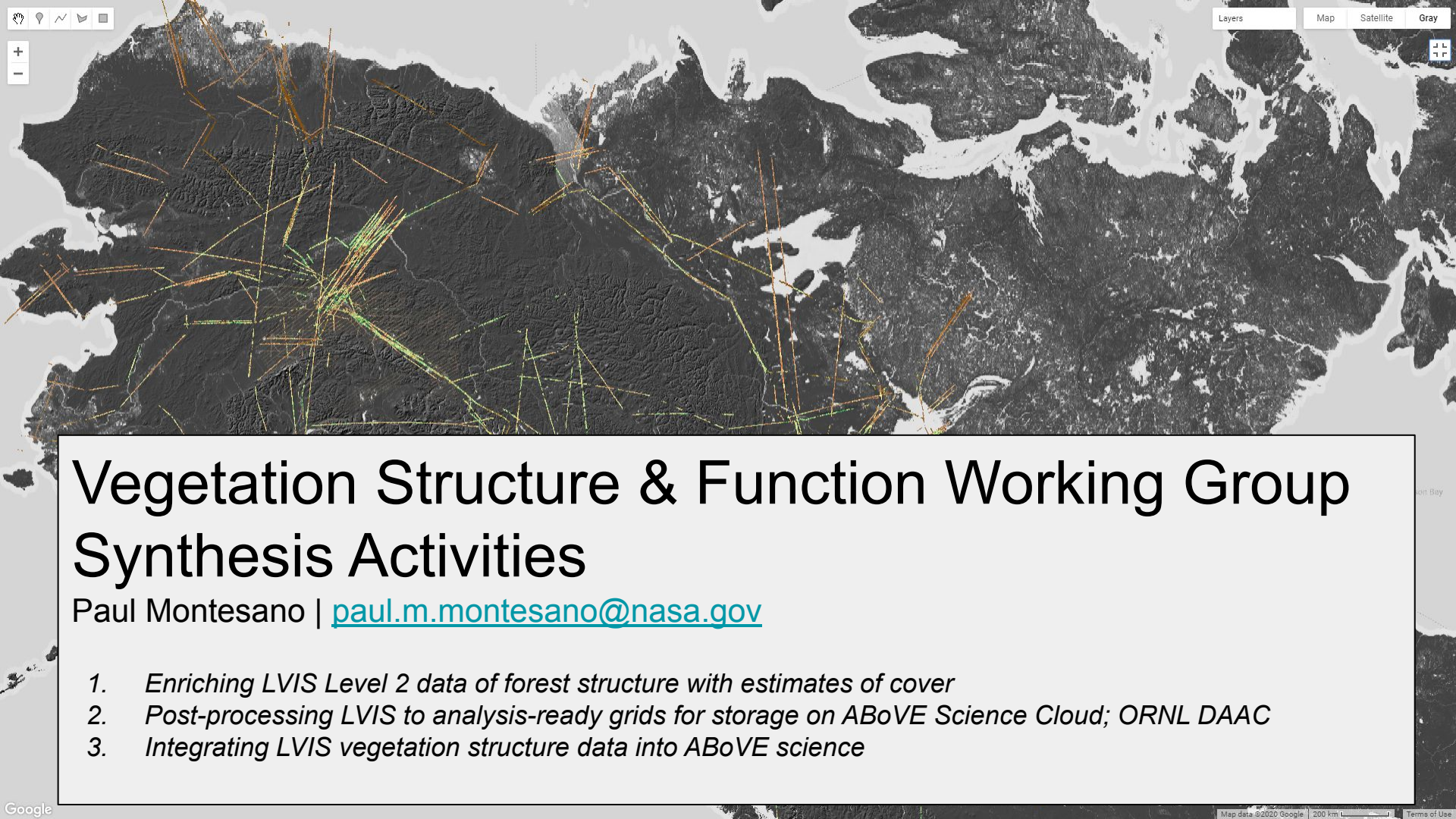
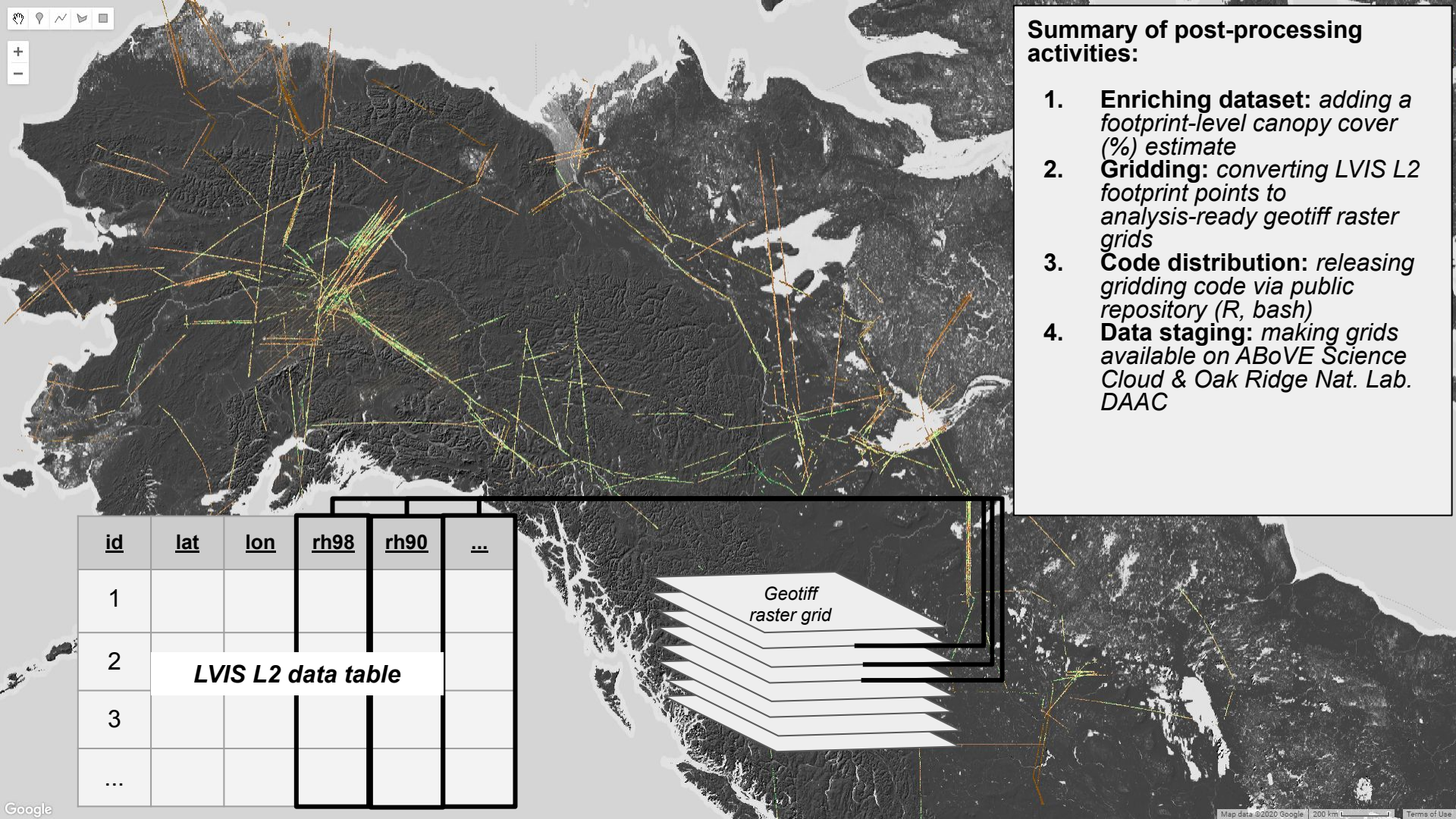


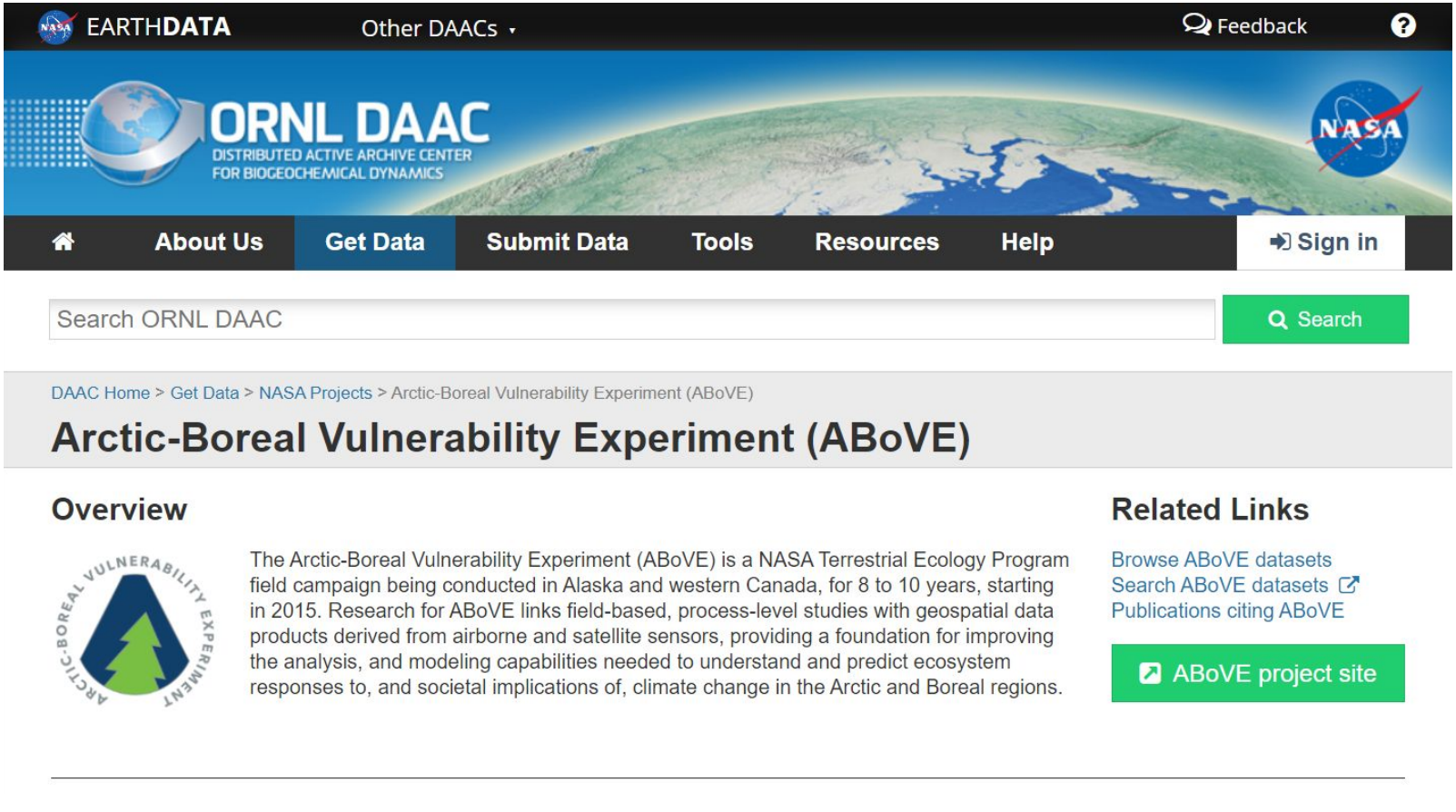
Vegetation Structure & Function Working Group Synthesis Activities

Paul Montesano | paul.m.montesano@nasa.gov

1. *Enriching LVIS Level 2 data of forest structure with estimates of cover*
2. *Post-processing LVIS to analysis-ready grids for storage on ABoVE Science Cloud; ORNL DAAC*
3. *Integrating LVIS vegetation structure data into ABoVE science*

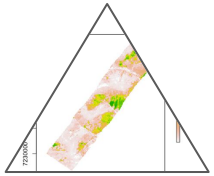

Summary of post-processing activities:
1. Enriching dataset: adding a footprint-level canopy cover (%) estimate
2. Gridding: converting LVIS L2 footprint points to analysis-ready geotiff raster grids
3. Code distribution: releasing gridding code via public repository (R, bash)
4. Data staging: making grids available on ABoVE Science Cloud & Oak Ridge Nat. Lab. DAAC
id
lat
lon
rh98
rh90
...
1
2
3
...
LVIS L2 data table
Geotiff raster grid
Google

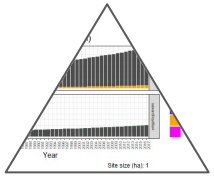
LVIS @ DAAC


EARTHDATA
Other DAACs
Feedback
ORNL DAAC
DISTRIBUTED ACTIVE ARCHIVE CENTER
FOR BIOGEOCHEMICAL DYNAMICS
NASA
About Us
Get Data
Submit Data
Tools
Resources
Help
Sign in
Search ORNL DAAC
Search
DAAC Home > Get Data > NASA Projects > Arctic-Boreal Vulnerability Experiment (ABoVE)
Arctic-Boreal Vulnerability Experiment (ABoVE)
Overview
ARCTIC-BOREAL VULNERABILITY EXPERIMENT
The Arctic-Boreal Vulnerability Experiment (ABoVE) is a NASA Terrestrial Ecology Program field campaign being conducted in Alaska and western Canada, for 8 to 10 years, starting in 2015. Research for ABoVE links field-based, process-level studies with geospatial data products derived from airborne and satellite sensors, providing a foundation for improving the analysis, and modeling capabilities needed to understand and predict ecosystem responses to, and societal implications of, climate change in the Arctic and Boreal regions.
Related Links
Browse ABoVE datasets
Search ABoVE datasets
Publications citing ABoVE
ABoVE project site

Science incorporating LVIS to examine vegetation structure

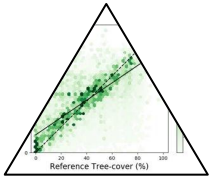
Science with estimates within LVIS swaths

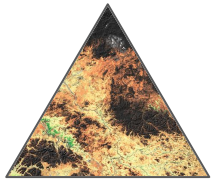


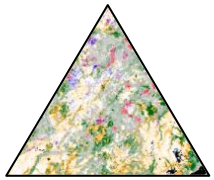


Reference biomass from LVIS used to validate predictions of current maps and simulations of biomass to understand recent and predict future change

Science with mapped predictions driven by LVIS







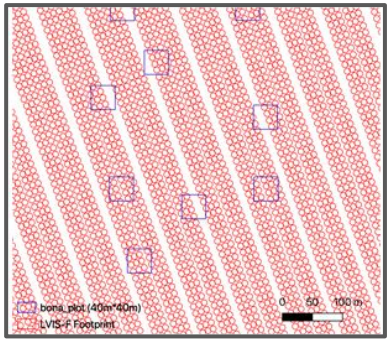
Reference estimates of structure from LVIS drive spatially continuous predictions of forest structure and dynamics to understand variations in structure and function

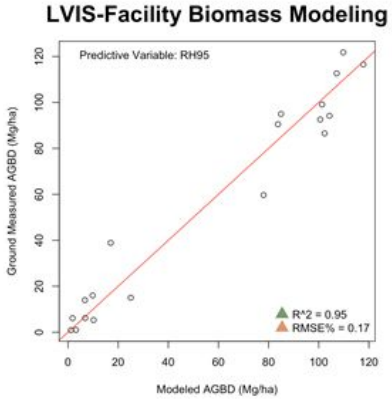
Modeling forest AGB across LVIS extents

Duncanson, T. Feng, D. Minor, J. Armston et al.

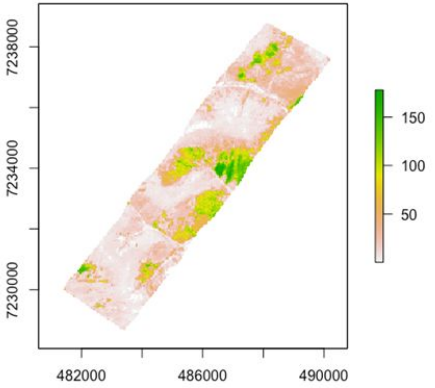
- Empirical models relate field derived biomass to 95th percentile heights from LVIS at sites where obs. from field & LVIS coincide (eg, Bona, AK)
- Resulting LVIS AGB maps will help validate spaceborne AGB maps from ICESat-2
-
- Important independent reference

Building AGB models with averaged LVIS heights within ground plots in ABoVE domain





Applying AGB models to LVIS grids across ABoVE domain



Validating simulations of vegetation structure

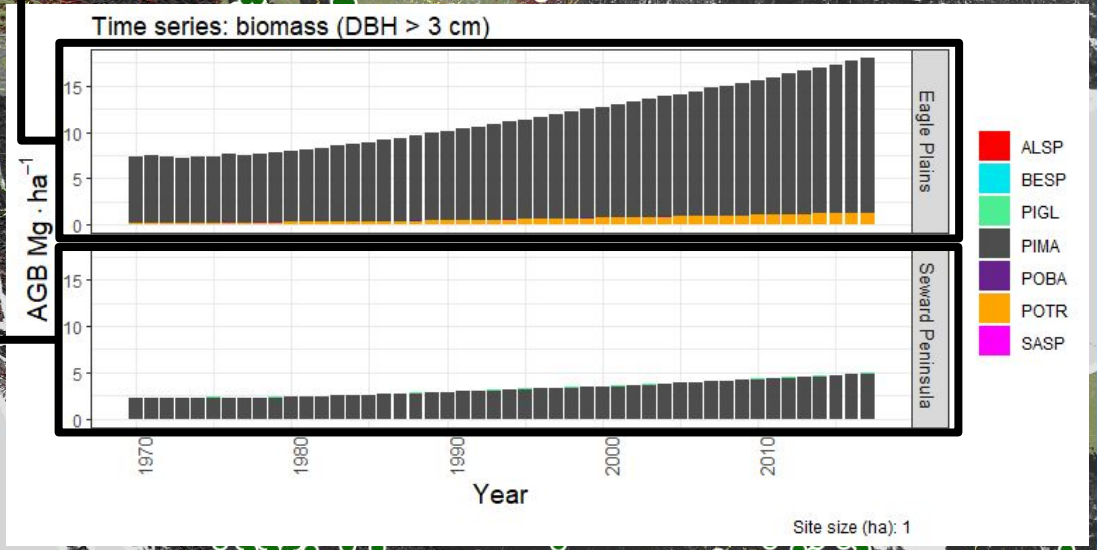
Armstrong, Osmanoglu, Montesano, Heffernan, Epstein, et al.

LVIS height and AGB estimates will :

- corroborate coincident high-resolution simulations of forest structure.
- constrain predictions of rates of change of structure at sites across the ABoVE domain.

Site: Eagle Plains
TTE abrupt

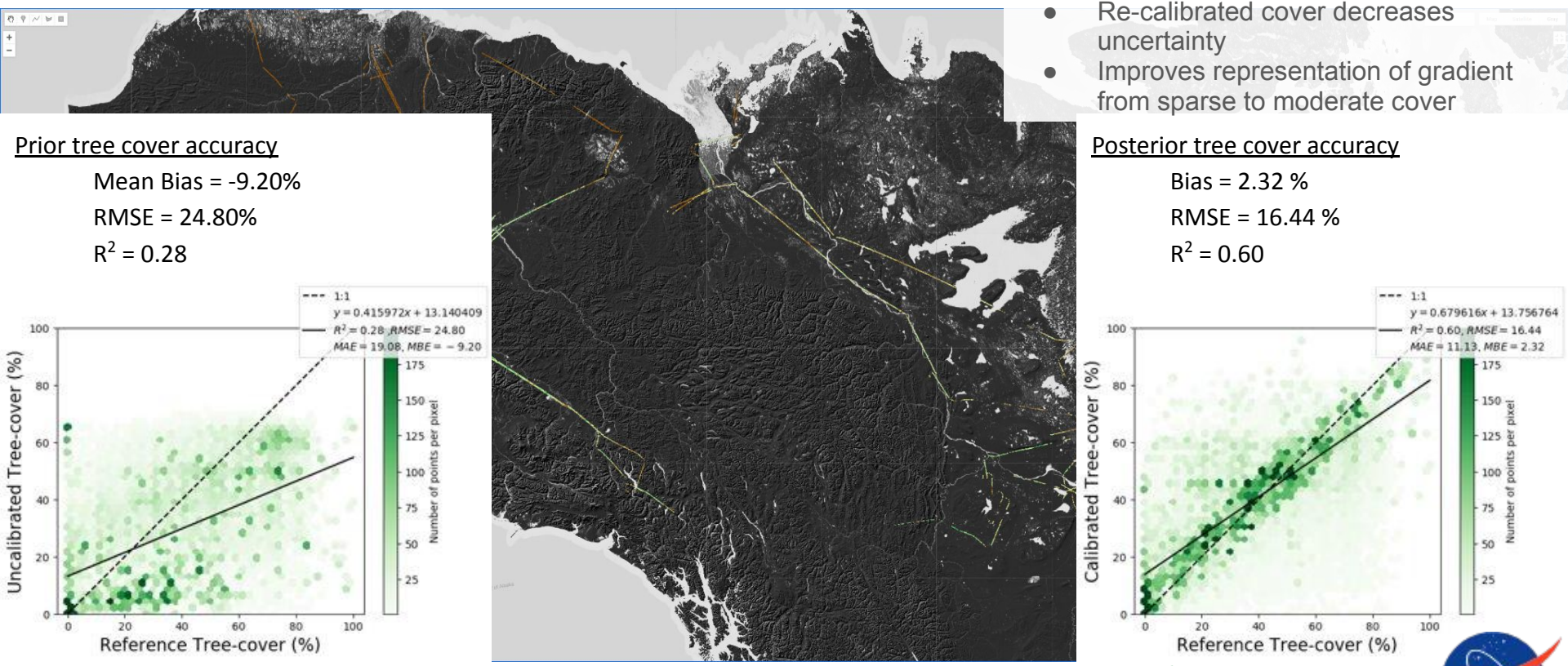
Site: Seward Peninsula
TTE abrupt



Re-calibration of Landsat boreal canopy cover with LVIS 2017

Feng, Sexton, Wang, Neigh et al.

- LVIS was used to re-calibrate a Landsat tree-cover model
- Re-calibrated cover decreases uncertainty
- Improves representation of gradient from sparse to moderate cover



Prior tree cover accuracy

Mean Bias = -9.20%

RMSE = 24.80%

R^2 = 0.28

Posterior tree cover accuracy

Bias = 2.32 %

RMSE = 16.44 %

R^2 = 0.60

Feng, M., J.O. Sexton, P. Wang, P.M. Montesano, L. Calle, N. Carvalhais, B. Poulter, M. Wooten, W. Wagner, A. Elders, S. Channan, C.S.R. Neigh. *In review.*.

terraPulse NASA

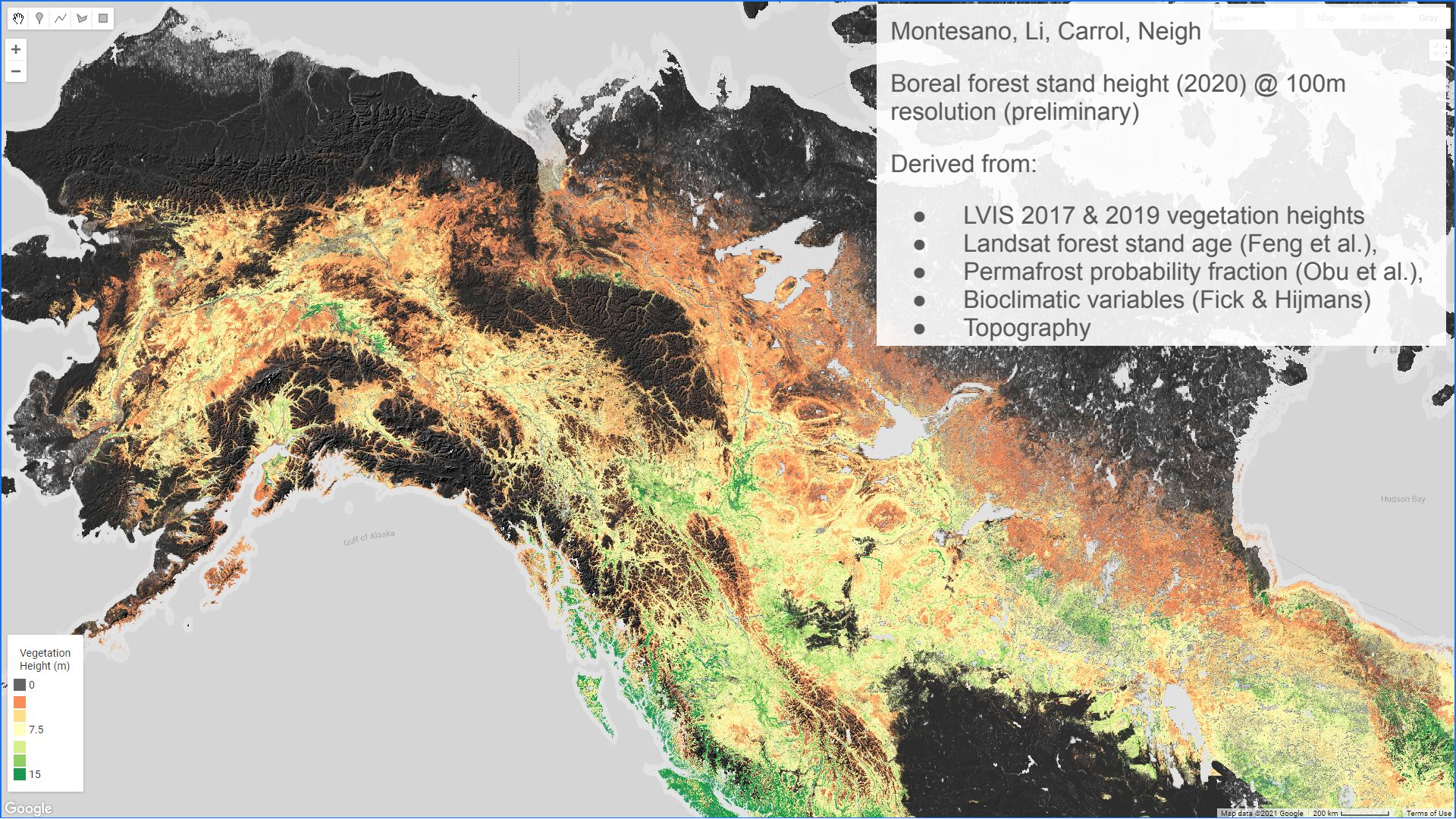
Re-calibration of Landsat boreal canopy cover with LVIS 2017

Feng, Sexton, Wang, Neigh et al.

This re-calibrated Landsat tree-cover model:

- was applied to ~ 225,000 boreal Landsat scenes.
- produced annual boreal tree cover maps from 1984-2020
- Provided estimates of forest stand age and multi-decadal forest change maps

Feng, M., J.O. Sexton, P. Wang, P.M. Montesano, L. Calle, N. Carvalhais, B. Poulter, M. Wooten, W. Wagner, A. Elders, S. Channan, C.S.R. Neigh. *In review.*.

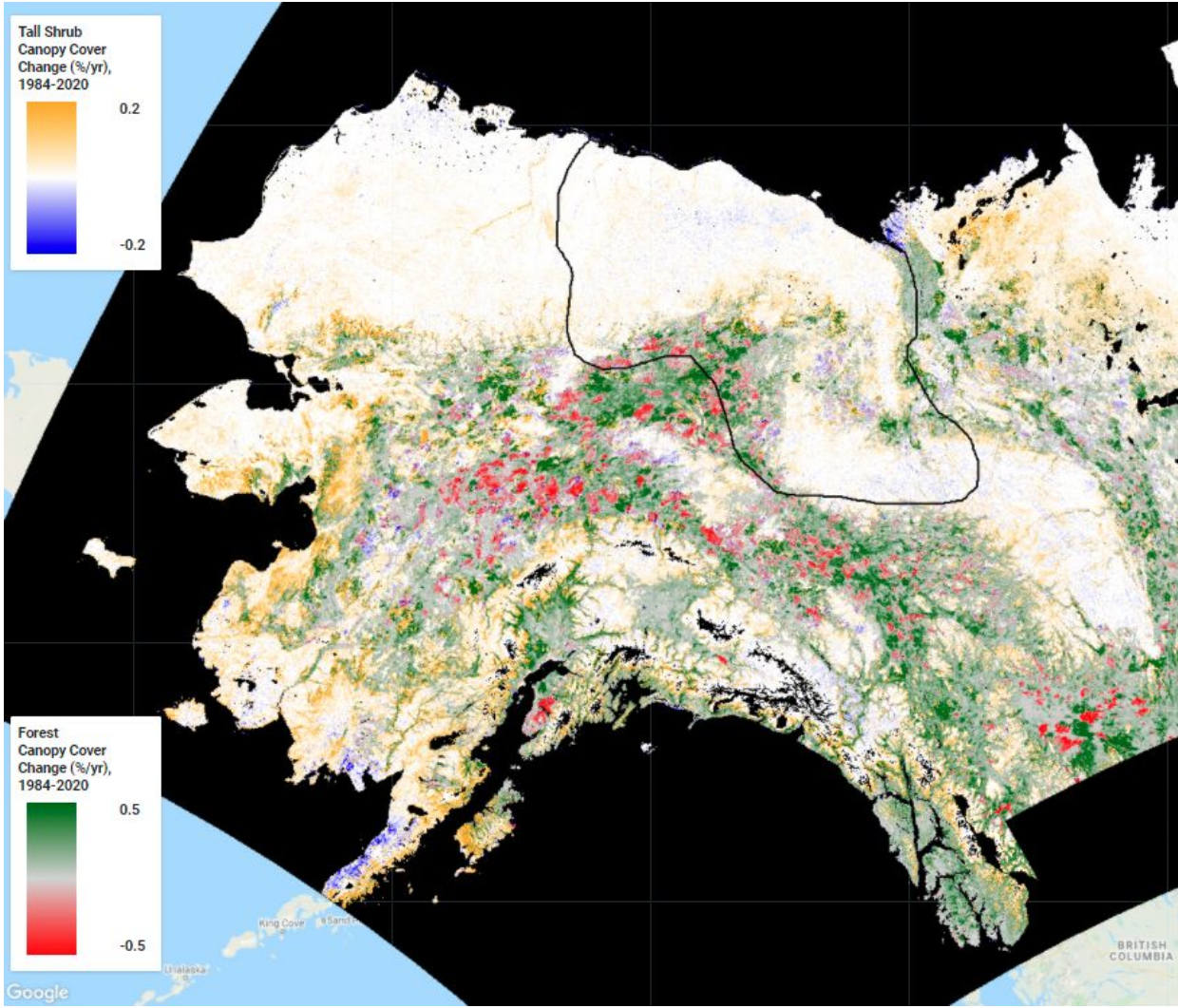

Montesano, Li, Carrol, Neigh
Boreal forest stand height (2020) @ 100m resolution (preliminary)
Derived from:
LVIS 2017 & 2019 vegetation heights
Landsat forest stand age (Feng et al.),
Permafrost probability fraction (Obu et al.),
Bioclimatic variables (Fick & Hijmans)
Topography
Vegetation Height (m)
0
7.5
15
Gulf of Alaska
Hudson Bay
Google
Map data ©2021 Google
200 km
Terms of Use

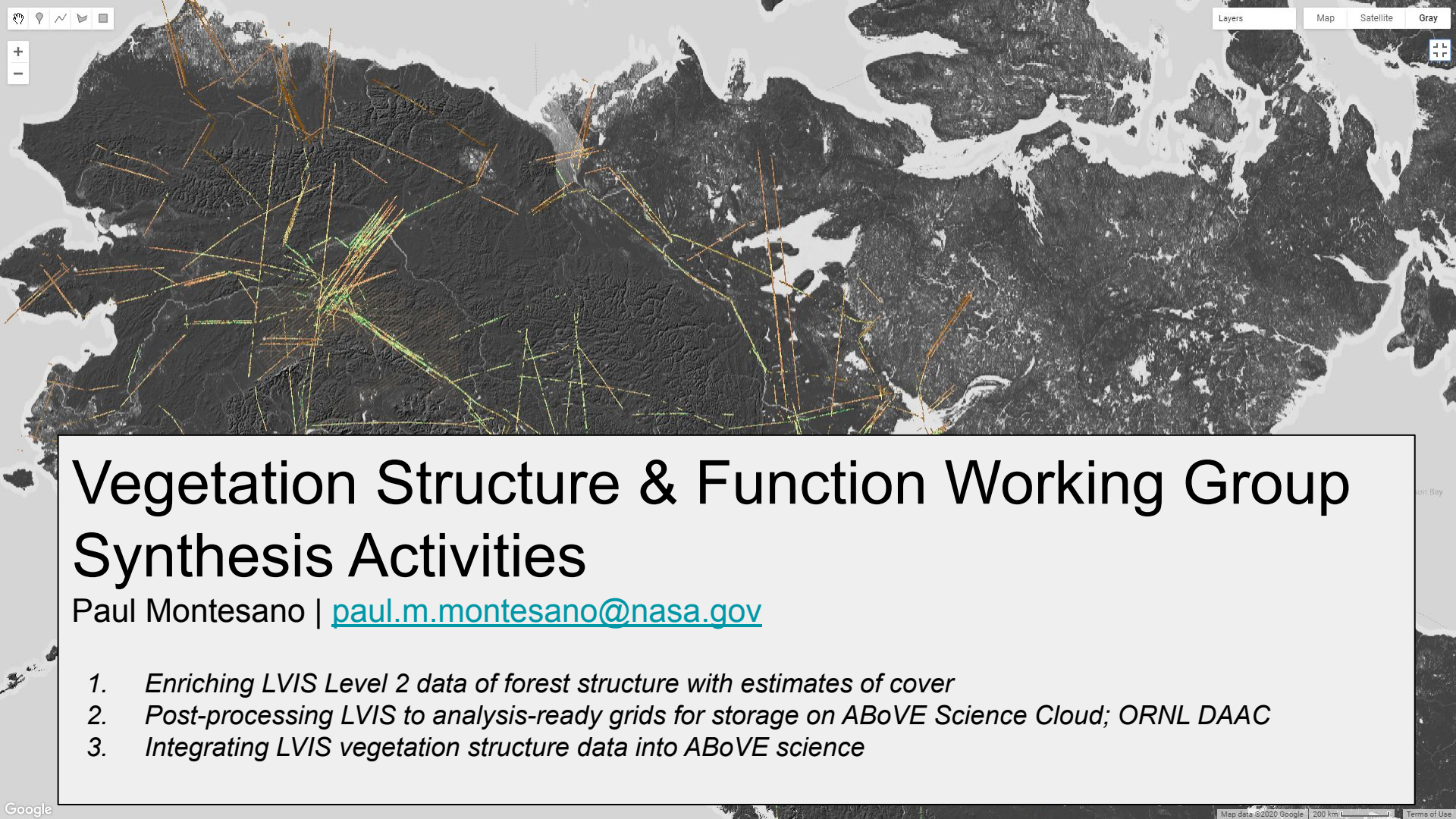
Distinguishing changes in structure

Macander, Frost et al.

LVIS canopy cover estimates used with Landsat time series to:

- predict cover,
- attribute cover type,
- calculate rate of cover type change





Vegetation Structure & Function Working Group Synthesis Activities

Paul Montesano | paul.m.montesano@nasa.gov

1. *Enriching LVIS Level 2 data of forest structure with estimates of cover*
2. *Post-processing LVIS to analysis-ready grids for storage on ABoVE Science Cloud; ORNL DAAC*
3. *Integrating LVIS vegetation structure data into ABoVE science*