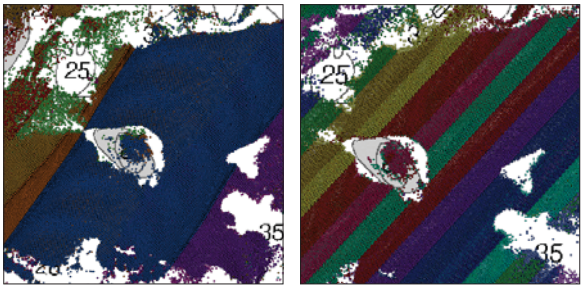
AIRBORNE LIGHT DETECTION AND RANGING (LIDAR)

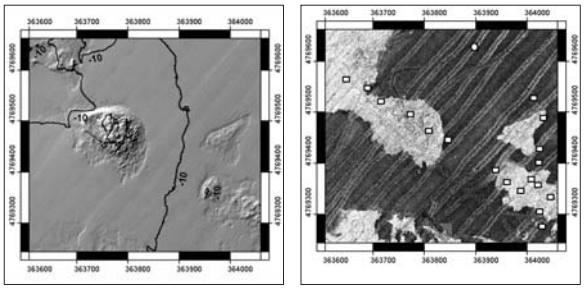
Shining a New Light on Ocean and Coastal Mapping

Airborne light detection and ranging (lidar) is a remote sensing technology that is proving increasingly beneficial in a variety of ocean and coastal mapping applications. Lidar systems use pulsed lasers in aircraft to measure ranges to the surface below. The range measurements are combined with position and orientation data to obtain accurate, 3D spatial coordinates (e.g., latitudes, longitudes, and heights) of points on Earth's surface, as well as elevated features, such as canopy and buildings. In the case of bathymetric lidar, green laser beams are employed for ranging through the water column in order to map bathymetry of shallow coastal waters.



Detection patterns of the laser measurements collected by SHOALS-3000 (LEFT) and LADS MK-II ALB systems (RIGHT). The laser measurements are color-coded for each survey line.

Current research at CCOM/JHC is facilitating use of lidar data not only for safe marine navigation (e.g., shallow-water bathymetry and shoreline for nautical charts) but also in support of a wide range of coastal science and coastal management applications. This multi-use of lidar data has the potential to streamline data acquisition, reduce data acquisition costs, and promote new science. The Center's work is also in accordance with NOAA's goals of the Integrated Ocean and Coastal Mapping (IOCM) initiative.



(LEFT) Color-coded shaded relief multibeam bathymetry map of the study area. (RIGHT) Acoustic backscatter map of the study area. White circles – bottom sample location at the time of the acoustic survey (2005); white rectangles – bottom samples and underwater video locations in 2008.

The current research focus in CCOM/JHC is to understand the capabilities of airborne lidar bathymetry (ALB) and extending its capabilities:

- The influence of the environment (water surface, water column and seafloor) on ALB performance.
- Fusion of ALB with passive optic remote sensing technologies (e.g., Frame imagery and hyperspectral data).
- Seafloor characterization and habitat mapping.
- Establishing an uncertainty model for the laser measurements.
- Inelastic scattering (e.g., fluorescence, Raman scattering and Brillion).
- Simulating ALB in laboratory conditions.
- Shoreline mapping.
- Shallow-water mapping.

Other laser and lidar systems that are being investigated are topographic lidar systems, terrestrial laser scanners, flash lidars and laser line scanners.

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