

Researchers Recognize 'Lower-Energy' Varieties Of Coastal Islands

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A different style of coastal barrier islands that forms under lower-energy conditions than classic ocean-facing barriers, such as North Carolina's Outer Banks, has been identified by coastal geological researchers at Duke University and the University of Ulster in Northern Ireland. The new style of islands is typically found in protected bays and lagoons.

"This is a major and important recognition," said Orrin Pilkey, a geology professor emeritus at Duke's Nicholas School of the Environment and Earth Sciences, who directs the university's Program for the Study of Developed Shorelines. "It's a type of island quite different from the standard barrier islands on the open ocean."

"There are some people who would argue that these aren't barrier islands," Pilkey said. But Pilkey, University of Ulster geology professor J. Andrew Cooper and Duke undergraduate David Lewis believe they can identify more than 20,000 uniquely "fetch-limited barrier islands" existing globally along the coastlines of every continent except Antarctica.

Lewis, a senior in Duke's earth and ocean sciences undergraduate program who has been researching fetch-limited barrier islands for two years, will describe the group's findings on Thursday, March 17, 2005, at the annual meeting of the Geological Society of America's Southeastern Section, to be held at the Grand Casino Resort's Bayview Hotel in Biloxi, Miss. The research was supported by the University of Ulster.

Lewis said these islands are called "fetch-limited" because he has found none that encounter wave-producing wind fields -- the geophysical definition of "fetch" -- any longer than 300 kilometers.

Classic barrier islands are built and sustained by fetches longer than 300 kilometers that deliver wave energy from the open ocean. Studies have shown this wave power delivers nourishing supplies of sand sufficient to

renew such islands following the severest of coastal storms.

Fetch-limited barrier islands are like the ocean-facing variety in being located along coastlines, separated from the mainland, said Lewis and Pilkey. But they are different in their wind- and wave-shielded settings.

Unlike barrier islands, numbers of fetch-limited islands are located within bays such as Maryland and Virginia's Chesapeake. Others occupy lagoons such as Mexico's Laguna Madre. And some are protected by coral reefs such as those behind Australia's Great Barrier Reef.

Fetch-limited barriers also tend to be smaller than ocean-fronting barriers, the Duke researchers added. The average length of short-fetch islands is only about 1 kilometer, as demonstrated by 105 examples along Delaware Bay. By contrast, North Carolina ocean front barriers have average lengths of 21 kilometers, while those in Texas average 54 kilometers.

Deprived of the presence of significant surf zones, fetch-limited barrier islands seem to depend uniquely upon periodic storm overwash or spring high tide events to provide fresh sand supplies needed to sustain them. "There is definitely a gradation of these islands, based on their wave energy," Lewis said. "The higher the wave energy, probably the bigger and longer the island."

Another difference in fetch-limited barriers is their relative greenness. Surf action is weak enough to allow even wave sensitive mangroves and salt marshes to grow on these islands' most exposed front sides, Lewis added.

Pilkey said that Lewis did the bulk of the work identifying and classifying these special islands, using extensive satellite surveys and also accompanying Pilkey and Cooper on on-site investigations as far away as Australia and Turkey.

Researchers in Pilkey's program have spent decades documenting that the major obstacle to the maintenance of classic ocean barrier islands is human beachfront development. Their research shows that development brings obstacles such as seawalls that can interfere with natural processes.

Many fetch-limited barrier islands have escaped human development

because they are too small and low or lack the attraction of an ocean view, the Duke researchers said. But development that does exist shares similarities to that on oceanfront barriers.

"Seawalls are really common on Chesapeake Bay," Lewis said. "On the New Jersey side of Delaware Bay, almost every house has a seawall in front of it."

For further information, please access: <http://www.dukenews.duke.edu/>

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General George S. Patton, Jr.