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THESIS/DISSERTATION INFORMATION

Author (last name, first name): Del Angel, Diana

Title: DUNE-BEACH MORPHODYNAMIC INTERACTION ALONG A SEMI-ARID, WAVE-DOMINATED BARRIER ISLAND: SOUTH PADRE ISLAND, TEXAS

Keywords (please provide at least three keywords that identify the topic of your work): Beach and Dune Morphology Coastal Lidar South Texas Sediment Transport

Abstract: Beach and dune volume changes, a sediment transport model, and a morphometric model were used to investigate dune development and to understand the influence of beach and dune morphology on dune accretion rates on South Padre Island, Texas. Dune volumes were calculated using lidar-derived digital elevation models for the years 2000, 2005, and 2009. Dune volume between the years 2000 and 2005 increased throughout the study area, averaging 3.5 m^3/m/yr, although there was large alongshore variability (-13.6 m^3/m/yr to 30 m^3/m/yr). Minimal dune erosion occurred from 2000-2005, making the 2000-2005 dune volume changes a good estimate of the long-term aeolian accretion rates. In contrast, dune volume changes from 2005-2009 are not a good estimate of long-term accretion rates because most areas experienced storm surge erosion averaging -8.3 m^3/m/yr. The dune accretion average from 2000-2005 is in good agreement with the results of the sediment transport model that coupled a locally measured wind velocity time series and a semi-empirical aeolian transport relationship. The morphometric model shows that dune accretion rates are influenced by the present dune morphology and beach width. From calculation of profile volume and estimates of dune accretion rate by dune type (washover terrace, dune terrace and dune ridge) it was determined that a washover terrace would require 43 years to develop into a foredune ridge, if the space, vegetation and sediment supply are available. Due to the shoreline retreat rate and hurricane frequency, overwash will continue to be a recurrent process shaping South Padre Island.

Description (optional, enter any other description or comments here):