Using Laser Line Scan Imaging Technology to Assess Deepwater Seafloor Habitats in the Monterey Bay National Marine Sanctuary

Mary M. Yoklavich
NOAA NMFS SWFSC, Santa Cruz Laboratory

james.lindholm@noaa.gov

Churchill B. Grimes
NOAA NMFS SWFSC, Santa Cruz Laboratory

W. Waldo Wakefield
NOAA NMFS NWFSC

Abstract: We conducted a 9-day field test of laser line scan (LLS) imaging technology to characterize and explore seafloor habitats in and around the Big Creek Marine Ecological Reserve (BCER) within the Monterey Bay National Marine Sanctuary off the central California coast. Our goal was to evaluate the utility of LLS technology for assessing the distribution and abundance of fish, megafaunal invertebrates, and seafloor habitats, and to compare LLS images with those acquired from side-scan sonar and a remotely operated vehicle (ROV). We surveyed an area approximately 2.6 km long and 0.4 km wide, extending inside and directly outside BCER. Using LLS technology, we imaged isolated rock outcrops with patches of large sea anemones and dense groups of fishes, drift kelp, sea pens, salp chains, and individual, sedentary benthic fishes (including California halibut, Pacific electric ray, ratfish, and juvenile lingcod). As can be achieved with side-scan sonar, the LLS system also did an excellent job of imaging structural details of low-relief features such as sand waves and ripples. The LLS system offered the advantage of imaging some of the biogenic components of habitat and of describing their spatial relationships with detail that currently is not possible using acoustic techniques such as side-scan and multibeam sonar. However, the ROV far exceeded the capability of a LLS system to discern organisms at the highest possible taxonomic level, which ultimately will affect measures of diversity. The ability to visualize the seafloor in a broad context from a mosaic of LLS images could help us understand physical and anthropogenic (e.g., bottom trawling) processes that influence dynamic benthic habitats. Further development and use of LLS technology have the potential to improve our understanding, quantification, and protection of fish habitats.

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