

Results from the first topo-bathymetric lidar surveys of the Chiroptera II sensor reveals near-shore structures to improve geological mapping

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The Applied Geomatics Research Group (AGRG) within the Nova Scotia Community College (NSCC) acquired a new shallow water airborne topo-bathymetric lidar sensor and flew the first missions in September 2014. The survey areas consisted of several embayments along the Northumberland Strait. Many of the areas sheltered bays that host or offer the potential to host shellfish aquaculture farms. The low flow rates associated with the inner bays promote high volumes of sediment cover and bedrock features are rarely exposed. However, the area near Cape John, Nova Scotia, where Carboniferous sandstone of the Cumberland Basin are exposed provides insights into the potential of this sensor to be used to enhance and extend structural information on geological maps. Traditional topographic lidar reveals a smooth terrestrial landscape with limited outcrop as a result of the deposition of glacial till. The bedrock is exposed along cliffs at the coast where limited bedding and structural measurements can be taken. The penetration of the green laser is limited by water clarity, which in this region is influenced by wind-induced waves which can re-suspend fine-grained sediment derived from the glacial till and increase the turbidity of the water. The first attempt to survey Cape John was aborted on September 25 because of high water turbidity levels and poor bathymetric lidar returns. However, after a day of reduced winds the area was surveyed on September 26 with penetration to 6 m water depth. The fact lidar is an active remote sensing system allows surveys to be conducted at night when the winds typical die down and thus further promote settling of the fine sediment and improved water clarity. The results of the survey reveal several previously uncharted features on the seabed including reefs. Other than near-shore areas covered by sand bars, the offshore currents have scoured the exposed bedrock geology on the seabed revealing subtle topographic differences representing the different bedding planes and fault structures. Details of the strike of the beds offshore reveal new details on the folding and faulting in this area and these new data can be used to update the existing geological map, NSDNR Map ME 1990-014.