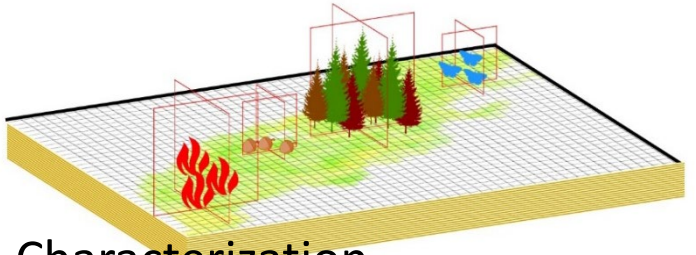
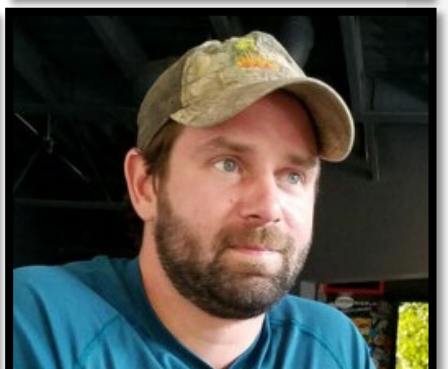
USFS – NASA Virtual Pitch Fest / June 2, 2020

Coarse-Scale 3D Fuel Mapping for Operational Use in Next-Generation Fire-Atmosphere Fire Behavior Models

By: Louise Loudermilk

About Me





Louise Loudermilk, PhD
Research Ecologist
USDA Forest Service
Southern Research Station
Center for Forest Health & Disturbance
Athens, GA

Work focus areas:
- Fuels Characterization
- Ecological Modeling

Team members:
- Andy Hudak, USDA FS, RMRS: Remote Sensing, Fuels Characterization
- Joe O'Brien, USDA FS, SRS: Wildland Fire Science, Fire Ecology
- Scott Goodrick, USDA FS, SRS: Meteorology, Fire Behavior Modeling
- Steve Flanagan, Tall Timbers Research Station, Tallahassee, FL: Ecosystem Modeling
- Kevin Hiers, Tall Timbers Research Station, Tallahassee, FL: Wildland Fire Science
- More to come!
- NASA scientists *here!*

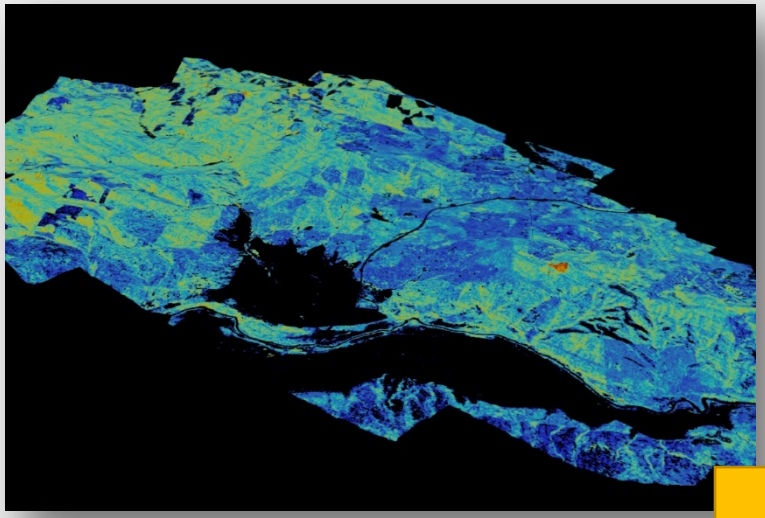
USDA FOREST SERVICE US DEPARTMENT OF AGRICULTURE

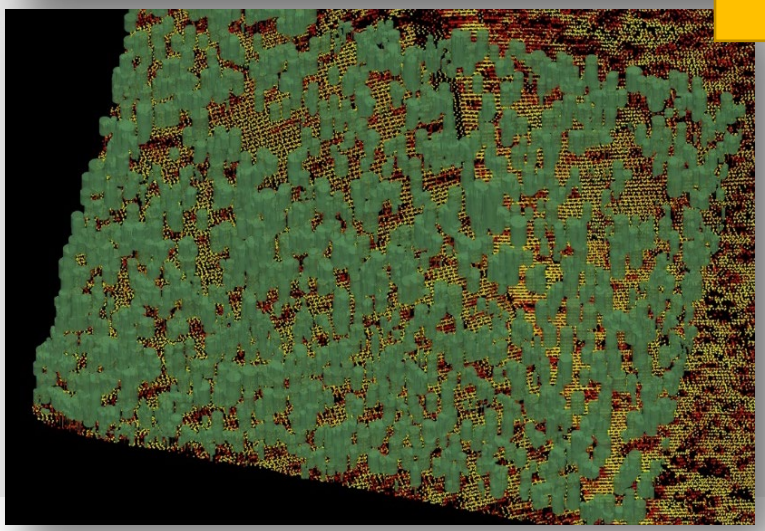
TALL TIMBERS

The Idea

Coarse-scale 3D fuel mapping for operational use in next-generation fire-atmosphere fire behavior models

- **Scope of Idea**
  - ***National*** **and** ***Regional*** **datasets used for** ***Local*** **management needs**





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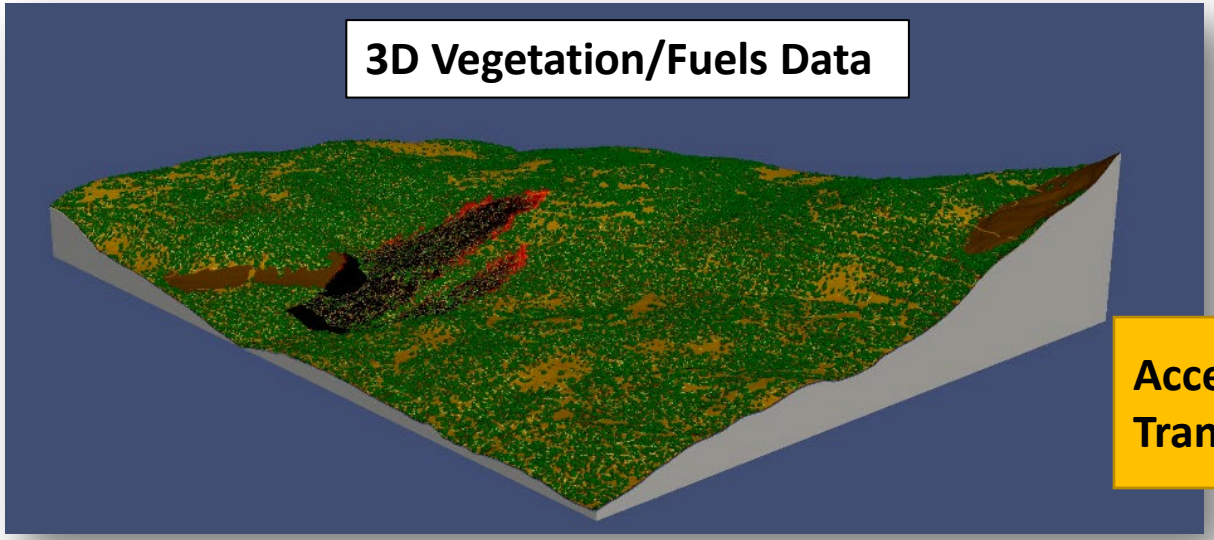
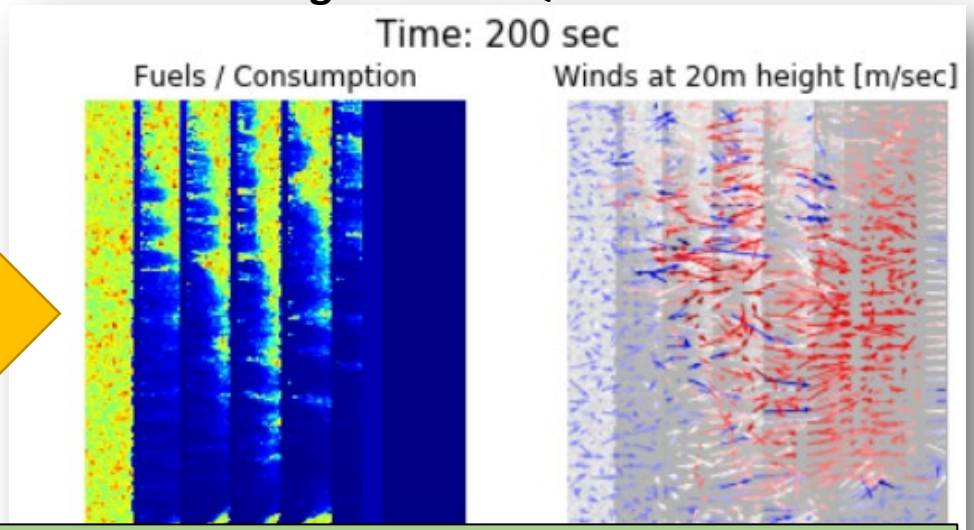
Coarse-Scale 3D Fuel Mapping for Operational Use in Next-Generation Fire-Atmosphere Fire Behavior Models

The Idea



Accessible?
Transferable?

Operational Prescribed Fire Planning using the new QUIC-Fire model



We propose to:

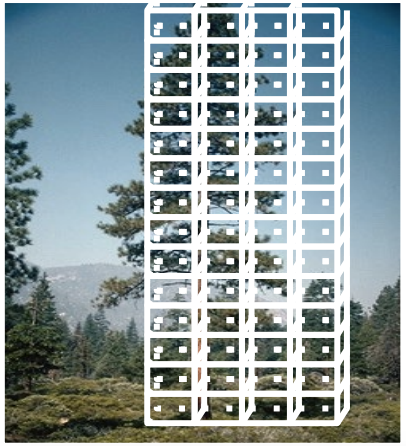
1. Create wall-to-wall 3D maps of canopy fuels, by linking sparse and coarse-scale 3D datasets to inform on more contiguous 2D datasets.
2. In select areas, create surface fuel maps of sub-canopy vegetation by linking coarse-scale canopy maps with field data and ancillary fire data.
3. Utilize state-wide datasets of ALS for cross-validation.
4. Test and validate data within QUIC-Fire model.
5. Streamline the process for continuous mapping.

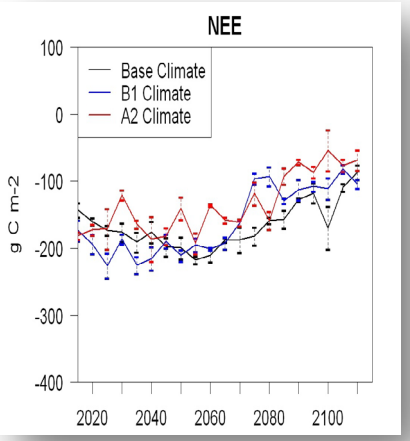
QUIC-Fire: Linn et al. (2020)

Issues being addressed

- ***Prescribed Fire Planning***
- **Wildfire hazard**
- **Fuel loading**
- **Vegetation mapping**
- Wildfire impacts: “fire effects”
- Forest health
- Climate and drought
- Carbon emissions and flux
- Rangeland management
- Soil moisture
- Water and aquatic resources

- Others: human health & safety, conservation…





The Idea

Issues Addressed

What EO data does your idea utilize?

The Idea

3D Data

EO - ICESat-2 & LiDAR (GEDI)
- National coarse-scale structural data

LiDAR (Aerial Laser Scanning)
- Regional/local structural data
- FL state-wide data for cross-validation

LiDAR (Terrestrial Laser Scanning)
- Local fine-scale structural data

Data leveraged from ongoing projects (DoD, NASA, etc.)

Forest Inventory Analysis (FIA) data
- Local fine-scale structural data

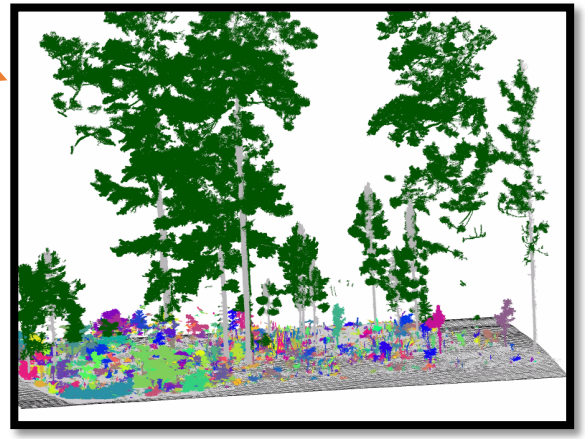
*We are also looking for guidance!

2D Data

EO - Landsat & Sentinel-2
- Forest/Ecosystem Type
- Biomass

EO - MODIS/VIIRS
- Local fire regime information

Forest Inventory Analysis (FIA) data
- Local fine-scale explicit vegetation data



Courtesy: Carlos Cabo

Courtesy: FIA & NRS

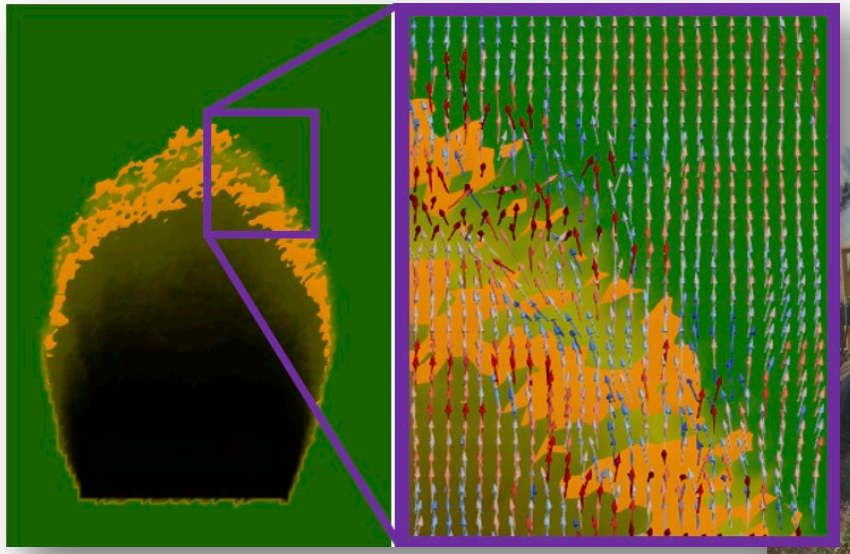
The Idea – Outcomes / Societal Benefits

Decision support for advanced wildland fire planning

- Kickstart the utilization and testing of models, such as QUIC-Fire with heterogeneous fuels data that are *accessible and transferable* to managers.

Benefits for land management, Forest Service and beyond

- Revolutionize cross-scale and adaptable approaches to characterizing novel fuel conditions, their effects on fire behavior, and applications for management.



QUIC-Fire: Linn et al. (2020)

Thank You!

E. Louise Loudermilk
eva.l.loudermilk@usda.gov
@LoudermilkL