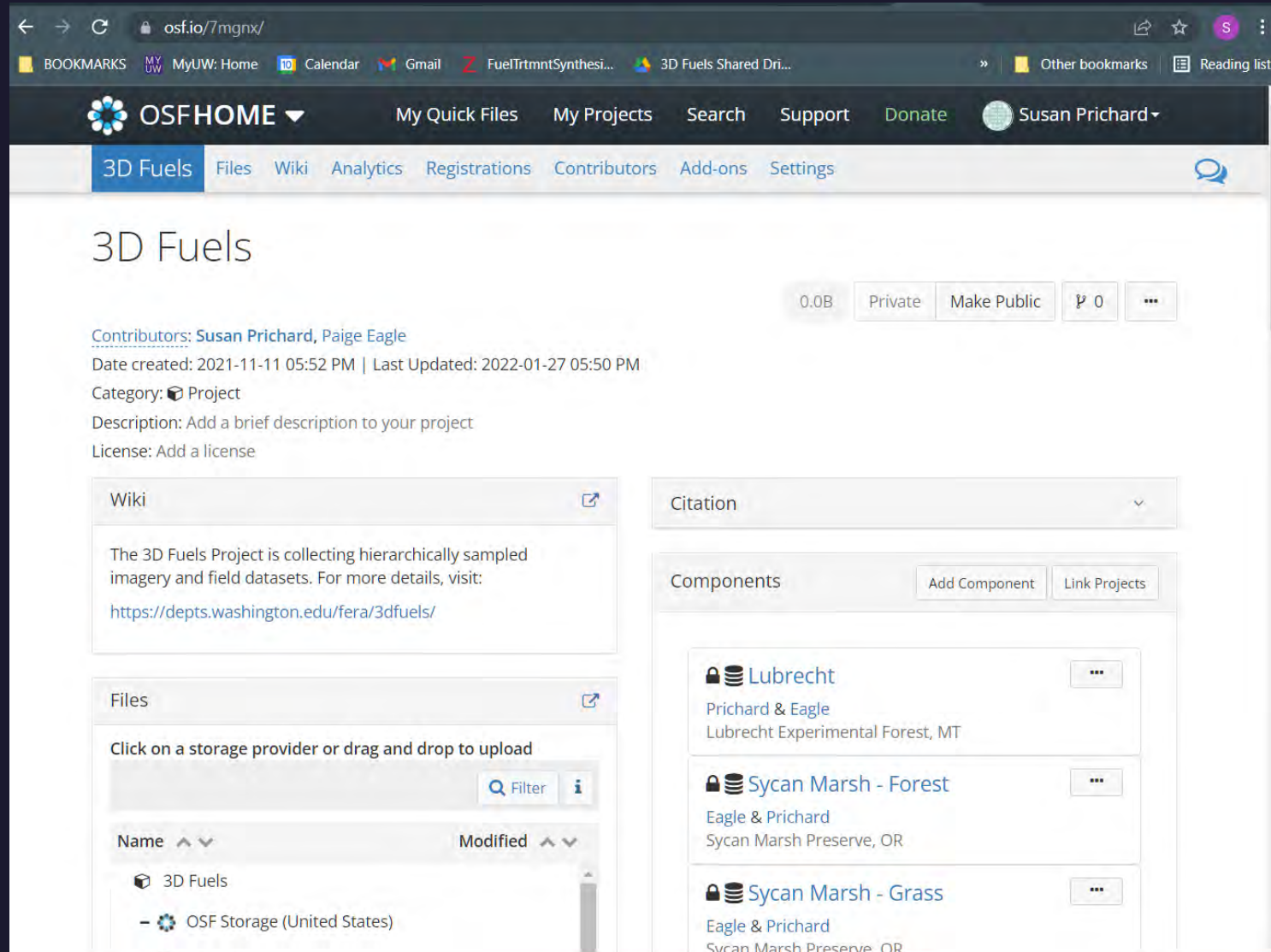


Planned Integration with FastFuels



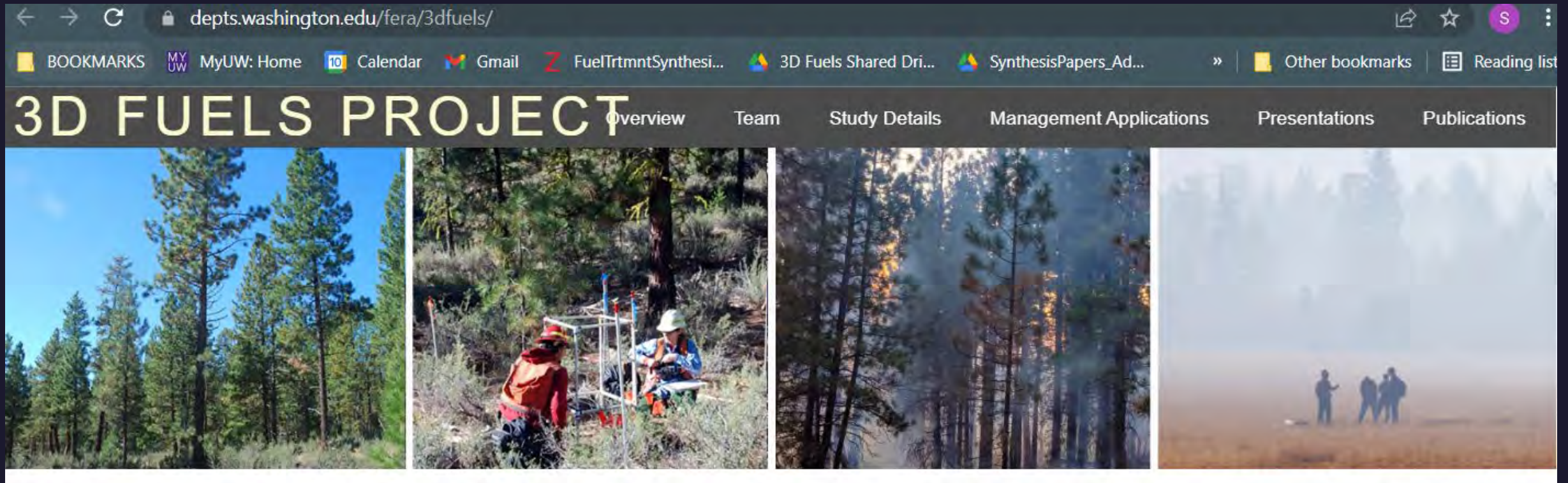
Open Science Framework – Integrated 3D datasets

<https://osf.io/7mgnx/>



The screenshot shows the OSF project page for '3D Fuels'. The browser address bar displays 'osf.io/7mgnx/'. The OSFHOME navigation bar includes 'My Quick Files', 'My Projects', 'Search', 'Support', 'Donate', and a user profile for 'Susan Prichard'. The project page header shows '3D Fuels' with a file icon, and a sub-navigation bar with 'Files', 'Wiki', 'Analytics', 'Registrations', 'Contributors', 'Add-ons', and 'Settings'. The main content area displays project details: 'Contributors: Susan Prichard, Paige Eagle', 'Date created: 2021-11-11 05:52 PM | Last Updated: 2022-01-27 05:50 PM', 'Category: Project', and a description field. Below this are sections for 'Wiki' (with a link to 'https://depts.washington.edu/fera/3dfuels/'), 'Files' (with a storage provider selection area and a file list showing '3D Fuels' and 'OSF Storage (United States)'), 'Citation', and 'Components' (listing 'Lubrecht', 'Sycan Marsh - Forest', and 'Sycan Marsh - Grass' with their respective contributors and locations).

Project Website



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