

# Handbook of Beach and Shoreface Morphodynamics

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## MORPHODYNAMIC CLASSIFICATION OF BEACHES ON THE ATLANTIC COAST OF FLORIDA: GEOGRAPHICAL VARIABILITY OF BEACH TYPES, BEACH SAFETY AND COASTAL HAZARDS

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### ABSTRACT

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Studies of coastal morphodynamics increasingly focus on quantification of relationships between processes, form, and function of dynamic beach systems because wave climates and beach sediments interact to collectively produce distinctive types of beaches. This classifies beach types in terms of beach morphology, field investigations and interpretation of aerial photography and bathymetric data. Regionalization of coastal morphodynamic patterns in turn facilitates compartmentalization of hazard zones (risks to coastal infrastructure associated with extreme meteorological events such as northeasters, tropical storms, and hurricanes) and beach safety to swimmers. The approach adopted here classifies morphological and geographical variability of beach types and indicates coastal hazards designations. Results indicate that the  $\Omega$  parameter is strongly influenced by cross-shore selective sorting of bimodal sediments. General beach morphology is approximated by the  $\Omega$  parameter but hardgrounds and coastal structures induce variability to beach morphology that is not detected by the  $\Omega$  calculations. The east Florida coast is divided into five morphological compartments and 24 sub-segments with distinct hazard levels. The higher hazard level, in reference to coastal flooding due to storm impact, was the dune-less dissipative beaches of the Daytona coastal segment. The least hazardous beaches were underdeveloped, intermediate beaches of the Cape Canaveral and Sebastian Inlet State park area.

**ADDITIONAL INDEX WORDS:** Beach, coastal sediments, coastal hazards, hurricane, northeaster, beach erosion, classification.

### INTRODUCTION

Although many well-known beaches occur along the Atlantic coast of Florida (e.g., Cape Canaveral, Daytona Beach, Palm Beach, Fort Lauderdale Beach, and Miami Beach), they remain unclassified except for generalized coastal energy-level descriptions by TANNER (1960). This paper classifies beach types in terms of beach morphology, based on WRIGHT and SHORT (1984), and describes morphological and morphodynamic trends along the Florida east coast. Regionalization of coastal morphodynamic patterns in turn is seen as a means to facilitate 'compartmentalization' of hazard zones (risks associated with extreme meteorological events) and beach safety levels. The approach adopted here is thus two pronged, to classify morphological and geographical variability of beach types and to indicate overarching coastal hazards designations.

#### Morphodynamic Framework: Application of the Omega ( $\Omega$ ) Concept

The morphodynamic classification of beaches is based on the application of a dimensionless fall velocity parameter, referred to by the Greek letter omega ( $\Omega$ ), that is related to wave climate and specific gravity of sand grain sizes. The systemization of beach types has been widely applied in Australia to define a three-dimensional beach model (e.g., SHORT, 1999) and is here adapted to conditions along the Florida east coast. Essential relationships upon which the system is based are given in Eq. 1.

where  $H_b$  is the wave breaker height,  $T$  is the wave period and  $\Omega$  is the sediment fall velocity.

Application of Eq. 1 results in a classification scheme that defines a range of discrete beach morphologies that are produced by definitive processes where reflective beaches ( $\Omega=1$ ) (comprised by medium- to coarse-grained sands) are associated with surging breakers, low wave heights, constant wave reflection, no bars, steep beach profiles, and low sediment transport mostly as bed-load. Intermediate beaches ( $1 < \Omega < 6$ ) (containing fine- to medium-grained sand) are characterized by medium wave height and period, plunging to spilling breakers, one or two bars, cellular circulation with rip currents, rhythmic shoreline features (e.g. beach cusps), high degree of shoreline mobility, and moderate rates of backshore transgression. Intermediate beaches are subdivided into four distinct types: (1) longshore bar-trough; (2) rhythmic bar and beach (crescentic bars); (3) transverse bar and beach; (4) ridge and runnel or low tide terrace. Dissipative beaches ( $\Omega > 6$ ) (containing fine-grained sediments) feature relatively large waves, low reflectivity of waves, multiple low-relief bars, flat topography of the berm - beachface, and multiple spilling breakers. Dissipative beaches tend to lack rhythmic shoreline morphologic features and the beach is usually flat and compacted.

$$\Omega = H_b T W_s \quad (1)$$

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Description. A highly readable book on the nature of beaches, including the dynamics of the shoreface, surf, swash and backbeach, and globally at the regional. Article in Aquatic Conservation Marine and Freshwater Ecosystems 10(5) DOI: //10.1002/CO.2-F. Coastal Morphodynamic Instabilities. Handbook of Beach and Shoreface Morphodynamics [Andrew D. Short] on cassiewerber.com \*FREE\* shipping on qualifying offers. A highly readable book on the. A highly readable book on the nature of beaches, including the dynamics of the shoreface, surf, swash and backbeach, and globally at the regional variations in. Handbook of Beach and Shoreface Morphodynamics. Short, A.D., (ed.), Chichester: Wiley, p. ISBN [US\$ ]. Available in the National Library of Australia collection. Format: Book; xii, p.: ill. ; 26 cm. Handbook of beach and shoreface morphodynamics / edited by Andrew D. Short Coast changes Beaches. Physical Description: xii, p.: ill., maps ; 26 cm. Get this from a library! Handbook of beach and shoreface morphodynamics. [ Andrew D Short;]. Book Review: Handbook of beach and shoreface morphodynamics. Show all authors. Heather A. Viles Heather A. Viles. University of Oxford See all articles by. Beaches (A. Short). Global Variation in Beach Systems (A. Short). BEACH MORPHODYNAMICS. The Shoreface (P. Cowell, et al.). The Surf Zone (T. Aagaard. Handbook of Beach and Shoreface Morphodynamics (Andrew D. Short) at cassiewerber.com This book describes in detail all aspects of wave and beach. The aim of this study is to present a new morphodynamic map (, scale) of a wave- Short (Ed.), Handbook of beach and shoreface dynamics. (pp. Andrew D. Short is the author of Handbook of Beach and Shoreface Morphodynamics ( avg rating, 1 rating, 0 reviews, published ), Brazilian Beach S. phology and morphodynamics of a number of coastal . Coasts; figures , , from Handbook of. Beach and Shoreface Morphodynamics; figures Author: Short, A.D.; Year: ; Summary: This report is on the public open space provisions of the Proposed District Plan. The Invercargill City district provides a.

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