Storm Surges Congress, Hamburg, Germany
13–17 September 2010
SSC2010-102

Coastal Flooding & Erosion Risk Mapping in Maritime Canada utilizing LiDAR and aerial photography

T. Webster

Applied Geomatics Research Group, Nova Scotia Community College, Middleton, Nova Scotia, Canada B0S 1M0 e-Mail Tim.Webster@nscc.ca

Several coastal areas around Maritime Canada have been surveyed with airborne LiDAR sensors to construct high-resolution digital elevation models (DEMs). These types of sensors use a narrow laser pulse that is able to measure ground elevations to a high precision even under the forest canopy. The coastal bare earth DEMs (ca 1-2 m grids) have been used to generate flood inundation maps of storm surge events and projected sea-level rise by routing water from the ocean landward utilizing a GIS. The Maritimes experiences storm surges on the order of 1-2 m and these new DEMs provide sufficient detail for the generation of accurate flood maps. There have been several studies in the Maritimes utilizing this approach to construct flood risk maps including: Charlottetown, Prince Edward Island; southeast New Brunswick; Annapolis Royal & Antigonish County, Nova Scotia. GIS is used to map the storm surge still water level and route the water over land ensuring connectivity with the ocean to low lying areas inland. In order to determine the risk or probability of a high water event occurring, a time series of water levels obtained from tide gauge records are. In addition to elevation, the LiDAR data have been used to derive surface cover roughness measurements and coastal landcover information for flooding using hydrodynamic models such as Mike21 and TuFLOW. However, for the generation of static flood risk maps for landuse planning purposes, the GIS & Water Modeller approach adequately satisfy the requirements. Natural Resources Canada has recently funded a climate change adaptation project with the Atlantic Provinces (Regional Adaptation Collaboration – RAC). Coastal risk will be mapped for several communities in Nova Scotia utilizing recently acquired LiDAR from an ALTM3100 system. In addition to flooding from storm surge events & sea-level rise projections, coastal erosion is a significant risk to many areas where clay rich unconsolidated glacial sediments form the coastline. Historical air photos are used to map and calculate the rate of change of the coastline, however because they are decadal in time this only provides a general average of the change. The erosion is linked to episodic storm events and the process of earth movement can be episodic and take months to stabilize, making the changes difficult to measure. Ground based LiDAR and Pictometry, which captures tradition vertical multi-angle oblique aerial orthophotos, are being used to map and measure changes more frequently in order to better understand the local and regional processes controlling erosion.