Improvements to Airborne Ladar Man-in-the-Loop Operations

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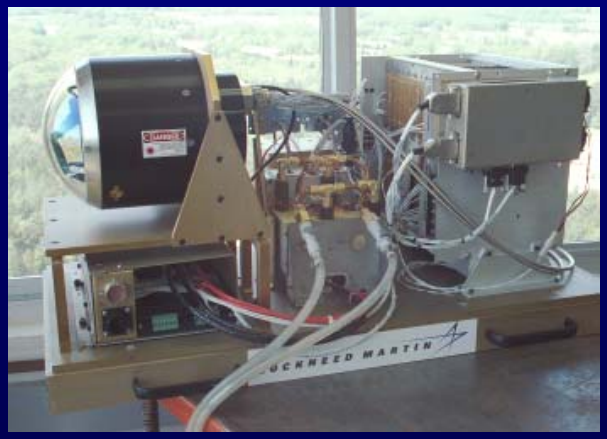
Outline

- Objectives
- Test Description
- Results
- Analysis
- Conclusions

Ladar Visualization and Analysis (LAVA) Test

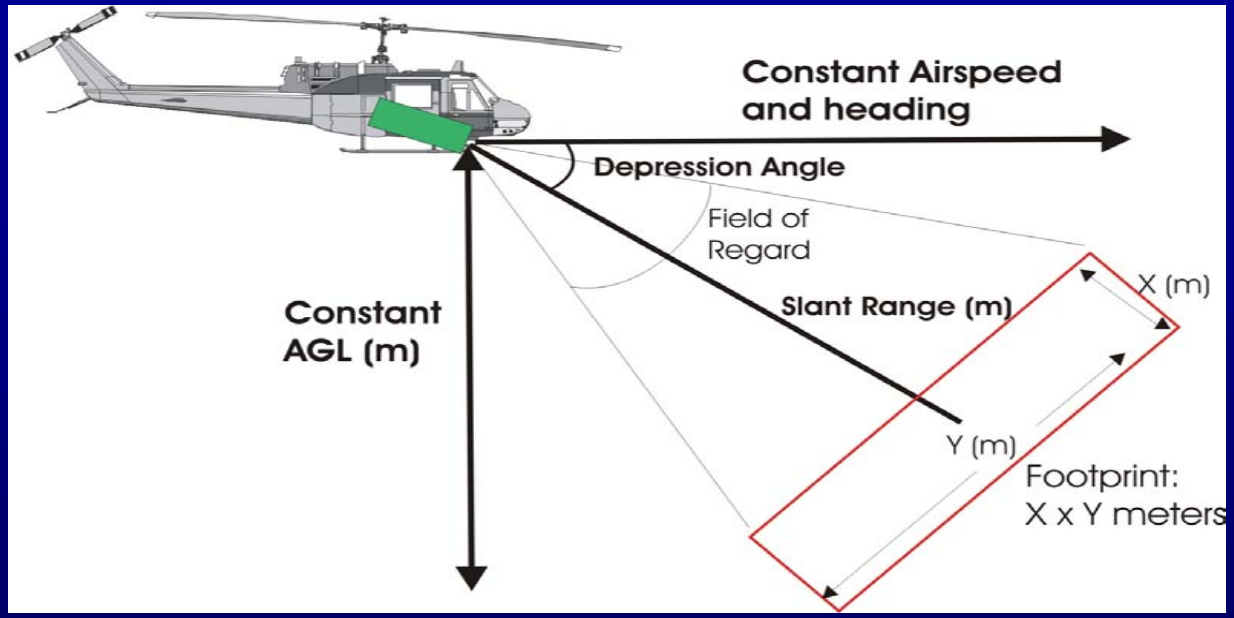
Objective:
- Collect Ladar imagery over UAV type scenarios
- Improve visualization processes and techniques employed by UAV sensor technology

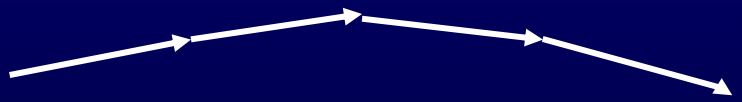
Approach:
- Conduct captive flight test (CFT) utilizing the Lockheed STAR Ladar seeker
- Collect Ladar imagery over RSA and surrounding urban area



Payoff:
- *Provide additional dataset to improve man-in-the loop operations and ATR development for UAV tactical environments.*

Test Description





Waypoint Flight Path

	Flight Configuration #1	Flight Configuration #2
Speed	50 kts	50 kts
Altitude (AGL)	2121 feet	3182 feet
Sensor Depression Angle	45°	45°
Sensor Slant Range	1000m	1500m
Sensor Scan Footprint	59m x 436m	89m x 655m
Sensor FOR	25 deg	25 deg
Spot Size at Range	40cm	60cm

LADAR CFT Data Collection Areas

Test Area 3, RSA

Building 5400, RSA

RMF, RSA

Whitesburg Bridge, HSV

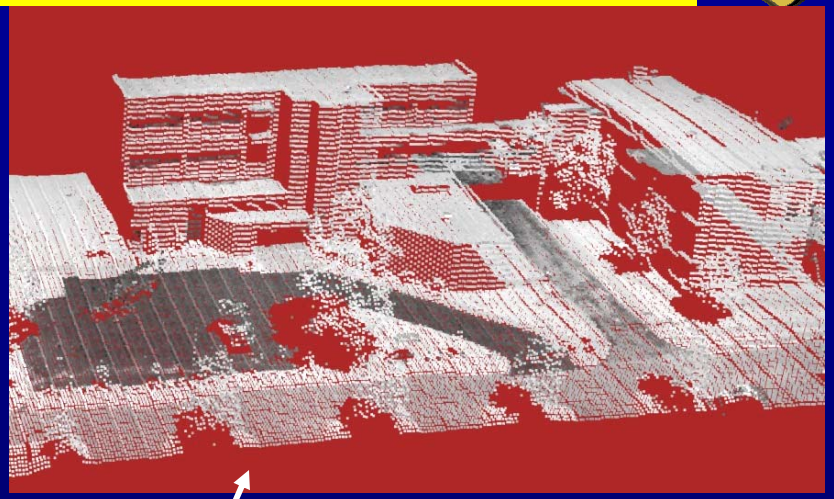
US Hwy 231, HSV

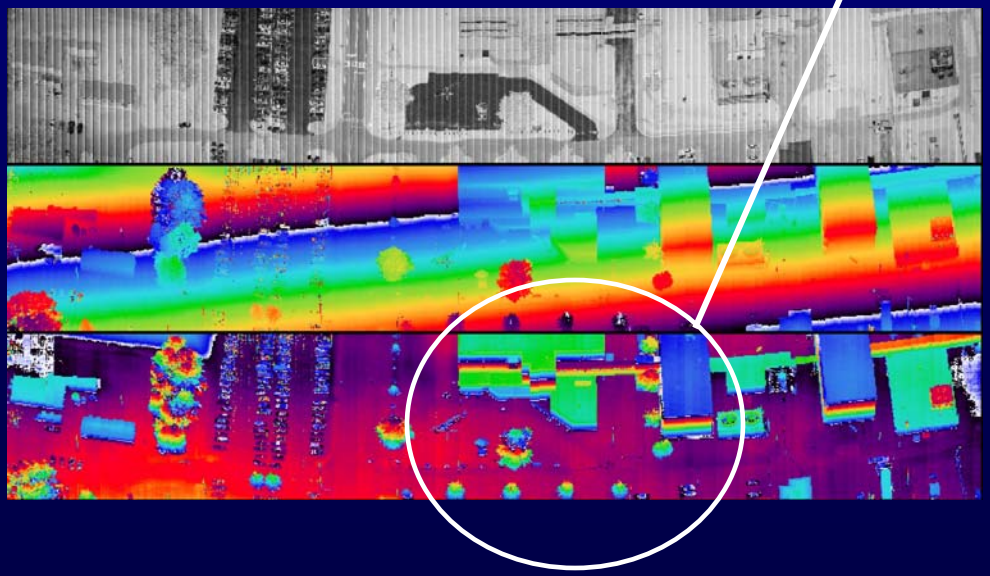
Space/Rocket Ctr, HSV

I-565, HSV

Data Results / Examples from CFT

Building 5400, Redstone Arsenal, AL



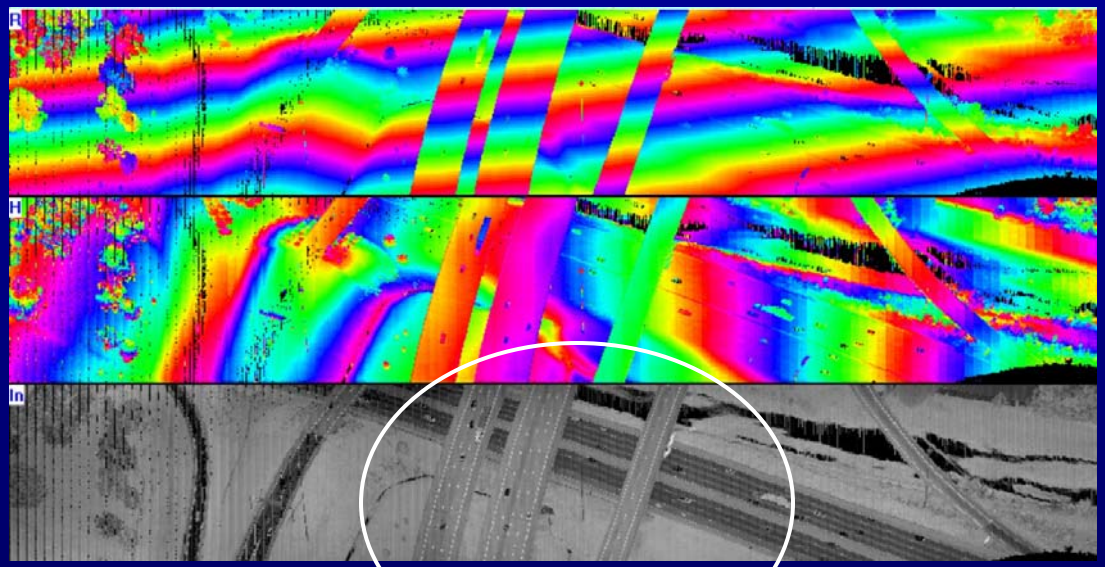


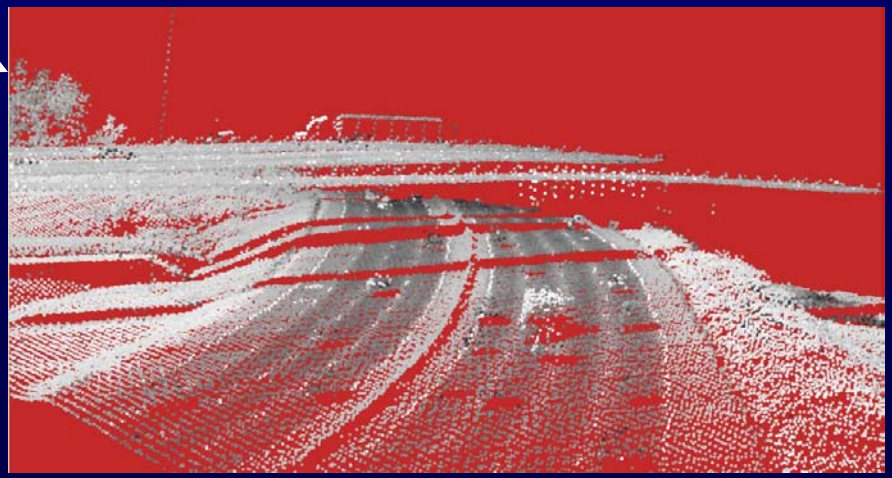
Intensity

Range

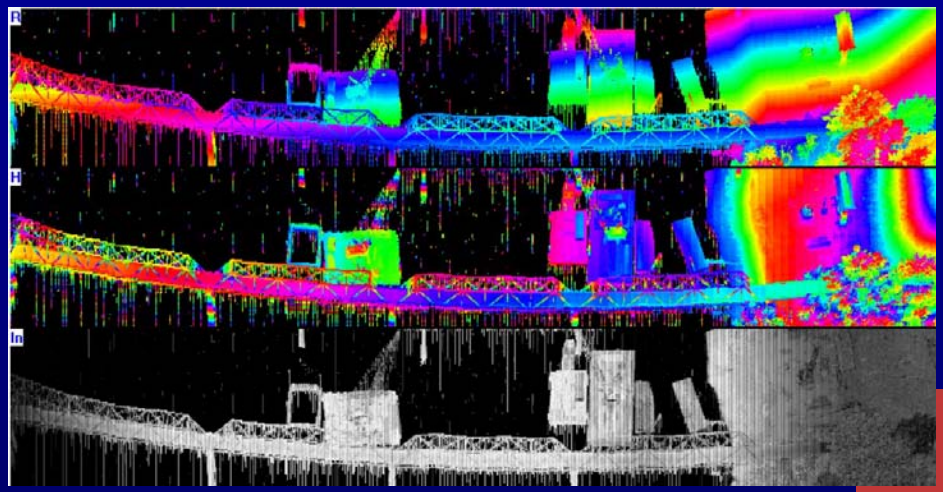
Height

I-565 over Highway 231, Huntsville, AL

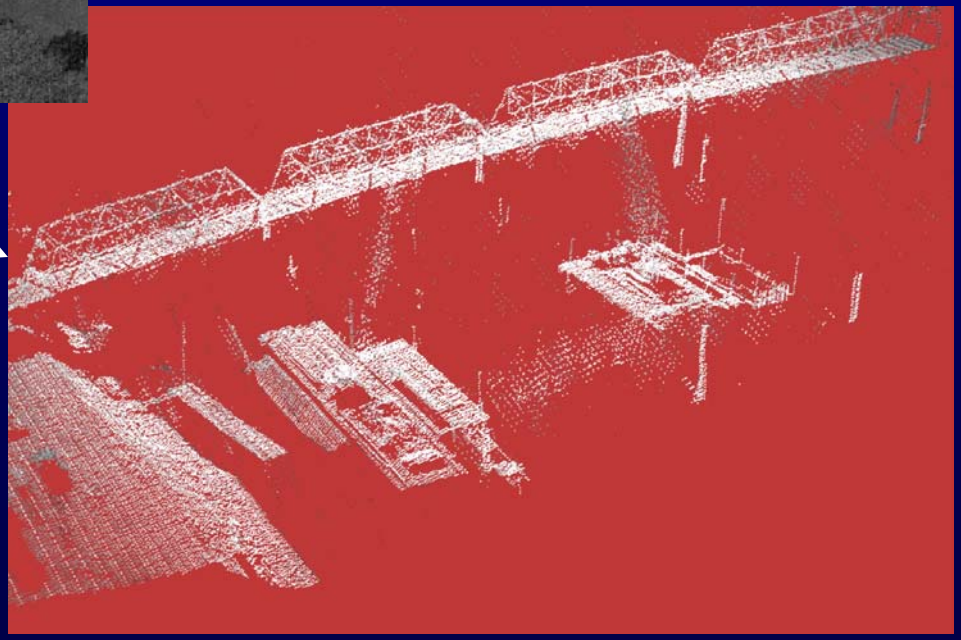




Whitesburg Bridge, Huntsville, AL



Reverse Angle



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CLAS Test Summary

- Test designed for advanced LADAR ATR algorithm development
- Data successfully collected for all test scenarios
  - Targets imaged from less than 250 meters to over 4 Km
- 3 Days, ~20 scenarios, thousands of images
  - Moving, confusers, long range, variable resolution, stationary, clutter, camouflage, dismounts, urban data
- System was operational in < 2 hrs after arrival on site
  - No failures in 2 weeks of CY2004 testing and significant transport

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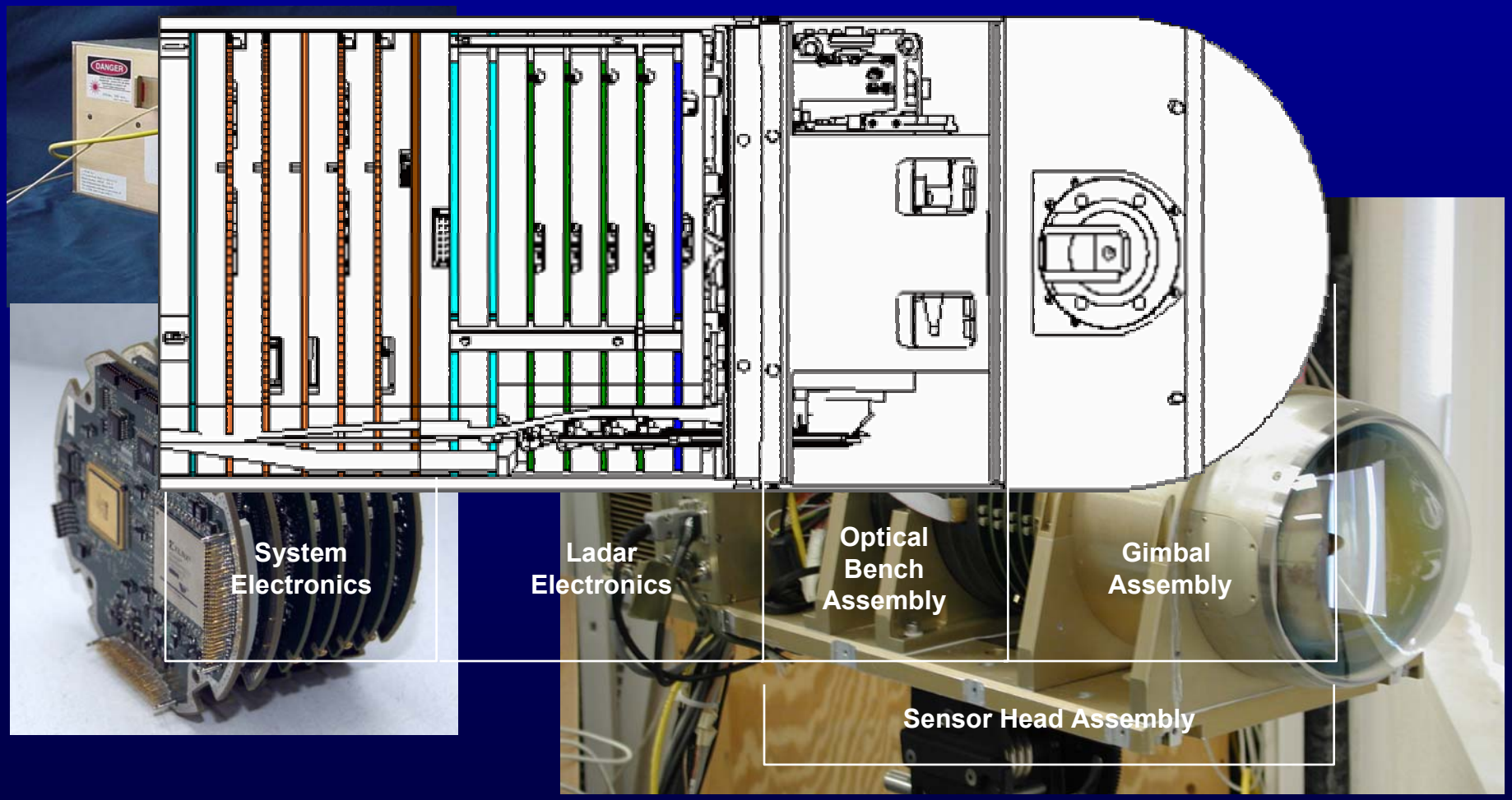
DASSL CMRTR LADAR Team Raytheon NetFires Flash

Common LADAR Seeker (CLAS)

ASGE



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Russell Measurement Facility (RMF) Laboratory Tower

Top Laboratory Height (from ground to floor): 300 feet

Floor Dimensions: 34 x17 feet

Total Tower Height: 329 feet

Elevator Laboratory
Floor Dim.: 10x6 ft.
30 floor stops

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Data Results / Examples from Tower Test

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Whitesburg Bridge

Range

Intensity

Target imaged during degraded weather conditions

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DASSL CMRTR LADAR Team NetFires Flash

RMF Compound Test Area

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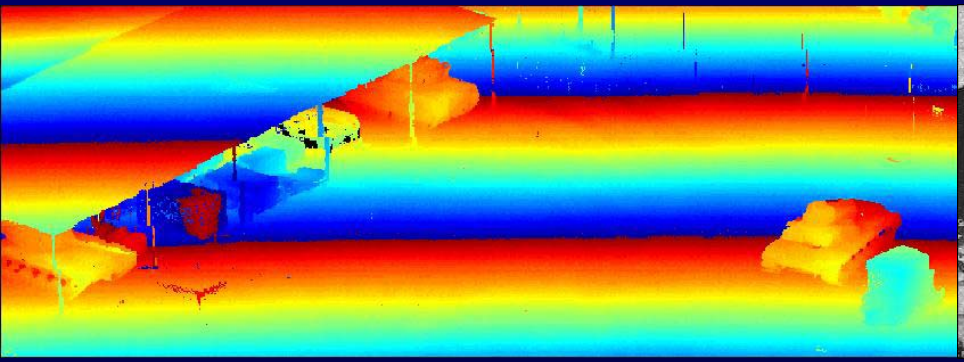
Data Collection at short range:

- **< 250 meters**
- **Targets in occlusion or open**

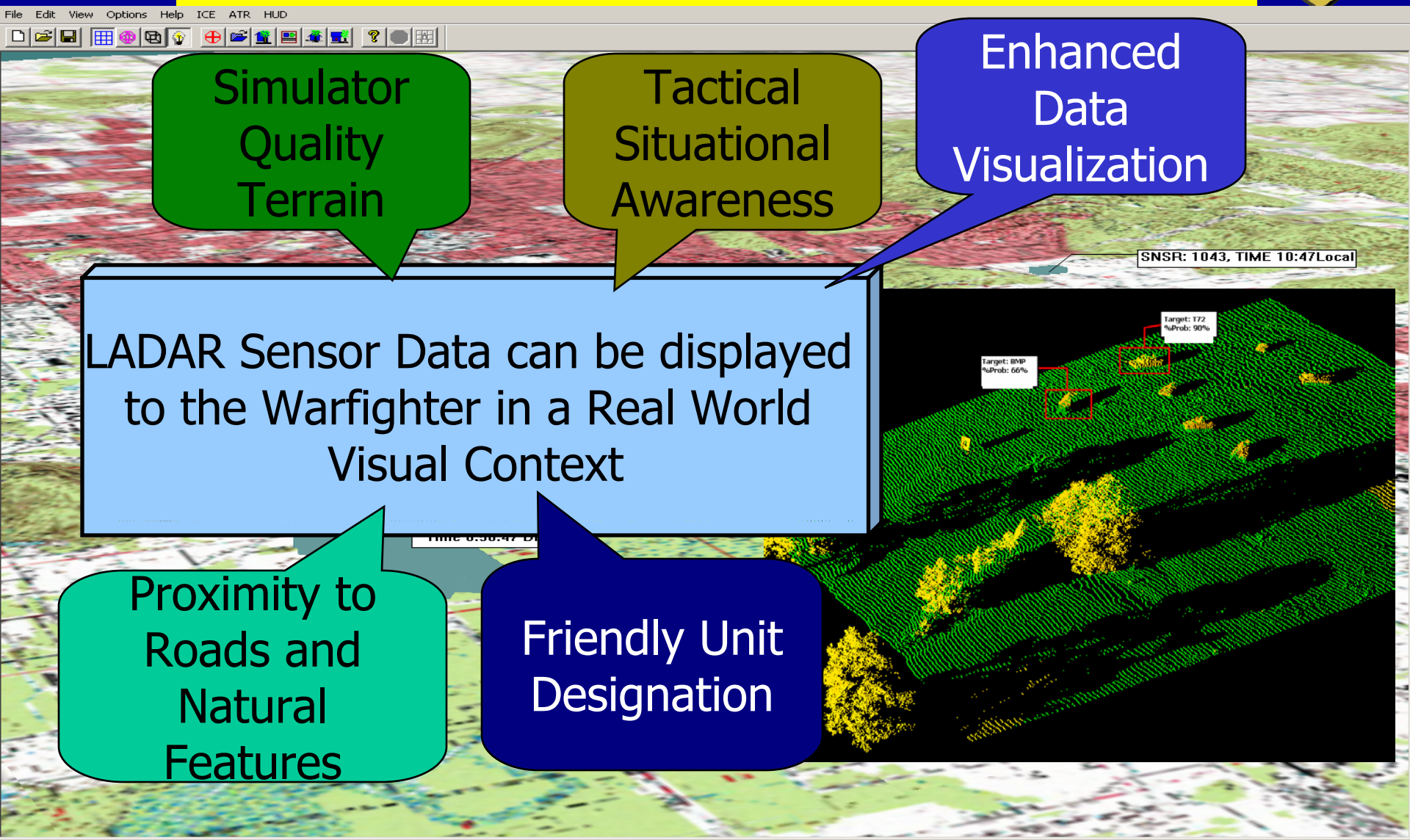
Range Image



Intensity Image

Conclusions

Ladar Data in a World Context

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Questions?