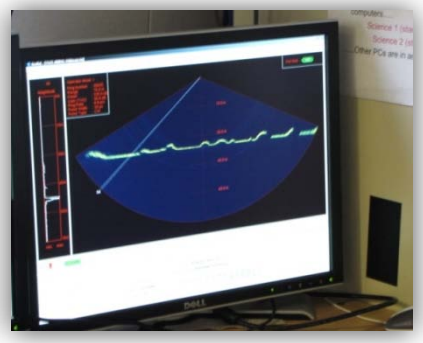
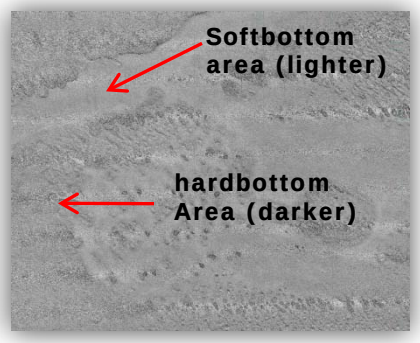
Seafloor Characterization of the U.S. Caribbean
2010 Field Season
March 18-April 6, 2010

Day 3: March 20, 2010
Today scientists focused on an area south west of St. Thomas.

Multibeam Echosounders: Using sound to learn more about the seafloor
The NOAA Ship Nancy Foster is equipped with a new multibeam echosounder that sends out 512 beams of sound– called a SONAR swath-- at one time. The same basic principles of acoustic technology that apply to the fish acoustic system (see the March 19, 2010 log) apply to the multibeam echosounder, but the frequency of the multibeam unit is calibrated to provide information unique to the physical characteristics of the seafloor.

Based on the intensity of the echo returned after the sound waves reach the seafloor, scientists can determine an area's unique features as well as regions that are suitable for further study. The images produced reveal the physical characteristics, or bathymetry, of the bottom.





The multibeam echosounder (bottom yellow) as it is prepared for instillation (left). The bumps and ridges of the seafloor appear as a horizontal line on the screen (center). A backscatter image created from the multibeam highlights the different substrates on the seafloor (right).

Backscatter images created from the data show the intensity of the sound return, which tells researchers the type of substrate present and its roughness. For example, if the area is primarily made of mud, the return will be much less intense because the mud will absorb some of the sound wave's energy and lessen the echo. This shows up as a light spot on the image. Whereas an area covered with something hard, like corals, will deflect the sound waves rather than absorbing them, making for a more intense and darker characteristic on the image. Features with different roughness but of similar hardness also show up differently (hard and flat versus hard and rough). The SONAR swath can also detect objects passing though it in the water column.

In shallow water, like the survey areas for this mission, the swath covers a smaller area because it has less distance to travel, but yields clearer information. In deeper water, the sound waves have further to travel and can fan out over a larger area, but the echo returns are less distinct.

Marine Life Finds
The day got off to an exciting start when just as the ROV team was about to deploy for the first time, what looked to be a nurse shark was spotted off the port side of the ship. Crew and scientists alike quickly ran to snap photos. Not long after the shark swam out of view, it was spotted again by the ROV (Image 1). This time, the full size of the nurse shark was fully visible.

During the nearly four hours of ROV operations, a wide variety of marine life was encountered. An hour or so into the operation, a large hammerhead shark cruised by (Image 2).

Great star corals (Image 3), boulder brain corals (Image 4) and patch reefs teeming with fish were observed. The ROV also snapped photos of algae (Image 5). There were many sightings of marine debris like fishing line entangled in the reefs (Image 6) and abandoned fishing traps.

DID YOU KNOW …

- About half of the coral reef ecosystem resources under US jurisdiction are considered by scientists to be in 'poor' or 'fair' condition.

- Reef habitats adjacent to populated areas tend to experience more intense threat levels, but even remote reefs far from human settlements are imperiled by illegal fishing, marine debris and climate-related impacts.

- To learn more about the state of coral reef ecosystems across the U.S. and territories visit, http://ccma.nos.noaa.gov/ecosystems/coralreef/coral2008/landing.html and http://coralreef.noaa.gov/

MEET THE SCIENTISTS …

Chris Taylor

Chris Taylor is a research ecologist with NOAA's Center for Coastal Fisheries and Habitat Research. His job on the ship is to operate the fish acoustic s equipment and analyze the data during the first leg of the mission.

Mike Stecher

Mike Stecher is the lead hydrographer for the mission. He is responsible for multibeam data collection and data quality assurance.