Seamless Mapping Across The Land-Water Boundary Using SHOALS Bathymetric Lidar

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ABSTRACT

The Optech SHOALS lidar bathymetry solution has proven to be an efficient means of providing depth information ranging from approximately 1.5 meters to 50 meters in clear water. However, the traditional depth extraction algorithm has limitations in very shallow water and/or turbid areas where lidar signals from the water surface and water bottom merge. Such limitations inhibit seamless lidar sounding at the land-water boundary and restrict a much broader application of laser bathymeters in inland environments as well as very shallow coastlines.

In the past, various approaches have been made to recover lidar points within very shallow water regions, but with limited success. Over the past few years however, very promising advances in shallow water algorithms have been made, demonstrating the depth-sounding capability of airborne lidar bathymeters in extremely shallow water as well as a seamless lidar depth solution across the land-water boundary.

To illustrate the unique capability of SHOALS in seamless mapping across complex land-water environments, this paper presents a case study based on data collected around the Gulf of St. Lawrence in Quebec, Canada, where bathymetric lidar measurements were obtained in the wetlands of shallow river channels. A review of SHOALS' bathymetric lidar capabilities in inland water environments is presented. In particular, the challenges of delineating complex land-water boundaries and depth extraction in extremely shallow water are discussed.

In this paper, the accuracy, consistency and robustness of the SHOALS shallow water algorithm (SWA) is also examined by comparing the SWA results with traditionally computed results and ground truths.