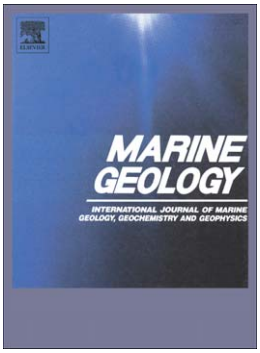

Depth of Closure over Large Regions using Airborne Bathymetric Lidar

Michael Hartman, Andrew B. Kennedy

PII: S0025-3227(16)30091-3
DOI: doi: 10.1016/j.margeo.2016.05.012
Reference: MARGO 5466

To appear in: *Marine Geology*

Received date: 28 August 2015
Revised date: 1 May 2016
Accepted date: 17 May 2016

Please cite this article as: Hartman, Michael, Kennedy, Andrew B., Depth of Closure over Large Regions using Airborne Bathymetric Lidar, *Marine Geology* (2016), doi: 10.1016/j.margeo.2016.05.012

Depth of Closure over Large Regions using Airborne Bathymetric Lidar

Michael Hartman and Andrew B. Kennedy[1]

University of Notre Dame

Keywords: water waves; nearshore processes; sediment transport; depth of closure

Abstract

The depth at which significant bathymetric change can be expected is an important morphological factor for science and engineering on sandy coastlines. Although most depth of closure studies have been conducted on a limited number of sites, the great quantity of airborne lidar bathymetry data collected over the past decade allows for a much wider study region. Here, we present depth of closure analysis over 600 km of sandy coastline using the Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX) dataset. Improved closure predictions resulted when both extreme waves (as represented by the 12 hour exceedance significant wave height over a given time interval), and more typical storm waves (as represented by the 99% significant wave height) were jointly considered. In contrast to some other studies, wave steepness terms were found to be negligible. Consideration of error terms in least-squares closure predictions was used to develop relations with different degrees of conservatism: e.g. to provide closure depth exceeded by only 10% of observations. Results are presented for four closure criteria: root-mean-square depth changes $\Delta h_{close} = [20, 30]$cm, and relative depth changes $\Delta h_{close} / h = [0.02, 0.04]$. Further improvements in accuracy may occur once decadal wave hindcasts include storm surge variations in water levels, and have increased nearshore resolution.

[1] Corresponding author: email: Andrew.kennedy@nd.edu