

Optical and Acoustic Habitat Characterization with the SeaBed AUV

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Abstract: The Seabed AUV is an Autonomous Underwater Vehicle (AUV) built to serve as a readily available and operationally simple tool for high resolution imaging. It is a hover-capable vehicle that performs optical sensing with a 12bit 1280x1024 CCD camera and acoustic high resolution mapping using an MST 300 kHz sidescan and a 675kHz pencil beam bathymetric sonar. The AUV has been designed for operations from small vessels with minimal support equipment. It has an operational depth of 2000 meters and at 1 m/s can run for up to 10 hours.

In this paper we report on the use of Seabed for habitat classification. Over the last two years we have utilized the vehicle in diverse areas off of Puerto Rico and Bermuda for coral reef habitat characterization and off of Cape Cod for scallop abundance measurements. Biological benthic imaging places unique constraints on the control, navigation and imaging requirements for AUVs. In particular, marine biologists require close-up, color imagery for species recognition. Thus we highlight our efforts controls, navigation and imaging in support of such tasks.

(i) Control - the ability to perform very tight surveys for photomosaicking areas of interest while simultaneously maintaining bottom following over rugged terrains.

(ii) Navigation - the use of single ship based long baseline navigation in combination with dead reckoned ADCP based inertial navigation which allows us to cover large areas without the need to deploy transponder nets.

and (iii) Imaging - obtaining high resolution color imagery within the constraints of power associated with working on an AUV.