Coastal Geomorphological 3D Modeling with LIDAR

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AGRG 2003

COGS
Centre of Geographic Sciences

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Kouchibouguac National Park
Cap-Lumiere
Ladune
Bouctouche
Cormierville
Cap Pele
Shemogue Harbour
Little Shemogue
Cape Jourimain
LIDAR Zones
New Brunswick
May 2003
Legend
HPN - High Precision Network
roads
Lidar Coverage Zone
N
W
E
S
0 3.75 7.5 15 22.5 30
Kilometers

Project Goals / Objectives

- 1) Gain a greater understanding of the Coastal Geomorphology of south eastern NB
- 2) Explore the benefit of using LIDAR to create accurate 3D models of the area
- 3) Make a significant and useful contribution to the rest of the CCAF project

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Data Sources

- RAW LIDAR Data
- Orthophotos
- Topographic data
- Satellite imagery
- GPS Validation data
- Digital photography
- other

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Literature Search

- Searched the Library, Internet, AGRG
- 38 resources including: Journals / Magazines / Books and other resources
- Main topics included:
  - Sea Level Rise
  - LIDAR
  - combination of the Two

Literature Review

- Sea Level Rise
  - Coastal Sensitivity to Sea Level Rise
  - Global Warming
  - Impacts And Adaptation
- LIDAR
  - Better DEMS
  - AGRG past LIDAR Research
  - LIDAR Data Integration
  - LIDAR Limitations

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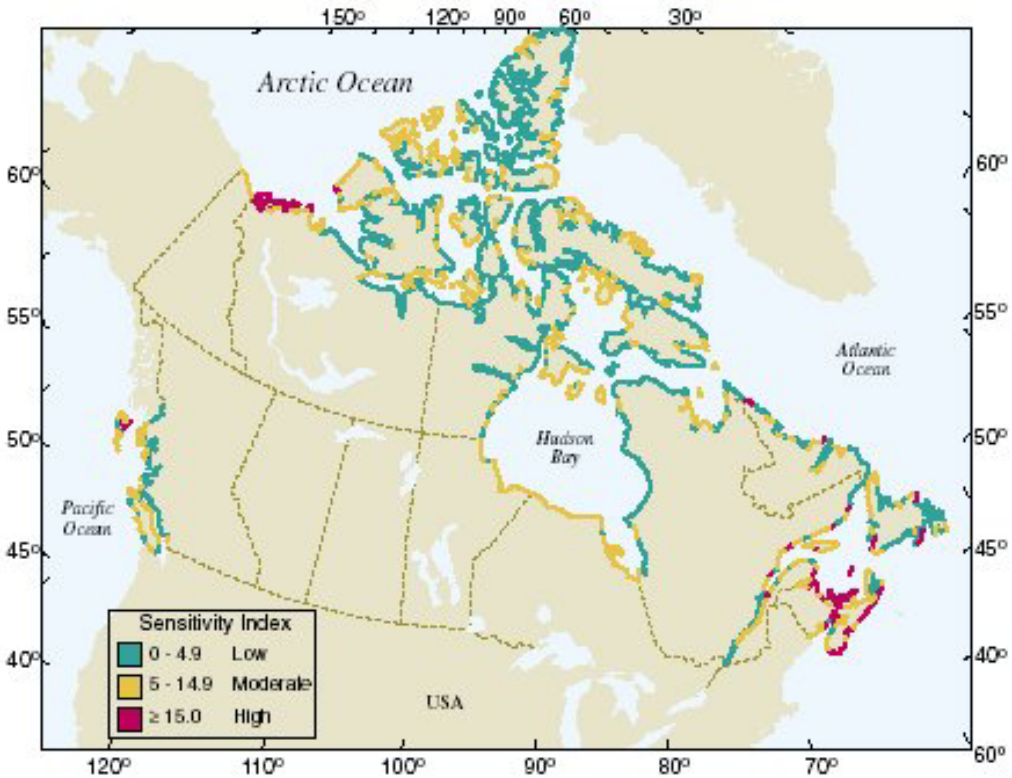
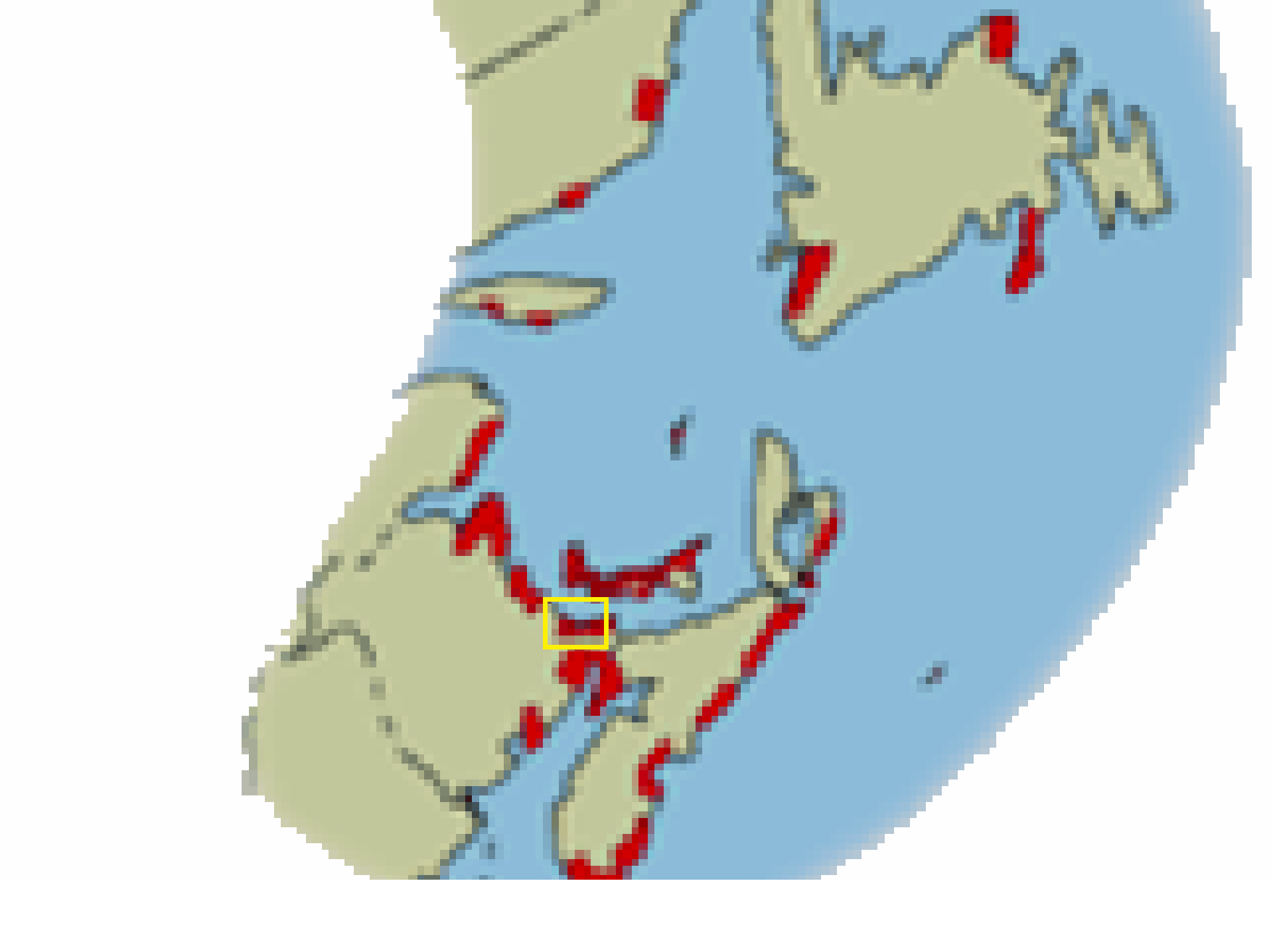
Coastal Sensitivity to SLR

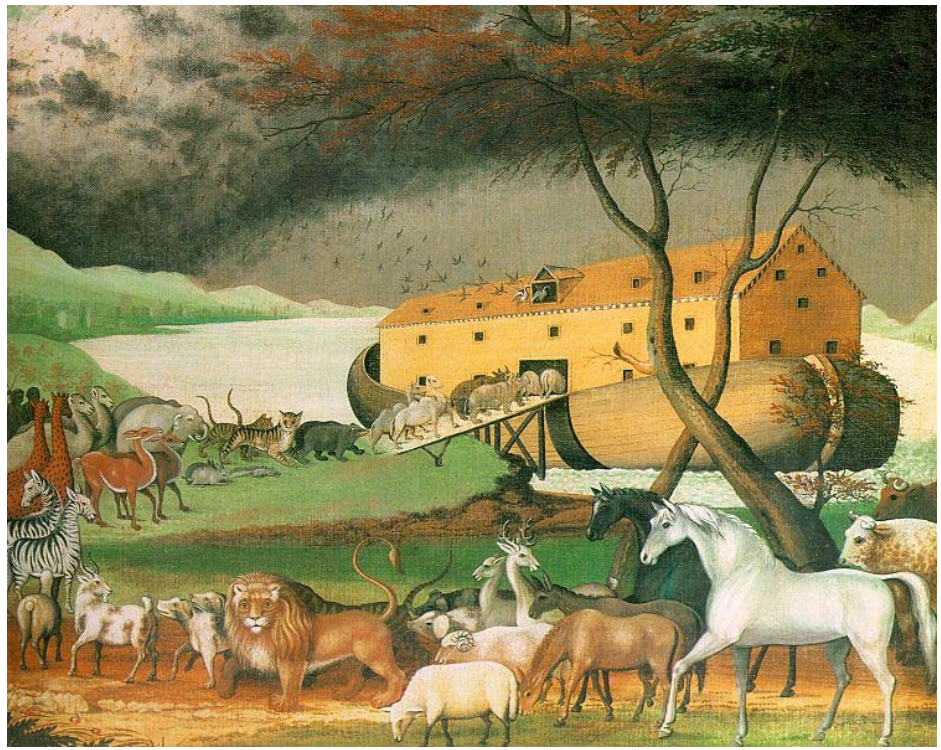




Sea Level Rise

- Not a new issue
- Global Wide Issue
- Global Warming Accelerates SLR

- Canadian coastline is one of the largest in the world
- Govt. provides $$ for research
- Coasts change through out time
- Regional Scale



- http://gsca.nrcan.gc.ca/coastweb/sealevel/sealevel3.swf

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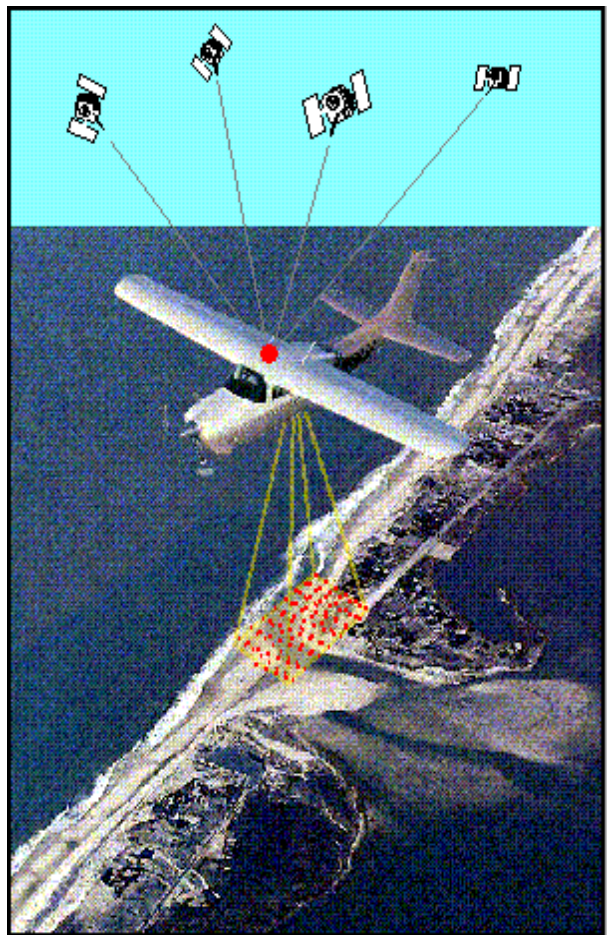
Impacts of SLR in coastal regions

- The impacts of rising sea level and other aspects of climate change in coastal regions can include:
  - flooding of wetlands and adjacent shores
  - expanded flooding during severe storms and high tides
  - increased near-shore wave energy (Erosion)
  - upward and land-ward migration of beach profiles
  - saline intrusion into coastal freshwater aquifers
  - impacts on coastal ecosystems
  - damage to coastal infrastructure and broad impacts on the coastal economy

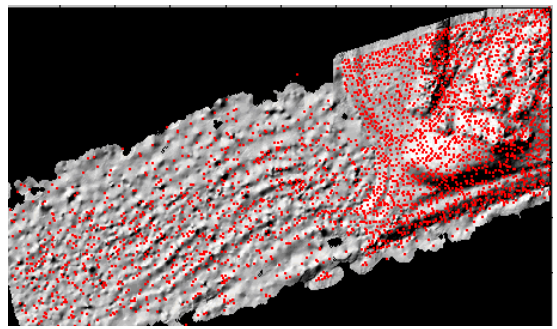
LIDAR

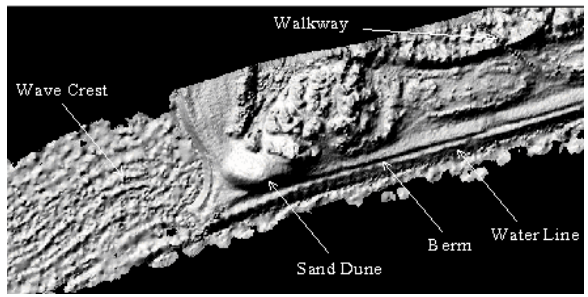
- Improvements
  - GPS
  - IMU
  - Sensor



LIDAR and Better DEMS

- High resolution DEM
- 3D modeling
- Integrate other data





AGRG past LIDAR Research

- History / Past Experience
- Documented procedures
  - Validation methods
  - Flooding Applications
  - Storm Surge Applications
  - Wetland Applications
  - other

Methodology

- Ground Validation (GPS / Total Station)
- Import Raw Data
- Build Grid / DEM
- Validate data
- Create 3D Models
- Integrate data and create GIS

Deliverables

- Several GIS derived products such as
  - DEM developed using ESRI tools
  - 3D visualizations of the area
  - Flood risk maps for different scenarios
  - Web-accessible GIS products
  - other

Conclusions

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Further Research

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