

Using LiDAR derivatives to estimate sediment grain size on beaches in False Bay

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Abstract

The coastal zone is a dynamic environment that is regulated and influenced by natural ocean processes and anthropogenic phenomena. Beaches are important elements within the coastal zone and are highly valued for the ecosystem services that they provide, such as buffering against wave erosion and their recreational value. Characteristics of beaches, such as slope and grain size, need to be monitored for protection and management purposes. These continuously changing variables can indicate vulnerability to erosion, for example. South Africa's False Bay includes a number of beaches that vary in terms of such vulnerability. Active remote sensing technologies are increasingly used as monitoring tools that allow for precise measurements of the status and changes in coastal environments. These technologies include LiDAR systems which have the capacity to record intensities which relate to surface characteristics. The aim of this study is to establish whether LiDAR derived intensity and slope of beaches can be correlated with, or serve as proxies for, sediment grain size. There are two supporting objectives. The first is to analyse airborne LiDAR data of False Bay to derive information on key physical characteristics of selected beaches and to relate these to the sand grain size of these beaches. The second objective is to conduct controlled laboratory-based analysis of sediment samples using a terrestrial LiDAR scanner, and to establish the correlations between different categories of grain size and measured LiDAR intensities.