

# Evaluation of Airborne LiDAR Bathymetry Data for Hydrographic Applications in Haida Gwaii, British Columbia

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Obtaining accurate, high-density bathymetry for hydrographic applications within Canada's nearshore environment is a complex and costly process. As a result, bathymetry in places like Haida Gwaii, a remote archipelago island in Western Canada, consist mainly of surveys pre-dating the 1940s. Due to insufficient modern data, Canada launched a national Oceans Protection Plan to better protect our coasts and waterways.

The Canadian Hydrographic Service (CHS) made a significant investment in utilizing airborne LiDAR bathymetry (ALB) for filling essential gaps in high-resolution coastline and near-shore bathymetry. Although ALB demonstrates excellent efficiency and rapid bathymetric data creation, a successful ALB hydrographic survey must meet the data quality requirements and accuracies defined by CHS and the International Hydrographic Organization. Under traditional processes, validating accuracy, data quality and integration into existing CHS products posed limitations.

This presentation describes CHS's continuous improvement efforts through innovation and best practices for ALB data governance. Through a comprehensive analysis of all components of the 2018 and 2019 Haida Gwaii ALB survey projects, CHS has identified three essential requirements for quality evaluation:

1. Acquired data must subscribe to a national standard
2. Documented uncertainty modelling
3. Data must be reviewed and validated through CHS's quality control (QC) principles:
  - a. data visualization
  - b. consistency
  - c. point density and spacing
  - d. accuracy.

The QC model has demonstrated that it can leverage current CHS data validation workflows augmented with supporting spatial statistical and visual analysis. The resulting data has led to the improvement and modernization of the coastal hydrography in the nearshore of Haida Gwaii. As a result, 173 notices to mariners and 12 chart patches have been actioned to date. In addition, the model development has helped highlight the future needs and improvements required for advancing hydrographic standards and services for CHS as well as contract ALB data assessments.