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"COASTLINE SHAPES RESPOND TO CHANGING STORMS: MORPHODYNAMICS, COUPLED WITH HUMAN DYNAMICS"

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Monday, February 8, 2016
3:30 PM
Conference Center, Innovation Research Park Building II
4211 Monarch Way, Norfolk, VA 23508

Abstract

As the statistics of storms (tropical and extra-tropical) shift with global warming, the wave climates affecting coastlines will shift. In response, we can expect coastline shapes to change—with associated intensification and changing locations of large-scale shoreline erosion zones. Observations from the cuspate capes of the Carolina coastline, USA, where a shift in wave statistics has been documented, provide a test of this prediction. Along undeveloped cape shorelines, the difference between historic and recent shoreline change patterns conforms to model predictions. However, on the developed Cape Fear, long-term shoreline stabilization (through beach nourishment) precludes the predicted changes in coastline shape. In this location, model experiments coupled with observations of cumulative beach-nourishment sand volumes indicates that the response to climate change exists within the human component of the coupled human/natural system.

Because shoreline stabilization decisions, made in response to coastline changes, affect large-scale coastline change, the present and future evolution of developed coastlines results from coupled physical and human dynamics. Coupling economic and coastline-evolution models leads to the conclusion that patterns of coastline change and alongshore distributions of property values are co-dependent. Analyzing the holistic results of different coastal management decisions made by different stakeholders along a common coastline requires taking human/coastline coupling, as well as wave-climate-change scenarios, into account. A stakeholder-initiated study of coupled dynamics on the Virginia coastline, USA, provides an example.

Biography

Dr. Brad Murray is a geomorphologist with expertise in modeling landscape evolution, focusing largely in recent years on understanding how the map-view shapes of coastlines develop, and predicting how these shapes might respond to changing climate and human forcing (i.e., how patterns of shoreline erosion and possibly accretion will vary under different storm-climate and shoreline-stabilization scenarios). He earned B.A., M.S., and Ph.D. degrees from the University of Minnesota, Twin Cities. He is currently with the Division of Earth and Ocean Sciences in the Nicholas School of the Environment at Duke University.

Reception before seminar at 3:00 PM