



Description

Coastal, airborne lidar and hyperspectral imagery collected by the JALBTCX for the USACE National Coastal Mapping Program (NCMP) are used to develop a standard suite of mapping products on a recurring basis. Airborne surveys collect high resolution bathymetric and topographic data and hyperspectral and aerial imagery along a 1-mile swath of the coast, including offshore and onshore portions of the coastal zone. For this study, data products for the offshore portion of the coastal zone, including bathymetric digital elevation models, aerial photo mosaics, hyperspectral image mosaics, and laser reflectance images will be further analyzed to characterize the seafloor. Fusion of bathymetry and hyperspectral imagery will be conducted to create enhanced seafloor data products in which major bottom (benthic) types can be identified through standard remote sensing classification procedures. The enhanced data are useful for a variety of regional sediment management objectives, such as distinguishing sand fields from hard bottoms to aid in the management of dredged material and locating potential sites for sediment sources and disposal areas. The USACE Honolulu District (POH) and Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX) propose to fuse light detection and ranging (lidar) bathymetry and hyperspectral imagery to develop enhanced seafloor data products to assist POH with identifying hard bottoms (e.g. corals) and sand fields.

Issues

Both dredging and the subsequent placement of dredged material in aquatic environments are activities having direct and indirect effects on benthic habitats. In addition, land-based pollution from upland development practices may impact benthic habitats. Therefore, benthic mapping products provide critical information for managers and planners to detect, monitor, and manage sediment and environmental resources as well as mitigate environmental impacts. Traditional techniques to create benthic maps include a variety of localized survey efforts, such as video, acoustic, and side scan sonar. Whereas these survey techniques provide sufficient level of detail needed for localized activities, they are limited in areal coverage. Airborne remote sensing offers the opportunity to characterize the seafloor with sufficient areal coverage and detail required for assessment and monitoring to support resource management.

Successes Lessons Learned

JALBTCX has demonstrated the capability to fuse hyperspectral imagery with lidar to characterize the seafloor at specific sites. LiDAR and Hyperspectral Imagery has been collected for the West Maui region during the FY14 NCMP survey. Ground truthing data was collected in March 2014 by leveraging support from the National Oceanic and Atmospheric Administration (NOAA). NOAA's Office of National Marine Sanctuaries (Hawaiian Islands Humpback Whale National Marine Sanctuary) provided the boat based ground truthing which collected data at 30 sites in West Maui (Figure 1).

Expected Products

The major product will be a benthic habitat map product generated from the fusion and

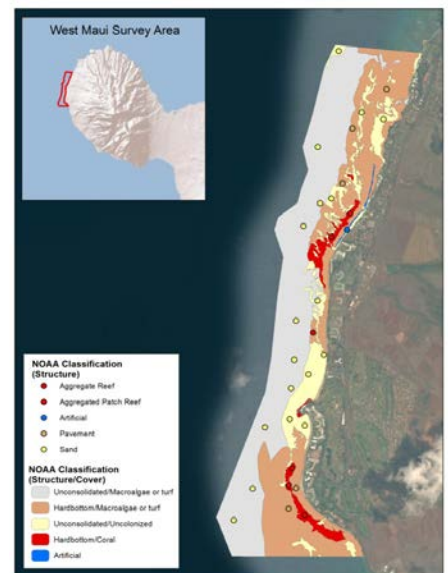


Figure 1. West Maui ground truthing sites.

classification of airborne survey data. A technical report describing the geo-processing steps, software, and methods will be written as part of this task and ultimately, provide critical technical transfer for the development of enhanced seafloor products used for RSM.

Potential Users

Navigation and Regional Sediment Management (RSM) would benefit from the advancement of seafloor data product development that identify the necessity for benthic resource mapping to support a variety of applications, ranging from dredge material placement to beach nourishment.

Projected Benefits

The enhanced seafloor data will facilitate a variety of RSM objectives, such as distinguishing sand fields from hard bottoms to aid in the management of dredged material and locating potential sites for sediment sources and disposal areas. Remote sensing classification will discriminate major benthic habitat types and enable avoidance of resources during future offshore sand recovery activities.

Leveraging Opportunities

The JALBTCX surveyed in Hawaii the end of FY13 and beginning of FY14 as part of the NCMP. This effort leverages NCMP airborne data collection in Maui. Products will include benthic habitat maps for Hawaii (West Maui). Products for the West Maui effort will focus on identifying potential offshore sand sources, mapping benthic habitat and ground truthing for the image analysis. This effort has already collaborated with NOAA to acquire ground truth for West Maui through an interagency agreement to exchange NOAA's one day of boat-based ground survey with a specific lidar survey at the island of Niihau during the FY13-FY14 Hawaii NCMP survey season.

Points of Contact

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Participating Partners

This effort is led by the ERDC Coastal and Hydraulics Laboratory and the Environmental Laboratory.