

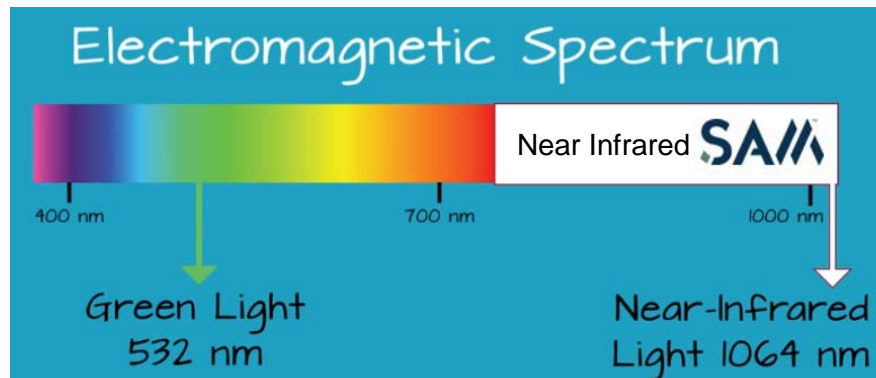


Utilizing Aerial LiDAR to Support Geohazard Analysis

August 2022

LiDAR Overview

- Light Detection And Ranging
- Platforms: Ground, vehicle, airborne, or even satellite
- Components:
 - GPS Receiver
 - Inertial Measurement Unit (IMU): records the roll, pitch and yaw of the aircraft
 - Laser Scanner: emits the signal in a particular pattern
 - Sensor: reads the returning signal



The diagram shows an aircraft at the top, emitting a red laser pulse down to a green ground profile. The pulse is represented by a vertical red line. The text '(travel time) * (speed of light)' is written above the pulse, and '= Distance' is written to the right. A horizontal line is drawn below the text, and the number '2' is written below the line.

$$\frac{(\text{travel time}) * (\text{speed of light})}{2} = \text{Distance}$$

The diagram shows an aircraft at the top, emitting a red laser pulse down to a green ground profile. The pulse is represented by a vertical red line. The text 'Altitude (2,024m)' is written above the pulse, and '- Distance (1,000m)' is written below it. A horizontal line is drawn below the text, and the text 'Ground Elevation (1,024m)' is written below the line.

$$\text{Altitude (2,024m)} - \text{Distance (1,000m)} = \text{Ground Elevation (1,024m)}$$

2019 Grand Caravan & Reigl 1560II Sensor

Deployed in 2019, SAM was first to deploy in US

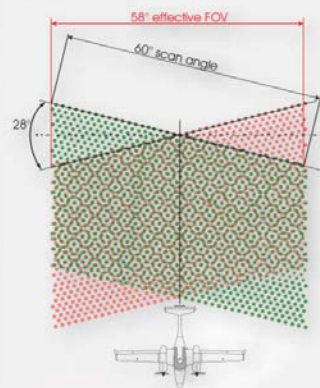
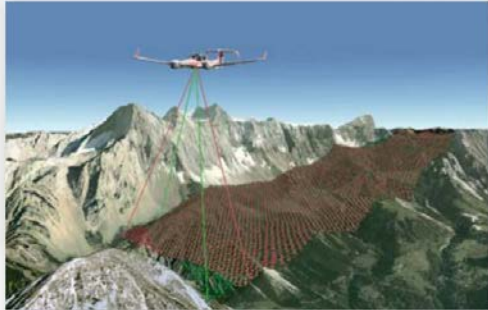
SINGLE PASS SOLUTION

- ± 50 ppsm (industry standard is ± 25)
- Up to 130 knots, $\pm 2,000$ ft. swath
- 4-Band Nadir (downward looking) 150MP Camera - $< 3''$ imagery
- 4x Oblique Cameras to all for wider view of ROW
- 2x Video Cameras

NEXT GENERATION LIDAR

- 2.5x Faster - 120 Knots, 2.6 M measurements per second on the ground
- 2x Endurance / Distance
- 2x Swath Width
- 25% Cost Reduction

RIEGL VQ-1560II Scan Pattern



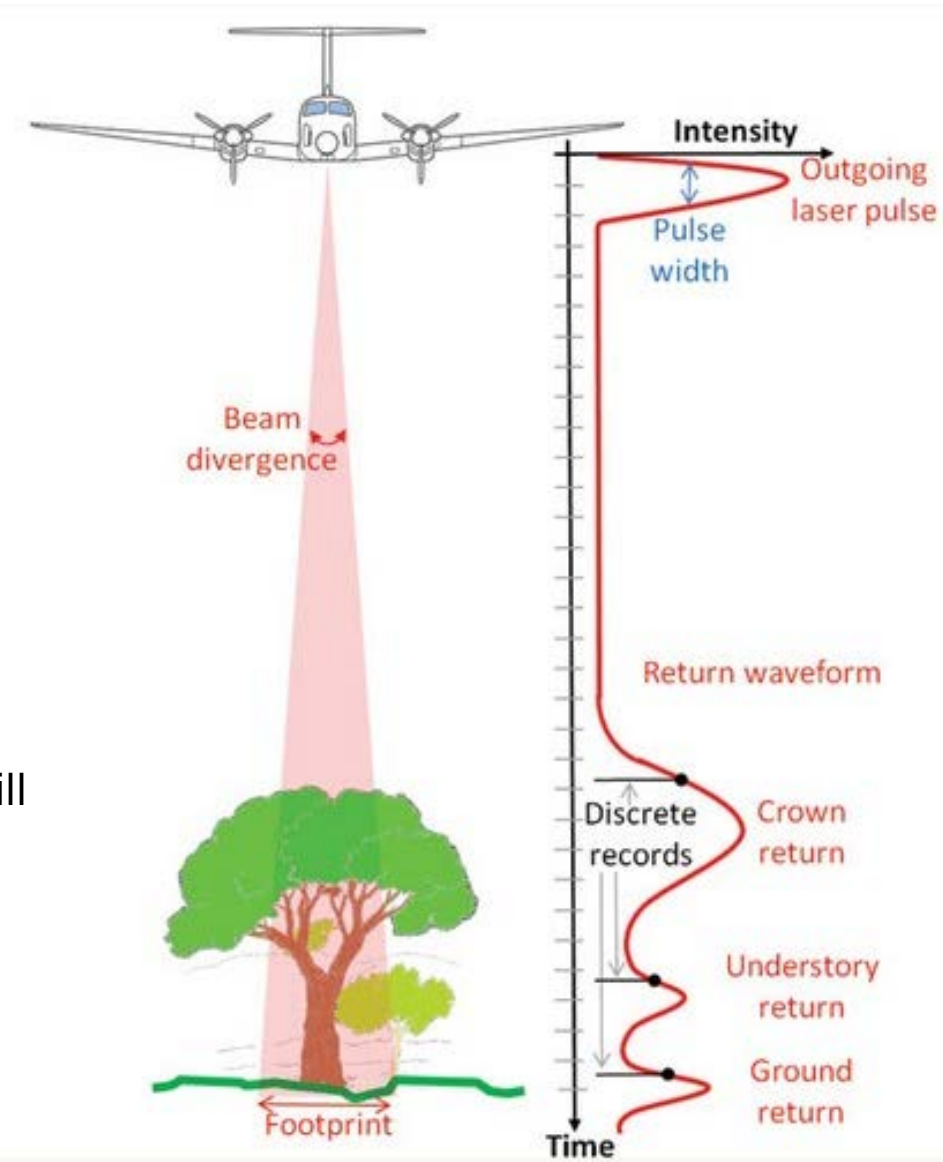
Additional LiDAR Details

Benefits

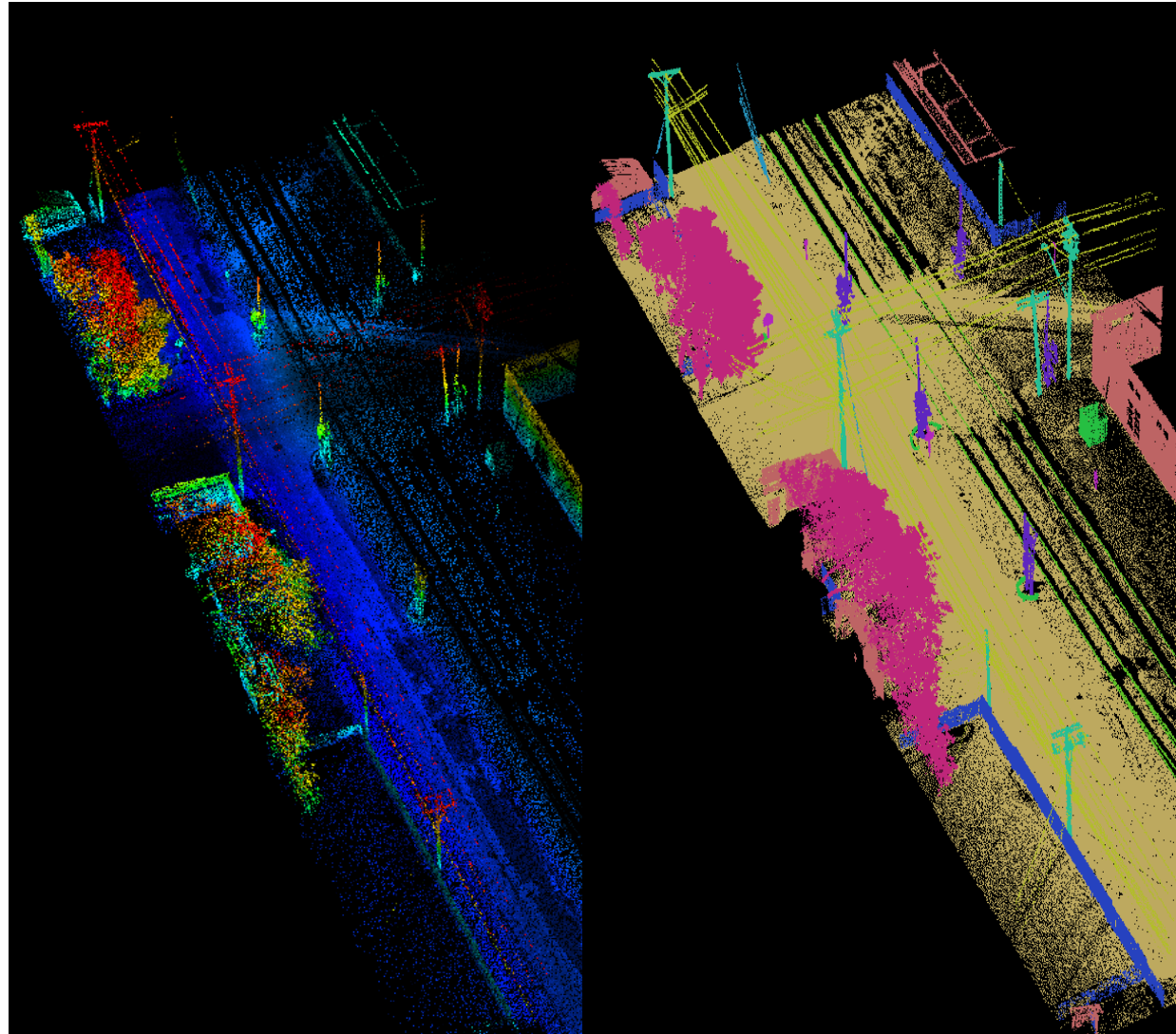
- Direct Measurement (as supposed to photogrammetry)
- Can penetrate vegetation
(rule of thumb: LiDAR can go where light can go)

Factors To Consider

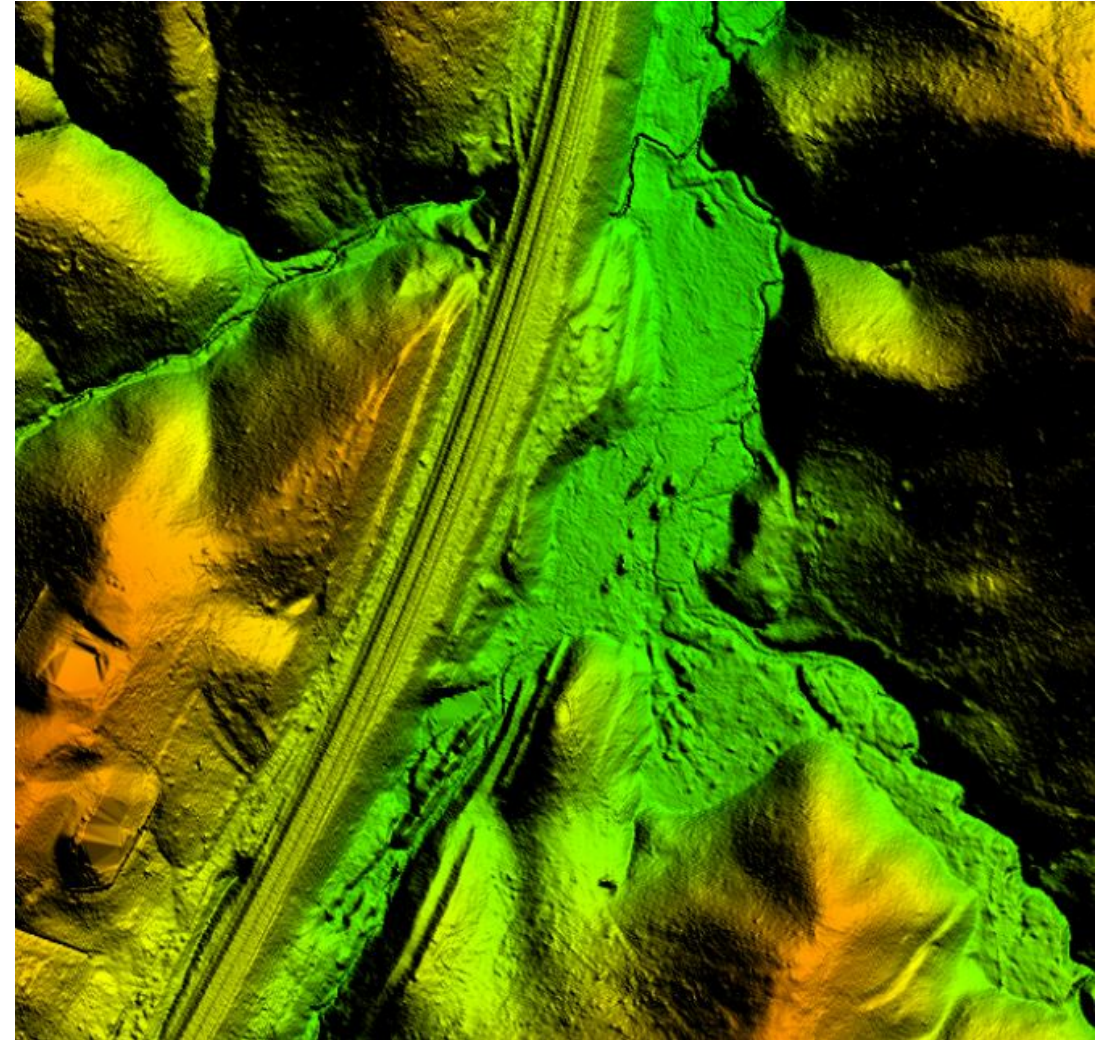
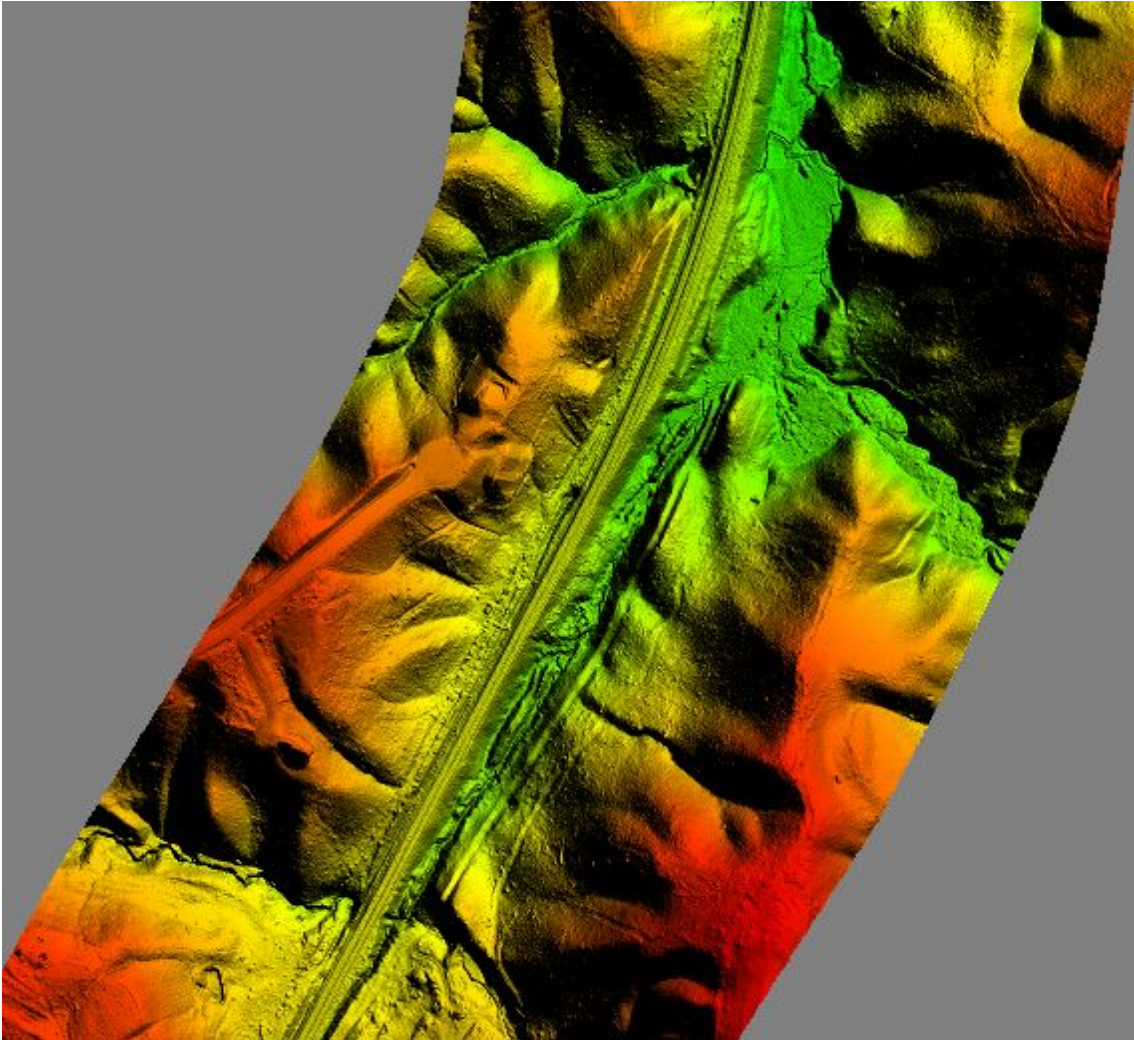
- Crops and dense vegetation can still obscure LiDAR in some cases.
- LiDAR can not typically penetrate water or snow so ground will be represented higher than reality if returns are even available. Water planimetrics (linework) are drawn at water surface level.
- SAM does not fly with snow on the ground or during precipitation.
- It's a good practice to acquire ground truthing, but it is an extra cost.



LiDAR Point Cloud



DEM Creation



Change Detection



Thank You & Questions

KEY CONTACT:

Allen Siler
Senior Project Manager

512.568.2518
ASiler@sam.biz