

# Multibeam Sonar Mapping of Coral Reefs off the Coast of Vieques, Puerto Rico

Caroline Broderick, Justin Sparta, and Leslie "Doc" Sautter

Department of Geology and Environmental Geosciences, College of Charleston



NOAA Ship NANCY FOSTER

## Abstract

Vieques, Puerto Rico is an island in the Caribbean where The NOAA Ship *Nancy Foster* collected data from April 28 to May 6, 2007 off the north and south coasts. The purpose of this project was to better understand the coral reefs and the biota of the local marine ecosystem. Water depths range between 10 and 55 m and were mapped using a Multibeam sonar SIMRAD EM1002 acquisition system. Bathymetric data were processed using Caris HIPS 6.1 software. Previous studies of the area by NOAA have included collection of core samples, seawater samples, and pore water samples to study the benthic habitat around Vieques. The area mapped consists of hard bottom, coral reef habitats, and seamounts.

## Background:

- Vieques is located at 18°N and 65°W.
- NOAA, NOS, NCCOS, CCMA, and Biogeography Branch collaborated to conduct an ecological characterization of the marine ecosystem around Vieques
- This move was to support effective management and conservation of marine resources there.
- Data were collected from the reefs and hardbottom, to find the distribution of fish, corals, and benthic invertebrates..
- This study is important because it is vital for the future of managing Vieques' valuable marine resources.

National Oceanic and Atmospheric Association (NOAA)/National Ocean Service (NOS)/National Centers for Coastal Ocean Science (NCCOS)/Center for Coastal Monitoring and Assessment (CCMA)/Biogeography Branch  
 Hairston-Porter, Robert, Multibeam Sonar Mapping Offshore of Vieques Island, Puerto Rico, 2007  
[www.viequeshouse.com/vieques\\_pages/geology.html](http://www.viequeshouse.com/vieques_pages/geology.html)  
[www.golden-heron.com/coral.html](http://www.golden-heron.com/coral.html)  
<http://ccmaserver.nos.noaa.gov/ecosystems/coralreef/vieques.html>  
 Multibeam Data Collected by Chris Taylor of NOAA  
 Bauer, L.J, C. Menza, K.A. Foley, and M.S. Kendall, 2008. An Ecological Characterization of the Marine Resources of Vieques, Puerto Rico. Part:1 Historical Data Synthesis, Prepared by NCCOS with cooperation of the Office of Response and Restoration, and NOAA

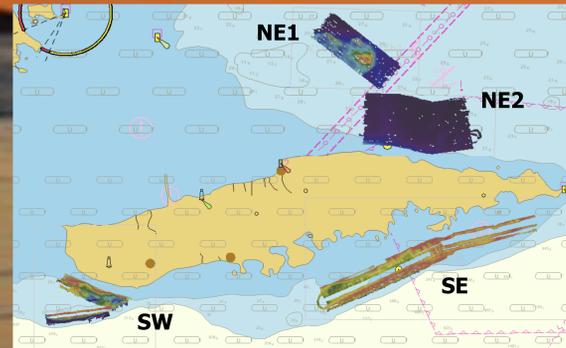


Figure 1. Location of the mapped areas off the coast of Vieques.

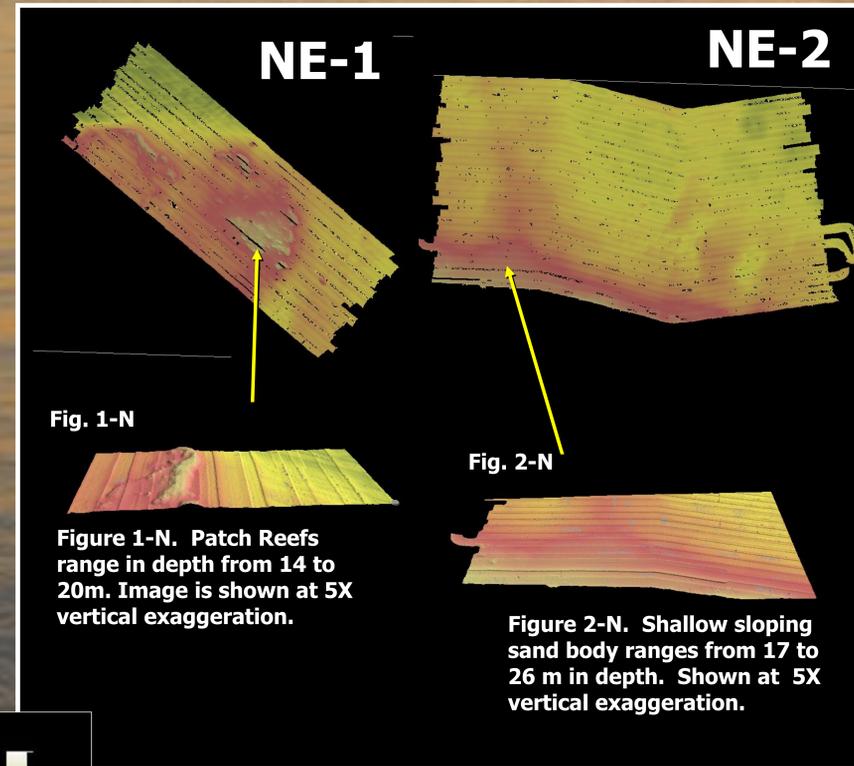
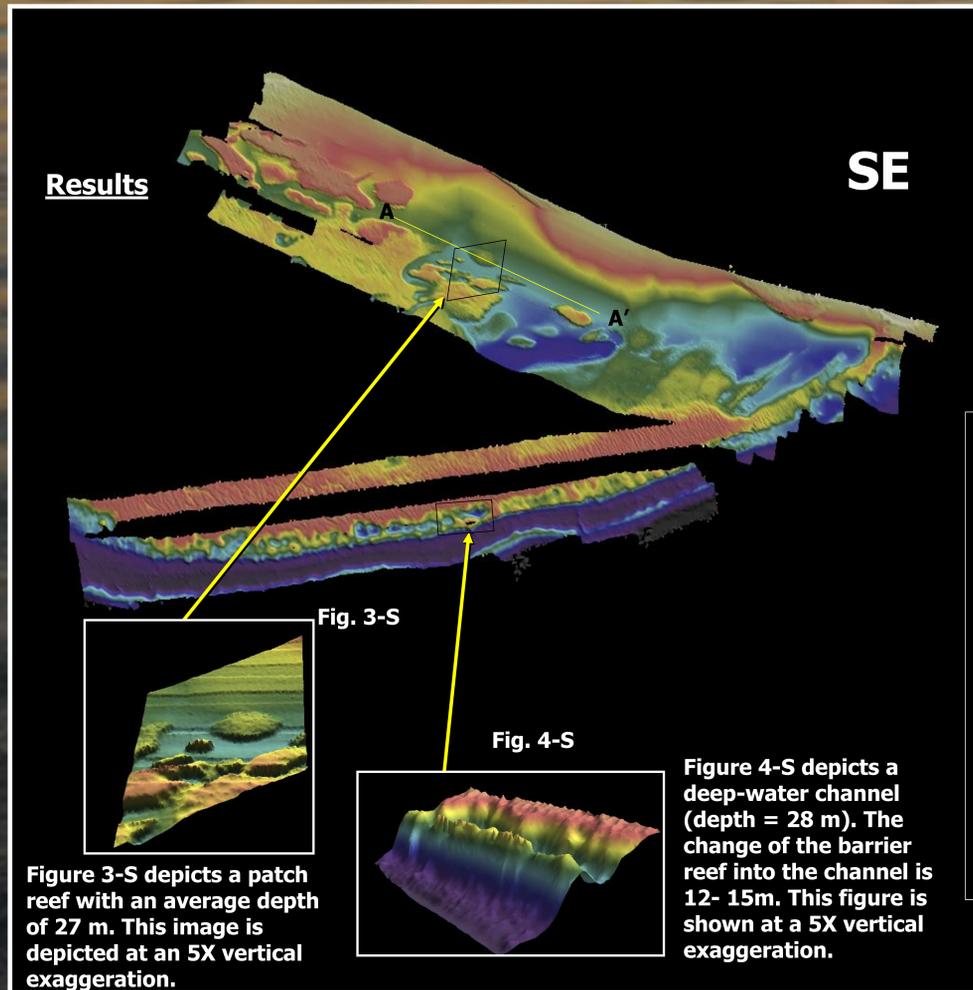


Fig. 1-N

Figure 1-N. Patch Reefs range in depth from 14 to 20m. Image is shown at 5X vertical exaggeration.

Fig. 2-N

Figure 2-N. Shallow sloping sand body ranges from 17 to 26 m in depth. Shown at 5X vertical exaggeration.



## Results

SE

Fig. 3-S

Figure 3-S depicts a patch reef with an average depth of 27 m. This image is depicted at an 5X vertical exaggeration.

Fig. 4-S

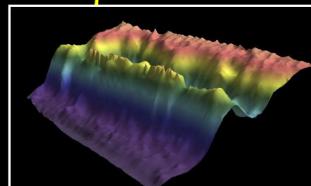


Figure 4-S depicts a deep-water channel (depth = 28 m). The change of the barrier reef into the channel is 12- 15m. This figure is shown at a 5X vertical exaggeration.

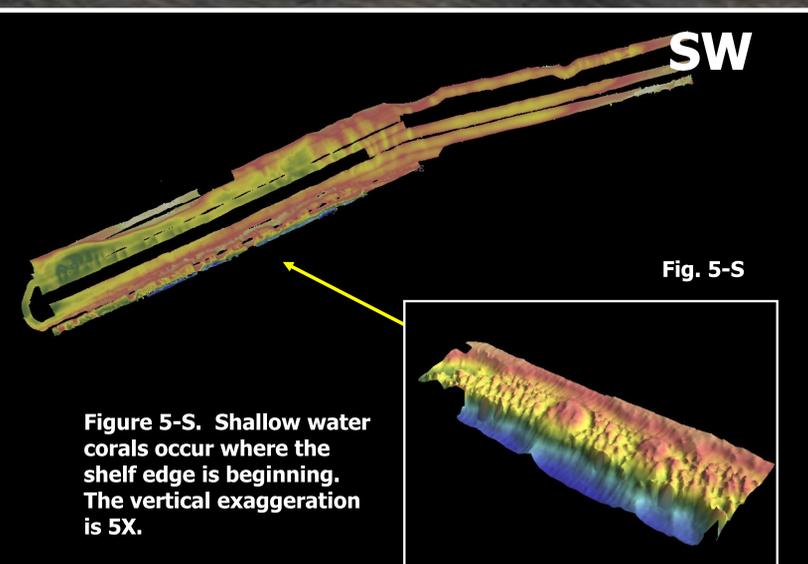
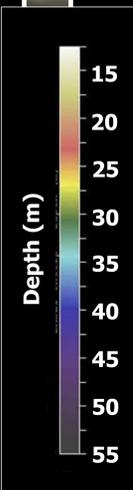


Fig. 5-S

Figure 5-S. Shallow water corals occur where the shelf edge is beginning. The vertical exaggeration is 5X.

## Methods

- Data collected aboard the NOAA Ship *Nancy Foster* from April 28 to May 6, 2007 led by Dr. Chris Taylor (NOAA)
- Multibeam data acquired using SIMRAD EM1002
- Four areas surveyed: NE1, NE2, SE, SW
- Data processed using Caris HIPS 6.1

## Results

- The areas off the island of Vieques consist of Patch Reefs, Barrier Reefs, and Hardbottom. The South end mapped areas consist of Large Migrating Barrier Reefs, and the North end profiles consist of Small Patch Reefs.
- Water depths off the coast of Vieques range from 10m to 55m on the profiles taken off the Southern end of the Island, and water depths range from 17m to 28m for the Northern end profiles.
- The profiles generated provide the bathymetry of coral reefs, hardbottom, and unexposed ridge.

## Discussion

- Vieques, Puerto Rico is part of an exposed ridge of an underwater volcanic mountain chain that extends from Cuba to Grenada.
- Off the coast of Vieques is a perfect location for coral, with the criteria for coral to flourish in clear water where water temperatures are above 70° F, and at depths not ranging greater than 75m.
- The most common species of corals found off Vieques are *Montastrea annularis*, *M. cavernosa*, *Siderastrea labyrinthiformis*, *P. asteroides*, *Millepora sp.*, and *Acropora palmata* (Bauer, Menza, Foley, and Kendall 2008).



Abandon Ship Drill!!  
(a.k.a. Doin' the Gumby)



### **Abstract**

**Multibeam Sonar Mapping of Coral Reefs off the Coast of Vieques, Puerto Rico**

**Caroline Broderick, Justin Sparta, and Leslie "Doc" Sautter**

**Department of Geology and Environmental Geosciences, College of Charleston**

**Vieques, Puerto Rico is an island in the Caribbean where The NOAA ship *Nancy Foster* collected data from April 28 to May 6, 2007 off the north and south coasts. The purpose of this project was to better understand the coral reefs and the biota of the local marine ecosystem. The water depths of the data collected range between 10 and 55 m found using sonar acquisition system, SIMRAD EM1002 multibeam software and the data were processed using Caris HIPS 6.1. Previous studies of the area by NOAA have included collection of core samples, seawater samples, and pore water samples to study the benthic habitat around Vieques. The area mapped consists of hard bottom, coral reef habitats, and seamounts.**

### **Methods**

**Data collected aboard the NOAA Ship *Nancy Foster* on a cruise sailed from April 28 to May 6, 2007 led by Dr. Chris Taylor (NOAA)**

**• Multibeam data acquired using SIMRAD EM1002**

**• Data processed using Caris HIPS & SIPS 6.1**

### **Results**

**Vieques, Puerto Rico is part of an exposed ridge of an underwater volcanic mountain chain that extends from Cuba to Grenada. Vieques is located at 18°N and 65°W. Water depths off the coast of Vieques range from 10m to 55m on the profiles taken off the Southern end of the Island, and water depths range from 17m to 28m for the Northern end profiles. The profiles generated provide the bathymetry of Coral Reefs, Hard bottom, and unexposed ridge.**

### **Background on Vieques, Puerto Rico**

**NOAA, NOS, NCCOS, CCMA, and Biogeography Branch collaborated to conduct an ecological characterization of the marine ecosystem around Vieques to support effective management and conservation of marine resources there. Data was collected from the reefs and hardbottom, to find the distribution of fish, corals, and benthic invertebrates on the hardbottom. This study is important because it is vital for the future of managing the marine resources there.**