Abstract

The Optech SHOALS solution has proven to be an efficient means of providing depth information ranging from approximately 0.5 meters to less than 0.5 meters. However, the traditional depth extraction algorithm has limitations when dealing with very shallow water and/or shallow coastal areas, where big changes in water depth occur. Such traditional algorithms fail to provide accurate bathymetric information in these areas, as well as in extremely shallow water environments.

Historically, several approaches have been attempted towards recovering lidar points within the very shallow water region, but with limited success. However, the past 20 years have witnessed advances in shallow water algorithms. SHOALS have been made, demonstrating the deepening of the water body and updating the number of bathymetric systems in the world. As a result, research on lidar depth measurements in shallow water has received increased interest.

2. Overview of the SHOALS Bathymetric Lidar System

It is a system that uses airborne lidar technology to map the seabed. The SHOALS system has been used in various applications, including mapping the ocean floor and shallow water environments. The system is capable of providing high-resolution bathymetric data in environments ranging from clear to turbid water.

3. Challenges at the Land/Water Boundary

One of the advantages of using airborne lidar bathymetry is its efficiency in acquiring full coverage of the land/water boundary, regardless of the complex environmental conditions encountered. However, there are a few challenges to achieve accurate bathymetric measurements at the land/water boundary. The challenge lies in the definition of the land/water boundary, as it is not clearcut. The land/water boundary is often defined as a band of land/water that is relatively shallow, typically less than 1 meter. The boundary is determined by the intersection of the land and water surfaces, which can be influenced by factors such as tides, currents, and sedimentation.

4. Advances in Shallow Water Depth Extraction and Case Studies

Since 2004, Optech has been making progress improvements to the SWA. One of the key improvements is the ability to accurately measure the distance to the shallow water boundary. The SWA can accurately measure the distance to the shallow water boundary, even in shallow water environments such as rivers and estuaries.

Eric Yang (1), Michael Sitar (1), Wenbo Pan (1), Karen Francis (1)

1. Optech Incorporated, 300 Interchange Way, Vaughan, Ontario, Canada L4K 528

BIOGRAPHY

Eric Yang: is a senior in the field of airborne lidar bathymetry and has been working in the field for over 20 years. He received his PhD in Geomatics from the University of Victoria. He has published several papers on airborne lidar bathymetry and has developed several algorithms for shallow water depth measurement.

Michael Sitar: is a project manager for Optech Incorporated and has been working in the field of airborne lidar bathymetry for over 15 years. He received his BSc in Geomatics from the University of British Columbia. He has published several papers on airborne lidar bathymetry and has developed several algorithms for shallow water depth measurement.

Wenbo Pan: has worked on the development of airborne lidar systems for Optech Incorporated. He has a PhD in Geomatics from the University of British Columbia. He has published several papers on airborne lidar bathymetry and has developed several algorithms for shallow water depth measurement.

Karen Francis: has been involved in software development at Optech Incorporated for over 15 years. She received her BSc in Computer Science from the University of British Columbia. She has published several papers on airborne lidar bathymetry and has developed several algorithms for shallow water depth measurement.

Optech Incorporated

300 Interchange Way, Vaughan, ON, Canada L4K 528

Fax: +1-905-660-0829

www.optech.ca