

United States Geological Survey
Branch of Atlantic Marine Geology
San Juan, Puerto Rico

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Cruise Report

R/V Boriken
2 cruises: May-June, 1988

CRUISE 1:

May 21-25
Dates: 16 May - 29 May 1988

Location: Puerto Real, off Villa Esperanza, south coast of Vieques, Puerto Rico

Objective: locate offshore sand supply that might possibly be suitable for nourishing the eroding beach along Villa Esperanza shoreline. This study is part of the coastal erosion study of Puerto Rico presently in its beginning stages.

Sampling gear:

- Seismic: Uniboom
- Grab sampling: Shipek
- Vibracore rig (not used because of foul weather)

Personel:

<u>Name</u>	<u>Title/Expertise</u>	<u>Affiliation</u>
David Bush	Chief Scientist	USGS-San Juan
Juan Trias	Geologist/sedimentology	USGS-San Juan
Rodney Friddy	Student	Duke Univ.
Rob Thieler	Student	Duke Univ.
Maritza Barreto	Student	Univ. Puerto Rico
Nalini Torres	Student	Univ. Puerto Rico
David Nichols	Electronic Technician	USGS-Woods Hole
Thorton Tyson	ET Assistant	USGS-Woods Hole
Eladio Rodriguez	Ship Pilot/Diver	Consultant
Wally Matos	Ship crew/Diver	Consultant
Gerardo Cabrera	Ship crew/Diver	Consultant

Operations Log:

16 and 17 May: all personnel meet in San Juan, assemble equipment and prepare for departure to Vieques.

18 May: Mobilize to Vieques via U.S. Navy Ferry from Roosevelt Roads Naval Station. Research Vessel already on location.

19 and 20 May: spent searching for navigation control locations

plus fixing air conditioner on boat plus general rigging up of equipment.

- 21 May: morning to early afternoon taken up by press conference and demonstration of techniques to the mayor of Vieques, Secretary of the Department of Natural Resources and other local dignitaries. Seismic survey begun in afternoon, lines 1 - 13 shot, all inside the bay.
- 22 May: Based on 21 May seismic data we switched emphasis from inside the bay to outside. Thus, to avoid line-of-sight problems, Mini-ranger stations had to be moved. Beach profiling and surveying for coastal erosion study begun.
- 23 May: Seismic lines 14 - 19 shot. Data deteriorating due to bad weather. Electronic equipment also taking a beating in small boat due to southeasterly swell and increasing seas. First grab samples (Shipek) taken. Weather too rough to even grab sample outside the bay from the Boriken. Beach profiling and surveying continued.
- 24 May: Seismic lines 20 -21 shot. Bad weather again. Beach surveying completed.
- 25 May: Seismic lines 22 -27 shot. Bad weather knocked us out again. Decision made to return to San Juan, not try to wait out weather in Vieques and get geared up for Cruise to Boqueron.
- 26 May: Pack up gear and return to San Juan.
- 27 - 29 May: Spent in the office in San Juan changing equipment and gearing up for cruise to Boqueron.

Findings and Summary:

We went to Vieques to search the near offshore area for a suitable sand supply to be used to replenish the eroding beach of Villa Esperanza. Some of this data will be used for Maritza Barreto's master's thesis. The hard-earned seismic coverage was of sufficient quality and quantity to identify sand deposits and to infer their composition. Just outside (to the south) of Puerto Real, about even with the two small islands, Cayo de Tierra and Cayo Afuera, there is a shore-parallel feature whose seismic signature suggests rock. This is most likely a reef, probably a flourishing reef. The feature is at about 10 meters water depth. Seaward of that feature is a wedge of sand, lapping landward onto the previously inferred reef. The sand wedge extends seaward about 200 or so meters and terminates behind another shore-parallel feature at about 20 meters of water depth. This feature is also inferred to be a reef. Diver observations were not made because of weather conditions. Seaward of this second shore-parallel feature is another wedge of sand that

extends for a few hundred meters until it terminates just landward of what is inferred to be a drowned, Pleistocene (?) reef at the present shelf edge.

In addition to these sand deposits, there are numerous Pleistocene (?) channels on the shelf, inside the islands, that are filled with sediment. These also are potential sources of sand for beach replenishment.

Unfortunately, the weather was at all times too rough for vibracoring. Even a larger vessel, such as the DNR's Jean A, would not have helped in this regard. Thus, it will be necessary to return to Vieques to obtain a few vibracores and a handful of grab samples outside of the bay. With good weather, all the samples could be obtained in just two days of field work. It is critical for beach replenishment that the mud content of the sand not exceed a value of more or less 2 percent, thus the composition and texture of the sediment needs to be known in some detail.

A larger vessel would have allowed us to obtain more seismic and more grab samples. More seismic is not really necessary, but more grab samples could, perhaps, take the place of vibracores. As mentioned, a larger vessel would not have helped with the vibracoring. More serious than sampling limitations of the small vessel were the logistical problems caused by not having a large-enough vessel for equipment storage and for housing and feeding the crew.

SAMPLE INVENTORY:

- Seismic: 27 Uniboom lines
- Grab samples: 5 beach samples
12 Shipek samples
- several beach profiles and observations