Oregon Department of Transportation

Study of the Hooskanaden Slide Using LiDAR Technology

By Audrey McHugh Britton
2019 Symposium by the Sea
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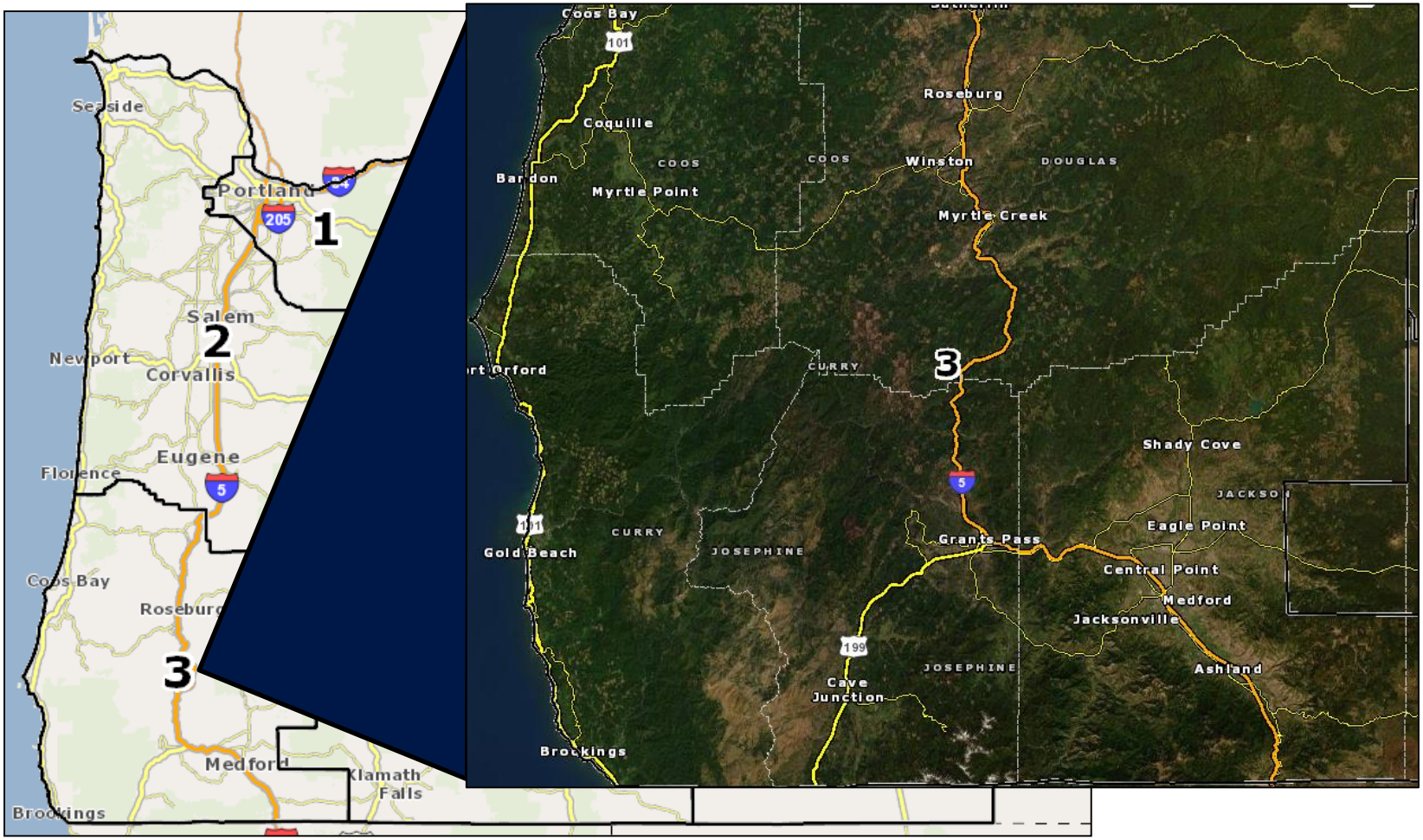
Region 3 – Southwest Oregon



Hooskanaden Slide

Background

- Mountain snow event in Coast Range
- Coastal rain event
  - 12 inches in 2 days
- Several highways in the region closed

Aftermath

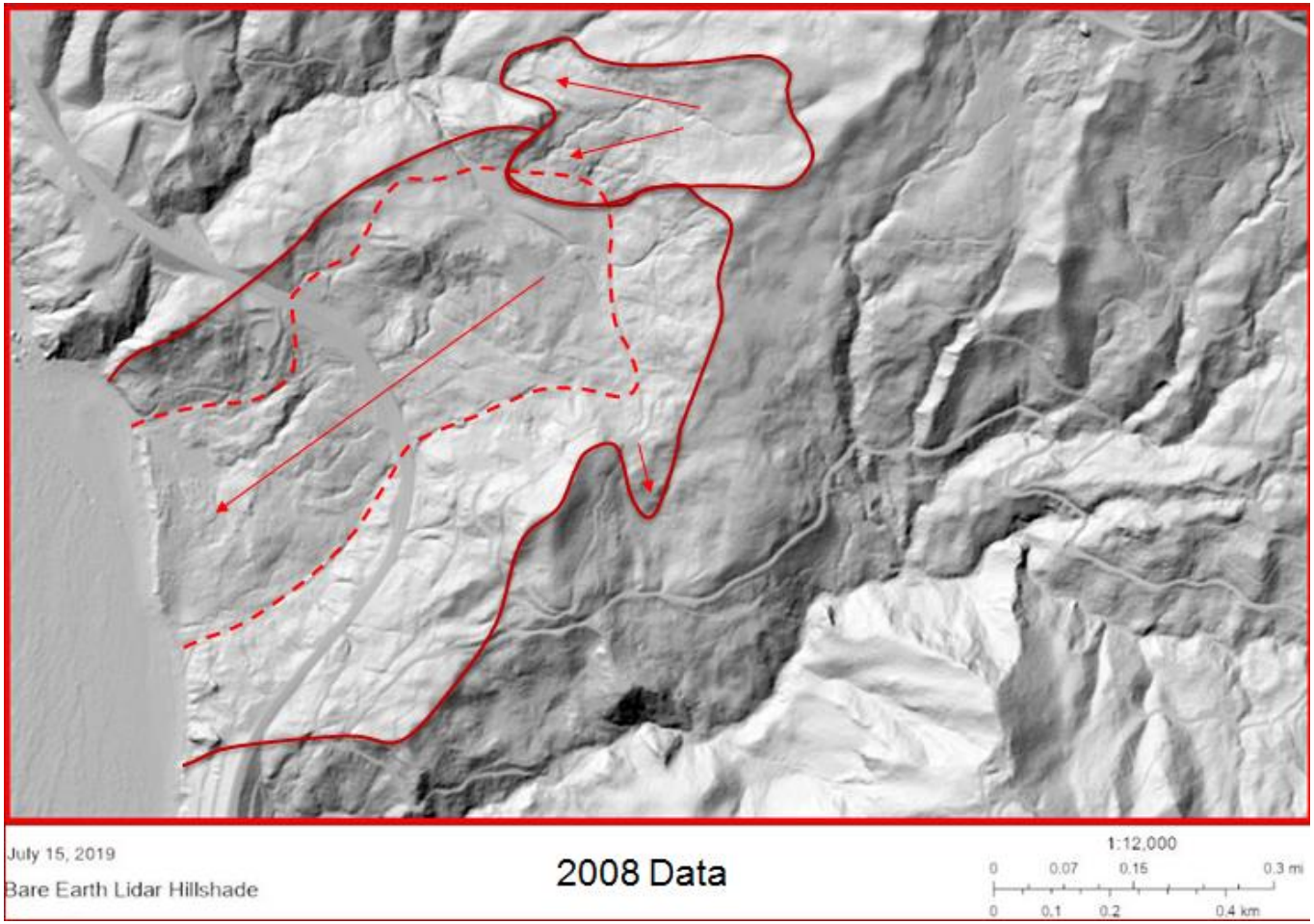
Approach

- How did the slope surface change?
- What is the extent of the slide?
- What are the characteristics of the slide?
  - Can we prevent it from happening again?
- How much roadway material was moved?

Approach

Mobile LiDAR	Terrestrial (Static) LiDAR	Aerial LiDAR
• High point density • Direct view of vertical faces • Restricted to roadway • Closer to ground/objects	• High point density • Not restricted to roadway • Coverage dependent on positioning • Gaps from obstructed areas	• Lower point density • Larger footprint • Not limited to visibility from roadway • Direct view of roads/roofs

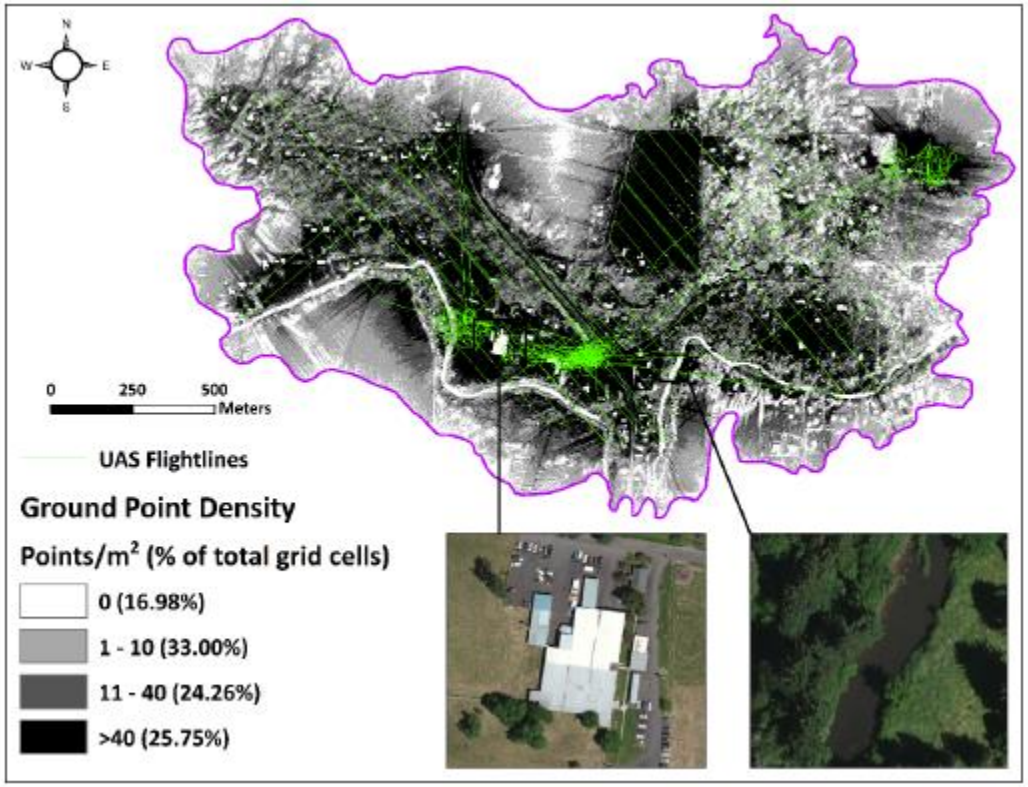
DOGAMI Aerial LiDAR



UAS LiDAR

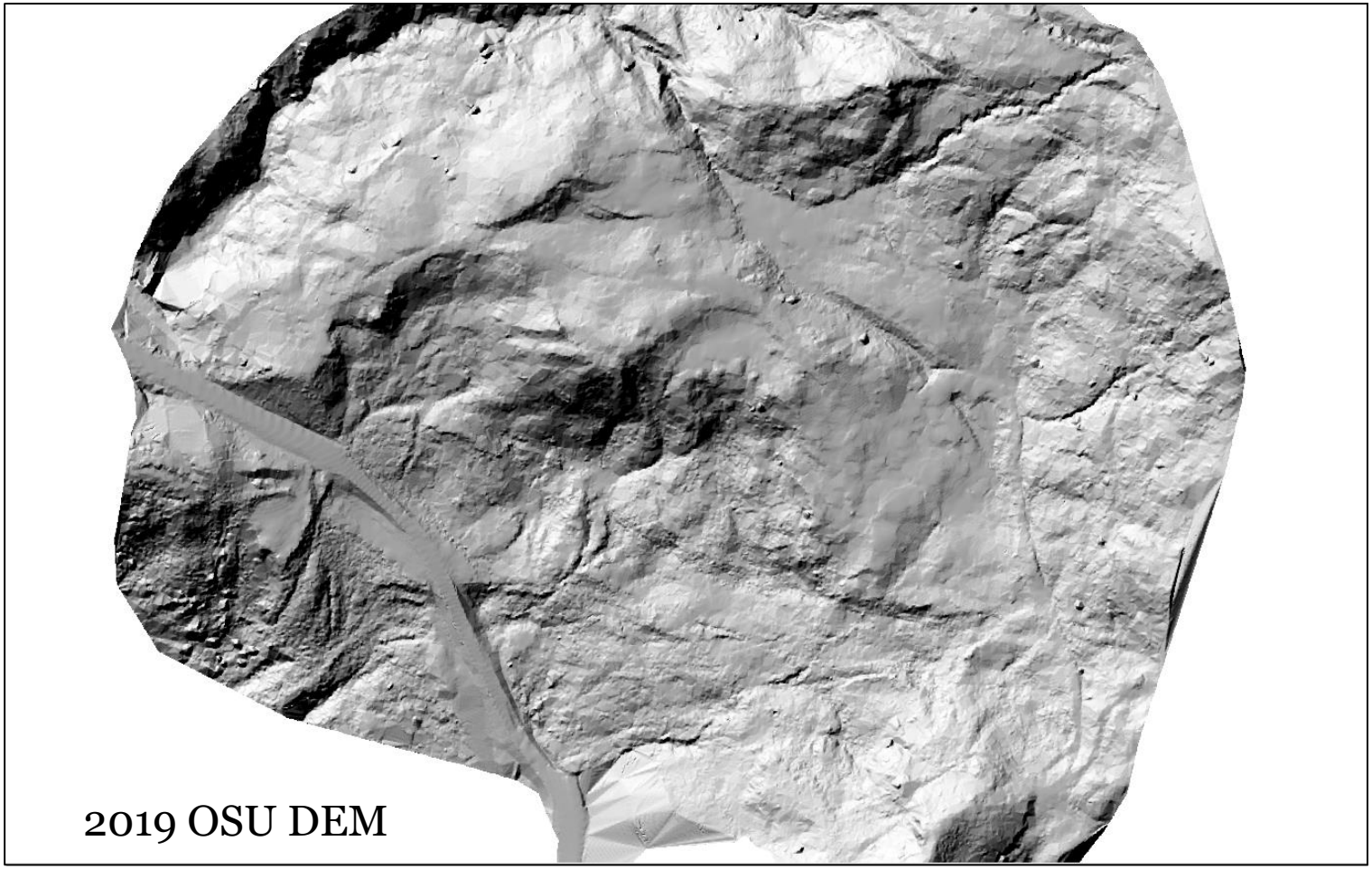
Photo courtesy of Oregon State University

UAS LiDAR



Graphic courtesy of Oregon State University

UAS LiDAR



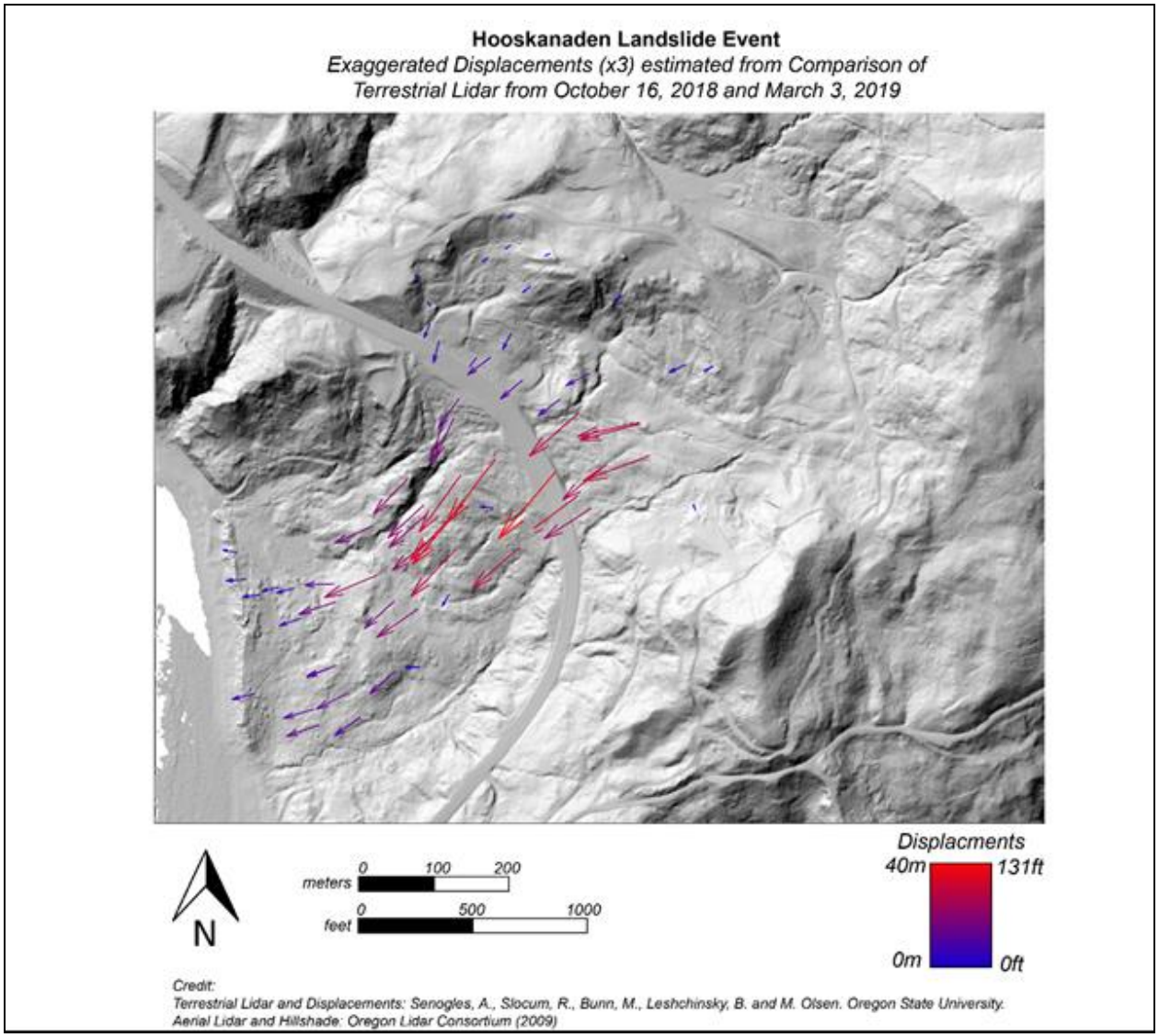
UAS LiDAR

- Ability to process a 0.5 m DEM with minimal data gaps to fill
- Ground point density typically ~30 ppsm
- Steep terrain and dense vegetation
- Turn around ~1-2 weeks

Terrestrial (Static) LiDAR

- Collected by Oregon State University for slope study
- Collected new data after the slide

Terrestrial (Static) LiDAR



Terrestrial (Static) LiDAR

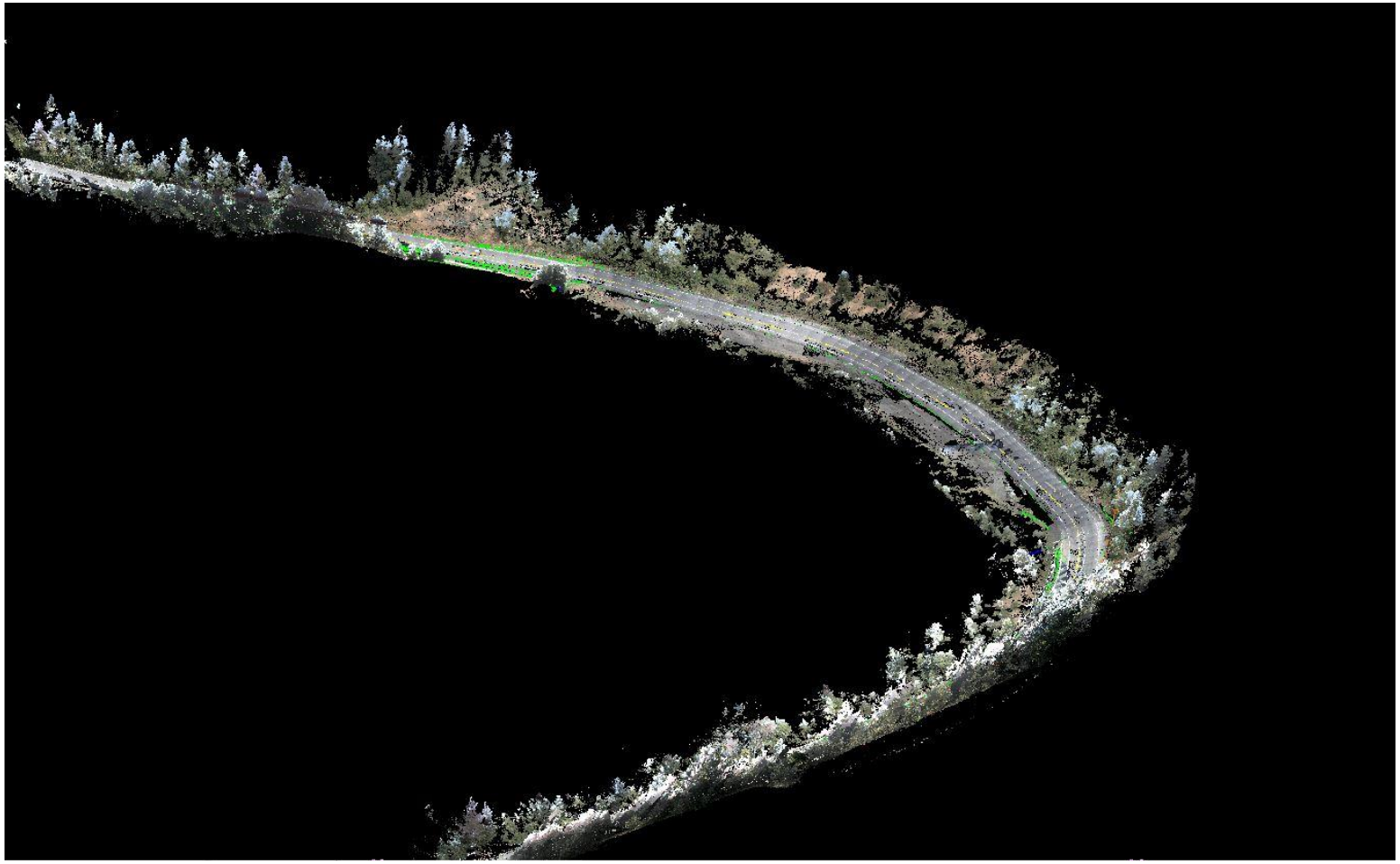
Mobile LiDAR

- Data collected summer 2018
- Temporary alignment placed
- ~15,000 cubic yards of material used

Mobile LiDAR

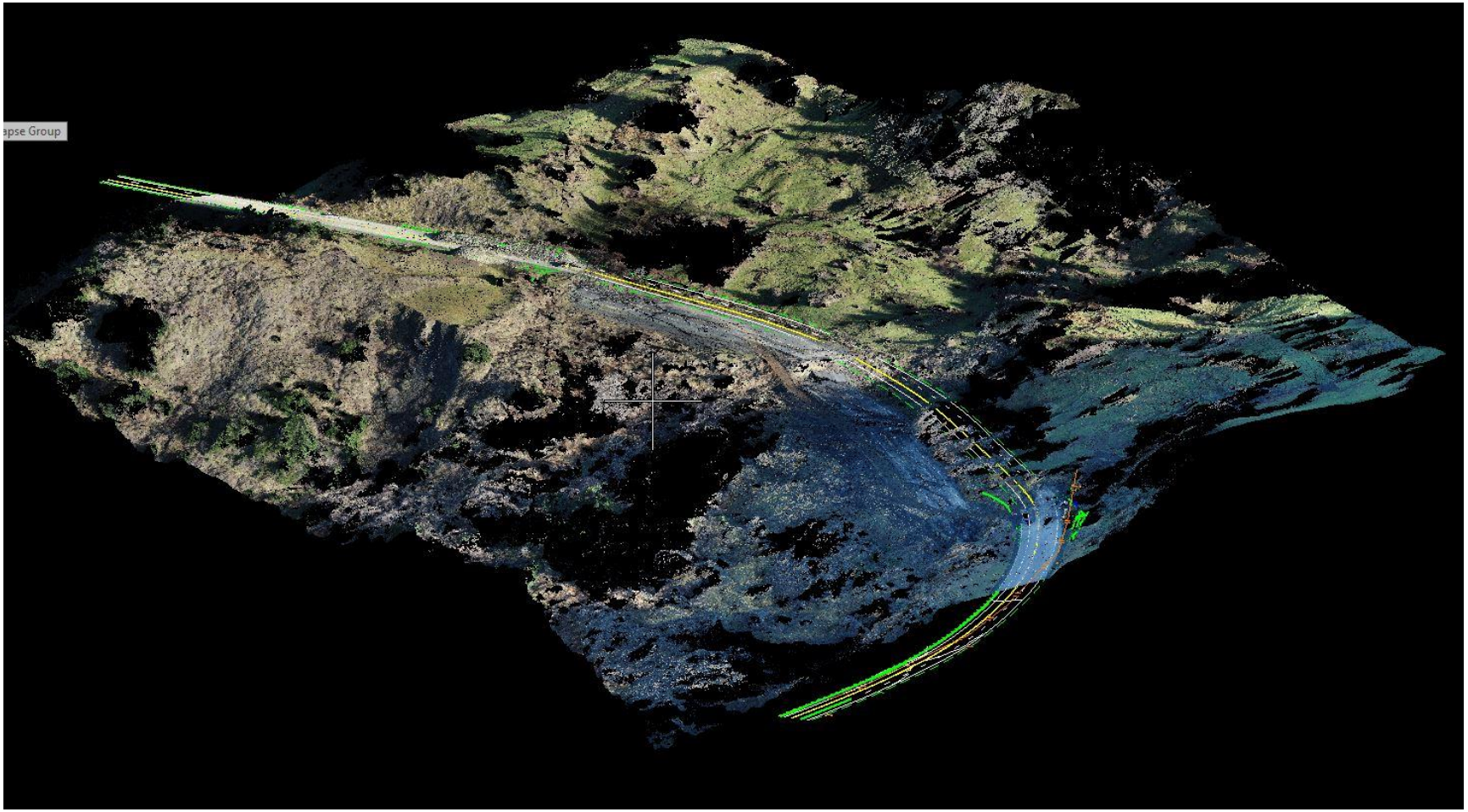
Mobile LiDAR

2018 Data



Mobile LiDAR

Post-slide data with 2018 line work



Results

- Point cloud data
  - Real latitude, longitude and elevation information
  - Vector analysis
  - Cross-sectional information
- Bare-earth DEM
  - Visualization/characterization of the slide
  - Difference in slope surface over time

Results

- Redesign in progress
- Reinforcement of slope drainages
  - Prevent obstruction in the event of more movement
- Ongoing maintenance
  - Difficult to prevent movement

Ongoing Monitoring Efforts

- ODOT
  - Site visits
- Oregon State University
  - Terrestrial LiDAR scans every 6 months
    - Only capturing bluff and area along the road
  - UAS LiDAR
    - Occasionally flown, depends on funding

Future Monitoring?

- UAS LiDAR Surveys of the entire slope
  - Ideal for hazardous areas and project sites
  - DOGAMI LiDAR not updated frequently
  - Road and bluff scans only

Questions?

Contact Info

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