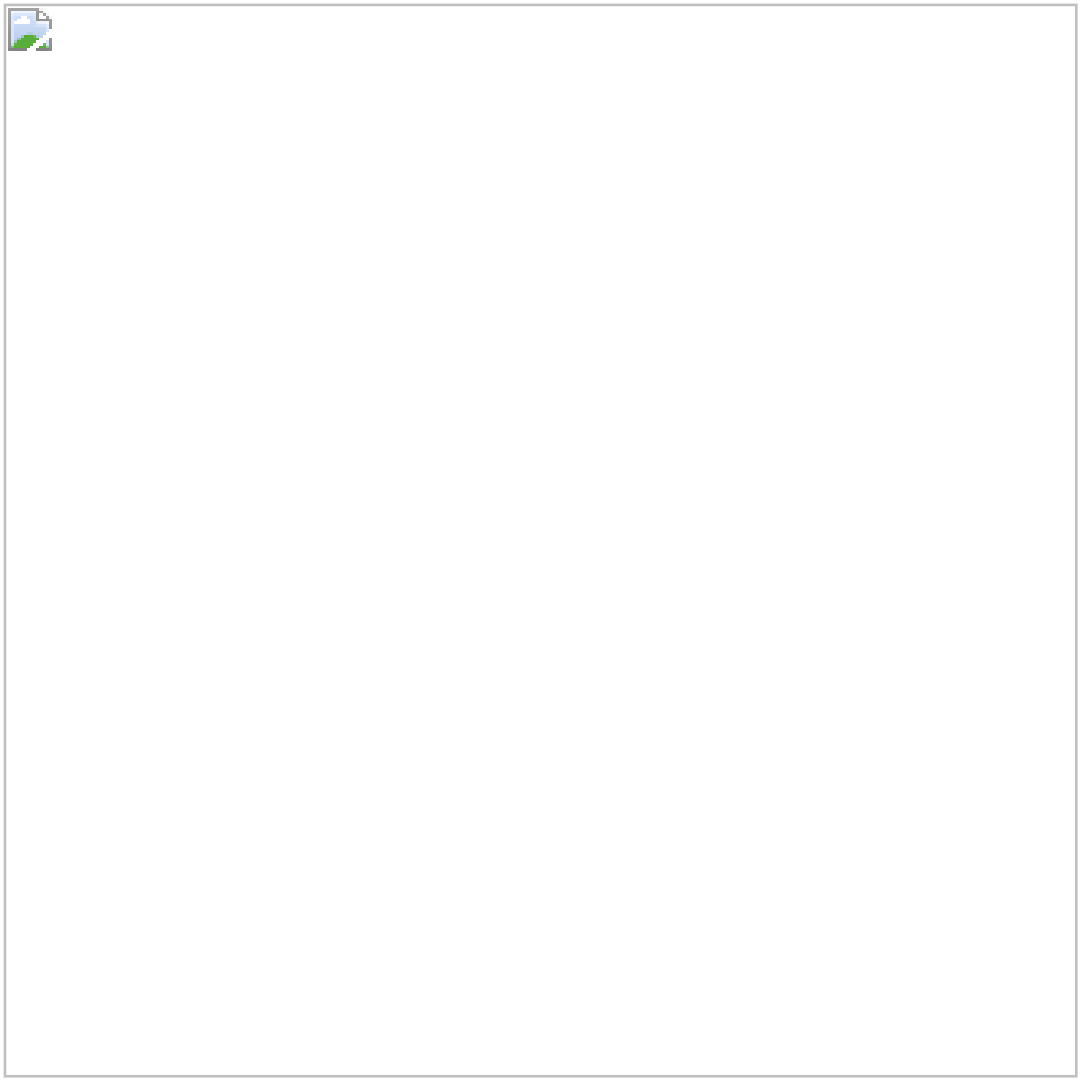

Discussion of “Global Distribution and Geomorphology of Fetch-Limited Barrier Islands” by O.H. Pilkey, J.A.G. Cooper, and D.A. Lewis (Journal of Coastal Research, 25[4], 819–837, 2009): Response to Discussion by E.G. Otvos (2010)

Authors: Cooper, J. Andrew G., Pilkey, Orrin H., and Lewis, David A.

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REPLY

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Discussion of "Global Distribution and Geomorphology of Fetch-Limited Barrier Islands" by O.H. Pilkey, J.A.G. Cooper, and D.A. Lewis (Journal of Coastal Research, 25[4], 819–837, 2009): Response to Discussion by E.G. Otvos (2010)

J. Andrew G. Cooper[†], Orrin H. Pilkey[‡], and David A. Lewis[‡]

[†]School of Environmental Sciences
University of Ulster
Coleraine, Northern Ireland, UK BT52 1SA

[‡]Nicholas School of the Environment
Duke University Box 90228
Durham, NC 27708, U.S.A.

Otvos (2010) expresses some reservations regarding the terminology applied in our recent paper (Pilkey, Cooper, and Lewis, 2009) in which we identify fetch-limited barrier islands (FLBIs) as a previously unrecognized coastal landform, describe their global distribution, and present a geomorphic classification. In our paper, we identified the occurrence of 15,000 islands that occur in fetch-limited environments worldwide and subdivided them into several types (Pilkey, Cooper, and Lewis, 2009, Tables 2 and 5), recognizing a variety of mechanisms of formation and evolution and thereby providing a useful basis for their future study. Globally, there are many types of open-ocean barrier islands (Pilkey, 2003; Stutz and Pilkey, in press), just as there are many types of fetch-limited barrier islands (Cooper, Pilkey, and Lewis, 2007a, 2007b; Lewis, Cooper, and Pilkey, 2005; Pilkey, Cooper, and Lewis, 2009).

Otvos (2010) contends that some of the types of FLBIs we describe are not barrier islands. For all of these settings of fetch-limited barrier islands to which he objects in his opening paragraph (mangrove, tundra, glacial sandur, and fjord-head), examples have previously been described of open-ocean equivalents that establish such landforms as barrier islands according to the widely accepted Oertel (1985) definition. Otvos perhaps has a rather narrow view of the range of barrier island morphologies globally because his studies are largely restricted to the Gulf of Mexico. Otvos overlooks our findings and extensive literature that reveal that just as fetch-limited barrier islands occur in a wide range of settings, so too do open-ocean barrier islands. For example, the Sandur Islands of SE Iceland (Nummedal, Hine, and Boothroyd, 1987) are analogous to our fjord-head fetch-limited islands; the thermokarst islands facing the Arctic Ocean on the North Slope of Alaska (Short, 1979) are analogous to the fetch-limited thermokarst islands that we identify; the mangrove swamp–surrounded islands of Colombia (Martinez *et al.*, 1994) are analogous to similar islands we identify among mangroves in fetch-limited conditions. The margins of some fetch-limited islands are inundated only at high tide, but so too are some open-ocean barriers in macrotidal settings, such as along the coast of Australia's northwest coast (Stutz and Pilkey, 2011).

Many fetch-limited barrier islands—such as those we identified in Laguna Madre, Mexico, and Maputo Bay, Mozambique—are virtually indistinguishable from ocean barriers in terms of their morphology. In fact, we place more than half of all FLBIs in the world in the category of "classic barrier islands." One reason for the similarity between fetch-limited and open-ocean islands is the lack of a clear line for determining limited fetch. For example, the islands of West Turkey, which we considered fetch-limited, and even some inlet islands along the Atlantic Coast of the United States could be considered open ocean because their fetch is similar to that of islands in open-ocean settings in the Arctic and elsewhere. In a detailed analysis of Tapora Bank, New Zealand, one of the inlet-associated FLBIs identified in our paper, Smith, Heap, and Nichol (2010) pointed to the complementary role of open-ocean swell and local waves on the evolution of this FLBI.

Otvos contends that the protection or "barrier" function is completely absent from these landforms. This is simply not true. Most fetch-limited islands act as barriers of some kind but on a smaller scale than the open-ocean barriers. Some (*e.g.,* Cedar Island, North Carolina) act as a barrier that protects miles of salt marsh behind it from wave action (of Pamlico Sound). Others (*e.g.,* in Laguna Madre, Mexico) act as a barrier for the lagoon shoreline of open-ocean barriers; more than 500 such islands exist globally. In some settings, there is even a multilevel hierarchy of barriers behind barriers behind barriers, each protecting the larger scale of barrier from wave action of the enclosed water body and enclosing progressively smaller

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water bodies. Just because the water body is not an ocean does not mean that the island lacks the barrier function endemic to all barrier islands, whether open ocean or fetch limited.

All the forms we cited are true islands (*i.e.,* fully surrounded by water at some stage of the tide), and the mechanisms by which they evolve are identical to the mechanisms shaping open-ocean islands. The primary differences between open-ocean and fetch-limited barrier islands are the magnitude and frequency of the geomorphic and oceanographic processes such as waves, tides, wind, and ice. Storms are generally more important and longshore transport is less important in fetch-limited settings, and the role of vegetation is enhanced compared to open-ocean islands.

Although barrier islands develop in a range of fetch conditions, the term "fetch-limited" readily distinguishes the barrier islands we describe from those facing the open ocean. Otvos (2010) appears to accept the use of fetch-limited for classic FLBIs but finds its application to other types "objectionable." We fail to comprehend why it is an acceptable descriptor for some but not all types of barrier islands in fetch-limited settings.

Our subdivisions will provide a useful basis for future study of these islands, which are rapidly becoming important islands for development and are especially susceptible to climate change–induced sea-level rise and storm surge. We present our classification as a basis for further study of this little-known and essentially unacknowledged type of landform. Many of the types of barrier islands, let alone individual islands, had not previously been identified as such. We expect that this framework will provide the basis for further studies of the evolution of these poorly studied landforms. Otvos (2010) does not suggest an alternative terminology for the 15,000 islands that do not conform to the "classic" model. To dismiss these because of the semantics of terminology is throwing out the baby with the bathwater. Our classification divides distinctive types of islands in fetch-limited settings. That they differ from classic islands in various respects is the reason for their subdivision.

In conclusion, it appears that Otvos' criticisms are based on a parochial view of barrier islands. Barrier islands, both in the open ocean and the fetch-limited environments we have described, are highly variable in morphology and behavior, and it is clear that there is no single behavioral or genetic model that encompasses their geologic evolution. In the case of FLBIs, scientific investigation to date has been extremely limited. The increasing development pressure on such islands imparts some urgency in developing a better understanding of the behavior and importance of these islands.

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