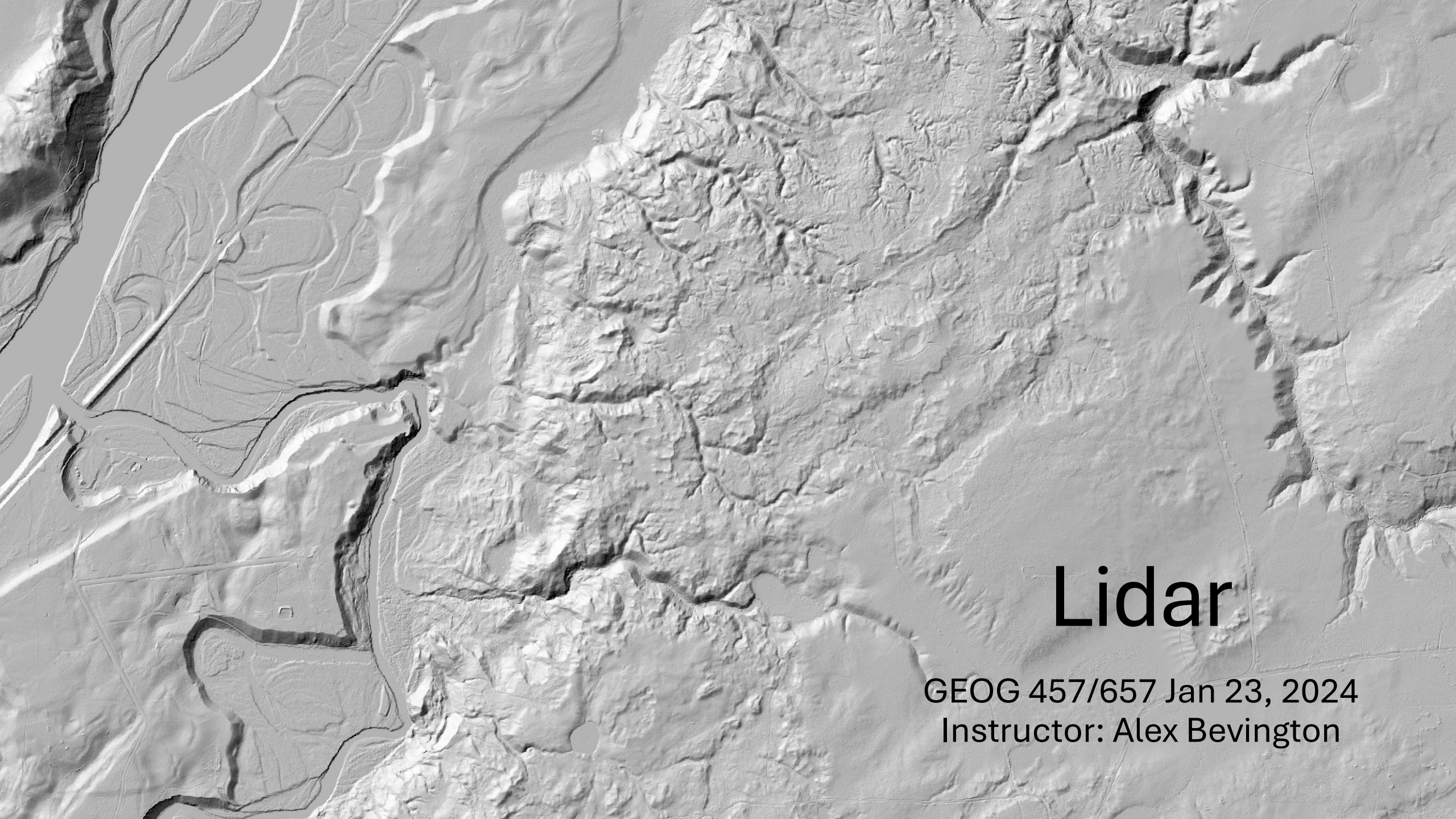


Lidar

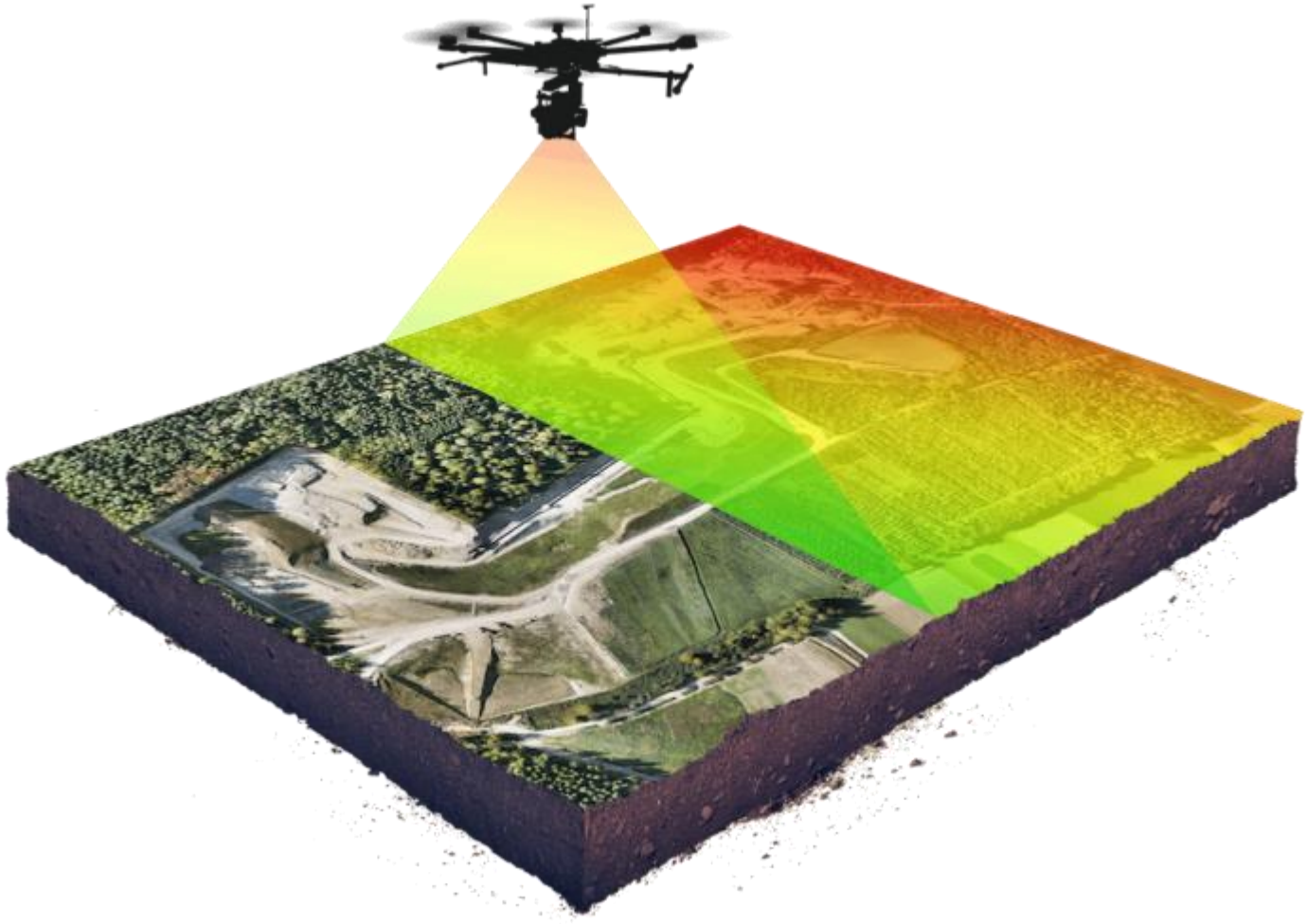
GEOG 457/657 Jan 23, 2024
Instructor: Alex Bevington

History

- LIDAR originated in the early 1960s, shortly after the invention of the laser.
- Its first applications came in meteorology, where it was used to measure clouds. The general public became aware of the accuracy and usefulness of LIDAR systems in 1971 during the Apollo 15 mission, when astronauts used a laser altimeter to map the surface of the moon.

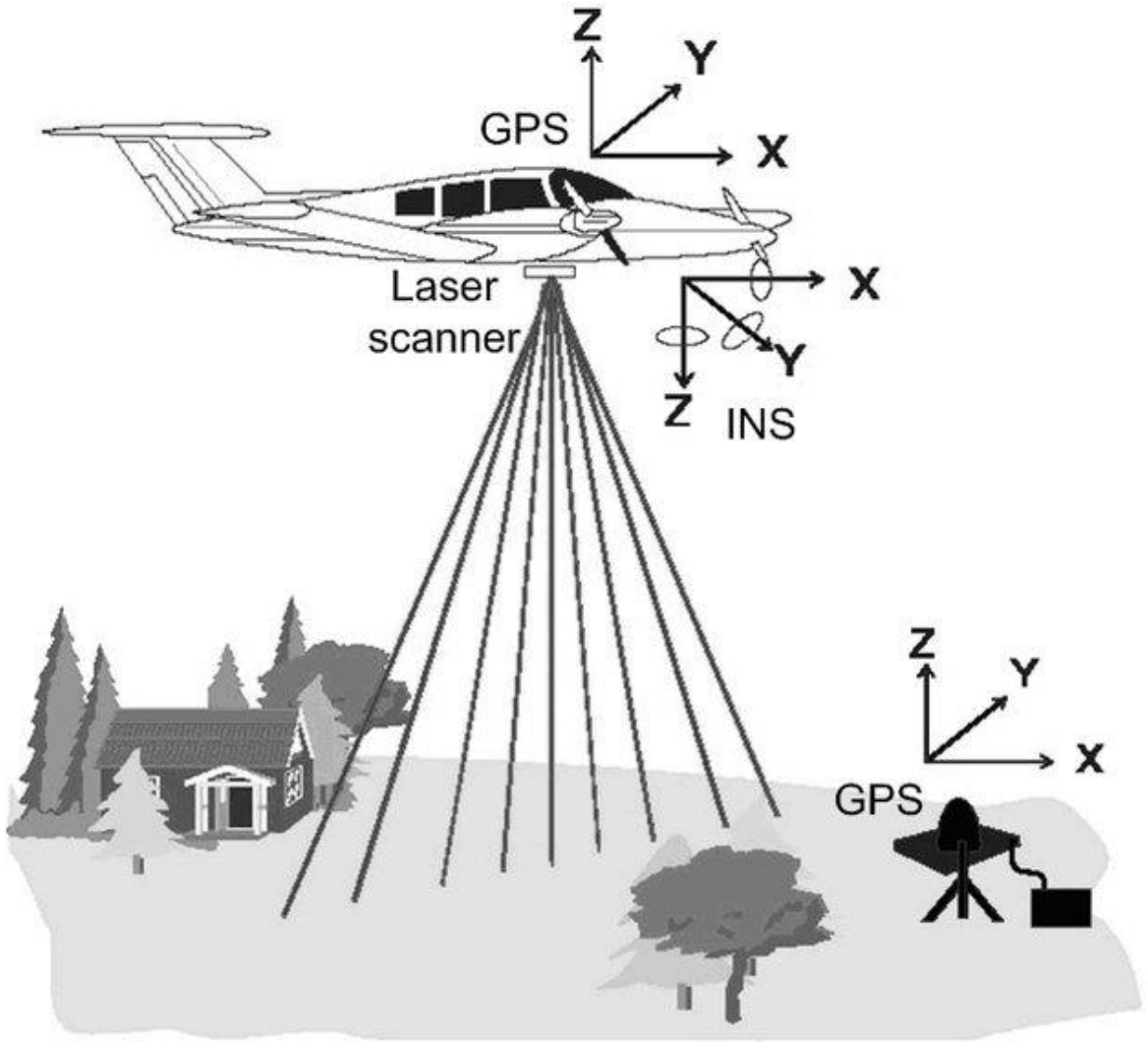
Platforms

- Ground based
  - Automotive
  - Robotics
- Airborne
  - Fixed wing aircraft
  - Helicopter
  - Drones
- Satellite



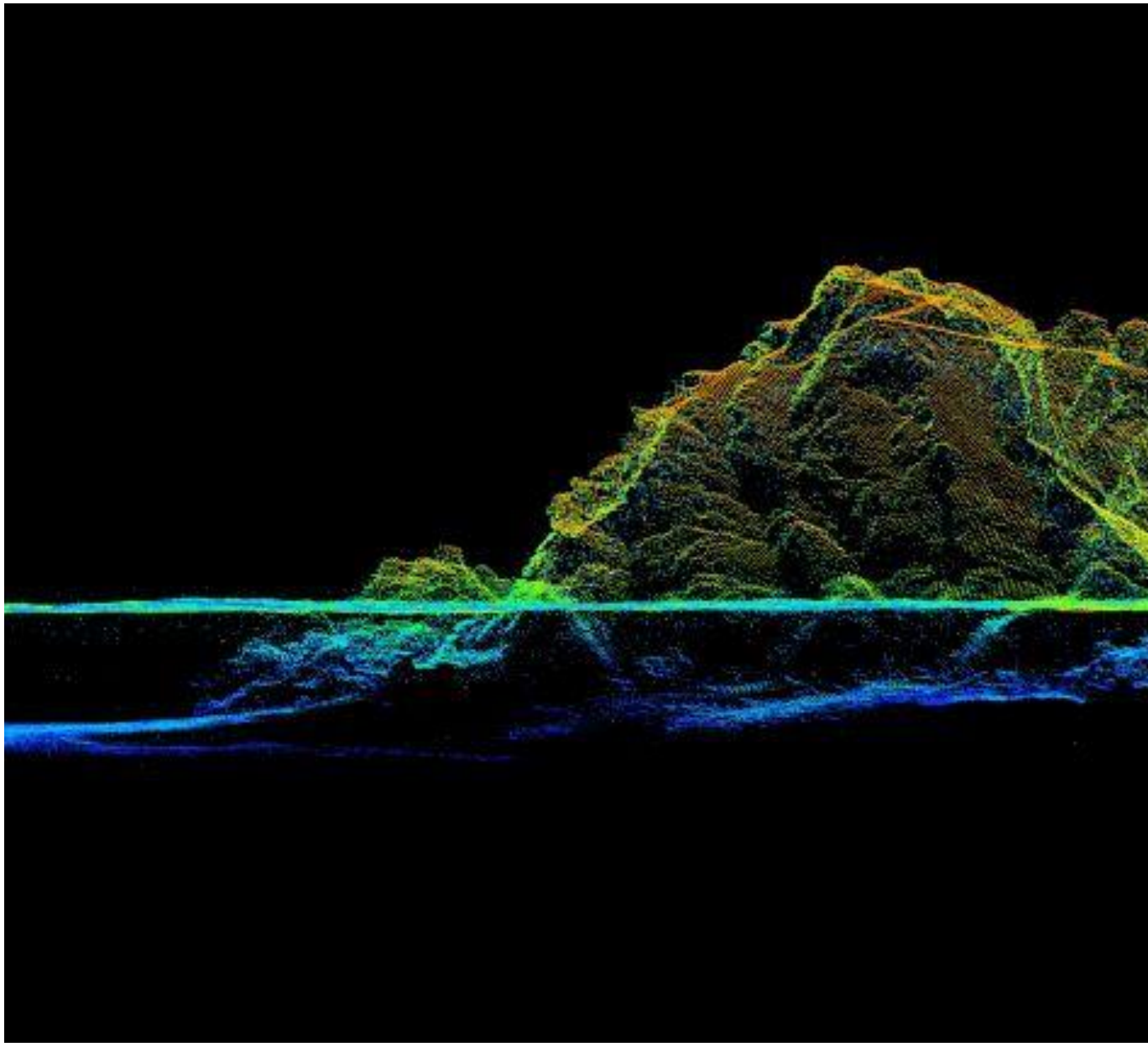
Components

- Components of LIDAR System:
  - a scanner, which is a laser transmitter and receiver
  - a global navigation satellite system (GNSS) receiver
  - an inertial navigation system (INS)
- The laser generates a laser beam and captures laser energy scattered/reflected from the target.

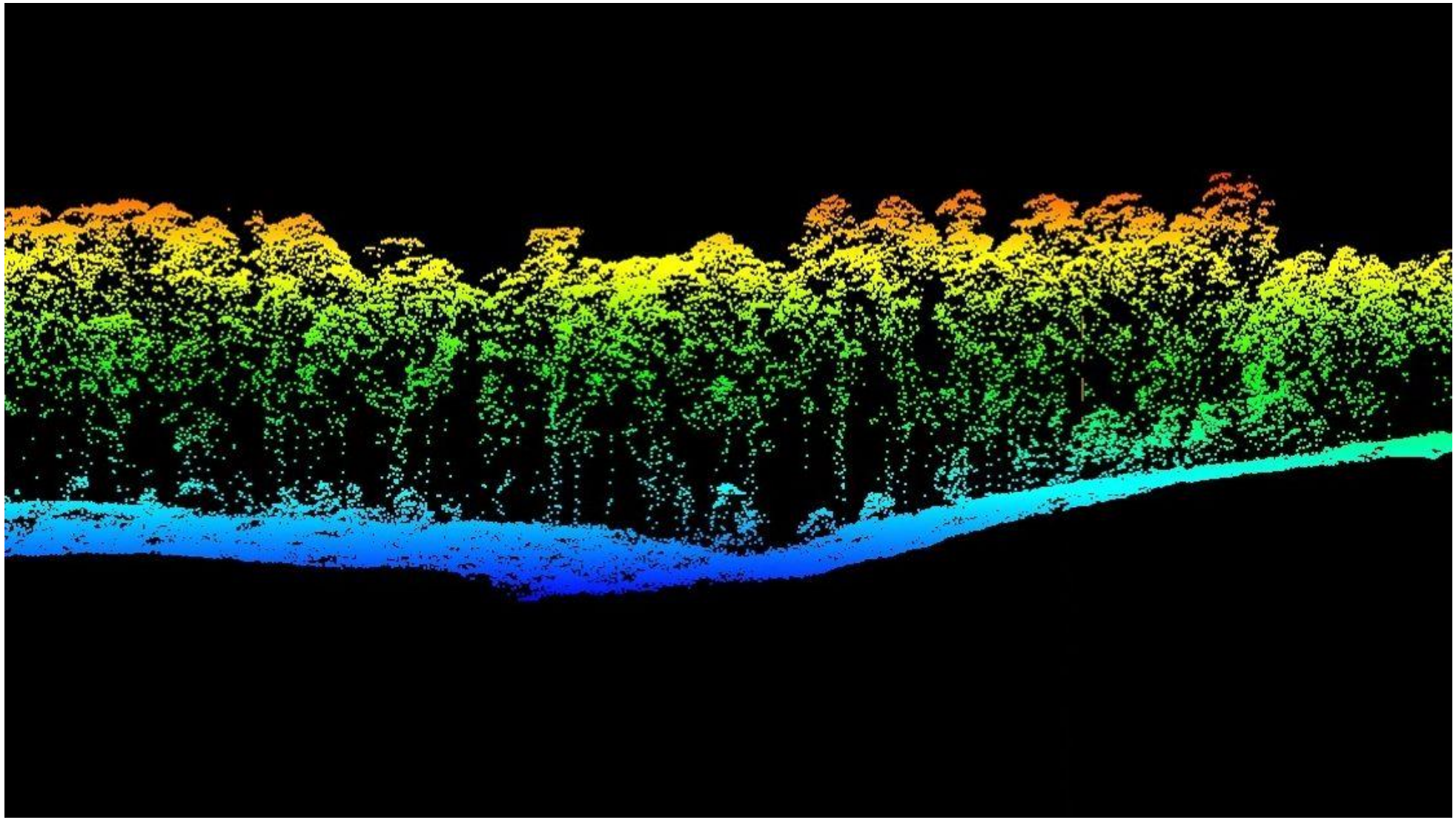


Types

- Topographic LIDAR (Near infrared)
- Bathymetric LIDAR (Green), and
- Doppler LIDAR

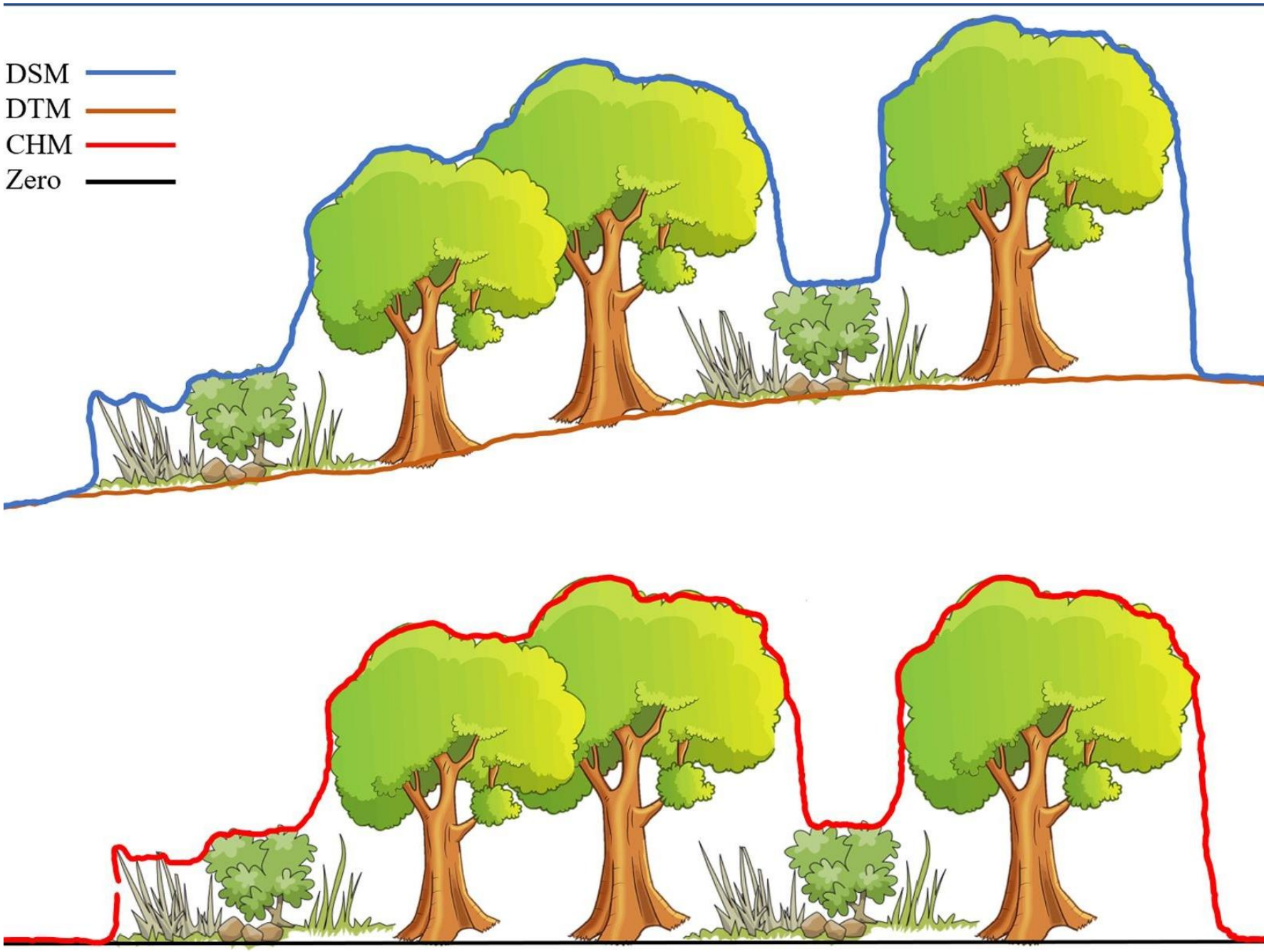


Point Clouds



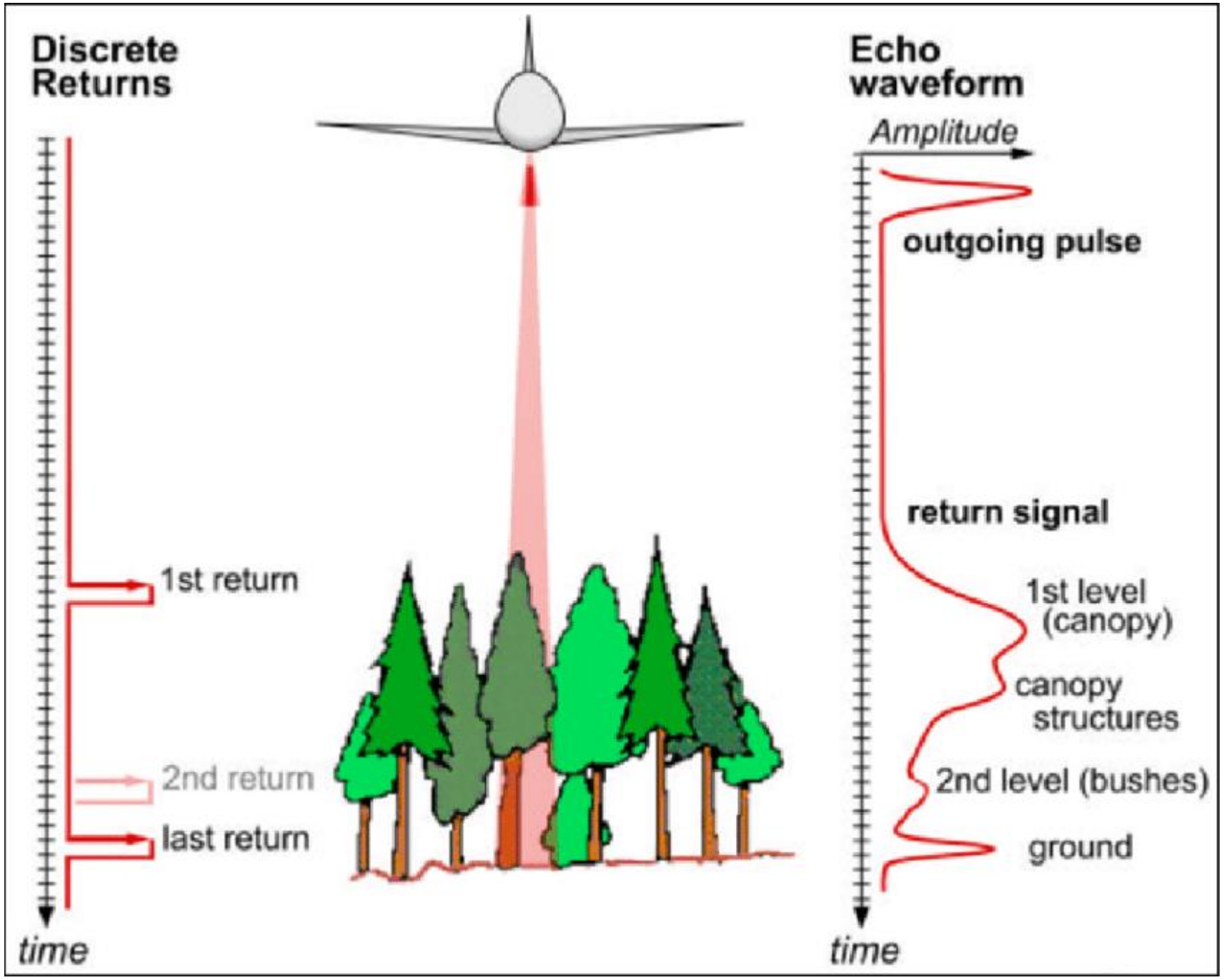
Gridded Data

- Digital Surface Model
- Digital Terrain Model
- Canopy Height Model

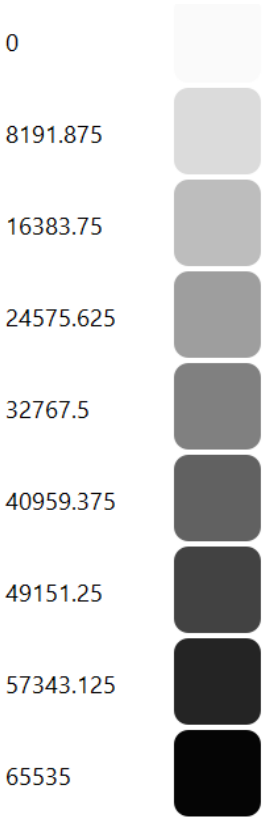


Discrete vs Full Waveform

- Discrete records 1-5 returns from each laser pulse.
- Full waveform lidar records a distribution of returned light energy.



Intensity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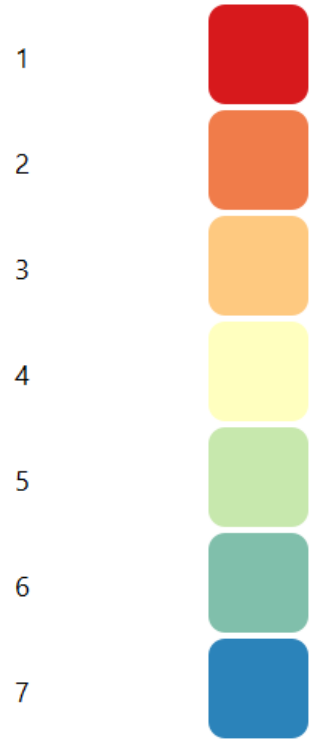
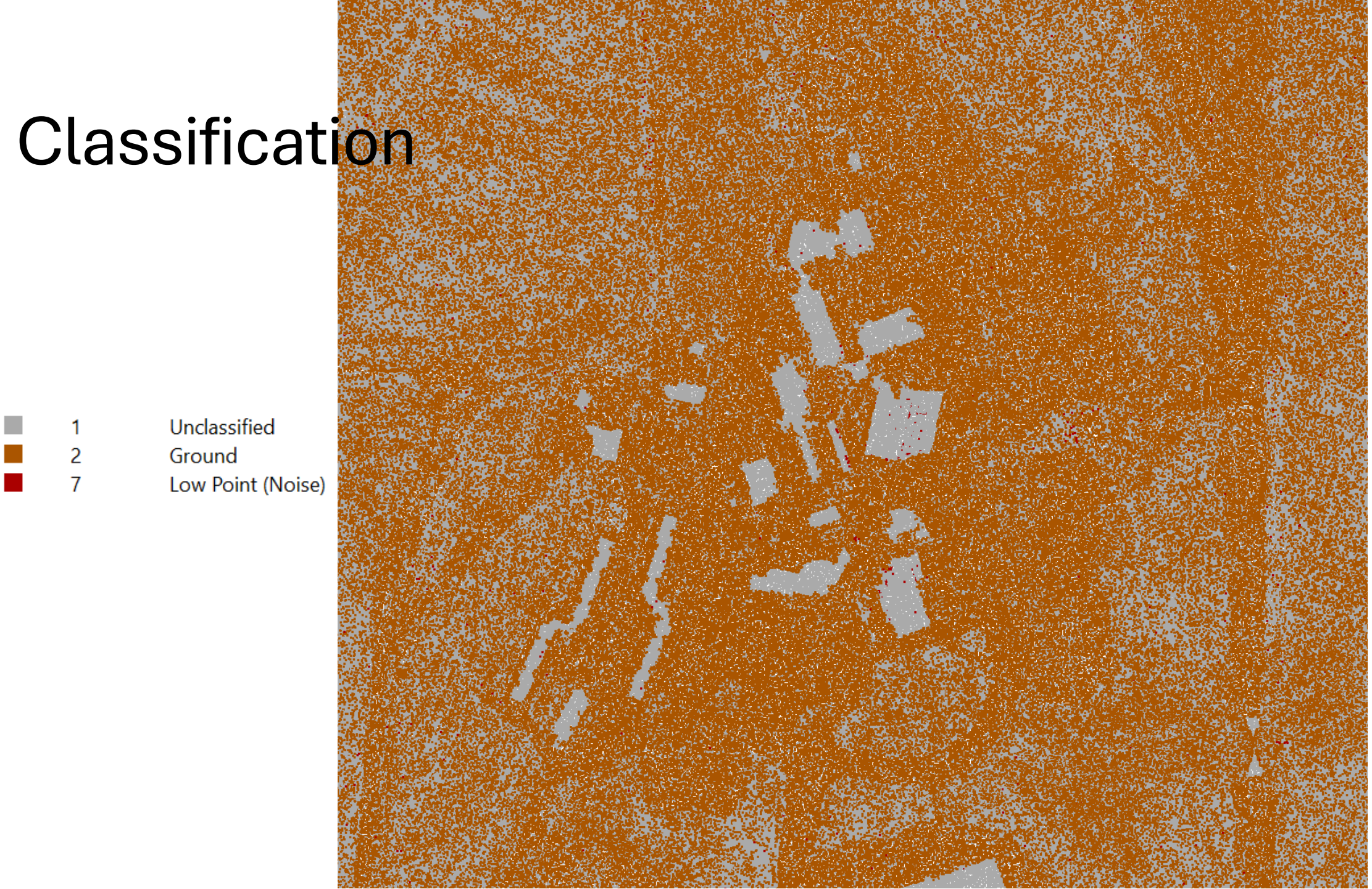
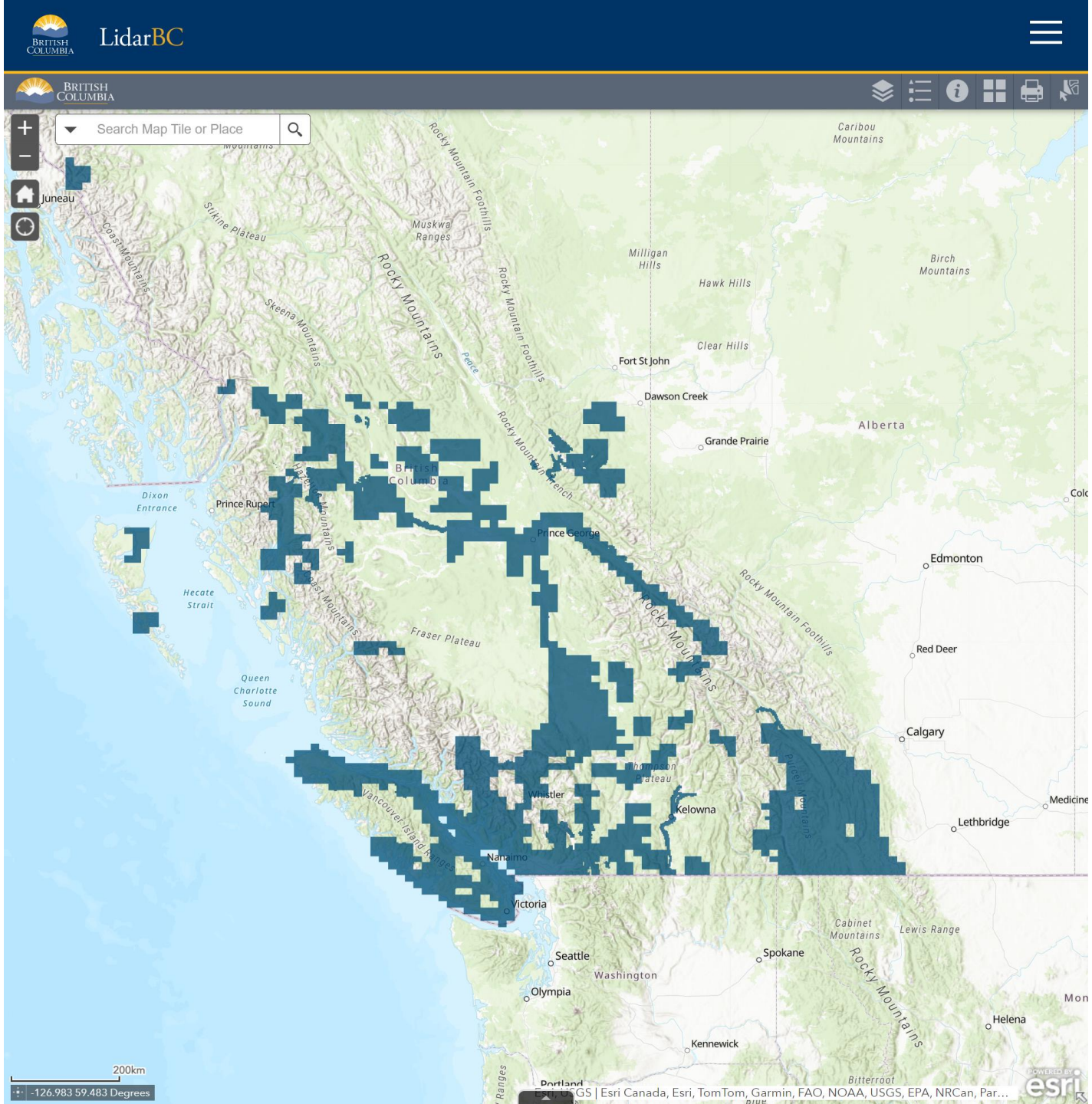
32767.5
40959.375
49151.25
57343.125
65535

Returns



Classification




LidarBC
BRITISH COLUMBIA
Search Map Tile or Place
Juneau
Coast Mountains
Stikine Plateau
Muskwa Ranges
Rocky Mountain Foothills
Rocky Mountains
Peace
Skeena Mountains
Caribou Mountains
Milligan Hills
Hawk Hills
Birch Mountains
Clear Hills
Fort St John
Dawson Creek
Alberta
Grande Prairie
Rocky Mountain Trench
British Columbia
Dixon Entrance
Prince Rupert
Prince George
Hecate Strait
Fraser Plateau
Queen Charlotte Sound
Edmonton
Red Deer
Calgary
Whistler
Kelowna
Lethbridge
Medicine
Nanaimo
Victoria
Seattle
Spokane
Washington
Olympia
Cabinet Mountains
Lewis Range
Helena
Kennewick
Portland
Bitterroot
200km
-126.983 59.483 Degrees
Esri, USGS | Esri Canada, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NRCan, Par...
esri

Outline

Show full outline

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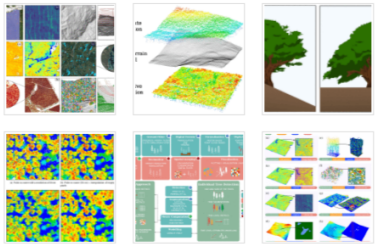

Remote Sensing of Environment
Volume 251, 15 December 2020, 112061

Review

lidR: An R package for analysis of Airborne Laser Scanning (ALS) data

Jean-Romain Roussel [a], David Auty [b], Nicholas C. Coops [c], Piotr Tompalski [c], Tristan R.H. Goodbody [c], Andrew Sánchez Meador [b], Jean-François Bourdon [d], Florian de Boissieu [e], Alexis Achim [a]

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https://doi.org/10.1016/j.rse.2020.112061

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Highlights

- We present the lidR package for ALS processing.
- We document the design and aims of the package with an emphasis on its flexibility.
- lidR assembles state-of-the-art algorithms from the literature.
- lidR was conceived for users to implement transparent and reproducible workflows.
- We provide evidence that liDR is increasingly being used for ALS-focused research.