Seafloor Mapping

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Goals

The Mississippi Mineral Resources Institute (MMRI), in close collaboration with the National Institute for Undersea Science and Technology (NIUST), has developed an advanced program in high resolution seafloor mapping in both shallow and deep water. The goal of the program is to explore and describe features of the deep seafloor by fostering innovative techniques that remotely image bathymetry, surficial geology and benthic fauna. The program aims to better describe the seafloor using a multidisciplinary approach while cultivating and training a new generation of ocean scientists in the use of cutting edge technology.

Uses of Seafloor Maps

Integrated seafloor maps are widely used by government agencies, the petroleum industry, researchers, and others to better understand and manage ocean resources and operating conditions in the ocean. Maps are used to characterize seafloor sediments, identify habitats and shipwrecks, guide scientific research and monitoring, track distribution of invasive species, mark navigation routes and potential hazards, site seafloor construction projects, and design dredging and dredged material disposal plans, to name a few uses of these valuable techniques. Seafloor mapping is also inspiring a greater appreciation of the distribution and incredible diversity of marine life and habitats that the world's oceans support.

The ROVARD safely takes instruments to the sea floor, provides power and data management and, when the monitoring is complete, easily brings the instruments back to the surface for recovery. The Platform is relatively compact and inexpensive to assemble. Multiple units can be readily deployed at sites of greatest interest and configured with the most appropriate instruments for each site.

MMRI's Seafloor Mapping Capabilities

The MMRI seafloor mapping program has achieved significant results that include:

- Advanced data processing in sonar data; in particular developing in-house post-processing algorithms that push the limits of the resolution of bathymetric mapping. (Figure 1)

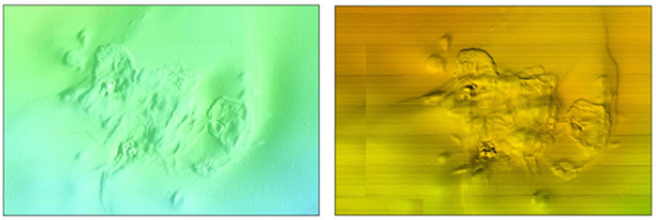

Figure 1. Comparison of the seafloor bathymetry map of MC118 from a commercial standard AUV survey (left) and the same image following the application of MMRI in-house post-processing (right).

- Seafloor sediments characterization using acoustic back-scatter data analysis. (Figure 2)

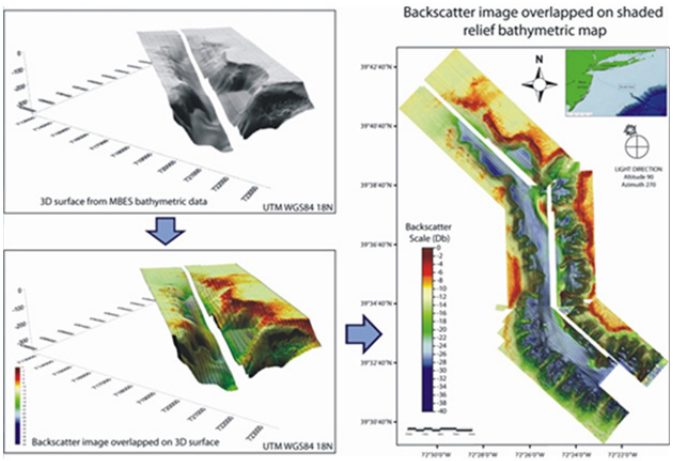

Figure 2. Hudson Canyon morphology and seabed reflectivity.

- Benthic habitat mapping and video mosaicking.
- Integrating data from AUVs and ROVs to produce accurately located high-resolution images of the seafloor in deep water areas that can be integrated with bathymetric data and other seafloor data. (Figure 3 – see reverse)

The MMRI seafloor mapping group is leading the effort to study cold seep processes in the Gulf of Mexico, (MC118 and EW873); is working jointly with the NOAA Northeast Fisheries Lab and the Department of Ocean Sciences of Rutgers University in defining and mapping benthic habitats of the Hudson Canyon; and has been heavily involved in mapping and monitoring effects of the Deep Water Horizon Oil Spill on the seafloor.

Collaborators

National Institute for Undersea Science and Technology (NIUST)

NOAA Northeast Fisheries Lab

The University of Rome, "La Sapienza"

Department of Ocean Sciences of Rutgers University

Pennsylvania State University

C&C Technologies, Lafayette, LA.

University of Southern Mississippi (USM)

Bureau of Ocean Energy Management (BOEM)

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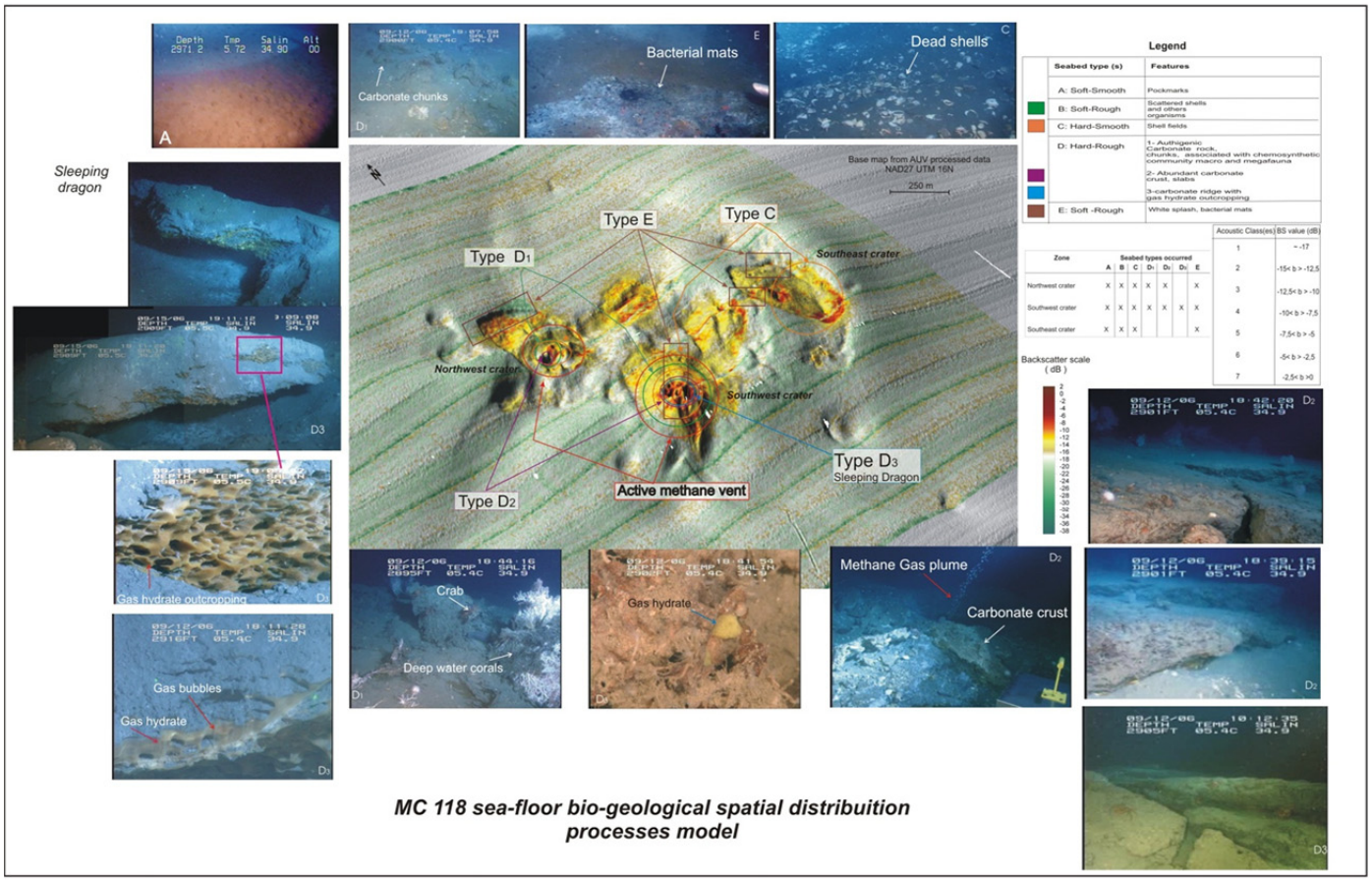

Figure 3. Composite illustration of the bio-geological processes active at Woolsey Mound (MC118). The model has been created integrating multibeam data, seafloor reflectivity, grab samples, video and camera surveys.