

Connecting the dots: Towards a LiDAR program for Newfoundland and Labrador

Geomatics Atlantic Conference
November 23, 2017

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Acknowledgements:

Financial support kindly provided by:

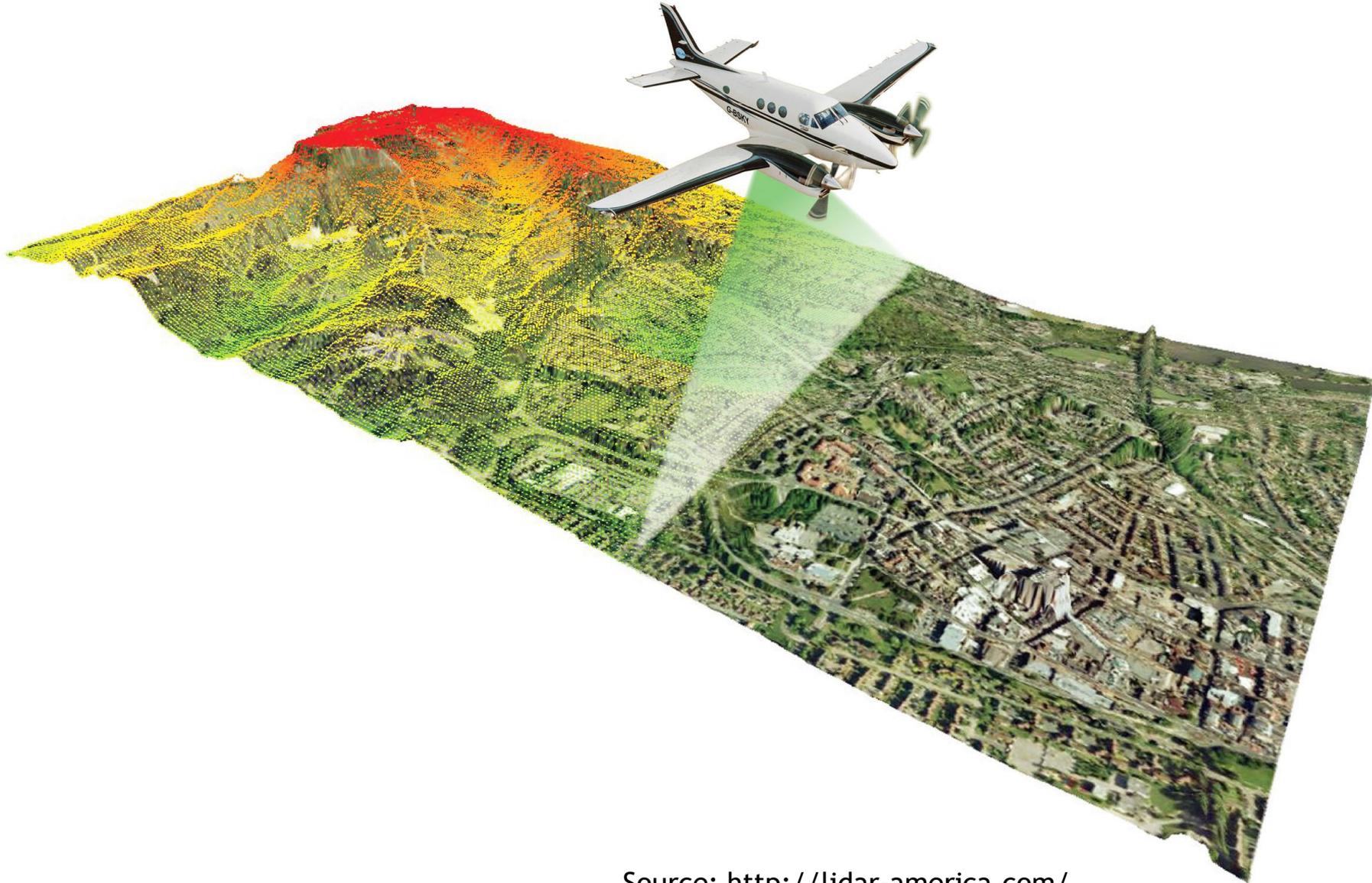
Centre for Forest Science and Innovation
Department of Fisheries and Land Resources



Purpose of presentation

- ▶ Present highlights of a review of Newfoundland and Labrador ‘wants/needs’ for LiDAR
- ▶ Summarize outcomes of a workshop on possible LiDAR program for Newfoundland and Labrador

Airborne Light Detection And Ranging (LiDAR)

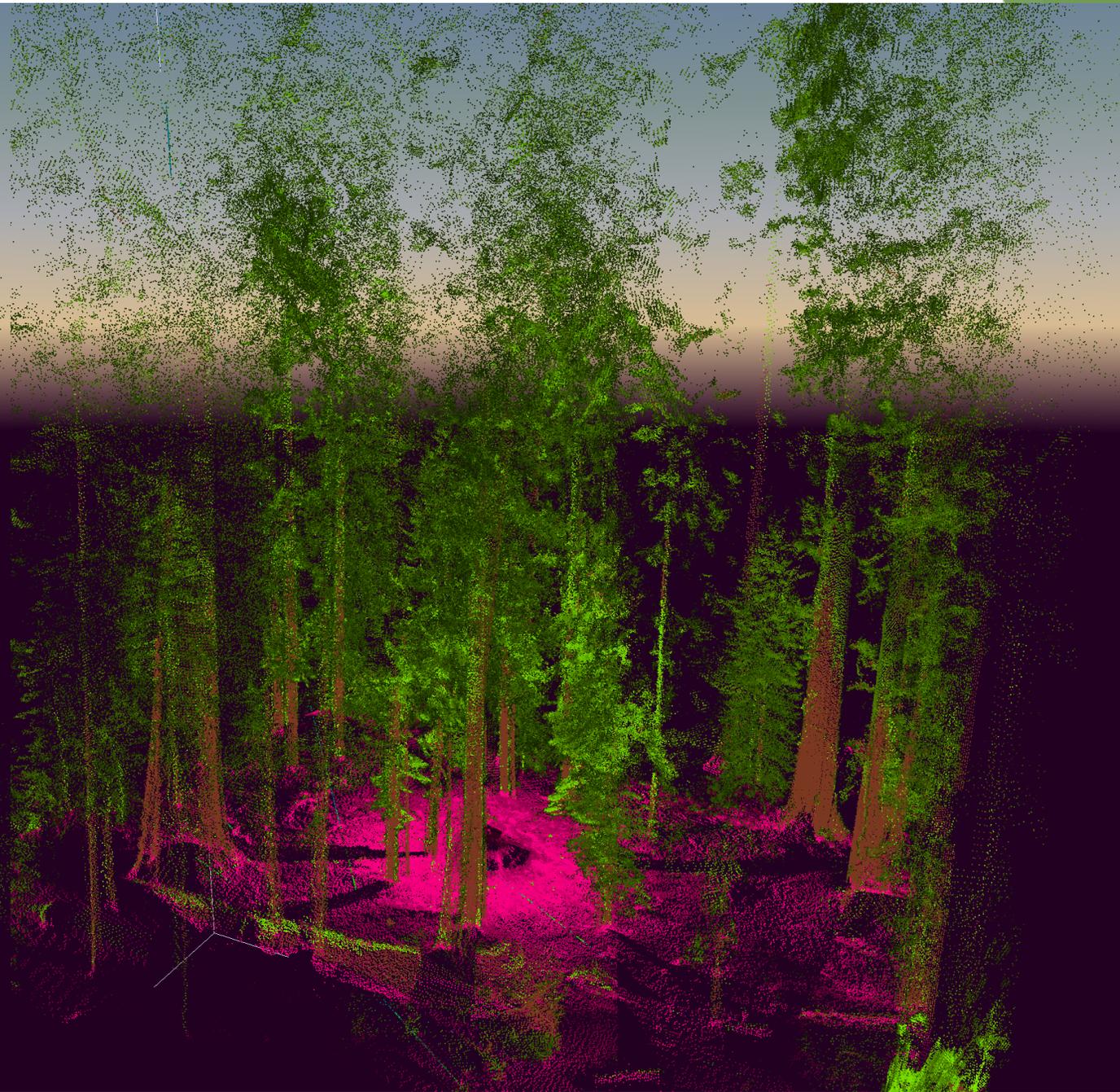


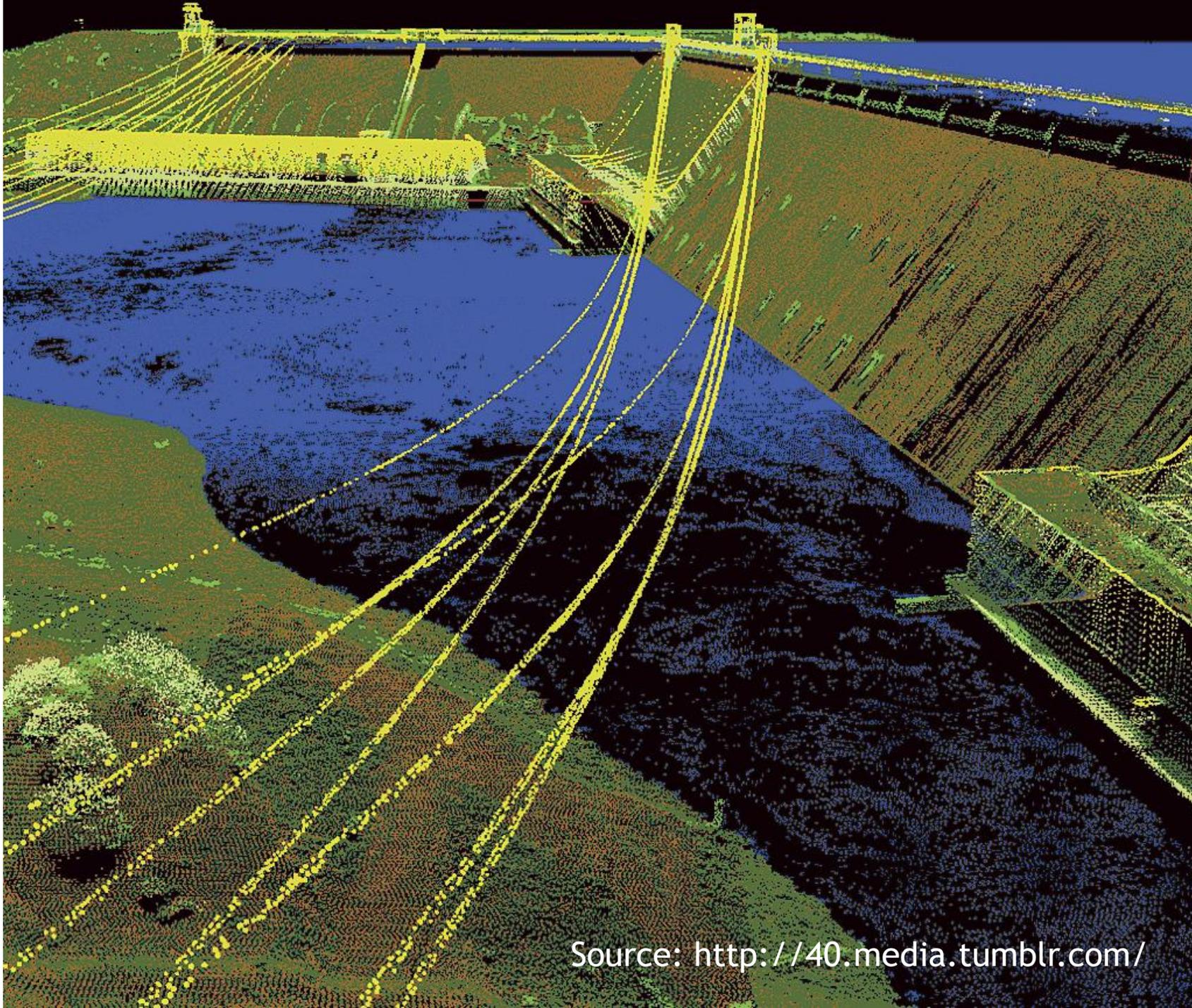
Source: <http://lidar-america.com/>

Forestry

LiDAR point cloud
with forest
materials
indicated by
color:
Green = foliage;
Brown = trunks
and branches;
Magenta = ground

Source: <http://www.bu.edu/>

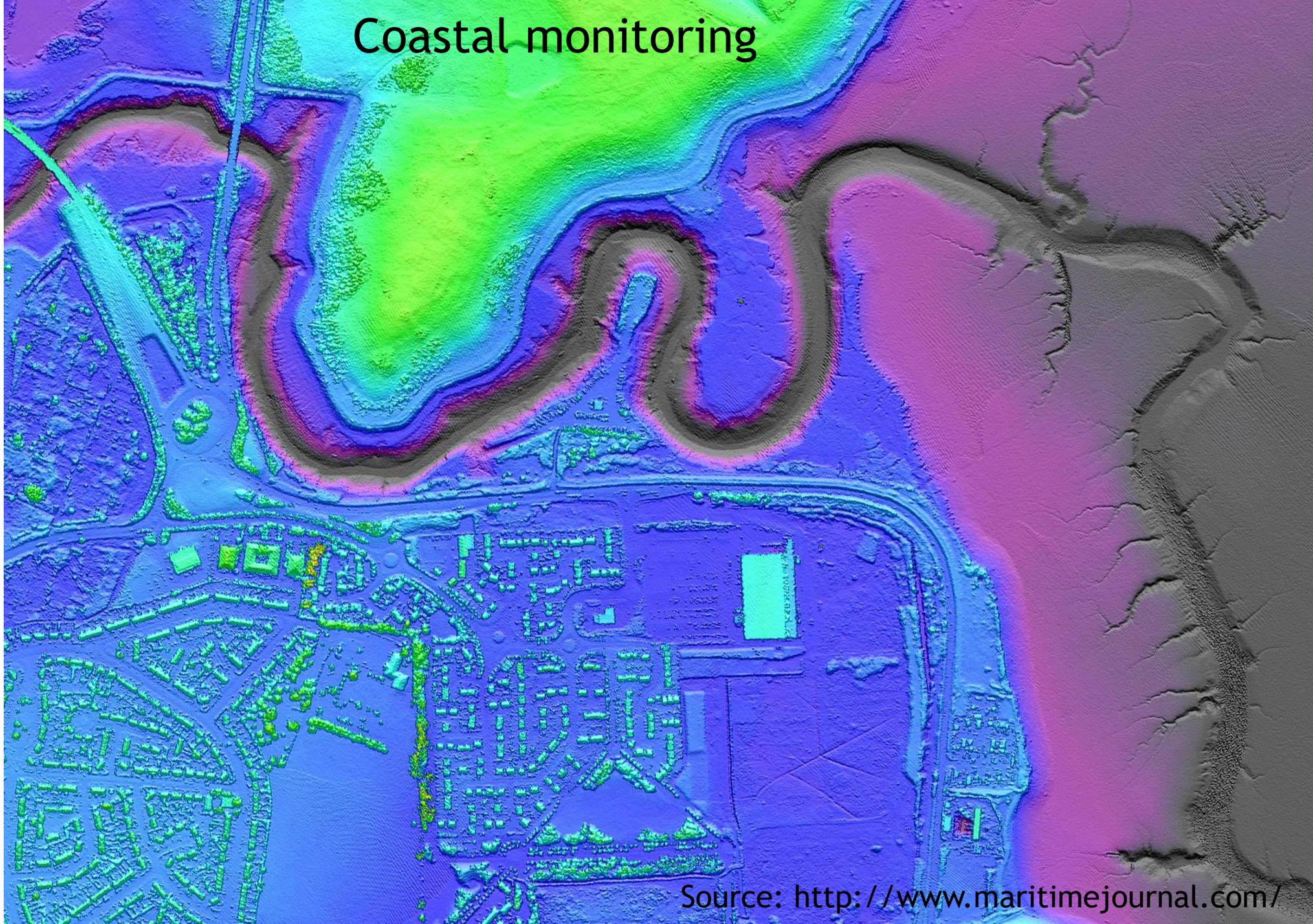




Utilities

Source: <http://40.media.tumblr.com/>

Coastal monitoring



Source: <http://www.maritimejournal.com/>

LIDAR applications by sector

Sector	Functional activity	Requirement
Forestry	Inventory	Vegetation structure; ground elevation
	Harvesting	Ground elevation; water features
	Wildfire management	Vegetation structure; ground elevation
	Insect management	Vegetation structure
Mining	Exploration	Ground elevation; vegetation cover
	Mining	Ground elevation; vegetation cover
Energy	Transmission corridor planning	Ground elevation; vegetation cover
	Transmission corridor management	Vegetation structure; vegetation cover
Environment	Flood risk management	Ground elevation; water features; vegetation cover
Transportation	Planning	Ground elevation; vegetation cover
Planning	Municipal planning	Ground elevation; vegetation cover; above ground features
	Land use planning	Ground elevation; vegetation cover; above ground features; water features
	Marine spatial planning	Ground elevation (above/below water)

Why LiDAR?

- ▶ Resource based economies are under pressure:
 - ▶ Profit margins are thinner
 - ▶ Competition is fierce
 - ▶ Market pressure to manage and exploit resources sustainably
- ▶ Goal of profitable yet sustainable resource development is not an oxymoron
- ▶ Key is information:
 - ▶ In the forest sector, for example, knowing the precise location and characteristics of every tree would allow for efficient harvesting of the resource (profitability) with minimum impact on the environment (sustainability)
- ▶ Information, such as can be provided by airborne LiDAR data is how we can transform a resource-based economy into a knowledge-based economy.

Economics of LiDAR

- ▶ Province of Quebec (forest inventory):
 - ▶ \$2.13/m³ in potential savings through adoption of LiDAR
 - ▶ For every dollar invested, \$1.40 in savings
- ▶ Ontario (forest inventory):
 - ▶ \$1.57/m³ demonstrated savings
 - ▶ 2-3 year payback
- ▶ US National Enhanced Elevation Assessment
 - ▶ “More than 600 requirements for enhanced elevation data to address mission-critical information requirements of 34 Federal agencies, all 50 States, ... private sector companies and Tribal and local governments”

Process of engagement (1)

- ▶ Stage 1: Consultation (May - August, 2016):
 - ▶ Assess NL stakeholder interest in LiDAR data
 - ▶ Identify key stakeholders in NL with an interest in LiDAR to support their mandate
 - ▶ Focus on opportunities for innovation (new applications, value-added products and services)
 - ▶ Solicit NL stakeholder interest in Atlantic Canada LiDAR Innovation Hub concept

Comments from Round 1 consultations:

- ▶ Need mutually accepted LiDAR data acquisition specifications and data standards (in partnership with Natural Resources Canada National Elevation Data Strategy);
- ▶ Leverage ongoing investments in data (photo and LiDAR) (including NRCan National Elevation Data Strategy);
- ▶ Achieve economies of scale through award of contracts for large, multi-province acquisition contracts;
- ▶ Take advantage of existing private and public sector capabilities for collecting, processing, storing and managing LiDAR data;
- ▶ Invest in innovation around new value added products and services
- ▶ Adopt an 'open data' policy
- ▶ Adhere to the principle of 'collect once, maintain closest to source, use many times';
- ▶ Begin with application-specific demonstration projects to show the quantitative value and benefits of airborne LiDAR data.

Cost benefit considerations

- ▶ For NL, cost varies from \$68/km² to \$100/km² - cost/km² goes down as the size of survey area goes up
- ▶ Benefits (cross-sectoral) - \$95/km² (Gov't Quebec, 2015)
- ▶ Benefits (forest sector) - \$1.60/m³ (Ontario) - \$2.13/m³ (Quebec)
- ▶ Value of Information:
 - ▶ Typically 1% of value of resource
 - ▶ For NL forest sector - 1% of \$200M = \$2M annually
- ▶ Municipalities - Value of information~\$200K/community - improved disaster preparedness (pers comm, NL Dept. Environment and Conservation)
- ▶ “...when all of the overlapping needs from multiple users are considered, a national program is more than justified” (US 3DEP; Sugarbaker et al, 2014)

Process of engagement (2)

- ▶ Stage 2: Workshop (February 2017):
 - ▶ Explore opportunities for cooperation
 - ▶ Leverage ongoing investments in LiDAR data;
 - ▶ Achieve economies of scale through award of contracts for large, multi-purpose data collection campaigns;
 - ▶ Take advantage of existing private and public sector capabilities for collecting, processing, storing and managing LiDAR data;
 - ▶ Invest in innovation - value added products and services.
 - ▶ LiDAR data acquisition specifications and data standards

Workshop outcomes

- ▶ Primary industry (i.e. forest companies, utilities) guidance is vital insofar as their needs are reflective of international need/opportunities
- ▶ Pilot projects and case studies help to raise awareness of what the benefits are and sell the need for LiDAR
- ▶ Break down data ‘silos’
- ▶ Continue to engage a broad community of interest
- ▶ Don’t wait until everyone is at the table and all of the money and other resources needed for a province-wide LiDAR program are in place
- ▶ Learn from and cooperate with other jurisdictions, particularly Fed gov’t
- ▶ Support federal/provincial initiative to establish a regional geomatics cluster, focused on LiDAR, under the innovation component of the Atlantic Growth Strategy
- ▶ Focus on opportunities for R&D/commercialization

'Competitive' landscape

- ▶ Digital aerial photography
 - ▶ Seen as complementary to LiDAR (and vice versa...)
 - ▶ Many need photography and would like to have both
 - ▶ Technology challenge/opportunity: simultaneous acquisition of high resolution (30cm or better) aerial photography and LiDAR
- ▶ NL DEM at +/- 2m vertical resolution (NL Municipal Affairs, Surveys and Mapping) viewed by some as 'good enough'
- ▶ Shuttle imaging radar - lower resolution; good enough for northern regions (e.g. US 3DEP, NRCan NEDS) and broad area analysis
- ▶ LiDAR on drones (small area surveys; lower mob/demob and acquisition costs)
- ▶ NRCan National Elevation Data Strategy (opportunity for leverage)

For further information

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