National Elevation Data For Transportation-Based Applications

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The National Elevation Dataset (NED)

- Seamless national coverage of "best available" raster elevation data
  - Geographic "projection"
  - 1-arc-second (30-meter), 1/3-arc-second (10-meter), and 1/9-arc-second (3-meter) grid spacing
    - Alaska: 2-arc-second grid spacing
  - Datum: NAD 83 horizontal; NAVD 88 vertical
  - Elevation units: decimal meters
  - Updated bi-monthly to incorporate all new USGS DEM production and other newly available source data
- NED is the elevation layer of *The National Map*

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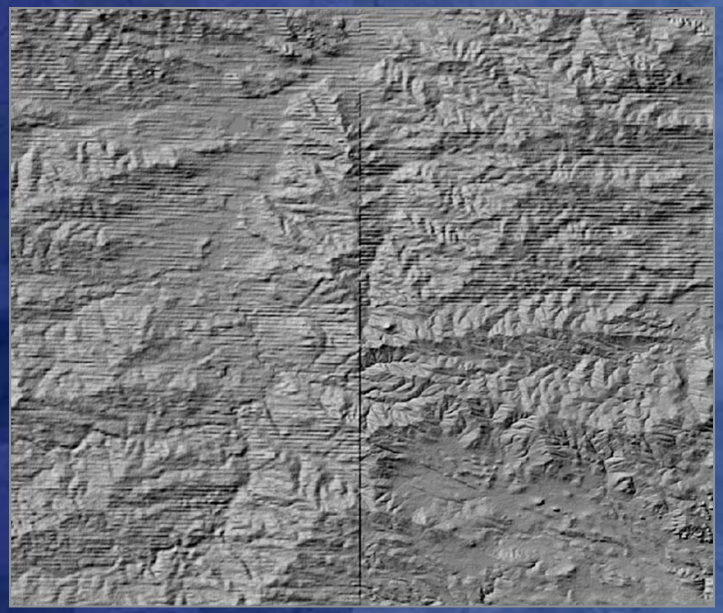
Large-Area Elevation Data Coverage



7.5-minute quadrangle tiled database

- Nearly 54,000 quad-based DEMs
- Projected in 10 different UTM zones
- Production artifacts (stripes), slivers of missing data, elevation value mismatches along quad boundaries
- Metadata in individual files

The National Elevation Dataset (NED)

- Seamless raster mosaic
- Consistent national coordinate system
- Standardized datums and units
- Filtered and edge-matched, where necessary
- Spatially referenced metadata

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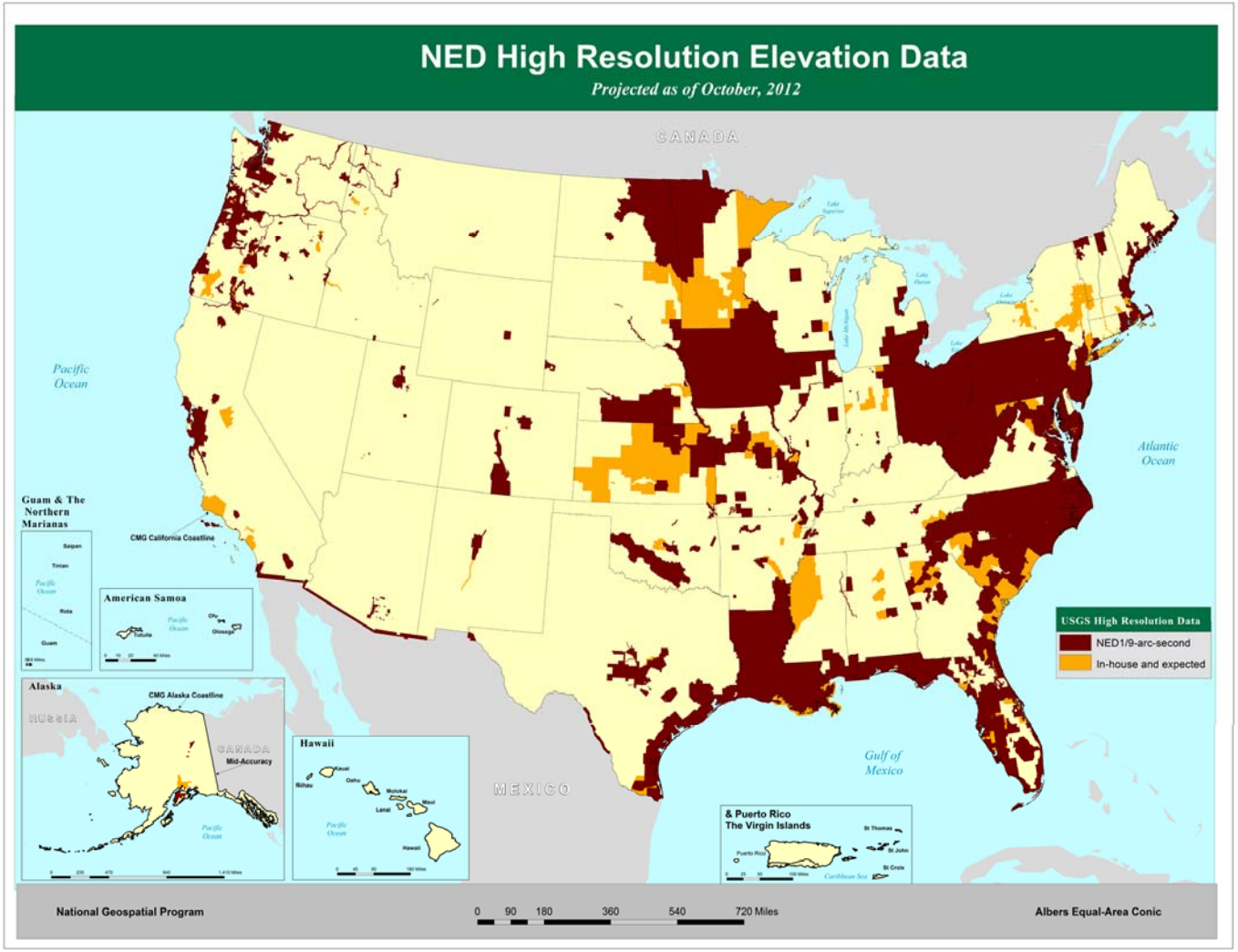
NED – High Resolution Elevation Data



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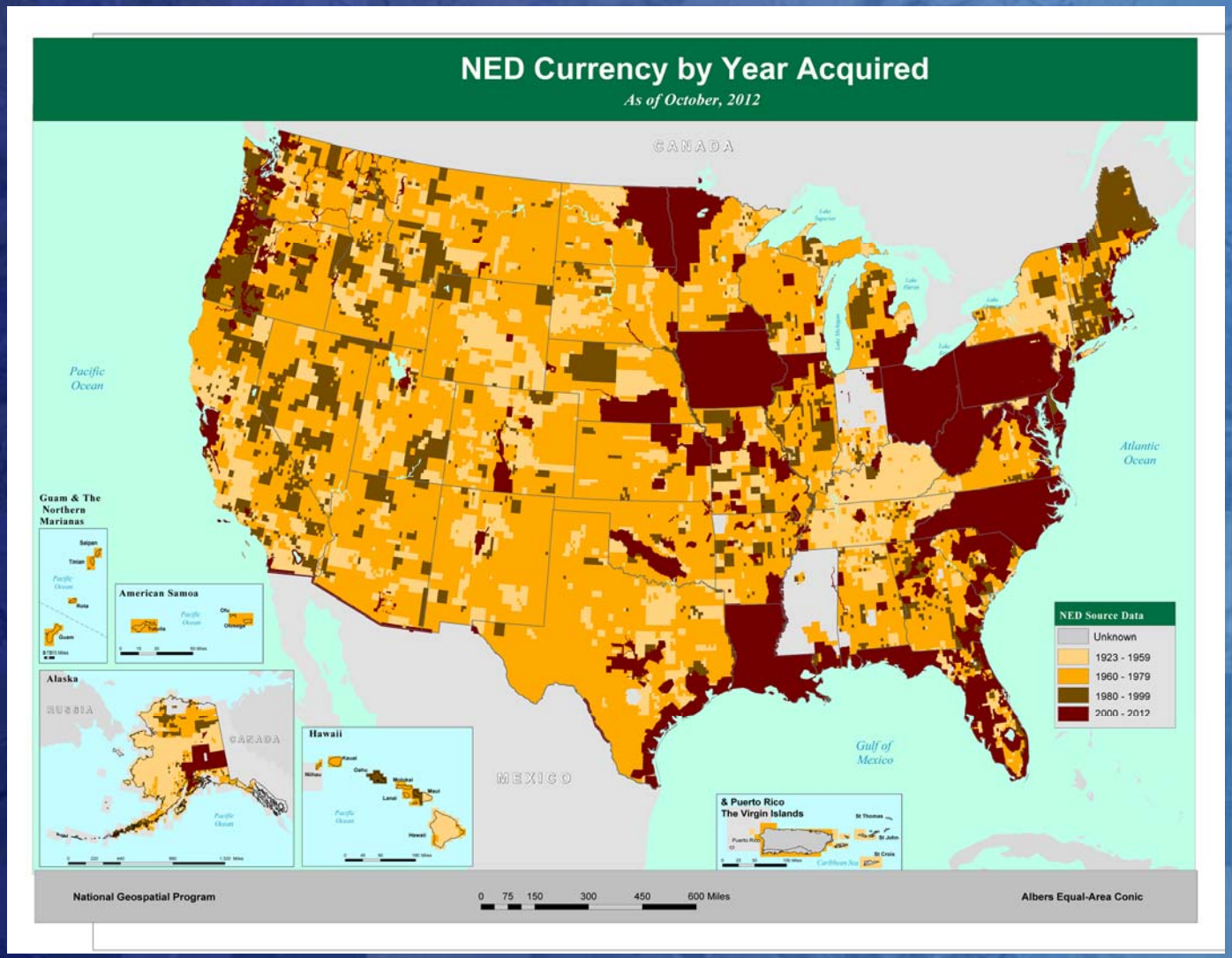
NED – Currency



NED Vertical Accuracy Statistics (CONUS)

n = 18,313
min = -9.92
max = 9.77
mean = -0.27
sigma = 1.41
RMSE = 1.44

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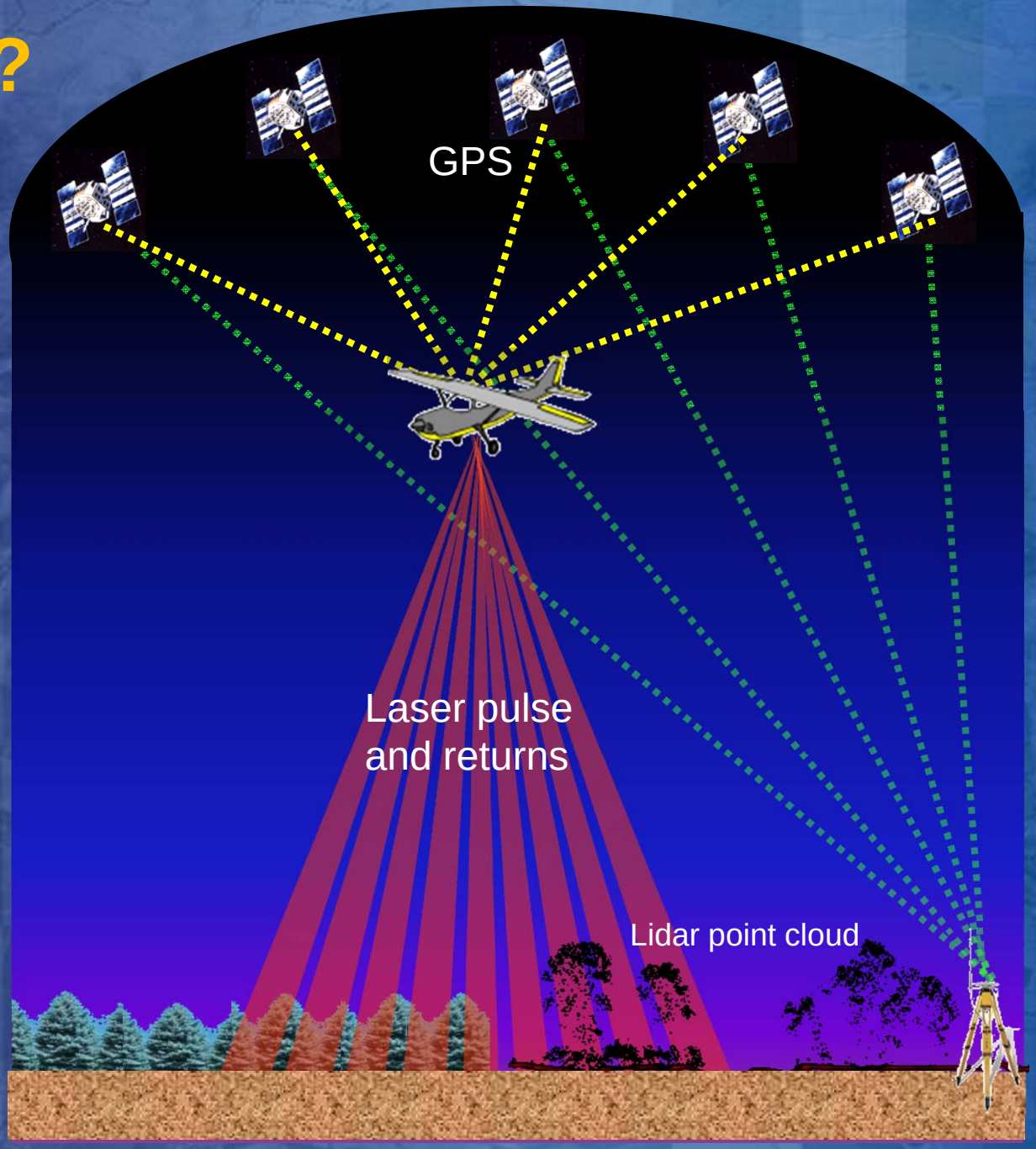
What is Lidar?

- Light Detection and Ranging
- System with a laser and detector (range), scanning mirror (laser direction), GPS (location), and IMU (orientation)
- Can output 300,000+ laser pulses per second & record laser reflection information
- End result is billions of 3-dimensional points representing bare earth, vegetation & structures at cm-level accuracy



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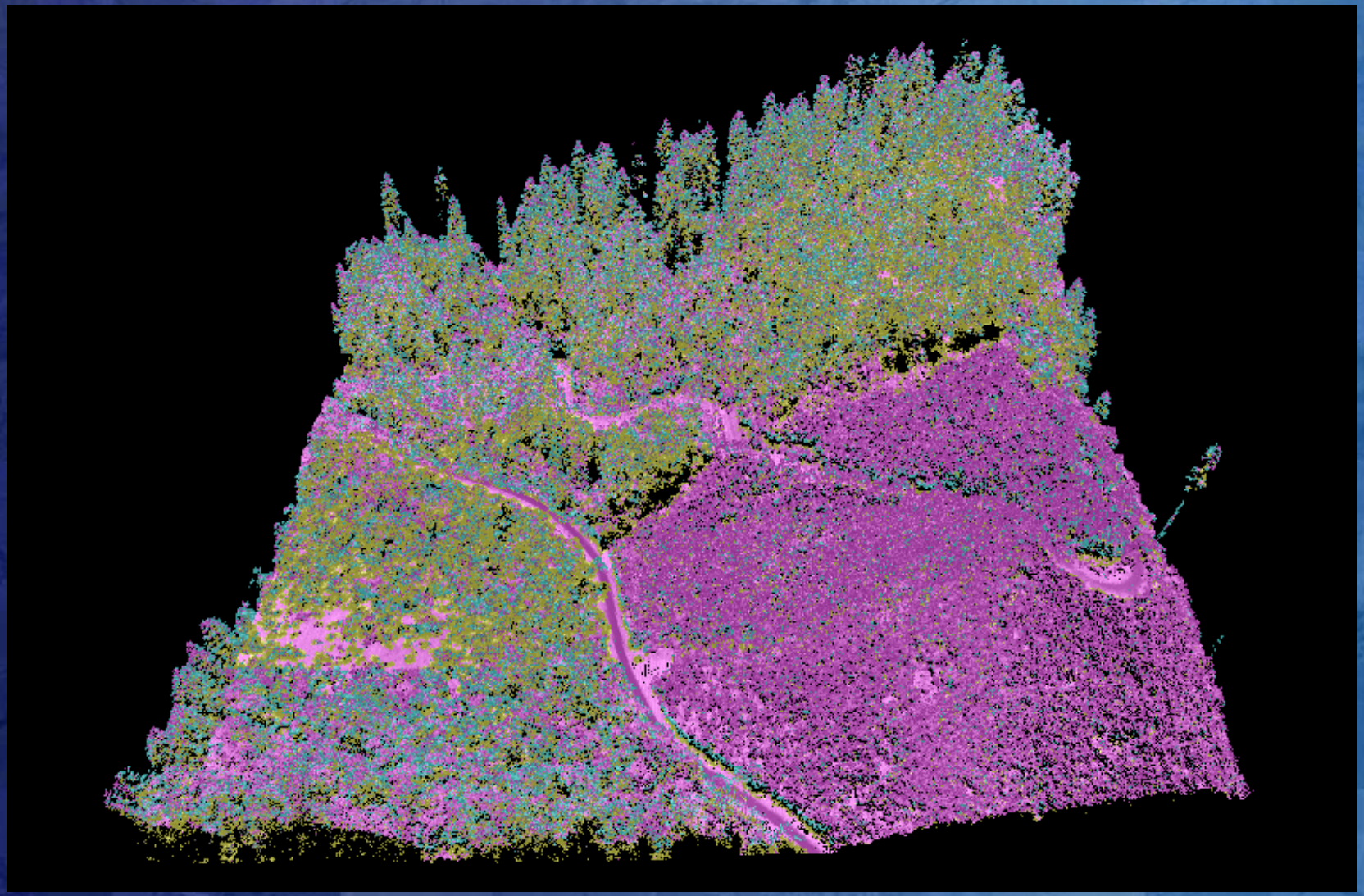
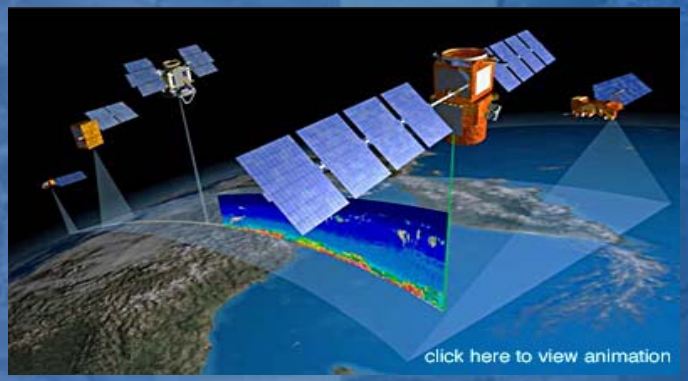
“Raw” Lidar – Point Cloud



A Suite of Lidar Platforms



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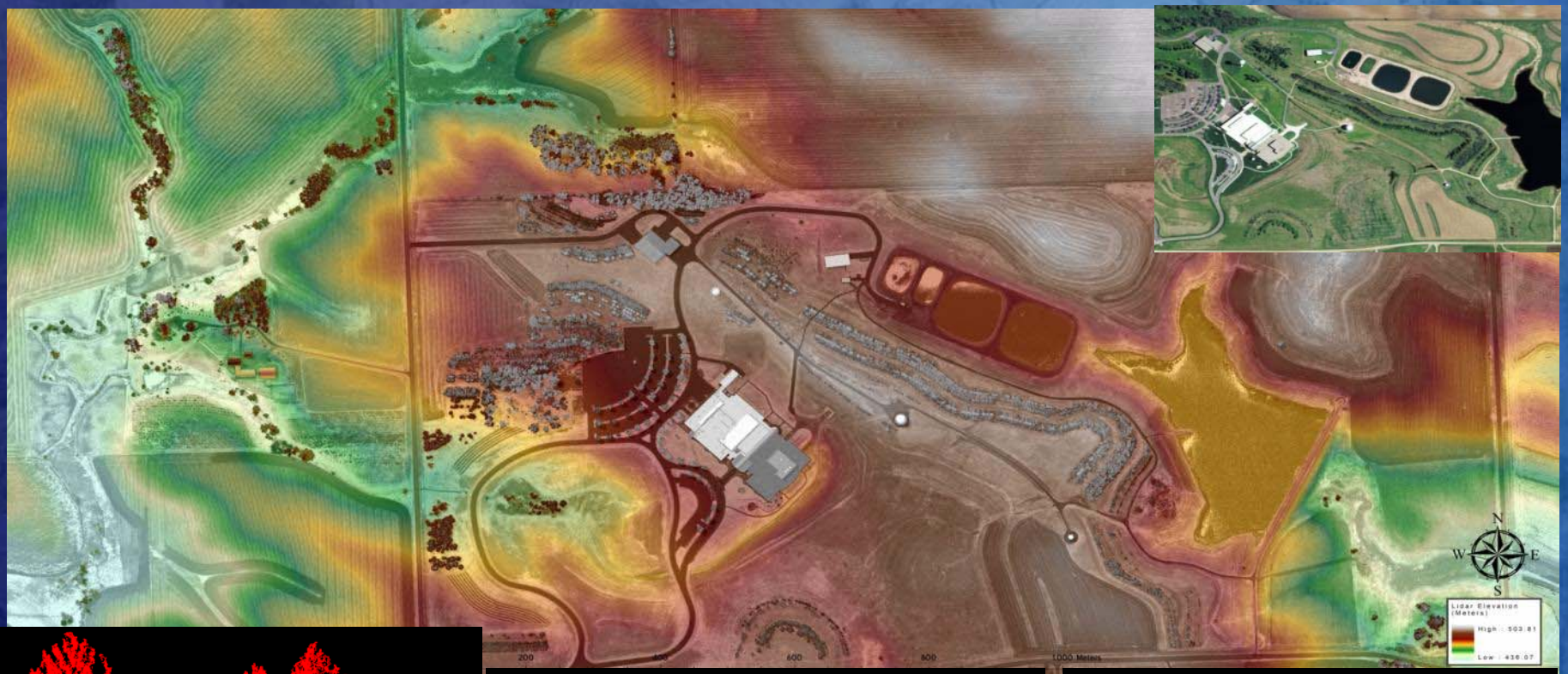
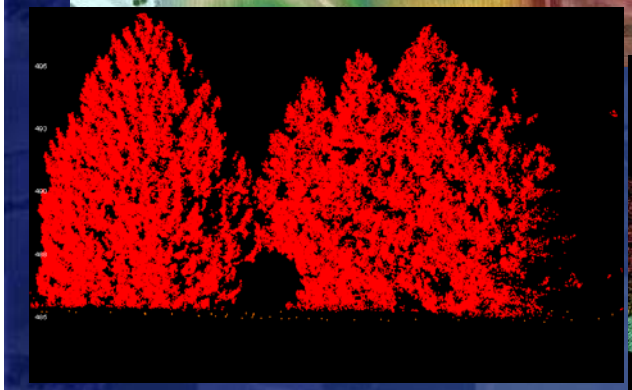
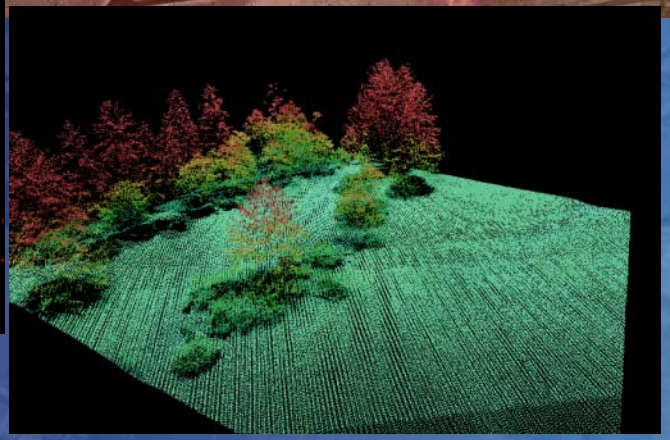
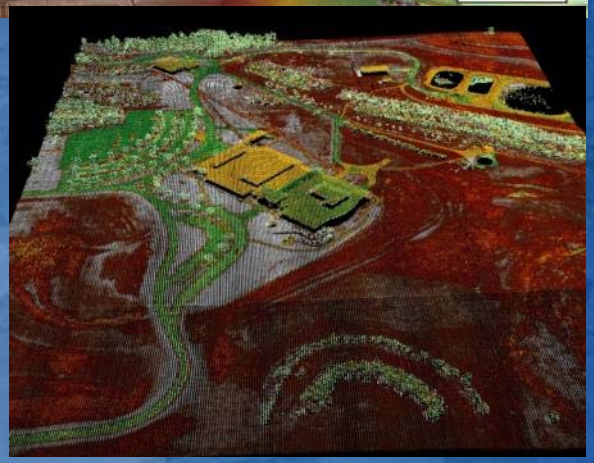
What can lidar information look like?





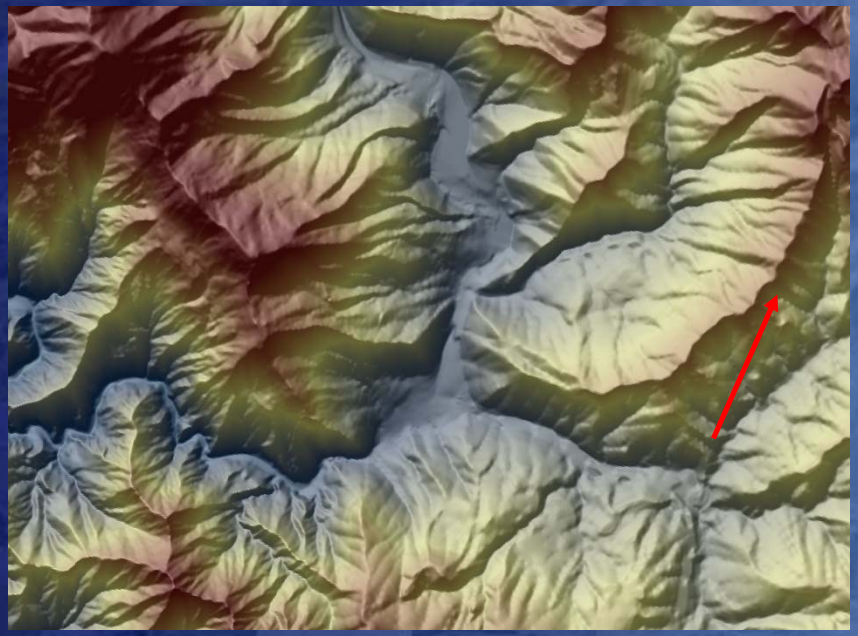


Trees in Mt. Rainier National Park

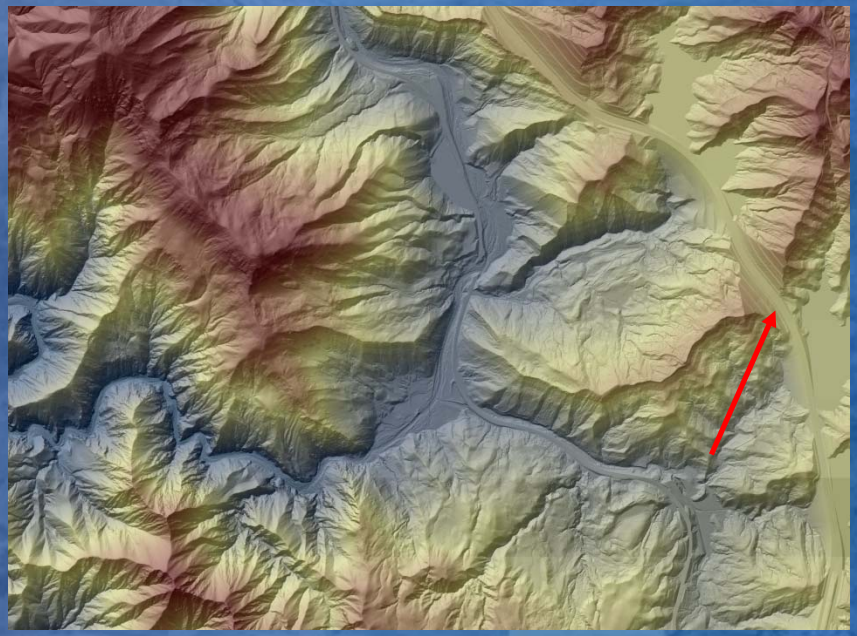


USGS EROS, Sioux Falls, SD

Importance of improved elevation 10-meter vs 1-meter lidar



10 meter elevation data



1 meter elevation data derived from lidar

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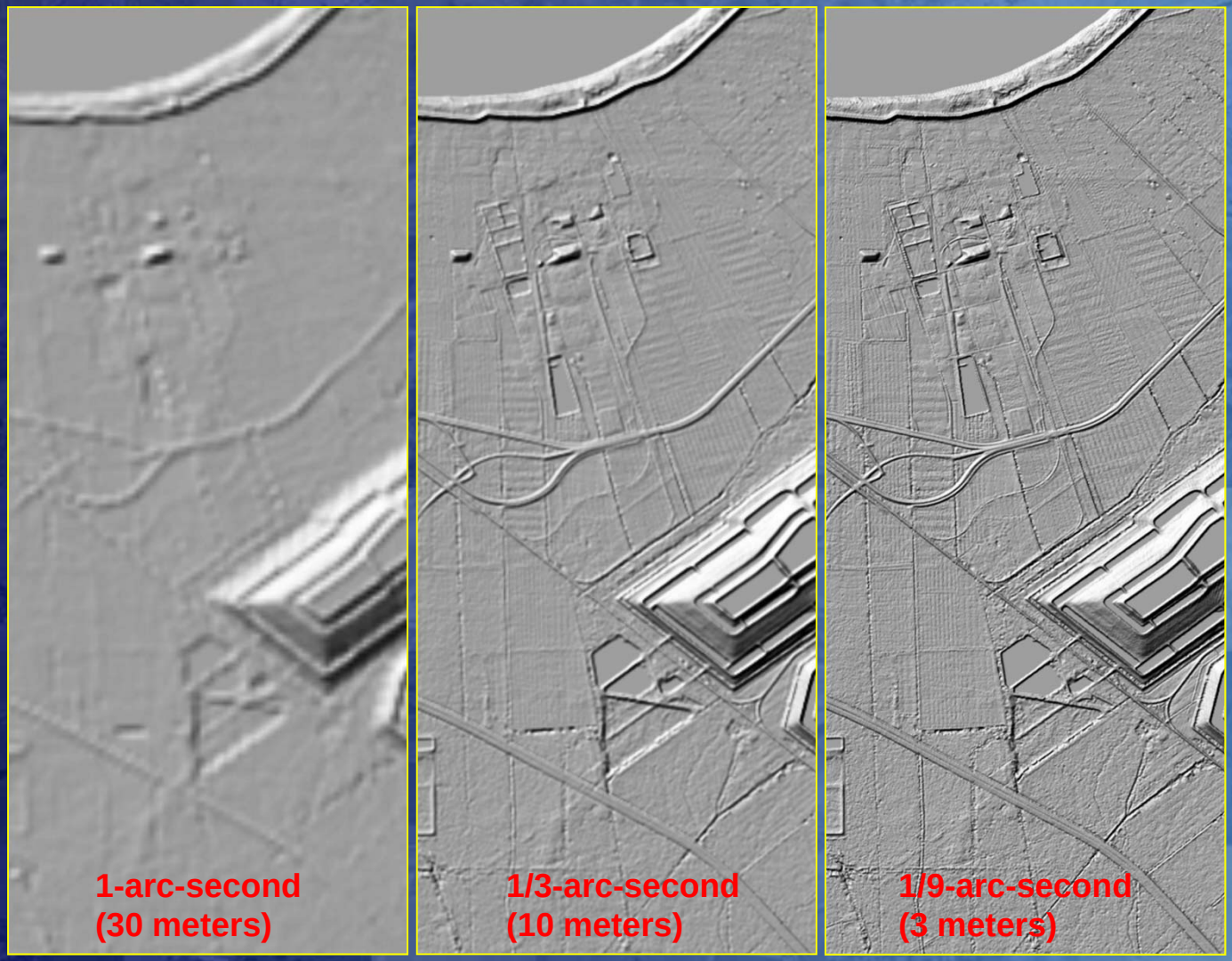
NED - Higher Resolution Source Migration



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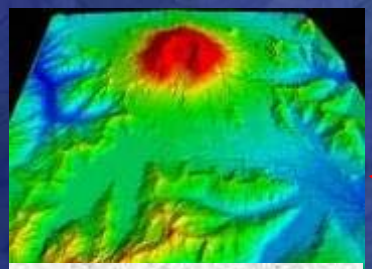
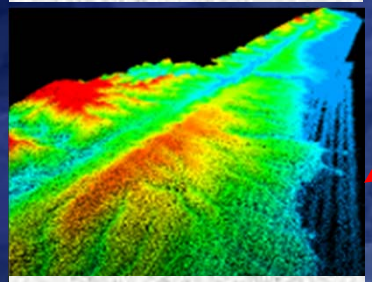
Potential National Applications for Lidar Data

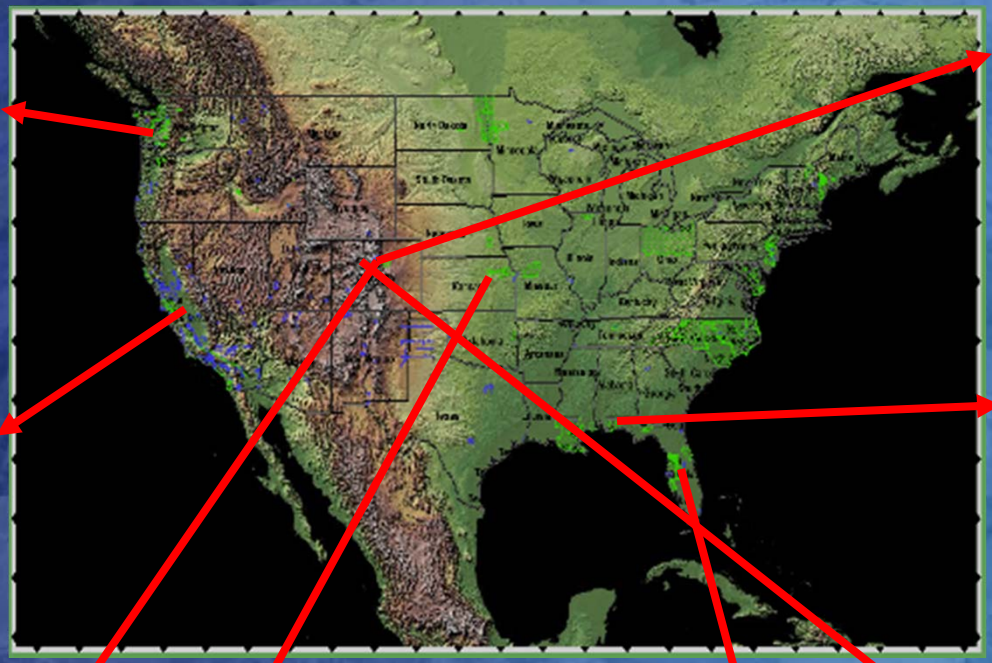


Volcano monitoring

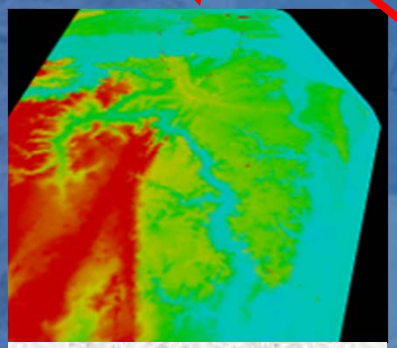


Earthquake faults

Hydrologic Studies

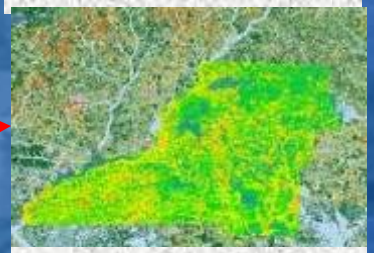


Urban / Suburban Response

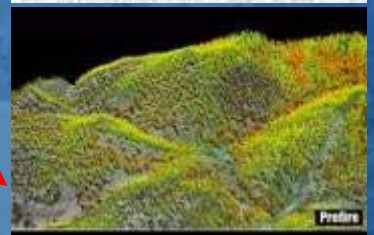


Coastal Studies

Vegetation / Biomass



Land Cover



Carbon / Disturbance studies

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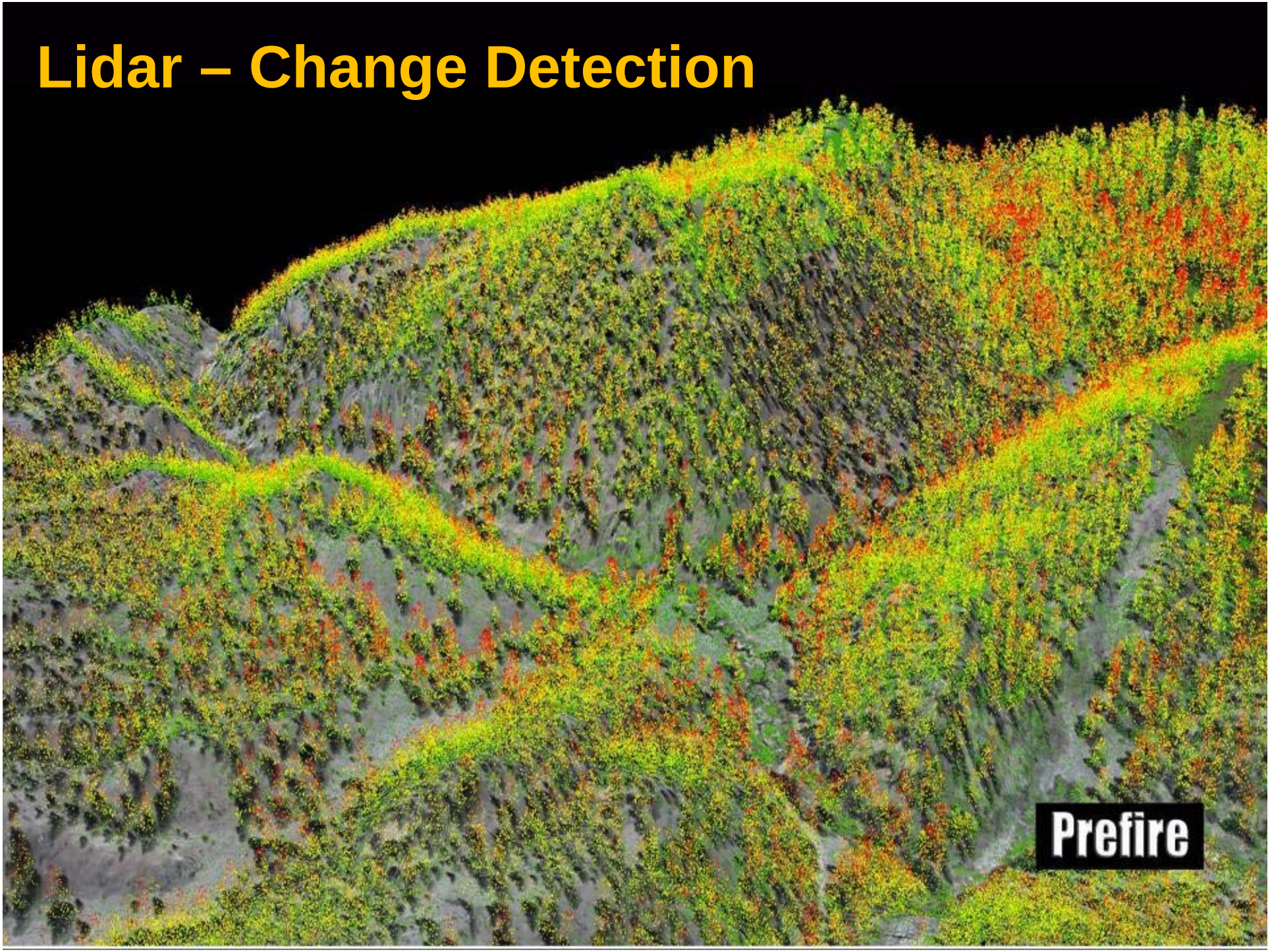
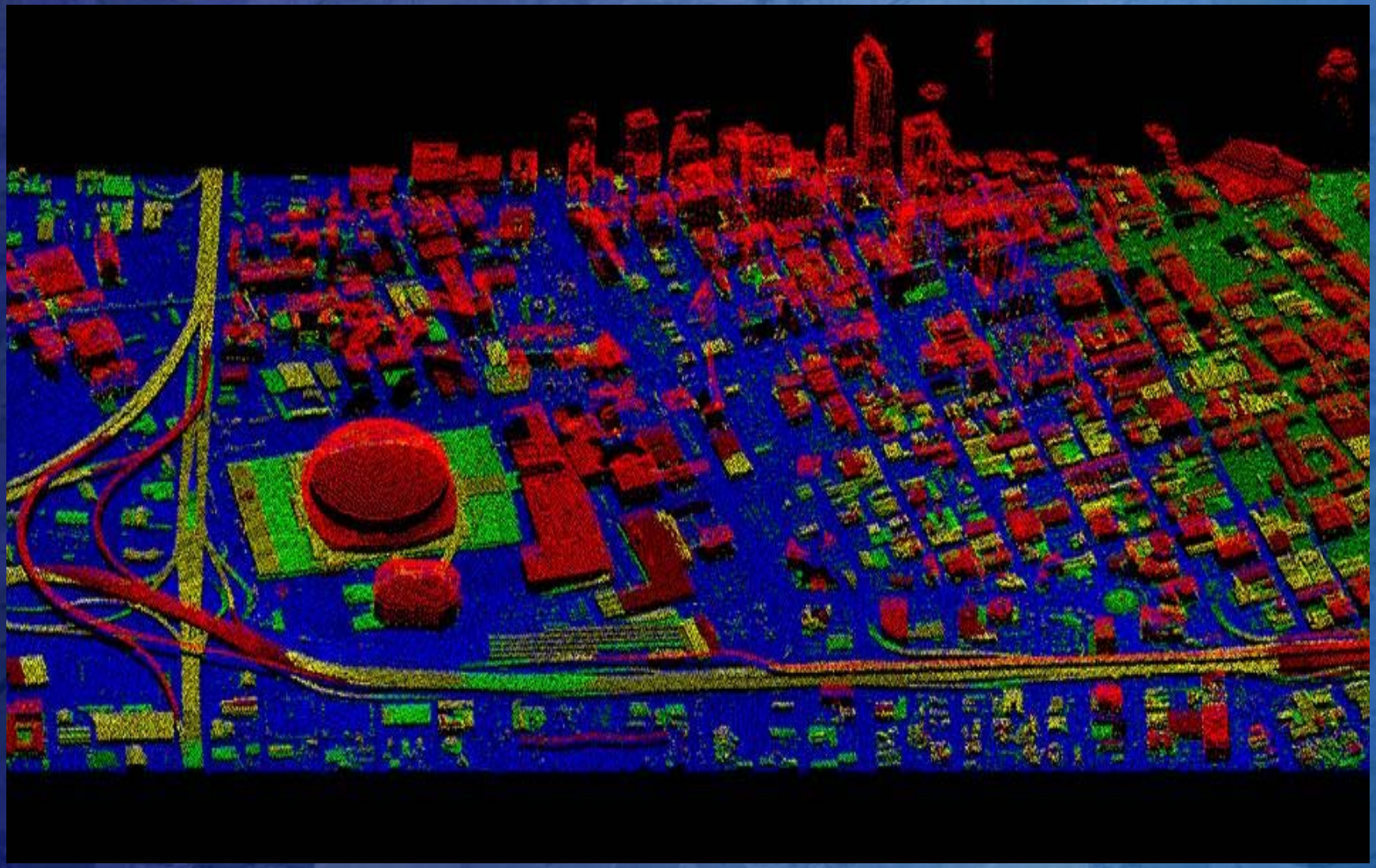
Lidar – Change Detection



Other Lidar Uses: Urban Modeling



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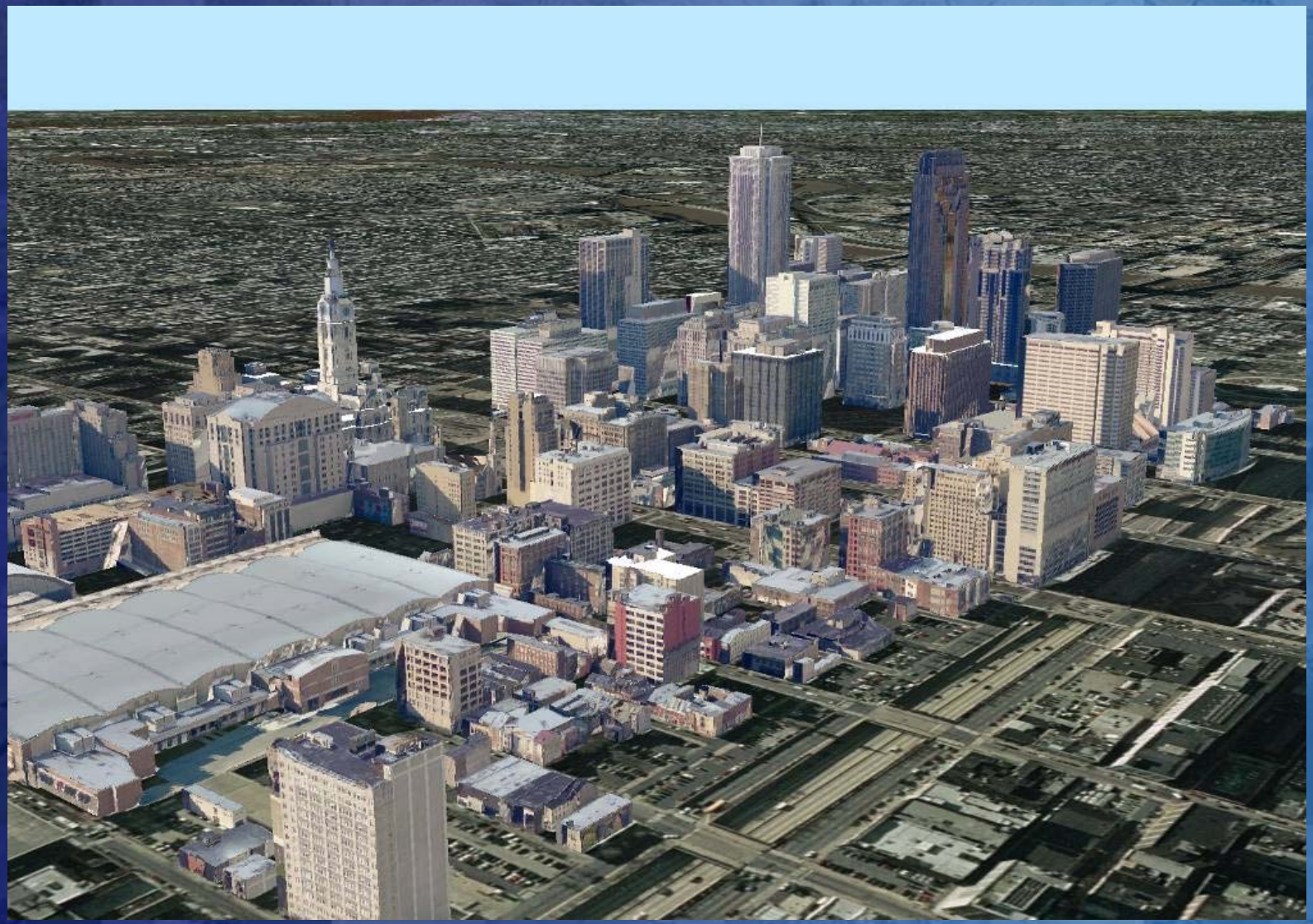
Lidar Capabilities – Infrastructure



Other Lidar Uses: Feature Extraction

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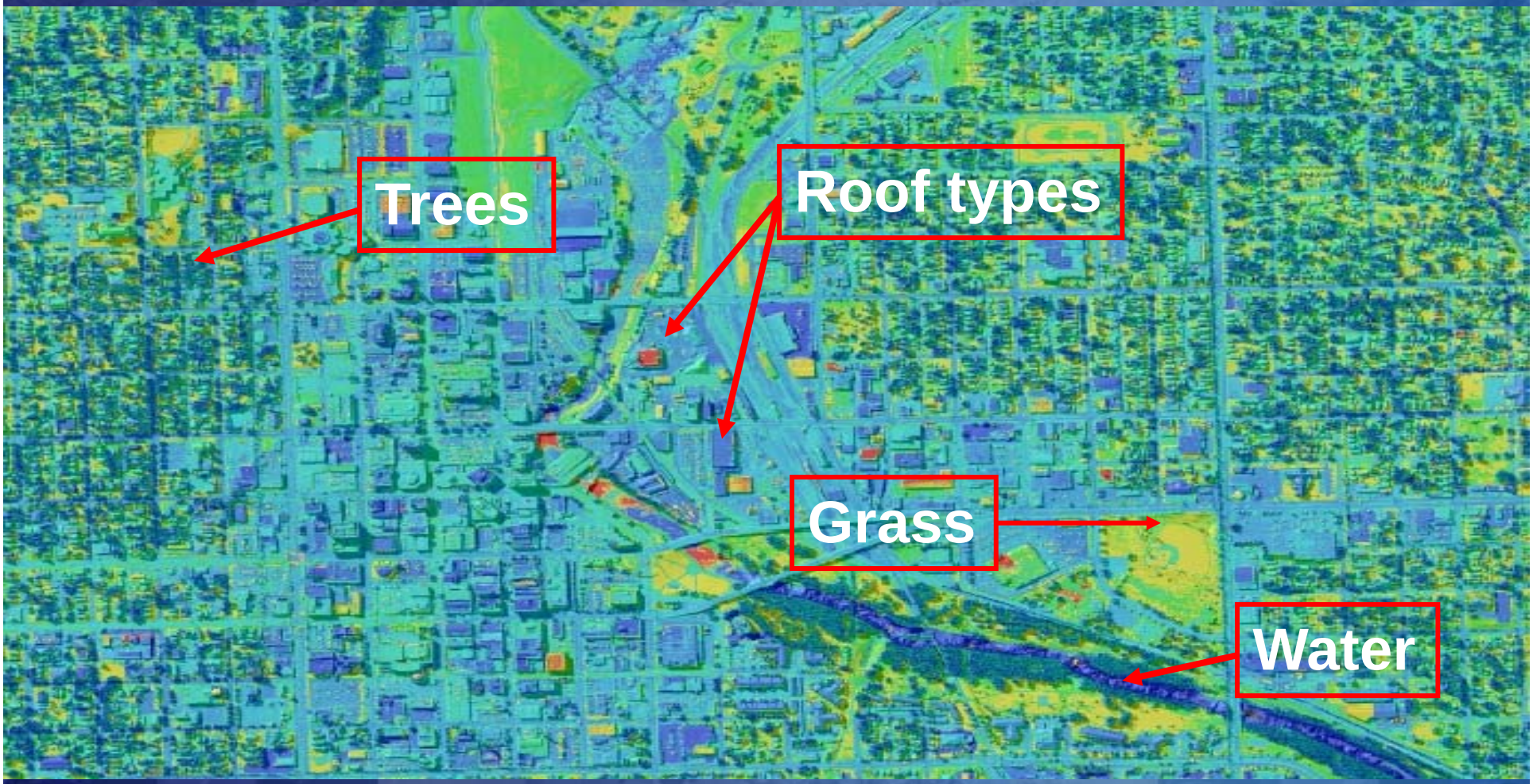
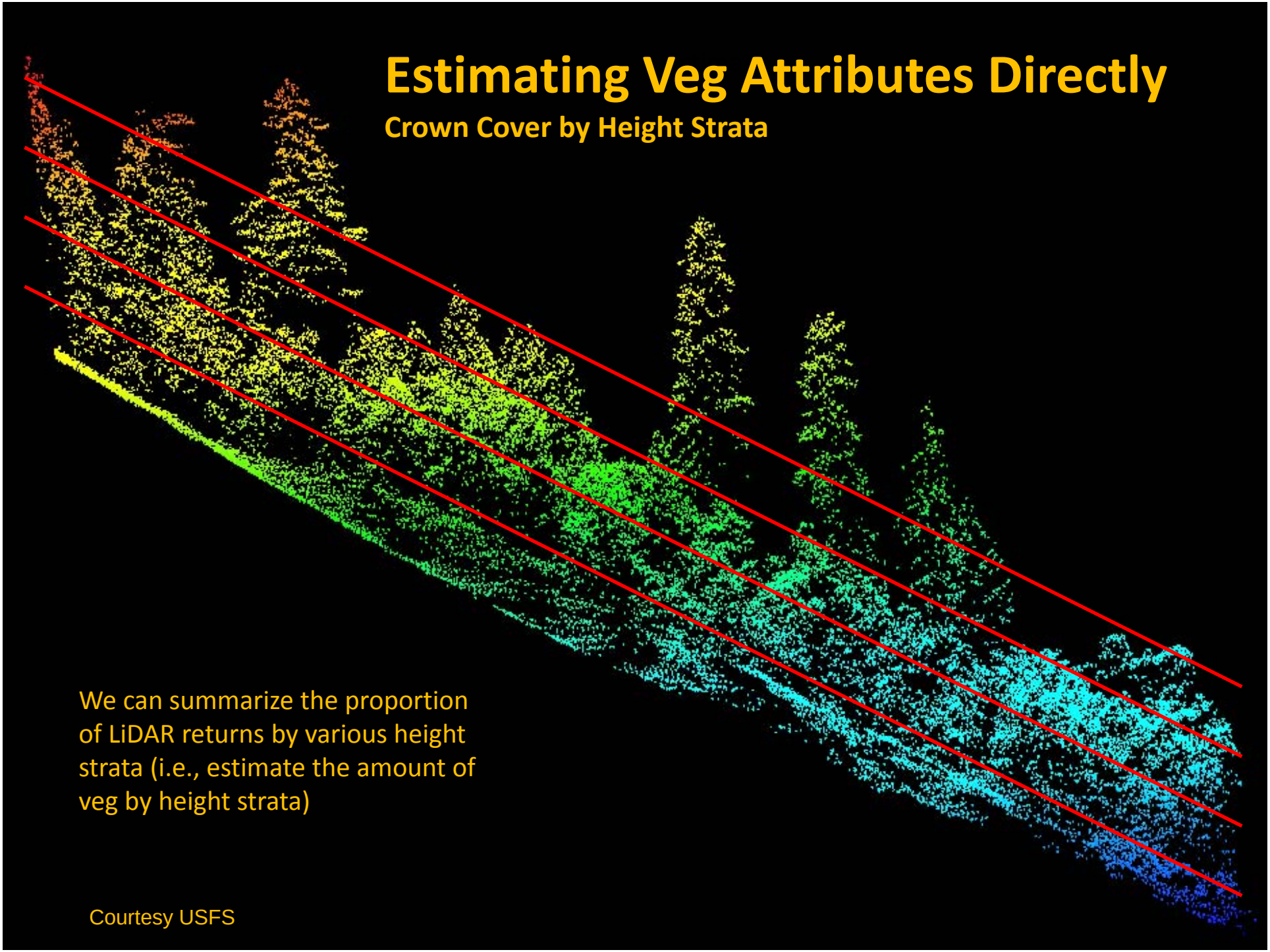
Lidar Capabilities - Intensity



Estimating Veg Attributes Directly

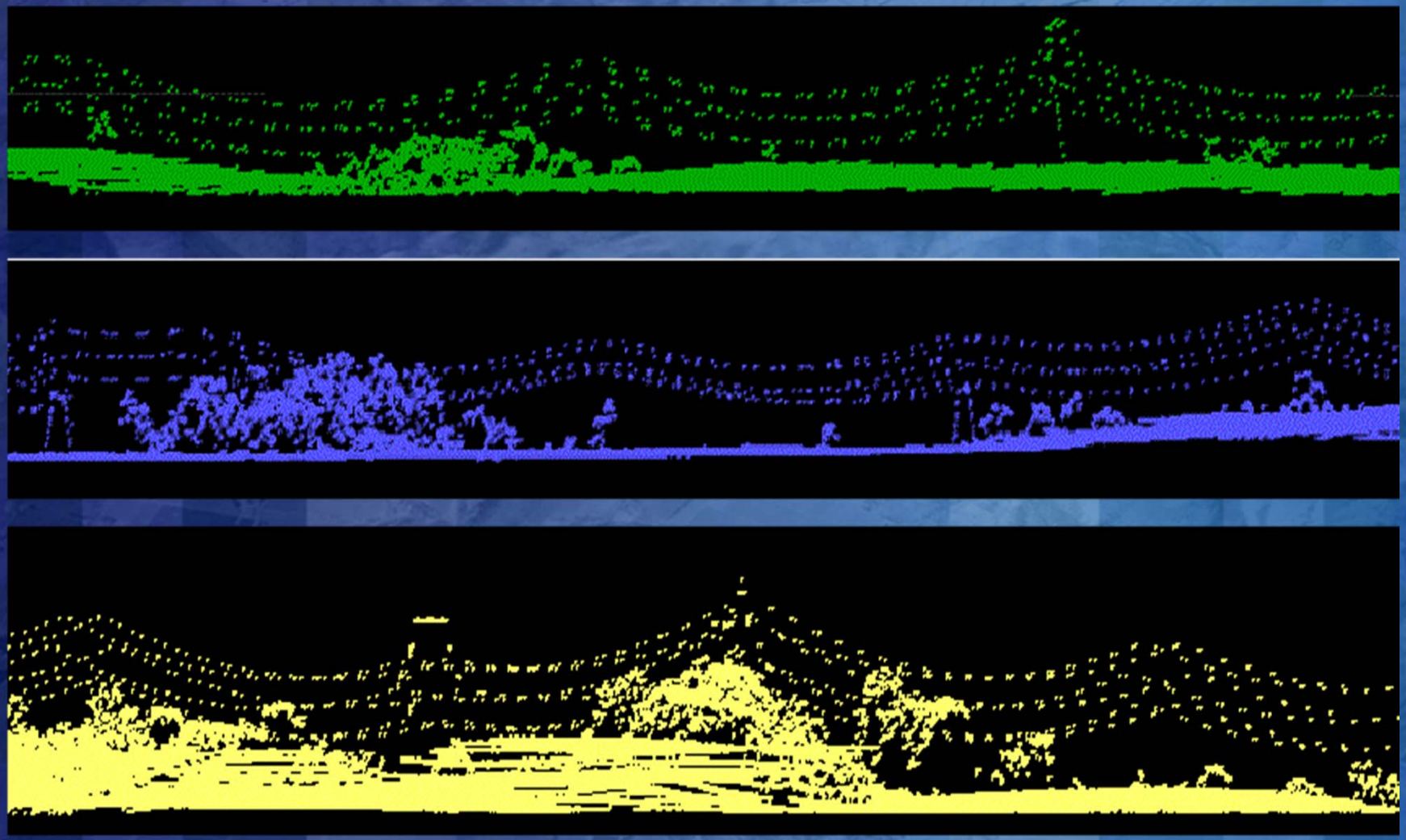
Crown Cover by Height Strata



We can summarize the proportion of LiDAR returns by various height strata (i.e., estimate the amount of veg by height strata)

Courtesy USFS

Other Lidar Uses: Utility Mapping



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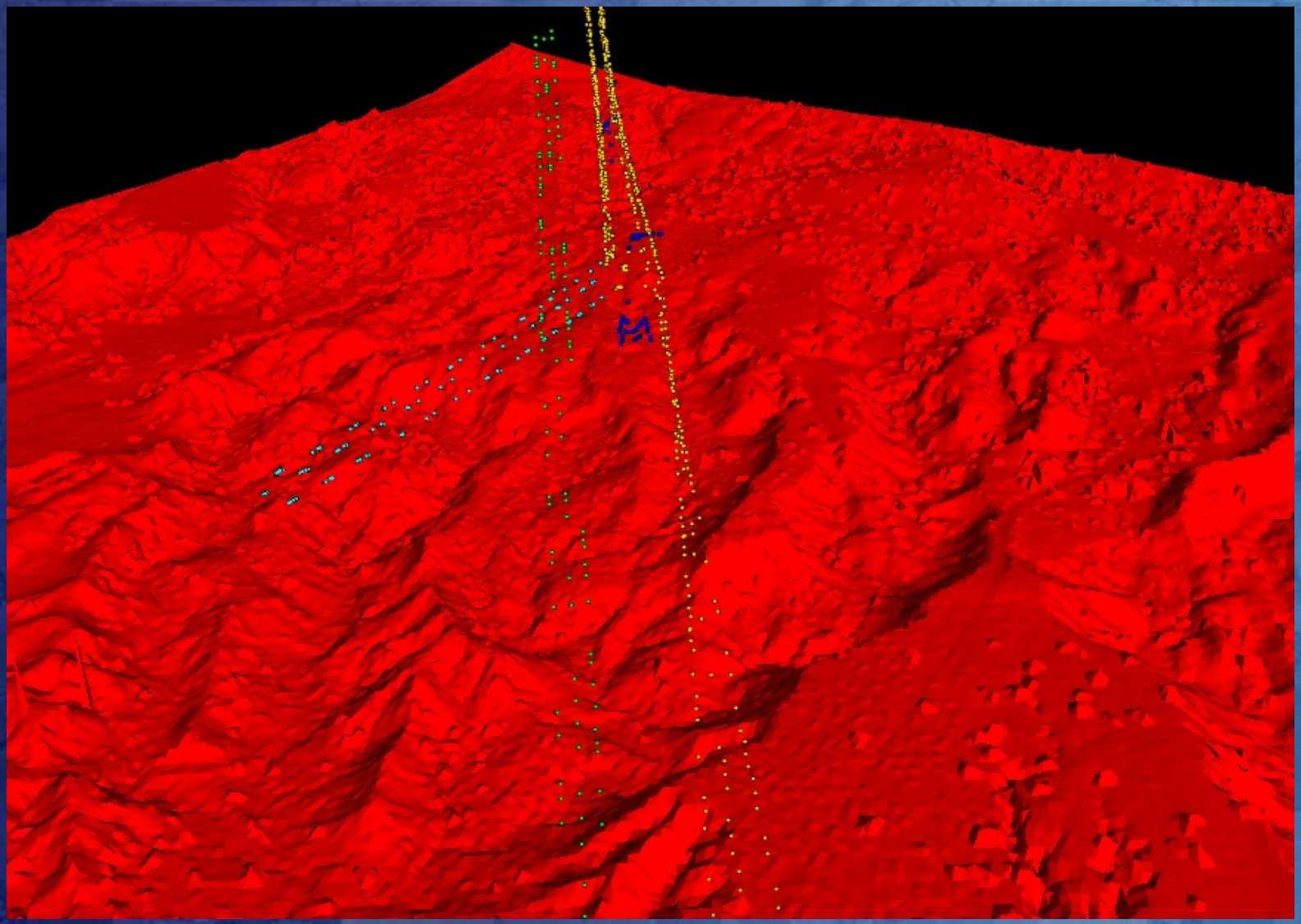
Multiple Powerlines



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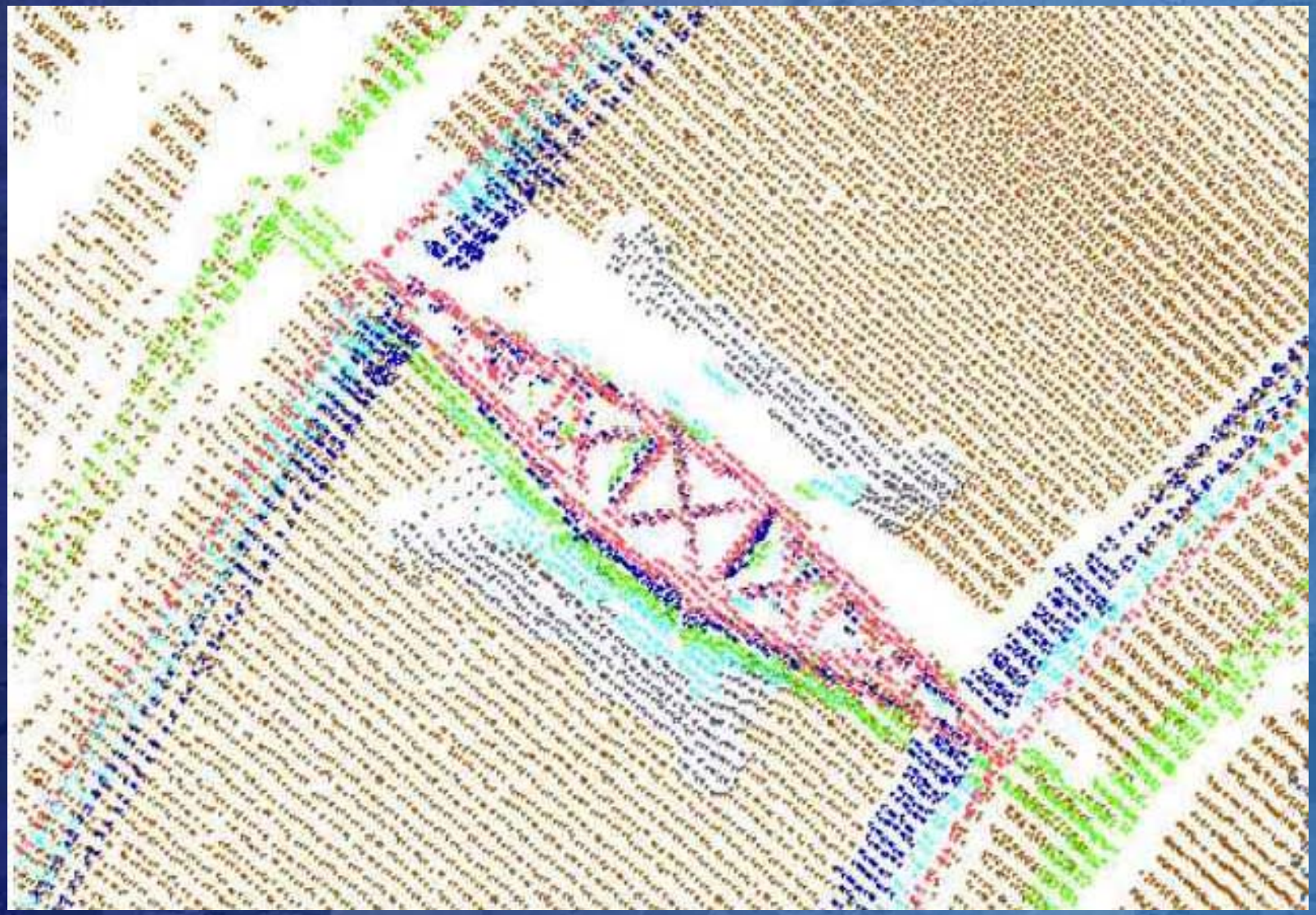
Power Line Mapping/Inspection



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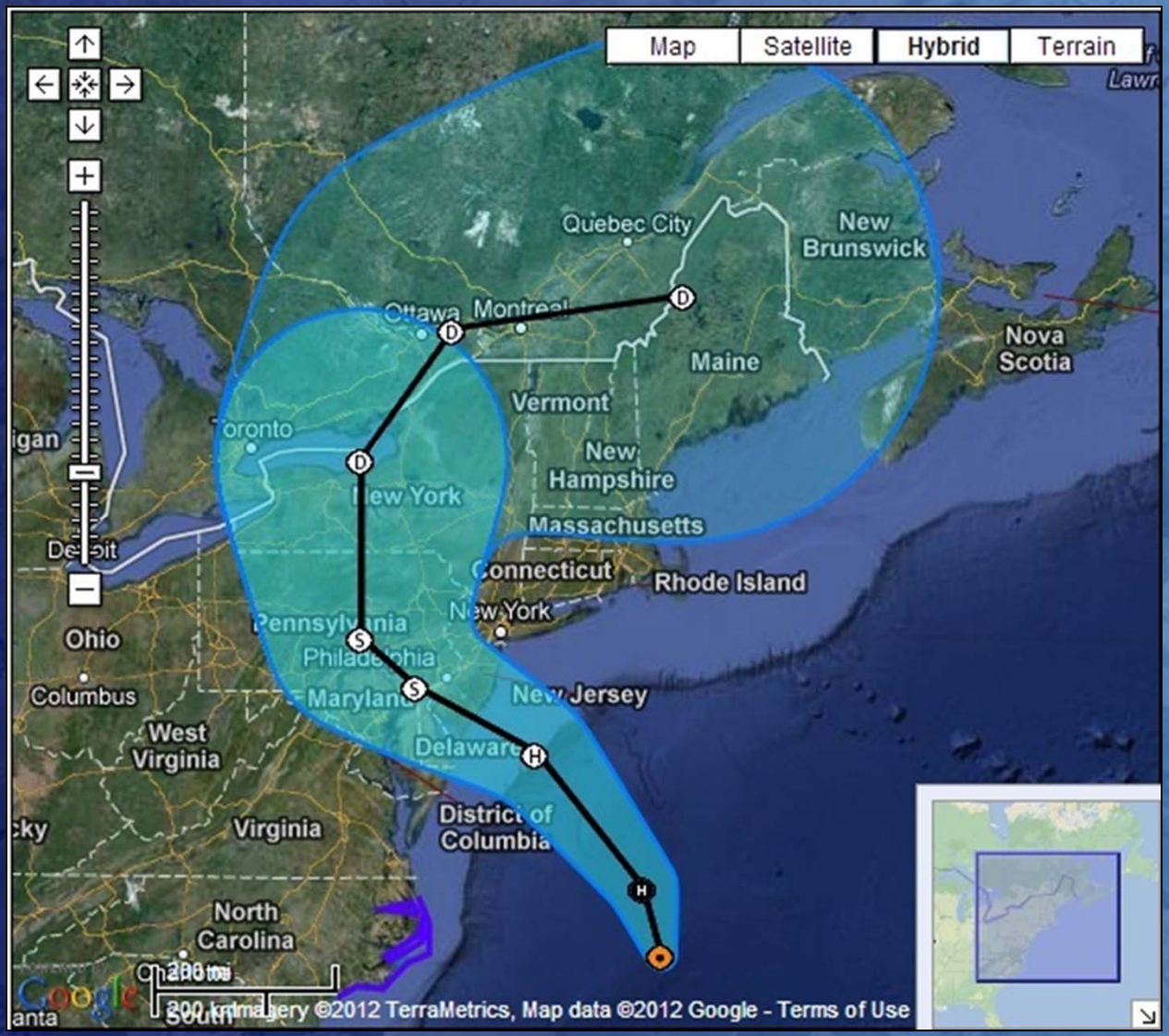
Hurricane Sandy – Storm Track



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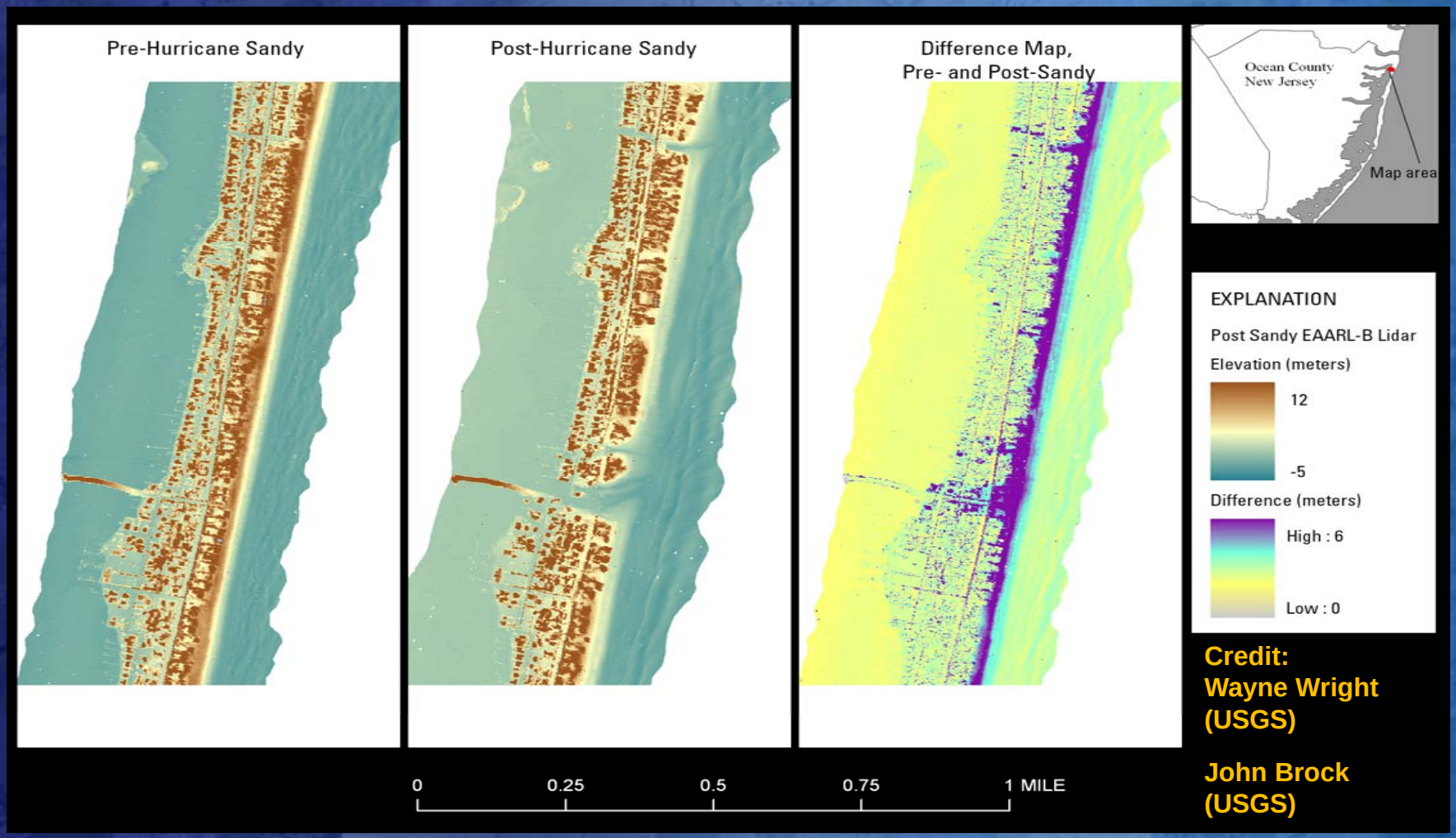
Hurricane Sandy – Pre and Post Change Mantoloking, New Jersey (Barnegat Peninsula) (USGS EAARL-B)



Credit:
Wayne Wright (USGS)

John Brock (USGS)

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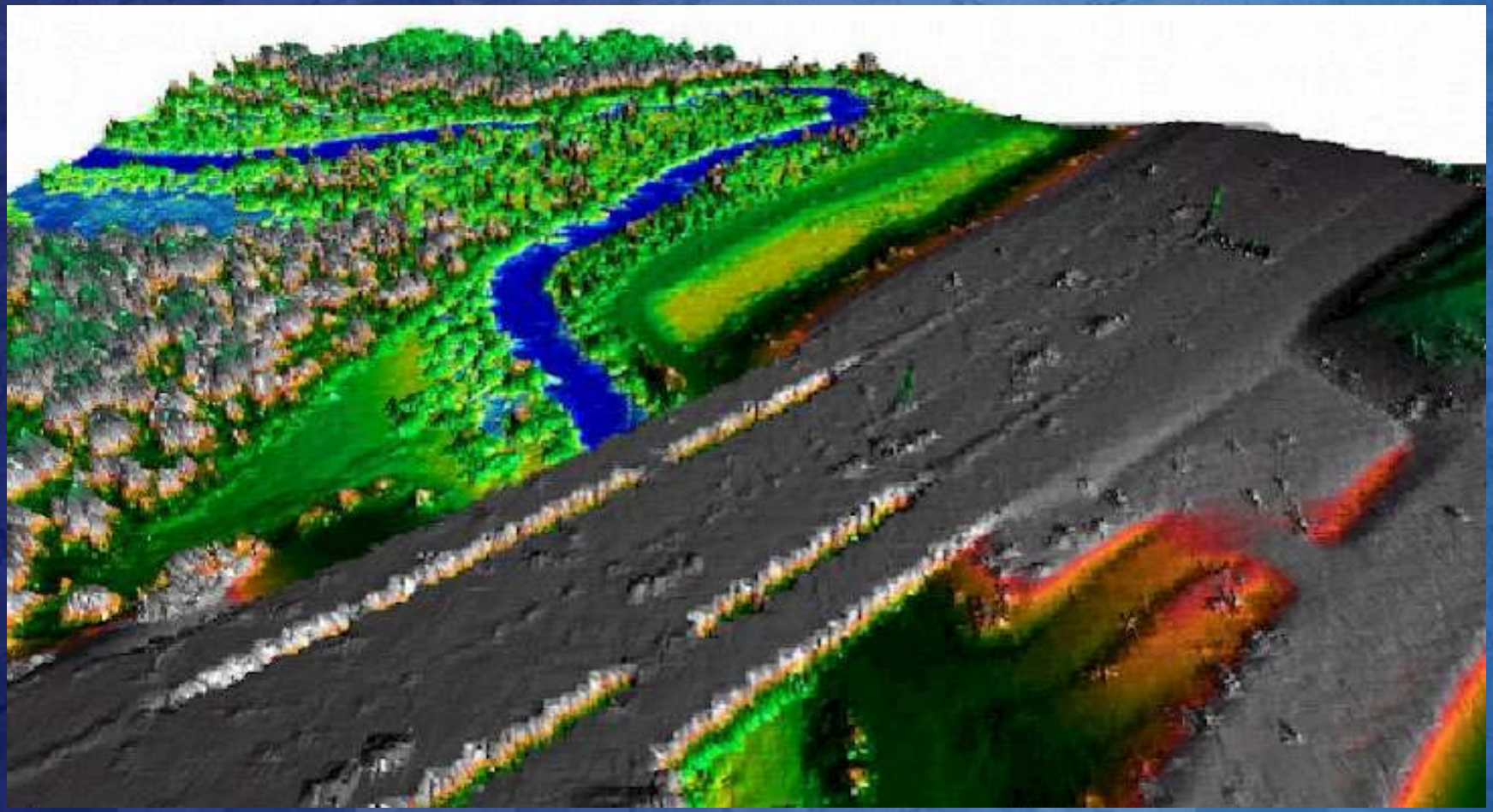
Other Lidar Uses: Transportation Mapping



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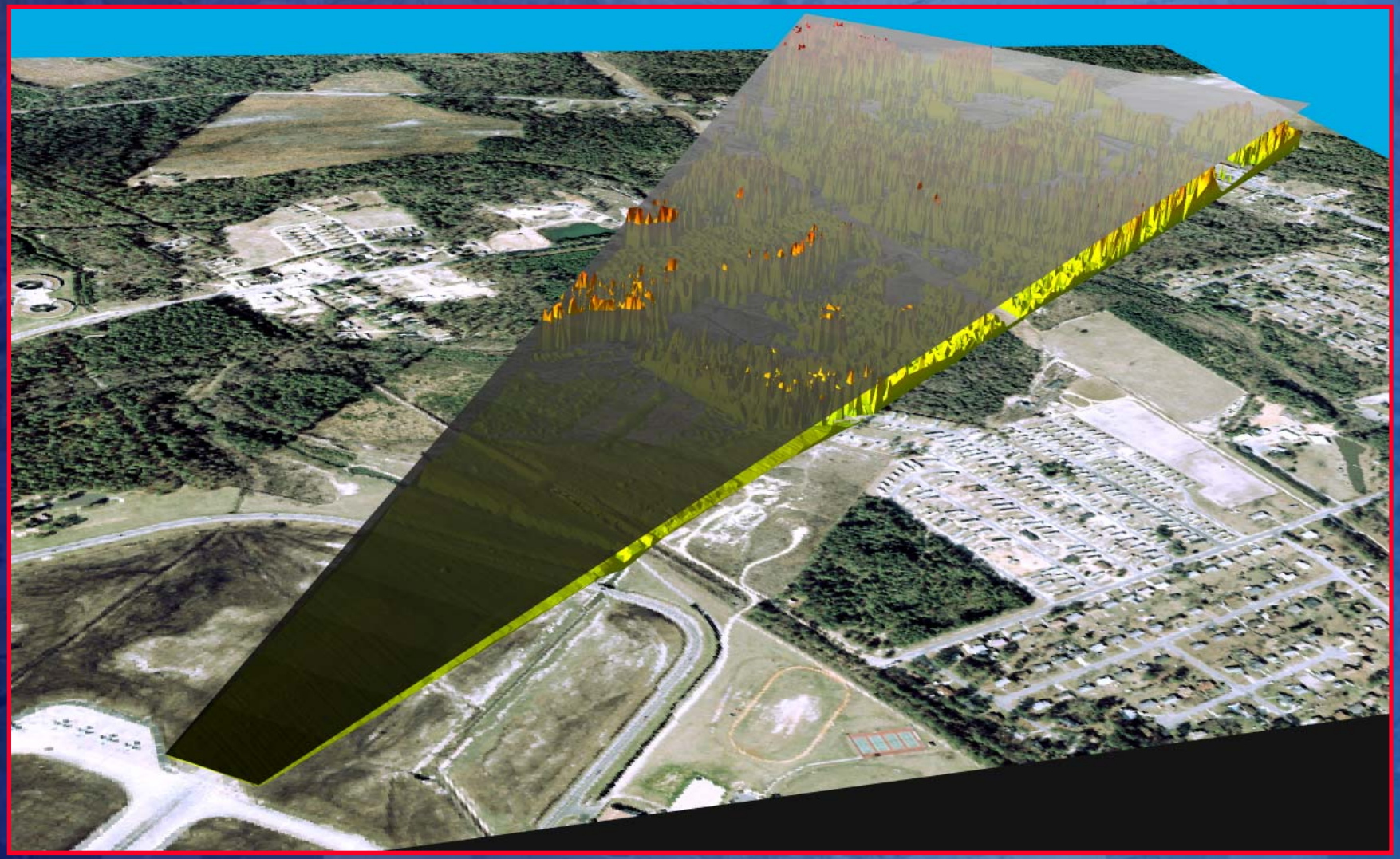
Aviation Safety – Landing Approach



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Questions?

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